

FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI
2014/2015 POST-UTM: SCREENING TEST

1. A ball is thrown vertically upwards from the ground with an initial velocity of 50m/s. what is the total time spent by the ball in the air
A. 2.5s B. 5.0s C. 10.0s D. 15.0s E. 20.0s
2. A body of mass 60g appears to have a mass of 39g when totally immersed in oil and appears to have mass of 36g when totally immersed water. Calculate the relative density of oil
A. $\frac{8}{7}$ B. $\frac{13}{12}$ C. $\frac{12}{13}$ D. $\frac{7}{8}$ E. $\frac{13}{20}$
3. Two resistors R_1 and R_2 are connected in parallel, R_2 being greater than R_1 the combined resistance is
A. Less than R_1 B. greater than R_2 C. The sum of R_1 D. The difference of R_1 and R_2 E. greater than R_1 but less than R_2
4. Two capacitance of $6\mu f$ are connected in series. What additional capacitance must be connected in series with this combination to give a total of $3\mu f$
A. $3\mu f$ B. $16\mu f$ C. $24\mu f$ D. $30\mu f$ E. $14\mu f$
5. The upper and lower fixed points of the thermometer are 90 and 10 respectively. Determine the temperature on the Kelvin scale when the reading on T is 30° .
A. 25K B. 298K C. 80K D. 303K E. 293K
6. If a copper has a heat capacity of $80J/^\circ C$ and specific heat capacity of $400 J/Kg$ calculate its mass.
A. 0.20kg B. 320kg C. 20.0kg D. 0.02kg E. 5kg
7. An object of height 12.0cm is placed 240cm from 3 pinhole camera. If the image distance from the pinhole is 10.0cm calculate the image height
A. 12.0cm B. 5.0cm C. 120.0cm D. 120.0m E. None of the above
8. Calculate the minimum value of the refractive index of a 45° prism which used to turn a beam of light by total internal reflection through 90° .
A. 1 B. 1.50 C. 1.41 D. 1.20 E. 4.11
9. A wave of frequency 75Hz form a stationary pattern in a medium where the distance between adjacent nodes is 2.0cm. what is the velocity of the wave
A. 3m/s B. 30m/s C. 300m/s D. 0.3m/s E. 150m/s
10. The half-life of a nuclide is 5 days what fraction of the initial sample will remain after 30 days.
A. $\frac{1}{8}$ B. $\frac{1}{16}$ C. $\frac{1}{32}$ D. $\frac{1}{36}$ E. $\frac{1}{64}$
11. How many faradays of electricity are required to deposit 216 grams of silver from a solution of silver nitrate
A. 1 B. 2 C. 3 D. 4 E. 5
12. Twenty two grams of a certain gas occupy 112 litres at s.t.p Assume the gas behaves ideally. How many moles of gas are there in the system?
A. 0.5 B. 0.6 C. 0.7 D. 0.8 E. 0.9
13. Which is most acidic oxide of the following?
A. CO B. MnO C. CaO D. N_2O E. Cr_2O_3
14. The carbon atoms in propyne are arranged at
A. 60° B. 90° C. 109° D. 120° E. 180°
15. Which of the following have saturated isomer?
A. methane and ethane B. methane and propane C. ethane and propane D. butane and methane E. butane and pentane
16. When coal is heated at $1000 - 1300^\circ C$ the product is
A. Coal gas B. Coal liquid C. Coal peat D. Coal flash E. Coal bed
17. Which one of the following is a brittle material?
A. rubber B. plastic C. thermoplastic D. gun E. $V = \frac{P}{T}$
18. Which of these mathematical relationships is for Charles law?
A. $V = k(1/p)$ B. $V = kT/p$ C. $V = KT$ D. $V =$ E. $V = \frac{P}{T}$
19. Kinetic theory of gases have ... postulates
A. 1 B. 2 C. 3 D. 4 E. 5
20. Which of the following have a covalent bond
A. silver B. copper C. sodium D. zinc E. diamond
21. Which of the following animals lack alimentary canal
A. earthworm B. jelly fish C. insect D. fish E. mollus
22. is not a major air pollution
A. carbon monoxide B. Ozone C. Oxygen D. Sulphur dioxide E. hydrogen
23. Which of the following is not a function of a tongue
A. function as organ of taste B. helps in softening C. it helps during chewing of food D. it helps in swallowing of food E. it is essential in speech
24. The most direct product of meiosis in a plant is
A. spore B. gamete C. zygote D. sporoph E. gametophyte
25. Which of the following vertebrate undergo external fertilizer
A. amphibian B. reptiles C. birds D. mammals E. both C and D.
26. Human somatic cells are made up of X and Y chromosome. However chromosome is found in
A. zygote B. Ovum C. sperm cell D. cell of female E. egg cells
27. Open circulatory is found in
A. rat B. bird C. toad D. insect E. fish
28. Which bone is called the bone of the digits?
A. humerus B. femur C. sacrum D. phalanges E. tibia
29. Which of the following is essential for a living cell?
A. flagella B. capsule C. cell wall D. cytoplasmic membrane E. capsule and cell wall
30. Bacterial flagella impart motility to the cell by
A. undulating movement B. rotatory movement C. gliding movement D. swaying movement E. looping movement
31. Simplify $(\frac{16}{81})^{-3/4}$
A. $\frac{8}{17}$ B. $\frac{27}{1}$ C. $\frac{27}{8}$ D. $\frac{2}{3}$ E. $\frac{9}{4}$
32. If $X = \frac{a^n + a^{-n}}{2}$ and $Y = \frac{a^n - a^{-n}}{2}$ find the value of $x^2 - y^2$
A. 5 B. 4 C. 1 D. 3 E. 2
33. What is the remainder when $4x^3 - 5x + 2$ is divided by $(x - 1)$
A. 1 B. 2 C. 3 D. -1 E. -2
34. If $a = 2 + \sqrt{3}$ find the value of $a - \frac{1}{a}$
A. $\sqrt{3}$ B. $\sqrt[3]{\sqrt{5}}$ C. $\sqrt[2]{5}$ D. $\sqrt[3]{3}$ E. $\sqrt{5}$
35. The 2nd and 5th terms of a geometric progression are 24 and 81 respectively find the common ratio
A. $\frac{2}{3}$ B. $\frac{3}{2}$ C. $\frac{5}{2}$ D. $\frac{7}{2}$ E. $\frac{9}{4}$
36. A family of 5 is to sit round dining table. In how many different ways possible can they sit?
A. 12 B. 16 C. 24 D. 8 E. 14
37. If $\sin \theta = \frac{1}{3}$ θ is acute find the value of $\tan \theta$
A. $\frac{\sqrt{3}}{2}$ B. $\frac{\sqrt{5}}{4}$ C. $\frac{\sqrt{7}}{5}$ D. $\frac{\sqrt{2}}{4}$ E. $\frac{\sqrt{12}}{13}$
38. An article bought for ₦8.75 was sold for ₦6.65. What is the percentage loss?
A. 12% B. 15% C. 21% D. 24% E. 16%
39. A student's annual interest on his savings account is ₦5,000. If the rate of interest is $9\frac{1}{2}\%$ find the amount he deposited to the nearest naira.
A. ₦53.14 B. ₦47.63 C. ₦527.63 D. ₦51.15 E. ₦41.65
40. The percentage score of 10 students in test are 12, 56, 42, 21, 25, 18, 10, 53, 42, 24, what is the median score
A. 25.4 B. 27.6 C. 26.3 D. 27.5 E. 245

In questions 41 and 42 choose the option nearest in meaning to the underline expression

41. The story has to be taken with a grain of salt. This means that
 A. you need some salt to listen to the story B. There is no salt in the story C. The story is questionable D. The story is true E. You have too much in the story.
42. It is usually hard to change the course of action when one crosses the Rubicon. The underlined expression, as used in this sentence, means to A. pass through place called Rubicon B. cross a river called Rubicon C. cross a bridge called Rubicon D. pass a special test E. be irrevocably committed.

In questions 43 and 44 choose the option opposite in meaning to the word underlined

43. Emeka is naturally taciturn. A. friendly B. Cheerful C. dumb D. lively E. kindness
44. He is loved for his altruism. A. benevolence B. sincerity C. selfishness D. selflessness E. kindness

In questions 45 and 46 choose the option nearest in meaning to the word(s) or phrase(s) underlined

45. The gallant soldiers met their waterloo unexpected A. victory B. trouble C. defeat D. happiest period E. enemy.
46. It is futile trying to make bricks without straw A. fertile B. important C. fragile D. vain E. bad

In questions 47 and 48 choose the expression or word which best competes each sentence

47. The student who went home without an exit has apologized.... His misconduct A. on B. at C. to D. for E. about
48. The man has atoned... his sins A. upon B. on C. for D. at E. against

Choose from the option the word that has the same vowel sound as the represented by the letter(s) underlined

49. Rust A. loud B. touch C. bought D. marsh E. roast

Select the word that has the same pattern of stress as the given word

50. ENORMOUS A. interest B. solution C. stupidly D. character E. harmony.

POST-UMTE SOLUTION ON 2014/2015

Physics

1. By using the law of motion where $V = ut$ at. convert it to

$$\text{gravity } \frac{v=U-gt}{v^2=U^2+2g^3}$$

$$U = 50\text{cm}$$

$$10t = 0$$

$$5 = 10\text{mls}$$

$$10t$$

$$T = ?$$

$$t = \frac{50}{10} = 5_s \quad B$$

2. $\frac{\text{mass in water}}{\text{mass in substance}} = \frac{60-36g}{60-37g} = 8/7 \quad A$

3. Two resistor R_1, R_2 where connect in perellel

$$\text{Therefore } R_1 = 1$$

$$R_2 = 2$$

$$R + V = IR \therefore R = \frac{V}{I}$$

$$1 +$$

$$\frac{1}{2} - \frac{3}{2} = 1.5 \therefore (\text{greater than } R_1, \text{ less then } R_2) \quad E$$

4. When $6\mu\text{f}$ and $8\mu\text{f}$ is connected in series to get a total combination $\approx 3\mu\text{f}$

\therefore By using the lens formular

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{u} \text{ to } \frac{1}{2}$$

$$\frac{1}{f} = \frac{1}{6} + \frac{1}{8} = \frac{1}{3} - \frac{1}{x}$$

$$\frac{1}{6} + \frac{1}{8} = \frac{1}{3} - \frac{1}{x}$$

$$\frac{2}{48} = \frac{2}{3x}$$

$$\therefore \frac{2}{48} \times \frac{3x}{2}$$

$$\frac{2}{48} - \frac{3x}{7} = 16\mu\text{f} \quad (B)$$

5. By converting celcius into kelvin $30^\circ\text{C} + 273 = 303\text{k} \quad (D)$

$$C = \frac{Q}{M \Delta T}$$

$$M = \text{mass}$$

$$\Delta T = 1^\circ\text{C}$$

$$Q = 80\text{J}$$

$$C = 4000$$

$$M = \frac{80}{400 \times 1} = \frac{80}{2000} = 0.20\text{kg} \quad (A)$$

7. $\frac{\text{object height}}{\text{image distance}}$

$$\text{Magnification} = \frac{\text{image height}}{\text{object height}} = \frac{\text{dst}}{\text{dst}}$$

$$M_{Hg} = \frac{2240}{120} = \frac{10}{10}$$

$$\text{Ans (2), (E) None}$$

8. Refractive index of a glass prism $M = 1.50 \quad (B)$

9. $\text{Speed} = \frac{z}{t}$

$$\text{Speed } 0.0133$$

$$\approx \frac{\text{wave length}}{\text{period}} = \frac{z}{0.0133}$$

$$\approx 150\text{m/s} \quad (E)$$

10. Halflife = 5 days

$$\text{every } 5 \text{ days } \frac{1}{2} \text{ decayed}$$

$$5 \text{ days}$$

$$\frac{1}{2}$$

$$10 \text{ days}$$

$$\frac{1}{4}$$

$$15 \text{ days}$$

$$\frac{1}{8}$$

$$20 \text{ days}$$

$$\frac{1}{16}$$

$$25 \text{ days}$$

$$\frac{1}{32}$$

$$30 \text{ days}$$

$$\frac{1}{64} \quad (E)$$

Chemistry

11. By using $M = 2It$

$$Z = \text{electrochemical equivalent}$$

$$\text{One for a clay} = \text{One mole of electron}$$

$$\therefore 216 \text{ of rams of silver from a solution of silver nitrate will be}$$

$$1 \quad (A)$$

12. Ideal gas law $Pv = nRT$

$$n = \frac{11.2}{22} = 0.50 \quad (A)$$

13. $\text{N}_2\text{O} \quad (D)$

14. $180^\circ \quad (E)$

15. Batane and pentane

$$\text{Batane has 2 isomer saturated} \approx 2 - \text{methyl propane and } 2,2 \text{ dimethyl propane} \quad (E)$$

16. Coal gas (A)

17. Glass (D)

18. Charles state that $\frac{V_1}{V_2} = \frac{T_1}{T_2}$ where $V = KT \quad (C)$

19. 3 Postulate (C)
20. Diamond (E)

Biology

21. Inserts (C)
22. Oxygen (C)
23. Helps in soften food (B)
24. (A) Spore
25. Amphibian (A)
26. Sperm cell (C)
27. Inserts (D)
28. Phalanges (D)
29. Cytoplasmic membrane (D)
30. Gliding movement (C)

$$31. \left(\frac{16}{8}\right)^{-3/4} = \sqrt[4]{\frac{81^3}{16}}$$

$$= \left(\frac{3}{2}\right)^3 = \frac{27}{8} \quad (C)$$

$$32. \frac{a^n + a^{-n}}{2} \text{ and } \frac{a^n - a^{-n}}{2}$$

Find the value of X^2 and Y^2
 $X = \left(\frac{a^n + a^{-n}}{2}\right)^2$ and $\left(\frac{a^n - a^{-n}}{2}\right)^2$

$$\left(\frac{a^n + a^{-n}}{2}\right)^2 \text{ and } \left(\frac{a^n - a^{-n}}{2}\right)^2$$

$$\left(\frac{a}{2}\right)^{-n} \text{ and } \frac{a^{-n}}{2}$$

$$\left(\frac{a^{1/n}}{2}\right)^2 \text{ and } \left(\frac{a^{1/n}}{2}\right)^2$$

$$\left(a^{1/2n}\right)^2 + \left(a^{1/2n}\right)^2$$

$$\sqrt{\frac{a^n}{2}} + \sqrt{a^n} = \frac{a^n}{2} + \frac{a^n}{2} = 1 \quad (C)$$

$$33. \frac{x^{-1} \sqrt{\frac{4x^2 - 1}{4x^3 - 5x + 2}}}{\frac{-x+2}{-x-1} = \frac{3}{2}} \quad (D)$$

$$34. A = 2 + \sqrt{3}$$

$$2 + \sqrt{3} - \frac{1}{2 + \sqrt{3}}$$

$$= \frac{2\sqrt{3}-1}{2+\sqrt{3}} = \frac{1+\sqrt{3}}{2+\sqrt{3}}$$

$$(2 + \sqrt{3})(2 + \sqrt{3}) - 1$$

$$\frac{2 + \sqrt{3}}{(4 + 2\sqrt{3} + 2\sqrt{3} + 3) - 1}$$

$$\frac{2 + \sqrt{3}}{2\sqrt{3}}$$

$$\frac{6 + 4\sqrt{3} - 1}{24\sqrt{3}} = \frac{6 + 4\sqrt{3}}{2 + \sqrt{3}}$$

$$\text{rationalize}$$

$$(2\sqrt{3}) \quad (D)$$

$$35. n^{\text{th}} \text{ term an } a, r^{n-1}$$

$$a_1 = ar$$

$$a_1 = ar_2$$

$$= \frac{ar^2}{2} = 8$$

$$ar^2 = 24r$$

$$ar = 2 \quad \text{--- 1}$$

$$ar^4 = 81 \quad \text{--- 2}$$

$$\frac{ar}{ar^4} r^3$$

$$r^3 = \frac{24 = 8}{81 = 27}$$

$$\sqrt[3]{\frac{8}{27}} = \frac{2}{3}$$

$$= \frac{2}{3} \quad (B)$$

$$36. \text{ For a circular formulation formula } = \frac{(n-1)^2}{2} = 12 \quad (A)$$

$$37. \text{ Hyp } 3, \text{ Opp } \sqrt{2}, \text{ Adj } x$$

$$3^2 = x^2 + 1^2$$

$$9^2 = x^2 + 1^2$$

$$x^2 + 8$$

$$x^2 + \sqrt{8}; x = 2\sqrt{2}$$

$$38. \frac{8.75 - 6.65}{8.75} \times \frac{100}{1} = 0.24 = 24\%$$

$$39. \text{ No answer}$$

$$40. \frac{25+18}{2} = 21.5$$

$$41. \text{ The story is questionable (C)}$$

$$42. \text{ Be irrevocably committed (E)}$$

$$43. \text{ Garrulous (E)}$$

$$44. \text{ Selfishness (C)}$$

$$45. \text{ Defeat (C)}$$

$$46. \text{ Vain (D)}$$

$$47. \text{ For (D)}$$

$$48. \text{ For (D)}$$

$$49. \text{ Touch (B)}$$

$$50. \text{ E - NOR - MOUS}$$

$$\text{So- lu - tion (D) answer}$$

$$\text{Cha - ra - cter}$$

$$\text{Ha - mo - n}$$

DAY 2 FUTO 2014/2015 POST-UTME SCREENING TEST

FOR CANDIDATE OF MATERIALS AND METALLURGICAL ENG., CIVIL ENG., POLYMER & TEXTILE, PETROLEUM ENG., CHEMICAL ENG. & AGRICULTURAL ENGINEERING DEPARTMENT: TIME: 1HR

CHEMISTRY

1. What volume of oxygen at s.t.p is require for the complete combustion of one mole of CH_4 ? A. 61.5litre B. 24.2litres C. 44.8litres D. 38.2litres E. 54.4litres
2. Calculate the pH 0.1 molar acetic acid? A. 1 B. 2 C. 3 D. 4 E. 5

3. Which of these compounds is a chloroform? A. $\text{CH}_3 \text{Cl}$ B. $\text{CH}_2 \text{Cl}$ C. CHCl_3 D. CCl_4 E. $\text{CH}_2 \text{Cl}_4$
4. Hydrogen bonding is encountered in two different forms A. Intermolecular B. Intermolecular and interdiatomic C. intermolecular and interatomic D. Intermolecular and intramolecular E. Intermolecular and intervalency

5. Which of these catalyst I used for hydrogenation of alkene A. H₂ B. Na C. Pd D. Hg E. Ag
6. The oxidizing agent commonly used for conversion of alcohol to aldehyde is A. Potassium dichromate (iv) B. Potassium dichromate (v) C. Potassium dichromate (vi) D. Potassium dichromate (vii) E. Potassium dichromate (viii)
7. Which one of the following is a hygroscopic compound? A. H₂SO₄ B. NaOH C. NaCl D. NaCl E. ECl
8. Which of these is constant R for ideal gas? A. 8.314 Jkmol⁻¹ B. 8.314¹ Jkmol⁻¹ C. 8.314 Jkmol D. 8.314 kL⁻¹ mol⁻¹ E. 8.314 Jk⁻¹ mol⁻¹
9. Which of these compound is covalent compound? A. ZnS B. NaCl C. CsCl D. SiO₂ E. TiO₂
10. Metallic elements usually have ----- structure A. Open packed B. Limited packet C. Slight-packet D. close-packet E. Ring packed

BIOLOGY

11. All except one are protists A. Spirochate B. Trypanosomus C. Paramecium D. Chlamydomonas E. Diatoms
12. ----- is not a green house gas A. Carbon dioxide B. Methane C. Chlorofluorocarbon D. Nitrous oxide E. Hydrogen sulphide
13. Which of these ecosystem has the lowest primary productivity per square meter A. Salt marsh B. An open ocean C. A coral reef D. A grassland E. A tropical rain forest
14. Homologous chromosome segregate toward opposite poles off a dividing cell during A. Mitosis B. Meiosis C. Meiosis II D. Fertilization E. Binary fission
15. Which organelle in paramecium is used for osmoregulation? A. Cilia B. Nucleus C. Contractile vacuole D. oral groove E. Pellicle
16. The shape of the chromosome is best studied during which phase in mitosis? A. Prophase B. Metaphase C. Anaphase D. Telophase E. Cytokinesis
17. The formation of urine involve all except one A. Ultra filtration B. Selective reabsorption C. Tubular secretion D. formation of metabolic by products E. Small molecule pass through the wall of capillaries into the capsular space.
18. Which of the following movement is seen in hydra? A. Swimming B. Gliding C. Looping D. Crawling E. Swaying
19. Nastic movement is in response to A. gravity B. Directional stimuli C. Non directional stimuli D. Para tonic stimuli E. Automatic stimuli
20. All the different type of ribonucleic acid except one A. transfer ribonucleic B. Messenger acid C. Ribosomal ribonucleic acid D. Chromosomal ribonucleic acid E. Option A and C.

MATHEMATICS

21. Simplify $\frac{2^{n+1}-2^{n-1}}{2^{n+1}-2^n}$ A. $\frac{2}{3}$ B. $\frac{7}{2}$ C. $\frac{9}{2}$ D. $\frac{3}{2}$ E. $\frac{2}{5}$
22. Find the value of x if $3(2^x) = 24$ A. 5 B. 2 C. 7 D. 8 E. 3
23. Find the value of K if the remainder when $3x^3 + Kx^2 - 11x + 12$ is divided by $x-2$ is 16 A. -1/2 B. 1/2 C. 2/3 D. 3/2 E. 2/5

24. If $a = \frac{1}{2-\sqrt{3}}$ and $b = \frac{1}{2+\sqrt{3}}$ find the value of $a^2 + b^2$ A. 17 B. 14 C. 9 D. 7 E. 12
25. The product of 3 numbers in geometric progression is 720 find the second term. A. 12 B. 7 C. 5 D. 9 E. 11
26. The sum of 3 numbers in arithmetic progression is 12 and the sum of their squares is 66 find the possible value of the common difference A. 2 or 1/2 B. 3 or 3/4 C. 5 or 3/4 D. 3 or 5/2 E. 2 or 7
27. If $\sin A = 4/5$ and $\cos B = 12/13$, find the value of $\sin(A+B)$ A. 63/65 B. 23/11 C. 61/67 D. 5/13 E. 12/13
28. Simplify $\frac{2\frac{3}{4} \times 1\frac{1}{2}}{3\frac{1}{2} \div 3\frac{1}{2}}$ A. 7/2 B. 3/5 C. 5/7 D. 4/9 E. 2/7
29. How much will N200,00 amount to at 12% simple interest over 4 years? A. 396,000 B. 296,000 C. 196,000 D. 396,000 E. 29,000
30. Find the arithmetic mean of 8, 3, 5, 12 and 10 A. 7.5 B. 9.3 C. 7.6 D. 11.5 E. 13.5

USE OF ENGLISH

In questions 31 and 32, choose the option nearest in meaning to the underlined expression

1. The salesman tried to pull the wool over my eyes. This implies that the salesman tried to? A. cover my eyes with wool his goods B. offer me cotton wool C. make me buy his wool D. dupe E. cover my eyes with wool
2. Amaka counted her chickens before they are hatched. This means that Amaka A. regarded each egg as a chicken B. hatched the eggs prematurely C. assumed that her expectations have already been realized D. protected her eggs from breaking E. insured the eggs
3. The military governor upheld the decision of the cabinet A. held up B. undercut C. maintained D. abolished E. reversed
4. Many untrustworthy students give evasive answers to questions which they fully understand. A. direct B. outspoken C. simple D. truthful E. clever

In questions 35 and 36 choose the nearest in meaning to the word(s) or phrase(s) underlined

5. He lost his voice momentarily. A. in a moment B. in a split second C. for a brief period of time D. without delay E. instantly
6. The corrupt official has to leave the public service willingly A. unprepared B. reluctantly C. willingly D. compulsorily E. by retirement

In questions 37 and 38 choose the expression or word which best completes each sentence

7. The headmaster was interviewed in connection _____ the expansion project A. to B. with C. for D. about E. at
8. What do you want me to do now? I'm _____ withdrawing and keeping quiet A. for B. with C. up D. off E. on
- Choose from the options the word that has the same vowel sound as the one represented by the letter(s) underline
9. Research A. disturb B. comfort C. affair D. humane E. repeat

Select the word that has the same pattern of stress as the given word.

10. Honour A. hostel B. hyena C. affair D. humane E. repeat

PHYSICS

11. An automobile travels along the straight road at a velocity of 150m/s a brake is applied and slows down to a velocity of 50m/s in 5sec. Determine the distance it travels at the end of 5secs. A. 50m B. 100m C. 25m D. 125m E. 225m
12. A spring is compressed through a distance of 0.05m to store 75J of energy. What is the spring constant? A. $15 \times 10^4 \text{N/m}$ B. $7.5 \times 10^4 \text{N/m}$ C. $5.0 \times 10^4 \text{N/m}$ D. $6.0 \times 10^4 \text{N/m}$ E. $8.0 \times 10^4 \text{N/m}$
13. Three 5ohms resistors connected in parallel have a potential difference of 60V applied across the combination. The current in each resistor is A. 4A B. 36A C. 12A D. 24A E. 10A
14. A transformer has 300 turns of wire in the primary coil and 30 turns in the secondary coil. If the input voltage is 100volts, the output voltage is A. 5volts B. 10volts C. 15volts D. 20volts E. 25volts
15. A copper wire 20m long is heated from 20°C to 70°C . if the linear expansivity of copper is 1.7×10^{-5} , calculate the increase in length. A. 0.017m B. 1.0m C. 17.00m D. 0.002m E. 1.72m
16. Which of the following relationship between superficial and cubical expansivities is correct?
A. $2\beta = 3\gamma$ B. $\beta = 2\gamma$ C. $3\beta = 2\gamma$
D. $-\gamma = 2\beta$ E. $\beta = 3\gamma$
17. If two plane mirrors intersect at an angle of 60° , determine the images formed when an object is placed between them. A. 6 B. 5 C. 4 D. infinite E. 10
18. An optical pin is placed 10cm from the pole of a convex mirror of focal length 15.0cm. What is the magnification of the image produce. A. 0.6 B. 6.0C. 6.0cmD. 60 E. 60cm
19. The fundamental frequency produced by a violin string is 270Hz. What is the frequency of the fourth harmonic produced by this string. A. 270Hz B. 540Hz C. 810Hz D. 1080Hz E. 70Hz
20. The half-life of a certain radioactive nuclide is 9hours. If the original mass of the nuclide is 28kg, determine the mass left after $1 \frac{1}{2}$ days. A. 1.75kg B. 17.5kg C. 175kg D. 1.75g E. 17.5g

**DAY 2 FUTO POST-UTME SCREENING 2014/2015
DETAILED SOLUTIONS**

1. $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
1 mole 2moles ; 1 mole of CH_4 requires 2 moles of O_2 ; to find the vol. of oxygen
 $\therefore 2 \text{ moles} = \frac{\text{volume occupied}}{22.4 \text{ dm}^3 \text{ mol}^{-1}} \Rightarrow \text{Vol} = 44.8 \text{ dm}^3$
(C)
2. - 3. C 4. D 5. C 6. C 7. A 8. E
9. D 10. D

BIOLOGY

11. A 12. E 13. A 14. B 15. C 16. B 17. E
18. C 19. C 20. D

MATHEMATICS

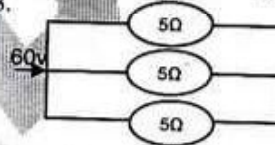
21. $\frac{2^{n+1} - 2^{n-1}}{2^{n+1} - 2^n} = \frac{2^n(2^1 - 2^{-1})}{2^n(2^1 - 1)} = 2 - \frac{1}{2} = \frac{3}{2}$ (D)
22. $3(3^x) = 24; 2^x = 24/3 = 8; 2^x = 2^3; x = 3$ (E)
23. $f(2) = 16; 3(2)3 + K(2)2 - 11(2) + 12 = 16; 24 + 4K - 22 + 12 = 16; 4k + 14; 4k = 2; k = \frac{1}{2}$ (B)
24. $\left(\frac{1}{2-\sqrt{3}}\right)\left(\frac{1}{2-\sqrt{3}}\right) + \left(\frac{1}{2+\sqrt{3}}\right)\left(\frac{1}{2+\sqrt{3}}\right) \Rightarrow \frac{1}{4-4\sqrt{3}+3} + \frac{1}{4+4\sqrt{3}+3} = \frac{1}{7-4\sqrt{3}} + \frac{1}{7+4\sqrt{3}}; \frac{1}{(7+4\sqrt{3})(7+4\sqrt{3})} = \frac{14}{1}$ (D)
25. $\frac{a}{r}, a, ar; \frac{a}{r} \times a \times ar = 729; a^3 = 729; a = 9$ (D)
26. Ans = +3; No right answer
27. $\sin(A+B); \sin A \cos B + \sin B \cos A; \sin A = \frac{4}{5}; \cos A = \frac{3}{5}; \sin B = \frac{5}{13}; \cos B = \frac{12}{13}$
 $\therefore \frac{4}{5} \times \frac{12}{13} + \frac{3}{5} \times \frac{5}{13} = \frac{63}{65}$ (A)
28. $\frac{14}{5} \times \frac{8}{25} = \frac{8}{9} \times \frac{9}{28} = \frac{2}{7}$ (E)
29. $S.I = \frac{PRT}{100}; S.I = \frac{200,000 \times 12 \times 4}{100} = 96,000 = 96,000 + 200,000 = 296,000$ (B)
30. $\text{Mean} = \frac{8+3+5+12+10}{5} = \frac{38}{5} = 7.6$ (C)

ENGLISH

31. D 32. C 33. C 34. E 35. C 36. D 37. B
38. D 39. A 40. B

PHYSICS

41. STV
42. $W = \frac{1}{2} Ke^2; K = \frac{2 \times w}{e^2} = \frac{2 \times 75}{0.05^2} = 6 \times 10^4 \text{N/m}$ (D)



Since v across the resistors is same, $I = \frac{V}{R} = \frac{60}{5} =$

- 12A (C)
44. $N_p = 300; N_s = 30; V_p = 100; V_s = ?; \frac{N_s}{N_p} = \frac{V_s}{V_p}; V_s = \frac{N_s V_p}{N_p}; V_s = \frac{30 \times 100}{300} = 10$ (B)
45. $l_2 - l_1 = \alpha l_1(\theta_2 - \theta_1) = 1.7 \times 10^{-5} \times 20 \times 50 = 0.017$ (C)
46. $\beta = 2\alpha; \alpha = \frac{\beta}{2}; \gamma = 3\alpha; \alpha = \frac{\gamma}{3}; \frac{\beta}{2} = \frac{\gamma}{3}; 3\beta = 2\gamma$ (C)
47. $\frac{360^\circ}{n} - 1; n = 60^\circ; \frac{360}{60} - 1 = 5$ (B)
48. For convex mirror -
 $\frac{1}{f} = \frac{1}{u} - \frac{1}{v}; U = 10 \text{cm}; F = 15 \text{cm}; -\frac{1}{15} = \frac{1}{10} - \frac{1}{v}; \frac{1}{v} = \frac{1}{10} + \frac{1}{15} = \frac{3}{30} + \frac{2}{30} = \frac{5}{30} = \frac{1}{6}; v = 6 \text{cm}; \text{magnitude} = \frac{v}{u} = \frac{6}{10} = 0.6$ (A)

49. Fundamental freq. fo = 270Hz; Freq of fourth harmonic = 4fo = 4 x 270 = 1080Hz (D)
50. Half life = 9hr; $1 \frac{1}{2}$ days = 24 + 12 = 36hr (D)

Kg	Hrs
28	0
14	9
7	18
3.5	27
1.75	36

FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI
2014/2015 POST-UTME SCREENING TEST

- Simplify $\sqrt{48} + \sqrt{75} - \sqrt{243}$ A.0 B.3 C.12 D.1 E.2
- Find the value(s) of x if $2x^2 + x = 4$. A.1, or 3 B. 1, or 2 C. 1, or -2 D. 1 or -1 E. 2 or 3
- If $\log(X^2 + 9) - 2 \log = 1$ find the value (s) of x. A.1 or 2 B.-1 or 3 C.1 or -2 D.1 or -1 E. 2 or 3
- When term of the arithmetic progression 2, 5, 8, ... is 44. A. 5 B. 20 C. 25 D. 16 E. 15
- If the three numbers x, $2x + 1$, $5x - 1$ are in arithmetic progression find the value of x. A. $\frac{1}{2}$ B. $\frac{2}{3}$ C. $\frac{5}{3}$ D. $\frac{2}{5}$ E. $\frac{3}{2}$
- If α and β are the roots of the equation $3x^2 + 5x - 1 = 0$ find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ A. $\frac{-21}{9}$ B. $\frac{-11}{7}$ C. $\frac{-13}{9}$ D. $\frac{-31}{3}$ E. $\frac{9}{5}$
- Without using tables find the value of $\cos 105^\circ$ A. $\frac{\sqrt{3}}{4}(1 - \sqrt{3})$ B. $\frac{\sqrt{2}}{4}(1 - \sqrt{5})$ C. $\frac{\sqrt{2}}{4}(1 - \sqrt{3})$ D. $\frac{\sqrt{3}}{4}$ E. $(1 - \sqrt{5})$
- simplify $\frac{\log 27 + \log 8 - \log 125}{\log 6 - \log 5}$ A. 5 B. 7 C. 3 D. 9 E. 25
- What is the area of the sector which subtends angle of 30° at the centre of circle of radius 7cm. A. $\frac{11}{6}\text{cm}^2$ B. $\frac{66}{5}\text{cm}^2$ C. $\frac{79}{6}\text{cm}^2$ D. $\frac{77}{6}\text{cm}^2$ E. $\frac{77}{6}\text{cm}^2$
- if the scores 5, 8, 6, and 2 occur in a distribution with frequencies 3, 2, 4 and 1 respectively find the arithmetic mean of the scores. A. 5.7 B. 15.2 C. 16.2 E. 12

In questions 11 and 12 choose the option nearest in meaning to the underlined expression

- The convict said he was tired of leading a dog's life. To lead a dog's life means A. carelessly B. In disgrace C. in solitude D. in misery E. in poverty
- He went through fire before qualified as a doctor. The underlined expression means that he A. had a fire accident B. made a lot of fire C. suffered a lot D. underwent some purification E. required a of fire

In questions 13 and 14 choose the option opposite in meaning to the word underlined

- The increase in transport fares deterred our club from planning an excursion this year. A. deferred B. irritated C. impelled D. restricted E. encouraged
- This card entitles you to attend the film show A. disqualifies B. discourages C. disenchant D. proclaims E. satisfies

In questions 15 and 16 choose the option nearest in meaning to the word(s) or phrase(s) underlined

- I am yet to write the penultimate paragraph of my essay A. last but one B. third to the last C. second D. conclusion E. introductory
- Despite increasingly punitive laws against hemp smoking, it is still rising at an alarming rate A. Devastating B. exemplary C. barbaric D. severe E. satisfactory

In questions 17 and 18 choose the expression or word which best completes each sentence

- I am looking ... seeing your family A. ahead at B. forward to C. forward on D. for to E. ahead to
- I was seriously disappointed when the ... between the two teams ended in a goalless draw. A. march B. marsh C. match D. mash E. martch

Choose from the options the word that has same vowel sound as the one represented by the letter(s) underlined

- Blood A. book B. block C. Stick D. money E. took

Select the word that has the same pattern of stress as the given word

- QUALITY A. guarantee B. accepted C. bachelor D. relation E. again
- A force of 150N is attaches to a mass of 200kg at an angle of 30° to drag it through a horizontal distance of 10m. how much work is done by the force A. 1200J B. 1300J C. 200J D. 1299J E.1290J
- A uniform meter stick is supported at the 25cm mark and maintained at equilibrium by a 10kg mass which is attached at 5cm mark. The mass of the meter rule is A 20kg B.10kg C.5kg D. 8kg E.6kg
- A $6\mu\text{f}$ capacitor is connected in series with a $5\mu\text{f}$ and $7\mu\text{f}$ which are connected in parallel. What is the equivalent capacitance of the network A. $18\mu\text{f}$ B. $4\mu\text{f}$ C. $2\mu\text{f}$ D. $12\mu\text{f}$ E. $13\mu\text{f}$
- When two parallel wires carry currents in opposite direction, the force either wire is A. away from the other wire B. zero, because the currents cancel each other C. twice as much as when the currents are in the same direction D. toward the wire E. None of the above
- Some quantity of hot water at a temperature T added to warm water at a temperature of 25°C in the ratio 1:4. Determine T if the final temperature of the mixture is 30°C A. 50°C B. 35°C C. 55°C D. 5°C E. 10°C
- When the saturated vapour pressure of a liquid becomes equal to the pressure of the air above it. A The liquid boils B. The liquid evaporates C. Dew begins to form D. The liquid condense E. None of the above
- Calculate the angle of incidence that will produce an angle of refraction of 36° for a light ray incident on glass if the velocities of light in air and glass one $3.0 \times 10^8\text{m/s}$ respectively A. 72° B. 36° C. 180° D. 61.8° E. 90°
- An object is placed 30.0cm from a converging lens of focal length 12.0cm, calculate the height of the object if the image formed is 4.0cm high A.20cm B.20m C.200cm D.6.0cm E.4.0cm
- What is the length of an organ pipe open at both ends which will produce the some fundamental note as a 75cm organ pipe closed at one end. A.75cm B.37.5cm C.150cm D.750cm E.7.5cm
- When a metal surface is irradiated by ultra-violet rays of wavelength 1200A, electrons with maximum note kinetic energy of 4ev are ejected. calculate the work function of the metal A. 10.36ev B. 4ev C.63ev D.63.ev E. 6.36ev
- Which of the following is isotopes of hydrogen. A. ^4_1H B. ^5_1H C. ^3_1H D. ^6_1H E. ^7_1H
- Can hydrogen be used to reduce the oxide of Na? A. No B. partial C. Yes D. insufficient E. Limited
- The term atomic orbital refers to ... A. a circular path B. elliptical path C. an energy level D. a volume of space E. a valence shell
- Which of these techniques are available for isolation and purification of compound A. recrystallization B. halogenations C. homogination D. hexagonation E. hydration
- Which is the following does not represent alkane A. C_6H_{14} B. $\text{C}_{13}\text{H}_{28}$ C. $\text{C}_{18}\text{H}_{36}$ D. $\text{C}_{19}\text{H}_{40}$ E. $\text{C}_{38}\text{H}_{78}$

36. The higher homologues of alkanes are solids at: A. 20°C B. -30°C C. -20°C D. 30°C E. -10°C
37. Calculate the oxidation number of Mn in MnO₂. A. 6 B. 4 C. 2 D. 8 E. 10
38. How many moles are there in 7.20g of H₂O. A. 0.20 B. 0.80 C. 0.60 D. 0.40 E. 0.10
39. Which of these is not a physical property of metal? A. electrical conductivity B. lustre C. ductile D. malleable E. resistant
40. How many straight-chain dichloroalkanes correspond to the formula C₄H₈Cl₂. A. 4 B. 5 C. 6 D. 7 E. 8
41. What part of prawn is used specifically for sensory? A. carapace B. mandible C. tracheae D. proboscis E. antennae
42. The excretory organ of an earthworm is called ... A. nephridia B. flame cell C. malpighian tubule D. chloragogenous cells E. kidney
43. Which of the following is not an essential nutrient for human? A. vitamin A B. lysine C. glucose D. calcium E. iron
44. A typical animal cell consists of all except A. chloroplast B. nucleus C. cell wall D. protoplasm E. cytoplasm
45. Malpighian tubules are excretory organs found in A. vertebrate B. insects C. flatworms D. annelids E. jelly fish
46. Which base replaces thymine (T) in base sequence of messenger RNA (mRNA)? A. Adenine (A) B. guanine (G) C. Cytosine (C) D. Uracil (U) E. both Guanine and cytosine
47. Which vertebrae maintains the right and proper gait of the body? A. caudal vertebrae B. lumbar vertebrae C. sacral vertebrae D. axis vertebrae E. cervical vertebrae
48. A fruit is most commonly A. a mature female ovary B. a thickened style C. an enlarged ovule D. a modified root E. a mature female gametophyte
49. Which of the following is not recycled in an ecosystem? A. water B. energy C. carbon D. nitrogen E. all
50. Movement of substance across cell membrane is controlled by the A. size of permeating particle B. permeability of membrane C. membrane proteins D. both A and C E. all.

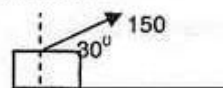
DAY 3 FUTO POST-UTME SCREENING 2014/2015 DETAILED SOLUTIONS

MATHEMATICS

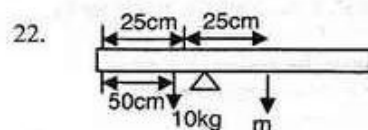
1. $\sqrt{48} + \sqrt{75} - \sqrt{243}$
 $\sqrt{16 \times 3} + \sqrt{25 \times 3} - \sqrt{81 \times 3}$
 $4\sqrt{3} + 5\sqrt{3} - 9\sqrt{3} = 0 \dots \dots \dots$ (A)
2. $2^{x^2+2} = 4$
 $2^{x^2+2} = 2^2$; equating powers we have $x^2 + x = 2$
 $x^2 - x + 2x - 2 = 0$; $x(x-1) + 2(x-1) = 0$
 $x = 1, -2 \dots \dots \dots$ (C)
3. $\log(x^2 + 9) - 2\log x = 1$
 $\log\left(\frac{x^2+9}{x^2}\right) = \log 10$
 $10x^2 = x^2 + 9$; $x = \pm 1 \dots \dots \dots$ (D)
4. $a = 2$; $d = 3$
 $T_n = a + (n-1)d$; $44 = 2 + (n-1)3$
 $\frac{42}{2} = n - 1$; $n = 15 \dots \dots \dots$ (E)
5. $T_2 - T_1 = T_3 - T_2$
 $2x + 1 - x = 5x - 1 - 2x - 1$
 $x - 1 = 3x - 2$; $x = \frac{1}{2} \dots \dots \dots$ (A)
6. $3x^2 + 5x - 1$
 $a = 3$; $b = 5$; $c = -1$
 $\alpha + \beta = \frac{-b}{a}$; $\alpha\beta = \frac{c}{a}$
 $\frac{\alpha^2 + \beta^2}{\alpha\beta} = \frac{b^2 - 2ac}{a^2} = \frac{25 + 6}{-3} = \frac{-31}{3} \dots \dots \dots$ (D)
7. $\cos 105^\circ = \cos(60+45)$
 $= \cos 60 \cos 45 - \sin 60 \sin 45$
 $\frac{1}{2} \times \frac{1}{\sqrt{2}} - \frac{\sqrt{3}}{2} \times \frac{1}{\sqrt{2}}$
 $= \frac{1 - \sqrt{3}}{2\sqrt{2}}$
 $= \frac{2\sqrt{2} - 2\sqrt{6}}{8} = \frac{\sqrt{2}}{4}(1 - \sqrt{3}) \dots \dots \dots$ (C)

9. $\frac{\theta}{360} \times \pi r^2 \Rightarrow$
 $\frac{30}{360} \times \frac{22}{7} \times 7 \times 7 = 77 \text{cm}^2 \dots \dots \dots$ (E)
10. $\frac{(5 \times 3) + (8 \times 2) + (6 \times 4) + (2 \times 1)}{10} = 5.7 \dots \dots \dots$ (A)
11. D 12. C 13. E 14. A 15. A 16. D 17. B
 18. C 19. D 20. D

PHYSICS



21. Work = F cos 30 x distance
 = 150 cos 30 x 10 = 1299N (D)



22. $10 \times 20 = m \times 25$; $M = 8 \text{kg} \dots \dots \dots$ (D)

23. $\frac{1}{6} + \frac{1}{(5+7)} = \frac{1}{6} + \frac{1}{12}$; $\frac{1}{c} = \frac{3}{12} + C = 4uf \dots \dots \dots$ (B)

24. A

25. Ratio = 1:4; Final T = 30°C
 $25 \times 4 = 100$; $x + 1 = x$
 $30 = \frac{(x+100)}{5}$; $x = 50^\circ \text{C} \dots \dots \dots$ (A)

26. A

27. Refractive index = $\frac{v_a}{v_g} = \frac{3}{2} = 1.5$

$1.5 = \frac{\sin i (\text{in air})}{\sin r (\text{in glass})} = \frac{\sin x}{\sin 36}$
 $i = 61.8^\circ \text{C} \dots \dots \dots$ (D)

$$28. \frac{\text{image height}}{\text{object height}} = \frac{\text{image distance}}{\text{object distance}}$$

$$U = 30; F = 12$$

$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f} = \frac{1}{v} + \frac{1}{30} = \frac{1}{12}$$

$$= \frac{1}{v} + \frac{5-2}{60} = \frac{3}{60} = \frac{1}{20}$$

$$V = 20; \frac{x}{4} = \frac{30}{20} = x = 6\text{cm}$$

D

29. Closed at one end = 75cm

Open at both end, L = ?

$$L_1 = \frac{\lambda}{4}; L_2 = \frac{\lambda}{2}$$

$$4L_1 = 2L_0 = \lambda$$

$$L_0 = 2L_c = 2 \times 75 = 150\text{cm}$$

CHEMISTRY

31. C 32. C 33. C 34. A 35. C 36. 37. B
38. D 39. E 40. A

BIOLOGY

41. E 42. A 43. B 44. A 45. B 46. D 47. E
48. A 49. B 50. B

FUTO 2013/2014 POST UTME SCREENING TYPE 0

DAY 1 ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

Chemistry

- 120 cm³ of hydrogen were sparked with 60cm³ of oxygen at 1 10°C. What was the volume of steam produced? The equation for the reaction is 2H₂(g) + O₂(g) → 2H₂O(g) A. 30cm B. 60cm C. 90cm D. 120cm E. 150cm.
- Catalytic hydrogenation of oils results in the production of? A. soaps B. detergents C. alkanes D. margarine E. butter.
- Which of the following compounds will undergo additional reactions? A Ethyne B. Butane C. Petane D. Ethanol E. tetrachloromethane
- The products of the electrolysis of dilute sodium chloride solution with platinum electrodes are A. hydrogen and oxygen B. oxygen and chlorine C. chlorine and water D. sodium amalgam and chlorine E. sodium hydroxide and water.
- When starch undergoes complete enzyme-catalysed hydrolysis, the resulting product is-. A. glucose B. maltose C. sucrose D. fructose E. cellulose
- Compounds that have the same molecular formula but different structures are said to be A. allotropic B. polymorphic C. polymeric D. isomeric E. isotopic.
- The maximum number of electrons that can be accommodated in the shell having the principal quantum number 3 is. A. 3 B.9 C. 10 D.18 E. 32.
- The following acids are non basic except A. methanoic acid B. dioxinotrae III acid C. ethanedioic D. oxochlorate (I) acid E. hydrobromic acid.
- What is the quantity of electricity produced when a current of 0.5A is passed for 5hours 45mins7 (IF = 96500C) A. 0.11F B. 0.12F C. 0.22F D. 1.1F E. 2.2F
- Which of the following pH values is likely to be that of a slightly alkaline system? A. 2 B. 5 C. 7 D. 8 E. 13.

Physics

- Which of the following is not a consequence of force field? A. weight B. surface tension C. gravitational pull D. magnetic force E. electric force.
- Which of the following is used to determine the relative density of the acid in a car battery? A. Hypsometer B. Hygrometer C. Manometer D. Hydrometer E. Nanometer.
- The motion of the prongs of sounding tuning fork is? A. random B. translational C. Rotational D. vibratory E. vibratory and rotational.
- A simple microscope forms an image twice the size of the object. If the focal length of the lens of the microscope is

29cm; how far is the object from the lens? A. 10m B.20m C.30m D.40m E.60m.

- An avocado fruit drops from the top of a tree 45m tall. How long does it take to reach the ground? A. 3.0s B. 4.5s C. 6.0s D. 8.6s E. 9.0s.
- Which of the following is a scalar quantity? A. momentum B. acceleration C. displacement D. distance E. Force.
- A ball bearing is gently released from rest and allowed to fall through a viscous fluid. Which of the following statements about the motion is correct? A. Its acceleration decreases before terminal velocity is attained B. When terminal velocity is attained the acceleration of the fluid becomes zero C. Its velocity increases before terminal velocity is attained D. There is no resultant force on the ball before it attains terminal velocity.
- When the vapour of a substance is in equilibrium with its own liquid, it is said to be A. gaseous B. unsaturated C. saturated D. diffused E. liquefied
- A man standing between two parallel mirrors in a barbers shop will see the following number of his own image A. Eight B. Two C. Four D. One E. Infinite
- If the wave length of a wave travelling with a velocity of 360ms⁻¹ is 60cm, the period of the wave is A. 6s B.3.6s C. 0.17s D. 0.61s E.3s
- A micrometre is defined as one millionth of a millimeter. A length of 12,000 micrometers may be represented as? A. 0.00012M B. 0.0000012M C. 0.000012M D. 0.0000012M E. 0.000 000012M.

Mathematics

- Factorise 3x² + 4x² - 1 3x + 6 completely, given that x- 1 is a factor. A. (x-1)(x-3)(x+2) B. (x-1)(x+3)(x-2) C. (x-1)x+3(3x-2) D. (x-1)x+3(3x-2) E. (x-1)(x 3)(x + 2).
- If the price of oranges was raised by 1/2k per orange, the number of oranges a customer can buy for N2.40 will be less by 16. What is the price of an orange? A. 21/2k B. 31/2k C. 51/2k D. 20k E. 25k
- Find all real numbers x which satisfies the inequality 1/3(x+1) - 1 > 1/5(x+4). A. x < 11 B. x < -1 C. x > 6 D. x > 11 E. x > -6.
- 71 pupils of average age 12 years leave a class of 25 pupils' average age 14 years. If 6 new pupils of average age 11 years join the class, what is the average age of the pupils now in the class? A 13 years B 12 years 71/2months C 13 years 5 months D. 13 years 10 months E. 13 years 71/2 months
- Given a regular hexagon, calculate each inter or angle of the hexagon. A. 60° B. 1200 C. 45° D. 135° E. 140°

27. Without using tables solve the equation $8x^2 = 2/5$. A. 4 B. 6 C. 8 D. 10 E. 12
28. A student measures a piece of rope and found that it was 1.26m long. If the actual length of the rope is 1.25m, what was the percentage error in the measurement?
A. 0.40% B. 0.01% C. 0.25% D. 0.89% E. 0.80%
29. Express the product of 0.21 and 0.34 in standard form.
A. 7.14×10^{-3} B. 7.14×10^{-1} C. 7.14×10^{-2} D. 7.14×10^{-4} E. 7.14×10^{-5}
30. If 5, 8, 6 and 2 occur with frequencies 3, 2, 4 and 1 respectively, find the product of the modal and median number. A. 36 B. 48 C. 30 D. 40 E. none of the options.

Use Of English

31. Without _____ words he accused him directly of treachery
A. amending B. modifying C. mixing D. mincing.
E. Minimizing
32. They tried to cash in _____ the peoples ignorance. A. under B. on C. against D. with E. at
33. Always remember to _____ the ghts before leaving the room
A. put on B. put off C. switch off D. blow out E. remove
34. I am disappointed _____ the ways, you conducted yourself at the party A. by B. for C. due D. in E. at
35. The proprietors should be blamed for such a deplorable condition in the nursery schools-- A. isn't it B. shouldn't they C. should they D. is it E. wouldn't they
36. Do you mind _____ another minute or two? A. to wait B. wait C. waiting D. being waited E. wait
37. It had been raining before the match started _____
A. isn't it B. hasn't it C. hadn't it D. wasn't it E. haven't it.
38. Mary goes to school _____ bus. A. in B. on C. with D. of E. by.
39. The plane overshot the _____ in a n accident. A. road B. hanger C. runway D. tarmac E. railway.

Chemistry

1. $2H_{(g)} + O_{2(g)} \rightarrow 2H_2O_{(g)}$
By comparing the number of mole, if $120cm^3$ of $H_{2(g)}$ was sparked. $120cm^3$ of steam will be produced. (A)

2. C
3. A
4. A
5. A (partial hydrolysis gives maltose. complete hydrolysis gives glucose)

7. D
8.
9. $\Phi = it$; $I = 0.5A$; $t = 5 \text{ hrs } 45 \text{ mins}$
 $= (5 \times 60 \times 60) + (45 \times 60)$
 $= 20,700 \text{ seconds}$
 $\Phi = It = 0.5 \times 20,700 = 10,350 \text{ C}$
Since $IF = 96500 \text{ C}$
 $= 10,350C = \frac{10,350}{96,500} = 0.11F \text{ A}$

10. D

Physics

11. B 12. D 13. D
14. Magnification. $m = \frac{V}{U} = 2 \Rightarrow V = 2u, f = 29cm$
 $U = \text{unknown}$
Lens formula: $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
 $\frac{1}{29} = \frac{1}{u} + \frac{1}{2u}$
 $\frac{1}{29} = \frac{1}{2u} + \frac{1}{2u}$
 $\frac{1}{29} = \frac{2}{2u}$
 $u = \frac{29}{2} \text{ u} = 43.5cm$

40. Journalists always collect and publish _____ A. Information B. informations C. an information D. much information E. every information.

Biology

41. A plant which grows on another plant without apparent harm to the host plant is called A. a parasite B. an epiphyte C. a saprophyte D. a predator E. a hermaphrodite.
42. Which of these types of skeleton is most appropriate to the cockroach?
A. Hyrostatic skeleton B. Exoskeleton C. Endoskeleton D. Cartilaginous skeleton E. Bonny skeleton.
43. Which of these is not true of the insect? The possession of
A. two pairs f antennae B. jointed appendages C. segmented body.
44. All living things A. photosynthesis B. respire C. move D. transpire E. feed
45. A Secchi disc is used in the determination of A. rainfall B. tides C. waves D. turbidity E. current velocity
46. Which of the following is not an excretory product? A. Urine B. Sweat C. Feaces D. Salts E. Carbon dioxide.
47. Which of the following organs produce bile? A. Gall bladder B. Pancreas C. Spleen D. Liver E. Stomach.
48. Which of the following food substances is digested in the stomach? A. carbohydrates B. Fats and oil C. Fats and Protein D. Proteins E. Carbohydrates and Fats
49. For pollination and fruit formation, the essential part (s) of the flower should be the A. corolla B. ovary C. pistil (gynoecium) D. ovules E. receptacle.
50. Which part of the human brain is concerned with reflexes controlling the rate of heart beat and breathing? A. medulla B. cerebrum C. cerebellum D. cal body E. Olfactory lobe

SOLUTIONS TO DAY 1 FUTO POST UTME 20012/2013 TYPE 0

No answer. However the closest is 40cm

15. $S = V_0 + \frac{1}{2}gt^2$ $45 = 0 \times t + \frac{1}{2} \times 10 \times t^2$

$45 \times 2 = 10t^2$; $\frac{99}{10} = t^2$

$\sqrt{99} = t$ $3 = t$

16. D 17. A 18. C

19. $E \left(\frac{360}{\theta} - 1 \right)$ is the formula to use

20. $T = \frac{\lambda}{v} = \frac{60/100}{360} = \frac{60}{100 \times 360} = 0.0016 \text{ sec}$ (No answer but a close resemblance is D)

21. C

Mathematics

22. Factorizing $3x^3 + 4x^2 - 13x + 6$ given $x - 1$ as a factor

$$\begin{array}{r} 3x^3 + 7x - 6 \\ X - 1 \quad 3x^3 + 4x^2 - 13x + 6 \\ \hline 3x^3 - 3x^2 \end{array}$$

$$7x^2 - 13x$$

$$7x^2 - 7x$$

$$-6x + 6$$

$$-6x + 6$$

$$0$$

Ans $(3x^2 + 7x - 6) = 3x^2 + 9x - 2x - 6$
 $3x(x + 3) - 2(x + 3)$
 $(3x - 2)(x + 3)$

The factors are

$(x - 1), (3x - 2), (x + 3)$

23.

$$24. \frac{1}{3(x+1)-1} > \frac{1}{5(x+4)}, \frac{1}{3x+2} > \frac{1}{5x+20}$$

Multiplying through by the LCM of $(3x+2)(5x+20)$; $5x+20 > 3x+2$

$$2x + 18 > 0; x > -9$$

25. Let sum of ages of 7 people be $\sum P_7 = P_7$ (left)

Sum of ages of 25 people be $\sum P_{25} = P_{25}$

Sum of ages of 6 people be $\sum P_6 = P_6$ (joined)

$$\frac{P_7}{7} = 12 \Rightarrow P_7 = 7 \times 12 = 84$$

$$\frac{P_{25}}{25} = 14 \Rightarrow P_{25} = 25 \times 14 = 350$$

$$\frac{P_6}{6} = 11 \Rightarrow P_6 = 6 \times 11 = 66$$

$$\text{New average} = \frac{350 - 84 + 66}{25 - 7 + 6} = \frac{332}{24}$$

$$13 \frac{5}{6} \text{ yrs} + \left(\frac{5}{6} \times 12 \right) \text{ months}$$

13 yrs, 10 months D.

26. Regular Hexagon, $\theta = 180(n-2)$

$$= 180(6-2) = 180 \times 4$$

$$= 720^\circ$$

Since, it's a regular polygon (hexagon), all the interior angles

are equal; each interior angle = $\frac{720}{6} = 120^\circ$ B

$$27. 8x^2 = \frac{2}{5}; x^2 = \frac{2}{5} \times \frac{1}{8}; \frac{1}{x^2} = \frac{1}{20}$$

$$x^2 = 20; x \sqrt{x \times 5}; x = \sqrt[3]{5} \quad \frac{A}{100}$$

$$28. \text{Percentage error} = \frac{\text{Error}}{\text{Actual Length}} \times \frac{100}{1}$$

$$= \frac{1.26 - 1.25}{1.25} \times \frac{100}{1}; \frac{0.01}{1.25} \times \frac{100}{1}$$

$$= 0.80\% \quad E$$

$$29. 0.21 \times 0.34 = 0.0714$$

DAY 2

FUTO 2013/2014 POST UTME SCREENING

TYPE T TIME: 1 HOUR

- Find the identity element of the set S under the binary operation * defined by $a*b = 2ab$ A. $-\frac{1}{2}$ B. 1 C. 0 D. $\frac{1}{2}$ E. -1
- Differentiate $y = 7x^4 \cos x - 5$ with respect to x
A. $28x^4 + \sin x$ B. $28x^4 - \cos x$ C. $28x^3 - \sin x$ D. $28x^3 - \sin x$ E. $28x^5 - \sin x$
- Find the value of n if $30x ({}^n P_5) = {}^n P_4$ A. 5 B. 2 C. 3 D. 6 E. 8
- What values of x satisfies the equation $3^{2x+3} - 3^{x+1} + 1 = 0$ A. (-2, -1) B. (2, 1) C. (-2, 1) D. $(\frac{1}{9}, \frac{1}{3})$ E. (0, 1)
- What is the quotient and remainder where $x+2$ divides $2x^2 - 3x + 2$? A. $(x+2, 16)$ B. $(x+2, 2x-7)$ C. $(2x-7, 16)$ D. $(2x+7, 16)$ E. $(2x+7, -16)$
- What is the point of intersection between the lines $y = 3x + 2$ and $2x + 3y = 17$? A. $(P(1, 5))$ B. $P(5, 1)$ C. $P(2, 3)$ D. $P(2, 17)$ E. $P(-1, -5)$
- Evaluate $(2^0 + 4^{10})^2$ A. 2 B. 4 C. $\frac{9}{4}$ D. 5 E. 1
- If $\cos \theta = \sin \theta$ then θ is A. 30° B. 45° C. 60° D. 90° E. 0°
- What is the probability of obtaining a total of 5 or 11 when a die is cast twice? A. $\frac{1}{6}$ B. $\frac{1}{9}$ C. $\frac{1}{18}$ D. $\frac{1}{12}$ E. None of the above.
- What is the first derivative of $\frac{3+2x-x^2}{6}$ A. $\frac{1}{3}(1-x)$ B. $\frac{1}{3}(1+x)$ C. $\frac{1}{3}(x-1)$ D. $\frac{1}{3}(1-x)$
- Four engineers On the system since March. A. worked B. are working C. had worked D. have been working E. has been working

To standard form 7.14×10^2 C

30. Mode = 6; Arranging in order of magnitude

2, 5, 5, 5, 6, 6, 6, 6, 8, 8; Media = $\frac{6+6}{2} = 6$

Product of mode and median = $6 \times 6 = 36$ A

Use Of English

31. D

32. B

33. B

34. E

35. B

36. C

37. C

38. E

39. C

40. A

Biology

41. B

42. B

43.

44. E

45. D

46. C

47. D

48. A

49. C

50. A

- I sent news to the press yesterday. A. parcel B. a flash C. a number D. a parcel E. an item
- The
- The workers suffered a lot, toiling..... the sun A. in B. under C. underneath D. inside E. on
- He is one of those who..... in my school A. teaches B. is teaching C. are teaching D. has taught E. teach
- Those men helped Ngozi and A. myself B. I C. me D. we E. he
- A university teacher is an A. academic B. academics C. academician D. academia E. none of the above
- It is high time we home A. go B. went C. are going D. gone E. have gone
- If one perseveres..... will surely succeed A. she B. one C. he D. they E. it
- By this time next year, I Twenty years old. A. would have been B. will be C. could have been D. will have been E. could be
- In an ecosystem, animals which feed directly on plants are called A. secondary consumers B. primary consumers C. producers D. predators E. none of the above
- Movement and positions of the head in man are detected by the A. cochea B. mallues C. utriculus D. semicircular canals E. outer ear
- In fish the sense organs which detect movements in the water are located within the A. gills B. operculum C. nostrils D. median fins E. lateral line
- The male toad differs from the female by having A. vocal sacs B. shorter hind limbs C. longer fore limbs D. bulging eyes E. nictating membrane

25. Which of these animals is NOT metamerically segmented? A. Tapeworm B. Earthworm C. Centipede D. Crayfish E. Shark
26. The glottis is the opening which leads to the A. oesophagus B. larynx C. nostrils D. pharynx E. mouth
27. An organism X lives entirely on the waste product in another organism Y. In this association X is a A. symbiont B. saprophyte C. commensal D. parasite E. epiphyte
28. The one-seed fruit in which the pericarp and seed coat have become fused together is known as A. achene B. samara C. legume D. caryopses E. drupe
29. The digestive enzyme that coagulates proteins in milk is A. ptyalin B. pepsin C. rennin D. trypsin E. amylase.
30. In Mucor or Rhizopus carbohydrate is absorbed in the form of A. starch B. sucrose C. glycogen D. arabinose E. glucose.
31. A gas occupies 30.0dm³ at S.T.P. What volume would it occupy at 91°C and 380mmHg? A. 20.0dm³ B. 40.0dm³ C. 60.0dm³ D. 80.0dm³ E. 100.0dm³
32. 28.8cm³ of nitrogen at 15°C is cooled to 0°C at constant pressure, the new volume of nitrogen is A. 17.4cm³ B. 14.7cm³ C. 27.3cm³ D. 31.7cm³ E. 34.7cm³
33. If the molar mass of X is 36g, the number of moles of X dissolved at 343K is A. 0.2 moles B. 0.7 moles C. 1.5 moles D. 2.0 moles E. 3.0 moles
34. If 24.83cm³ of 0.15M NaOH is titrated to its end point with 39.45cm³ of HCl, what is the molarity of the HCl? A. 0.094M B. 0.150M C. 0.940M D. 1.500M E. 0.091M
35. What volume of a 0.1M H₃PO₄ will be required to neutralize 45.0cm³ of a 0.2M NaOH? A. 40.0cm³ B. 10.0cm³ C. 20.0cm³ D. 27.0cm³ E. 30.0cm³
36. What is the concentration of H⁺ ions in moles per dm³ of a solution of pH 4.398? A. 4.0 X 10⁻⁵ B. 0.4 X 10⁻⁵ C. 4.0 X 10⁻³ D. 0.4 X 10⁻³ E. 0.4 X 10⁻²
37. What volume of 11.0M hydrochloric acid must be diluted to obtain 1dm³ of 0.05M acid? A. 0.05dm³ B. 0.10dm³ C. 0.55dm³ D. 11.0dm³ E. 0.15dm³
38. A given mass of gas occupies 2dm³ at 300K. At what temperature will its volume be doubled keeping the pressure constant? A. 400K B. 480K C. 550K D. 600K E. 500K
39. How many moles of oxygen molecules would be reduced from the decomposition of 2.5 moles of potassium trioxochlorate (V)? A. 2.50 B. 3.50 C. 3.75 D. 2.50 E. 2.75
40. The carbon atoms of ethane are A. sp² hybridized B. sp³ hybridized C. sp²d hybridized D. sp hybridized E. sd hybridized
41. A stone is thrown with a velocity of 50m/s upwards from a point 20m above the ground, when does the stone reach its maximum height? A. 0.51s B. 9.8s C. 5.1s D. 5.0s E. 5.2s
42. A simple pendulum with a period 0.2s has its length doubled. Its new period is A. 4.00s B. 2.83s C. 0.35s D. 1.00s E. 1.41s
43. A rope is being used to pull a mass of 10kg vertically upward. Determine the tension in the rope if starting from rest the mass acquires a velocity of 4ms⁻¹ in 8s. A. 5N B. 95N C. 50N D. 105N E. 40N
44. How long will it take a 60kg man to climb a height of 2m if he expended energy at the rate of 0.25KW? A. 52.8 B. 5.3s C. 34.5s D. 41.6s E. 52.2s
45. Hot water is added to three times its mass of water at 10°C and the resulting temperature is 20°C. What is the initial temperature of the hot water? A. 40°C B. 50°C C. 80°C D. 100°C E. 30°C
46. If the refractive index of a medium is 2, what is its critical angle? A. 45° B. 30° C. 60° D. 25° E. 15°
47. The energy stored in a capacitor of capacitance 5 microfarad is 40J. What is the voltage applied across its terminals? A. 4V B. 6V C. 200V D. 16V E. 4000V
48. The energy stored in an inductor of inductance 5mH when a current of 6A flows through it is A. 1.8 X 10⁻³J B. 9.0 X 10⁻²J C. 9.0 X 10⁻³J D. 1.4 X 10⁻²J E. None of the above
49. The wavelength of the first overtone of a note in a closed pipe of length 33cm is A. 17cm B. 22cm C. 44cm D. 33cm E. 11cm
50. The half-life of a radioactive element is 9 days. What fraction of atoms has decayed in 36 days? A. $\frac{1}{4}$ B. $\frac{1}{16}$ C. $\frac{1}{2}$ D. $\frac{15}{16}$ E. $\frac{3}{18}$

DAY 2 FUTO 2013/2014 POST UTME SCREENING SOLUTIONS

1) $a*b = 2ab$
Identity element
 $x*c = a$
 $2ac = a$
 $c = \frac{a}{2a} = \frac{1}{2}$ [D]

2) $28x^3 \cos x - 7x^2 \sin x$

3)

4) $(-2, -1)$ [A]

5)
$$\frac{x+2}{2x^2-3x+2} \cdot \frac{2x-7}{2x^2+4x}$$

$$= \frac{-7x+2}{-7x-14} = \frac{1}{2}$$
 [C]

6) Point of intersection = target

Where gradient is 0

Hence simultaneous equation of the two lines

$-3x + y = 2$

$2x + 3y = 17$

$2x + 3(3x + 2) = 17$

$2x + 9x + 6 = 17$

$11x = 17 - 6$

$11x = 11$

$x = 1$, put $x = 1$ in qu(i)

$-3(1) - y = 2$

$-3 - y = 2$

$y = 2 + 3$

$y = 5$

$x = 1, y = 5$ (1, 5) [A]

$$7) \quad \left(2^0 + 4^{-1/2}\right)^2$$

$$\left(1 + \frac{1}{\sqrt{4}}\right)^2$$

$$\left(1 + \frac{1}{2}\right)^2 \text{ (expansion)}$$

$$\left(1 + \frac{2}{2} + \frac{1}{4}\right)$$

$$1 + 1 + \frac{1}{4}$$

$$2 + \frac{1}{4}$$

$$= \frac{9}{4} \quad [C]$$

8) $\cos 45^\circ = \frac{1}{\sqrt{2}}, \sin 45^\circ = \frac{1}{\sqrt{2}}$
 $\theta = 45^\circ \quad [B]$

9) A die has 6 faces
 (or - addition)
 Hence the set = (2,3) (4,1), (5,6)
 (faces of die)
 $= \frac{2}{6} + \frac{1}{6} = \frac{1}{2}$
 none of above [E]

10) $\frac{3+2x-x^2}{6}$
 Using quotient rule of differentiation

$$\frac{dy}{dx} = \frac{1}{1}$$

$$\frac{dy}{dx} = \frac{U \frac{dv}{dx} - v \frac{du}{dx}}{v^2}$$

$$U = 3 + 2x - x^2, V = 6$$

$$\frac{dy}{dx} = 2 - 2x, \frac{dv}{dx} = 0$$

Hence, $\frac{-6(2-2x)}{6^2}$
 $\frac{12x-12}{36} = \frac{1}{3}(x-1) \quad [C]$

- 11) have been working [D]
 12) a flash [B]
 13) says it is [C]
 14) under [D]
 15) teach [E]
 16) myself [A]
 17) academician
 18) go [A]
 19) one [B]
 20) will be [B]

21) herbivores which feed directly on plants are known as primary consumers [B]

22) Semicircular canals sense movement of your head and help to control balance and posture [D]

23) Lateral line is used to detect movement and vibration in the surrounding water [E]

24) Vocal Sacs [A]

25) Sharks [E]

26) Glottis is the opening that leads to the larynx [B]

27) Saprophyte lives entirely on the waste products of another organ [B]

28) Caryopsis e.g. grasses and cereals [D]

29) Rennin [C]

NB: Rennin is also known as chymosin

30) starch [A]

31) 200dm³ [B]

32) 14.7cm³

33) 0.7 [D]

34) 1.500m [D]

35) 40.0cm³ [A]

36) 0.4 x 10⁻⁵ [A]

37) 11.0dm³ [D]

38) 2.50 [A]

39) 600k [D]

40) sp² hybridized [A]

41) 5.05 [D]

42) 4.005 [A]

43) 40N [E]

44) 5.3s [B]

45) 30°C [E]

46) 45° [A]

47) 200V [C]

48) None of the above [E]

49) 22cm [B]

50) ¼ [A]

DAY 3

FUTO 2013/2014 POST UTME SCREENING

TYPE U TIME: 1 HOUR

- A body starts from rest and moves with uniform acceleration of 6ms⁻². What distance does it cover in the third second? A. 60m B. 27m C. 18m D. 15m E. 2m
- An object is projected with a velocity of 80ms⁻¹ at an angle of 30° to the horizontal. The maximum height reached is A. 20m B. 80m C. 160m D. 320m E. 240m
- What is the frequency of vibration if the balance wheel of a wrist-watch makes 90 revolutions in 25s? A. 3.60Hz B. 2.27Hz C. 0.04Hz D. 0.01Hz E. 2.60Hz
- A beam of light is incident from air at an angle of 30°. Find the angle of refraction if the refractive index of water is 4/3 A. 0.15° B. 22.02° C. 41.81° D. 0.67° E. 0.38°
- A concave lens of focal length 20cm forms an image ½ the size of the object. The object distance is A. 100cm B. 100/9 C. 60/7 D. 10cm E. 60cm
- A wire of length 15m made of a material of resistivity 1.8 x 10⁻⁶Ω-m has a resistance of 0.27Ω. Area of the wire is A. 1.5 x 10⁻⁴m² B. 1.0 x 10⁻⁴m² C. 2.7 x 10⁻⁵m² D. 7.3 x 10⁻⁶m² E. 1.5 x 10⁻⁵m²
- The power dissipated in an A.C circuit with an r.m.s current of 5A, r.m.s. voltage of 10V and a phase angle of 60° is A. 25W B. 50W C. 120W D. 125W E. 2W
- A cell can supply currents of 0.4A and 0.2A through a 4.0Ω and 10.0Ω resistors respectively. The internal resistance of the cell is A. 2.0Ω B. 1.0Ω C. 2.5Ω D. 1.5Ω E. 0.5Ω
- If the decay constant of a radioactive substance is 0.231s⁻¹, the half-life is A. 1.50s B. 0.33s C. 0.12s D. 3.00s E. 2.31s
- What is the number of neutrons in the uranium isotope, ²³⁸₉₂U? A. 92 B. 146 C. 238 D. 330 E. 119
- If 52_n - 24_n = 25_n, the area is A. 4 B. 7 C. 11 D. 5 E. 2

12. The value of n that satisfies $\frac{8^{n+2}-6(2^{11+3})}{2^n \times 4^{n+2}}$ is A. 1
B. $\frac{1}{2}$ C. $\frac{1}{4}$ D. 2 E. 4
13. Find x if $(2.5)^{x-3} = (0.4)^{6+x}$ A. 1.5 B. 2.5 C. -1.5
D. -2.5 E. 2
14. Solve the following equation $\sqrt{x+6} = 1 + \sqrt{x+1}$
A. 3 B. 4 C. 5 D. 2 E. 1
15. The remainder when $(x+3)$ divides $2x^2 - 11x^2 + 8y - 1$ is
A. -871 B. 784 C. 187 D. 178 E. 0
16. If A is the set of even numbers between 1 and 10 inclusive, find the power set of A , $P(A)$. A. 5^7 B. 32
C. 16 D. 64 E. 128
17. If $3(2^x) = 24$ then x is A. 2 B. 4 C. 8 D. 3
E. 1
18. Simplify $\cos^2 x (\sec^2 x \tan^2 x)$ A. 2 B. 4 C. -1
D. 1 E. 5
19. What is the value of n if $5x^n P_3 = 24x^n C_4$ A. 4 B. 6
C. 8 D. 2 E. None of the above
20. The remainder when $x + 3x - 5x + 7x - x$ is divided by $x - 1$ is A. 5. B. 0 C. 1 D. 3 E. 17
21. Three quarters of the Physics classdramatically
A. improve B. improves C. are improving D. is improving
E. have improve
22. The university has large collection of sporting
A. equipment B. equipments C. costumes
D. aids E. facility
23. There are on the spelling and pronunciation at the end of the book. A. appendixes B. appendix C. appendices D. appendixes' E. appendices'
24. A range of optionsavailable to the political parties during the recent concluded elections. A. were made B. is made C. are made D. is make F. was made
25. Either Ada or youto go A. was B. are C. has D. is E. had
26. A very popular ruler is as theA. helms of affairs B. helm of affair C. realm of affair D. helm of affairs E. helms of affairs
27. I had hardly..... down to sleep when I heard the gunshot. A. lay B. lied C. lain D. laid E. lie
28. I have already it on the sitting-room wall
A. hanged B. hungecl C. hang D. hung E. hanging
29. The visitor was very uncomfortable because of his..... nose. A runny B. running C. watery D. flowing E. running
30. The members of the other team agree..... all the terms of the contract. A. by B. to C. on D. of E. with
31. The cilia in parainccium are used for .A. respirating B. locomotion C protection D. regulating food intake E. excretion
32. Which of these is not associated with the movement of the toad, reptile or birds? A. Hopping B. Bopping C. Flapping D. Gliding E. Pecking
33. The region of cell division in a root is A. root cap B. endodermis C. xylem D. piliferous layer E. meristem
34. Which of the following insects has an incomplete metamorphosis during its life cycle? A. Grasshopper B. Bee C. Mosquito D. House-fly E. Butterfly
35. The deficiency of vitamin D leads to A. scurvy B. pellagra C. rickets* D. beriberi E. polio
36. Exoskeleton is NOT found in the A. maggot B. mosquito larva C. earthworm D. caterpillar E. termite
37. How many nuclei are found in a pollen tube during fertilization? A. 2 B. 3. C. 5 D. 6 E. 7
38. A group of similar cells performing the same function is A. an organ B. a system C. a tissue D. an organelle E. an enzyme
39. One disease NOT caused directly by bacteria is. A. malaria B. tuberculosis C. pneumonia D. tetanus E. cholera
40. Which vertebra has a projection called odontoid process? A. Atlas B. Thoracic C. Lumbar D. Axis E. Caudal
41. How many grams of hydrogen gas will be liberated when 6g of magnesium ribbon dissolves in 500cm³ of 6M HCl? (Mg = 24, H = 1, Cl = 33.57)
42. The ratio of the number of molecules in 2g of hydrogen to that in 16g of oxygen is A. 2 B. 1:1 C. 1:2 D. 1:4 E. 1:8
43. The minimum volume of oxygen required for the complete combustion of a mixture of 10cm³ of CO and 15cm³ of H₂ is A. 25.0cm³ B. 12.5cm³ C. 10.0cm³ D. 5.0cm³ E. 10.5cm³
44. An element X, terms a volatile hydride XH₃ with a density of 17.2. The relative atomic mass of X is A. 34.0 B. 31.0 C. 20.0 D. 14.0 E. 30.0
45. The pH of a solution obtained by mixing 100cm³, 0.1M HCl solution with 100cm³ of a 0.2M solution of NaOH is A. 1.3 B. 7.0 C. 9.7 D. 1.7 E. 10.7
46. How many moles of limestone will he required produce 5.6g of CaO? A. 0.20 mol B. 0.10 mol C. 1.12 mol D. 0.56 mol E. 0.30 mol [Ca = 40, C 12, O = 16]
47. If 30cm³ of a gas at 50°C is warmed to 80°C at s.t.p pressure, the fractional increase in volume is A.. 0.009 B. 0.093 C. 0.910 D.
48. What is the volume of oxygen required to burn completely 45cm³ of methane at s.t.p? A. 135.0cm³ B. 180.0 cm³ C. 45.0 cm³ D 190.0 cm³ E. 90.0 cm³
49. What is the pH of 0.001 mol dm⁻³ solution of sodium hydroxide? A. 14 B. 13 C. 12 D. 11 E. 10
50. The number of isomers that can be obtained from O₄H₁₀ is A. 3 B. 4 C.1 D. 5 E.

DAY 3 FUTO 2013/2014 POST UTME SCREENING SOLUTIONS

- 1) $t = 3s, a = 6m/s, s = ?$
 $S = ut + \frac{1}{2} at^2$
 $S = \frac{6 \times 3^2}{2} = 27m$ [B]
- 2) 160m [C]
 3) $\frac{\text{no of revolutions}}{\text{time}} = \frac{90}{25} = 3.60\text{Hz}$ [A]
 4) 0.15 [A]

- 5) 60cm [E]
- 6) $\frac{0.27}{0.000018} = 1.5 \times 10^5 \text{m}^2$ [E]
- 7) Power = Voltage x Current x Cos θ
Where θ = phase angle
 $5 \times 10 \times \cos 60 = 25\text{W}$ [A]
- 8) 2.5 Ω [C]
- 9) 2.31s [E]
- 10) $238 - 92 = 146$ [B]
- 11) $52_n - 24_n = 25_n$
 $5_n + 2_n - 2_n - 4 = 2_n + 5$
 $5_n - 2_n + 2 - 4 = 2_n + 5$
 $3_n - 2_n = 2n + 5$
 $3_n - 2_n = 5 + 2$
 $n = 7$ [B]
- 12) 1 [A]
- 13) 2 [E]
- 14) Square both sides
 $(\sqrt{x+6})^2 = (1+\sqrt{x+1})^2$
 $x+6 = -1+2\sqrt{x+1}+x+1$
 $x+6-1-x-1 = 2\sqrt{x+1}$
 $5-1 = 2\sqrt{x+1}$
 $4 = 2\sqrt{x+1}$
Square both sides again
 $= 16 = 4(x+1)$
Divide both sides by 4
 $4 = x+1$
 $X = 3$ [A]
- 15)
$$\begin{array}{r} X+3 \overline{) 2x^3 - 17x + 59} \\ \underline{2x^3 - 11x^2 + 8x - 1} \\ -17x^2 + 8x - 1 \\ \underline{-17x^2 - 51x} \\ 59x - 1 \\ \underline{59x + 177} \\ -178 \end{array}$$
 [D]
- 16) The set of even number is 2, 4, 6, 8, 10 = 5 in number
Power set = 2^n
= $2^5 = 32$ [B]
- 17) $3(2^x) = 24$
Divide both sides by 3
 $2^x = 8$
 $2^x = 2^3$
 $X = 3$ [D]
- 18) 1 [D]
- 19) none of the above [E]
- 20) By substitution, $x-1 = 0$, $x = 1$ into the equation, we have
 $(1) + 3(1) - 5(1) + 7(1) - 1$
 $1 + 3 - 5 + 7 - 1$
 $-1 + 7 - 1$
 $6 - 1 = 5$ [A]
- 21) are improving [C]
- 22) facility [E]

- 23) appendix [B]
- 24) were made [A]
- 25) 15 [D]
- 26) helm of affairs [D]
- 27) lay [A]
- 28) hanged [A]
- 29) runny nose [A]
- 30) on [C]
- 31) Cilia is hair like material used
hanged [A]
- 28) runny nose [A]
- 30) on [C]
- 31) Cilia is hair like material used for movement / locomotion in paramecium [B]
- 32) Bopping [B]
- 33) Meristem [E]
- 34) housefly [D]
- 35) deficiency of vitamin D leads to ricket a disease of the bone [C]
- 36) mosquito larva has endoskeleton [B]
- 37) 3 [B]
- 38) tissue [E]
- 39) malaria [A]
- 40) atlas [A]
- 41) $6\text{m} \rightarrow \frac{6 \times 36.5\text{g}}{7}$ per 500 conc
 $24\text{g} \rightarrow 2 \times 36.5$
 $6 \times \frac{2}{24} = \frac{12}{24} = 0.5\text{g of H}_2$ [C]
- 42) 1 : 8 [C]
- 43) 25.0cm³ [A]
- 44) 34.0 [A]
- 45) 7.0 [B]
- 46) Calcium oxide is obtained by the thermal decomposition of calcium trioxo carbonate (iv) limestone.
 $\text{CaCO}_{3(s)} \rightleftharpoons \text{CaO}_{(s)} + \text{CO}_{2(g)}$
56g of CaO = 1 mole of CaO
5.6g of CaO = $\frac{5.6}{56} = 0.1$ CaO
From the reaction the molar ratio = 1 : 1
Hence 0.1 mole of CaCO₃ is required [B]
- 47) $V_1 = 30\text{cm}^3$, $V_2 = ?$
 $T_1 = 50^\circ\text{C}$, $T_2 = 80^\circ\text{C}$
 $\frac{p_1}{p_2} = \frac{V_1}{V_2}$
 $\frac{30}{50} = \frac{V_2}{80}$
 $\frac{30 \times 80}{50} = \frac{240}{5} = 48\text{cm}^3$
- 48) 1 volume of methane will react with 90cm³ of oxygen at stp
 $\text{CH}_{4(g)} + 2\text{O}_{2(g)} \rightarrow 2\text{H}_2\text{O}_{(g)} + \text{CO}_{2(g)}$
 $45\text{cm} \times 2 = 90\text{cm}^3$ [E]
- 49) 10 [E]
- 50) Two isomers [E]

CHEMISTRY

- 120cm³ of hydrogen were sparked with 60cm³ of oxygen at 110°C. What was the volume of steam produced? The equation for the reaction is $2H_{2(g)} + O_2 = 2H_2O_{(g)}$ A. 30cm B. 60cm C. 90cm D. 120cm E. 150cm.
- Catalytic hydrogenation of oils result in the production of A. soap B. detergents C. alkanes D. margarine E. butter
- Which of the following compounds will undergo additional reaction? A. Ethyne B. Butane C. Pentane D. Ethanol E. Tetrachloromethane
- The products of the electrolysis of dilute sodium chloride solution with platinum electrodes are A. hydrogen and oxygen B. oxygen and chlorine C. chlorine and water D. sodium amalgam and chlorine E. sodium hydroxide and water.
- When starch undergoes complete enzyme-catalyzed hydrolysis, the resulting product is A. glucose B. maltose C. sucrose D. fructose E. cellulose
- Compounds that have the same molecular formula but different structures are said to be A. allotropic B. polymorphic C. polymeric D. isomeric E. isotopic
- The maximum number of electrons that can be accommodated in the shell having the principal quantum number 3 is A. 3 B. 9 C. 10 D. 18 E. 32
- The following acids are non-basic except A. methanoic acid B. diaxonitrate III acid C. ethanedioic D. oxychlorate (I) acid E. hydrobromic acid.
- What is the quantity of electricity produced when a current of 0.5A is passed for 5 hours 45mins? (F = 96500C) A. 0.11F B. 0.12F C. 0.22F D. 1.1F E. 2.2F
- Which of the following pH values is likely to be that of a slightly alkaline system?
A. 2 B. 5 C. 7 D. 8 E. 13

PHYSICS

- Which of the following is not a consequence of force field? A. weight B. surface tension C. gravitational pull D. magnetic force E. electric force.
- Which of the following is used to determine the relative density of the acid in a car battery? A. hypsometer B. hygrometer C. manometer D. hydrometer E. nanometer.
- The motion of the prongs of sounding tuning fork is? A. random B. translational C. rotational D. vibratory E. vibratory and rotational
- A simple microscope forms an image twice the size of the object. If the focal length of the lens of the microscope is 29cm, how far is the object from the lens? A. 10m B. 20m C. 30m D. 40m E.
- An avocado fruit drops from the top of a tree 45m tall. How long does it take to reach the ground? A. 3.0s B. 4.5s C. 6.0s D. 8.6s E. 9.0s.

- Which of the following is scalar quantity? A. momentum B. acceleration C. displacement D. distance E. force
- A ball bearing is gently released from rest and allowed to fall through a viscous fluid. Which of the following statements about the motion is correct? A. its acceleration decreases before terminal velocity is obtained B. when terminal velocity is attained, the acceleration of the fluid becomes zero C. its velocity increases before terminal velocity is attained D. there is no resultant force on the ball before it attains terminal velocity.
- A man standing between two parallel mirrors in a barber's shop will see the following number of his own image A. eight B. two C. four D. one E. infinite
- If the wavelength of a wave traveling with a velocity of 360ms⁻¹ is 60cm, the period of the wave is A. 6s B. 3.6s C. 0.17s D. 0.61s E. 3s

MATHEMATICS

- A micrometer is defined as one millionth of a millimeter. A length of 12,000 micrometers may be represented as? A. 0.00012M B. 0.0000012M C. 0.000012M D. 0.00000012M E. 0.000000012M
- Factorize $3x^3 + 4x^2 - 13x + 6$ completely, given that $x - 1$ is a factor. A. $(x-1)(x-3)(x-2)$ B. $(x-1)(x+3)(x-2)$ C. $(x-1)(x+3)(3x-2)$ D. $(x-1)(x+3)(8x-2)$ E. $(x-1)(x-3)(x+2)$.
- If the price of oranges was raised by $1/2k$ per orange, the number of oranges a customer can buy for N2.40 will be less by 16. What is the price of an orange? A. $21/2k$ B. $31/2k$ C. $51/2k$ D. $20k$ E. $25k$
- Find all real numbers x which satisfies the inequality $1/3(x-1) - 1 > 1/5(x+4)$. A. $x < 11$ B. $x < -1$ C. $x > 6$ D. $x > 11$ E. $x > -6$.
- 7pupils of average age 12years leave a class of 25pupils average age 14years. If 6 new pupils of average age 11years join the class, what is the average age of the pupils now in the class? A. 13 years B. 12 years C. $7\frac{1}{2}$ months D. 13years 10 months E. 13years $7\frac{1}{2}$ months
- Given a regular hexagon, calculate each interior angle of the hexagon. A. 60° B. 120° C. 45° D. 135° E. 140°
- Without using tables, solve the equation $8x^{-2} = 2/5$. A. 4 B. 6 C. 8 D. 10 E. 12
- A student measures a piece of rope and found that it was 1.26m long. If the actual length of the rope is 1.25m, what was the percentage error in the measurement? A. 1.40% B. 0.01% C. 0.25% D. 6.9% E. 0.80%
- Express the product of 0.21 and 034 in standard form. A. 7.14×10^{-3} B. 7.14×10^{-1} C. 7.14×10^{-2} D. 7.14×10^{-4} E. 7.14×10^{-5}

30. If 5,8,6 and 2 occur with frequencies 3,2,4 and 1 respectively, find the product of the modal and medial number. A. 36 B. 48 C. 38 D. 40 E. none of the options.

ENGLISH LANGUAGE

31. With.....words he accused him directly of treachery. A. amending B. modifying C. mixing D. mincing E. minimizing.
 32. They tried to cash in---the people's ignorance. A. under B. on C. against D. with E. at
 33. Always remember to.....the lights before leaving the room. A. put on B. put off C. switch off D. blow out E. remove
 34. I am disappoint.....the ways you conducted yourself at the party. A. by B. for C. due D. in E. at
 35. The proprietors should be blamed for such a deplorable condition in the nursery schools.... A. isn't it B. shouldn't they C. should they D. is it E. wouldn't they.
 36. Do you mind....another minute or two? A. to wait B. wait C. waiting D. being waited E. waits
 37. It had been raining before the match started..... A. isn't it B. hasn't it C. hadn't it D. wasn't it E. haven't it.
 38. Mary goes to school.....bus A. in B. on C. with D. of E. by
 39. The plane overshot the..... in a minor accident. A. road B. haunger C. unway D. tarmac E. railway
 40. Journalists always collect and publish..... A. information B. informations C. an information D. much information E. every information.

BIOLOGY

41. A plant which grows on another plant without apparent harm to the host plant is called A. a parasite B. a epiphyte C. a saprophyte D. a predator E. a hermaphrodite
 42. Which of these types of skeleton is most appropriate to the cockroach? A. hydrostatic skeleton B. exoskeleton C. endoskeleton D. cartilaginous skeleton E. bony skeleton
 43. Which of these is not true of the insect? The possession of A. two pairs of antenna B. jointed appendages C. exoskeleton D. three pairs of leg E. segmented body
 44. All living things A. photosynthesize B. respire C. move D. transpire E. feed
 45. A secchi disc is used in the determination of A. rainfall B. tides C. waves D. turbidity E. current velocity
 46. Which of the following is not an excretory product? A. urine B. sweat C. faeces D. salt E. carbon dioxide
 47. Which of the following organs produce bile? A. gall bladder B. pancreas C. spleen D. liver E. stomach
 48. Which of the following food substances is digested in the stomach? A. carbohydrates B. fats and oil C. fats and protein D. proteins E. carbohydrates and fats.
 49. For pollination and fruit formation, the essential part(s) of the flower should be the A. corolla B. ovary C. pistil (gynpecium) D. ovules E. receptacle
 50. Which part of the human brain is concerned with reflexes controlling the rate of heart beat and breathing? A. medulla B. cerebrum C. cerebellum D. pineal body E. olfactory lobe

ANSWERS TO 2012/2013

CHEMISTRY

1. D 2. D 3. A 4. A 5. A
 6. D 7. C 8. E 9. A 10. D

PHYSICS

11. B 12. B 13. D
 14. $\frac{\text{Object height}}{\text{Image height}} = \frac{\text{Object distance}}{\text{Image distance}}$, $v = 2u$ but $f = 29$
 $\frac{1}{f} = \frac{1}{u} + \frac{1}{v} = \frac{1}{u} + \frac{1}{2u} \Rightarrow u = \frac{87}{2} = 43.5\text{cm}$
 15. $s = \frac{1}{2}gt^2 \Rightarrow 45 = \frac{1}{2} \times 9.8t^2 \Rightarrow t = 3.0\text{s} \dots\dots A$
 16. D 17. B 18. C 19. E
 20. $v = f\lambda$ but $\lambda = 60\text{cm}$ and $v = 360\text{m/s}$
 $F = 360/60 = 6$, but $f = 1/T = 1/6 = 0.17\text{s} \dots\dots C$

MATHEMATICS

21. A micrometer = 0.000001
 Millimeter = 0.001
 A. Micrometer is defined as
 $\frac{1}{1000000}$ of $\frac{1}{1000} = \frac{1}{1000000000}$
 \therefore A length of 12,000 micrometer =
 $\frac{1}{1000000000} \times 12000 = 0.000012\text{m} \dots\dots C$
 22. To factorize $3x^3 + 4x^2 - 13x + 6$ given that $x-1$ is a factor. Divide the given equation by $x-1$.

DAY 1

TYPE O

$$x - 1 \frac{3x^2 + 7x - 6}{3x^2 + 4x^2 - 13x + 6}$$

$$\frac{7x - 7x}{3x^2 + 3x^2}$$

$$\frac{6x + 6}{7x^2 - 13x + 6}$$

$$7x - 7x$$

$$6x + 6$$

$$\text{Then factorize } 3x^3 + 3x - 6$$

$$3x^2 + 9x - 26 - 6 = 0$$

$$3x(x+3) - 2(x+3)(x-1)(x+3)(3x-2)..D$$

23. Let x represent the price of an orange and y the number of oranges that can be bought $xy = 240 \Rightarrow 240/x \dots\dots(i)$

If the price of oranges is raised by $\frac{1}{2}k$ per orange, number that can be bought for ₦2.40 is reduced by 16

$$\text{Hence, } y - 16 = \frac{240}{x + \frac{1}{2}k} = \frac{480}{2x + 1}$$

$$-16 = \frac{480}{2x + 1} \dots(ii) \text{ subst. for } y \text{ in eqn (i)}$$

$$\frac{40}{x} - 16 = \frac{480}{2x + 1} \Rightarrow \frac{24 - 16x}{x} = \frac{480}{2x + 1}$$

$$(24 - 16x)(2x + 1) = 480x$$

$$480x + 240 - 32x^2 - 16 = 480x \Rightarrow 224x - 32x^2$$

$$x^2 = 7 \Rightarrow x = 2\frac{1}{2}k$$

$$24. \frac{1}{3}(x+1) - 1 = \frac{1}{5}(x+4) \Rightarrow \frac{x+1}{3} - 1 = \frac{x+4}{5} \Rightarrow \frac{x+1-3}{3} = \frac{x+4}{5} \Rightarrow \frac{x-2}{3} = \frac{x+4}{5} \Rightarrow 5(x-2) = 3(x+4) \Rightarrow 5x-10 = 3x+12 \Rightarrow 2x = 22 \Rightarrow x = 11 \dots D$$

$$25. \text{Mean } \bar{x} = \frac{\sum f/x}{\sum f}$$

$$\text{Number of pupil leaving} = 7 \times \frac{12}{7}$$

$$\text{Number of pupil in class} = 25 \times \frac{14}{25}$$

$$\text{Number that joined} = 6 \times \frac{17}{6}$$

$$\text{Hence, } \frac{28 \times 14}{25} - \frac{12600 + 11550}{1050} = 13 \text{ yrs} \dots A$$

26. D

$$27. 8x^{-2} = \frac{2}{5} \Rightarrow 8/x^2 = 2/5$$

$$10 = 2x^2 \Rightarrow x^2 = 20$$

28. Actual measurement = 1.25m

Measured length = 126m

Error deviation = 1.26 - 125 = 0.01

% error = $\frac{0.01}{125} \times 100 = 0.8\% \dots E$

29. C 30. E

ENGLISH LANGUAGE

30. D 32. B 33. C 34. E 35. B

36. C 37. C 38. E 39. C 40. A

BIOLOGY

41. C 42. B 43. A 44. E 45. D

46. C 47. D 48. C 49. C 50. A

DAY 2

FUTO 2012/2013 POST UTME SCREENING TYPE

BIOLOGY

- Which of the following hormones is produced during fright or when agitated? A. insulin B. adrenalin C. thyroxine D. pituitrin
- Which of the following animals is cold blooded? A. cat B. lizard C. whale D. bird F. dog
- Spirogyra reproduces vegetatively by A. spore production B. fragmentation C. multiple fission D. binary fission E. division
- All of the following are digestive enzymes except A. bile B. lipase C. maltase D. pepsin E. ptyalin
- If a 26year old man marries a one eyed woman and they had four children, how many of them would be blind like the father? A. all B. 3 C. 2 D. 1 E. none
- A tapeworm has no alimentary canal because A. it is antotrophic B. it does not feed C. it has no enzymes D. its body absorbs digested food E. it is long
- Where is energy produced in the cell? A. nucleus B. nucleolus C. lysosome D. mitochondria
- Which of the following structure is not found in a female agama lizard? A. prenatal pads B. eardrums C. nuchal cord D. gular fold E. chloroplast
- Which of the following diseases is NOT caused by a virus A. rinderpest B. maize rust C. Newcastle disease D. sware fever E. nasal scale
- Plants which can survive in places where the water supply is limited are A. bryophates B. mesophytes C. xerophytes D. hyrophytes E. plaridophytes
- The interior angles of a pentagon are $(2x+5)^\circ$, $(x-2)^\circ$, x° , $(3x-20)^\circ$ and $(x+15)^\circ$. Find the value of x ? A. 80° B. 70° C. 65° D. 40° E. 30°
- A train travels 60km in M minutes. If its average speed is 400km per hour, find the value of M. A. 15 B. 12 C. 10 D. 9 E. 7
- A baker used 40% of a 50kg bag of flour if 1/8 of the amount used was bake, how many kilograms of flour was used for the cake? A. $2\frac{1}{2}$ B. $6\frac{1}{4}$ C. $15\frac{5}{5}$ D. $17\frac{1}{2}$ E. $19\frac{1}{3}$
- Find the average of the first four prime numbers greater than 10 A. 20 B. 19 C. 17 D. 15 E. 13
- Find the mean deviation of 6,7,8,9,10 A. 1.2 B. 1.5 C. 2 D. 8 E. 10
- The variance of a given distribution is 25. What is the standard deviation? A. 125 B. 75 C. 25 D. 5 E. 3
- Express 7/19 as a percentage, correct to 1 decimal place. A. 2.7% B. 3.7% C. 27.1% D. 36.8% E. 42.2%
- Given that $\log_4 x = xx$ and x A. 1/81 B. 1/64 C. 64 D. 81 E. 102
- A chord of circle radius 26cm is 10cm from the centre of the circle. Calculate the length of the chord. A. 1cm B. 27.86cm C. 32cm D. 40cm E. 48cm.

PHYSICS

- Which of the following types of waves can travel through a vacuum? A. sound waves B. light waves C. infra-red waves D. x-radiation E. radio waves
- The temperature at which the water vapour in the air saturates the air and begins to condense is known as A. boiling point B. melting point C. triple point D. dew point E. critical temperature
- The motion of the moving skin of a talking drum can rightly be described as A. translational B. random C. rotational D. oscillatory E. transitory

MATHEMATICS

- Simplify $\log 6 + \log 2 - \log 12$. A. -4 B. -1 C. 0 D. 8 E. 10

24. What is the relative permittivity of a capacitor if its capacitance with a medium as dielectric is 16farads, and its capacitance with vacuum as dielectric is 2farads? A. -1 B. $-\frac{1}{2}$ C. 2 D. 6 E. 8
25. The activity of a radioactive substance depends on A. temperature and purity B. temperature and age C. age, purity and temperature D. purity and age E. none of the above.
26. The principle of the transmissibility of pressure in fluids at rest in all directions is known as A. Archimedes's principle B. Floatation principle C. Newton's law D. Pascal's law E. Boyle's law
27. Change of state is accompanied by change of A. temperature B. volume C. heat content D. temperature and volume E. volume and heat content
28. The lack of power of accommodation which is mainly due to the hardening of the eye is called A. myopia B. hypermetropia C. presbyopia D. eye ring E. astigmatism
29. The hatch door of a submarine has an area of $0.5m^2$. The specific gravity of sea water is 1.03 (Assume that $g = 10ms^{-2}$, and neglect the atmospheric pressure). The force exerted by sea water on the hatch door at a depth of 200m is A. 1.03×10^5N B. 1.03×10^3N C. 1.06×10^5N D. 2.06×10^6N E. $1.03 \times 10^6Nm^{-2}$
30. The point beyond which a stretching string does not return to its original length is called A. breaking point B. elastic limit C. spring constant D. elastic point E. release point
36. Water can be obtained as the only product during A. combustion of hydrocarbons B. neutralization of an acid by base C. combustion of hydrogen D. electrolysis of brine E. boiling water
37. The oxidation of ammonia in excess air produces A. N_2O_2 B. N_2O C. NO_2 D. N_2O_4 E. NO
38. The gasification of coke is used for the manufacture of A. producer gas B. natural gas C. synthetic gas D. industrial gas E. artificial gas.
39. The solubility curve shows the variation of solute concentration with A. volume B. temperature C. vapour D. pressure E. weight
40. The density of a certain gas is $1.98gdm^{-3}$ at stp. What is the molecular mass of the gas? (molar volume of gas at stp = $22.4dm^3$) A. 44g B. 54g C. 26g D. 31g E. 39g

ENGLISH LANGUAGE

41. Ifeyinwa found that thieves had entered her house in her absence. She went to the police to report the..... A. breakout B. breakup C. break in D. breakthrough E. breakin
42. Gone are the days when he enjoy patronage A. would B. will C. could D. used to E. can
43. All..... well will Peter A. are not B. have not been C. were not D. is not E. aren't
44. The villagers looked.... their leader for good examples A. up to B. on to C. up at D. forward to E. into
45. Emeka failed because the examination was.....difficult for him A. so B. very C. highly D. too E. much
46. The dancers were all in.....before their departure. A. good spirits B. good spirit C. high spirit D. high spirits E. highspirit
47. The suspect defrauded his.....victim of large sums of money. A. unsuspected B. unsuspecting C. unexpected D. unexpecting E. suspecting
48. The judge acquitted the accused.....all the eight counts A. of B. in C. from D. upon F. on
49. My uncle is one of the.....of the society A. elitists B. elites C. elite D. elitist
50.all probability, the train will arrive today. A. in B. under C. for D. by E. upon

CHEMISTRY

31. Which of the following solids has a network structure? A. diamond B. iodine C. sulphur D. graphite E. butter
32. The following gases decolourize bromine water except A. C_2H_6 B. C_2H_4 C. C_2H_2 D. C_3H_4 E. C_4H_6
33. The alloy used for metal work and plumbing contains A. lead and tin B. iron and carbon C. copper and tin D. aluminum and copper E. aluminum and iron
34. The components of universal indicator solution can best be prepared by A. chromatography B. filtration C. evaporation D. fractional distillation E. transpiration
35. The oxidation numbers of phosphorus in PO_4^{3-} is A +1 B. +2 C. +3 D. +5 E. +7

ANSWERS TO 2012/2013 POST UTME

DAY 2

TYPE S

BIOLOGY

1. B 2. B 3. B 4. A 5. E
6. D 7. D 8. C 9. D 10. C

MATHEMATICS

11. $\log 6 + \log 2 - \log 12 = \log (6 \times 2 / 12) = \log 1 = 0$ C
12. C
13. Speed = distance / time $\Rightarrow 400 = 60.M$

$$M = 60/400 \text{ (hrs)}$$

$$\text{Hence } M = 015 \times 60 = 9 \text{ mins}$$

.....D 14.

A

$$15. \frac{40}{100} \times 50 = 20 \text{ kg of the flour was used}$$

$$\frac{1}{8} \times 20 = 2\frac{1}{2} \text{ kg was used for cake ...A}$$

$$16. \text{Mean} = \frac{6+2+8+9+10}{5} = 8$$

$$\text{Deviation} = \frac{(6-8)+(7-8)+(8-8)+(9-8)+(10-8)}{5}$$

$$= 6/5 = 1.2 \quad \dots A$$

17. Standard deviation = $\sqrt{\text{variance}}$

S.D. = $\sqrt{25} = 5 \quad \dots D$

18. D

19. $\log_4 x = 3$

$4^3 = x \Rightarrow x = 4^3 = 64 \quad \dots B$

20. B

PHYSICS

21. B 22. D 23. A 24. C 25. C

26. B 27. D 28. C 29. A 30. B

CHEMISTRY

31. D 32. A 33. A 34. A 35. D

36. C 37. E 38. A 39. A 40. A

ENGLISH LANGUAGE

41. C 42. D 43. D 44. A 45. D

46. B 47. B 48. E 49. B 50. B

DAY 3

FUTO 2012/2013 UTME SCREENING

TYPE: W

CHEMISTRY

- Pure solvents are obtained by A. distillation B. condensation C. extraction D. evaporation E. desolution
- Environmental pollution is worsened by the release from the automobile exhaust of A. water vapour B. steam C. smoke D. heavy metals E. steam and smoke
- Sieving is a technique used to separate mixtures containing solid particles A. small sizes B. large sizes C. different size D. the same size E. one size
- Nitrogen obtained from the liquefaction of air has a higher density than that obtained from nitrogen containing compounds because the former contains A. water vapour B. oxygen C. carbon (iv) oxide D. rare gases.
- Hydrogen is used with oxygen flames for melting metals because it A. involves a lot of heat when burnt B. combines explosively with oxygen C. is a very light gas D. is a rocket fuel E. it combines with air
- Polyvinyl chloride is used to produce A. bread B. pencils C. ink D. pipes E. pots
- The addition of water to calcium oxide leads to A. a physical change B. a chemical change C. the formation of mixture D. an endothermic change
- The mixed that will react with water only in the form of steam to liberate hydrogen gas is A. calcium B. aluminium C. iron D. zinc E. platinum
- 35cm^3 of hydrogen was sparked with 12cm^3 of oxygen at 110°C and 760mmHg to produce steam. What percentage of the total volume of gas left after the reaction is hydrogen? A. 11% B. 31% C. 35% D. 69% E. 80%.
- In the extraction of iron in the blast furnace, limestone is used to A. release CO_2 for the reaction B, reduce the iron ore C. increase the strength of the iron D. remove impurities.

PHYSICS

- The force with which an object is attracted to the earth is its A. acceleration B. mass C. gravity D. weight E. momentum
- A train has an initial velocity of 44m/s and an acceleration of -4m/s^2 . Its velocity after 10s is A. 2m/s B. 4m/s C. 8m/s D. 12m/s E. 16m/s
- A man of mass 50kg ascends a flight of stairs 5m high in 5 seconds. If acceleration due to gravity is

10ms^{-2} , the power expended is A. 500W B. 400W C. 250W D. 200W E. 100W

- Longitudinal waves do not exhibit A. refraction B. reflection C. diffraction D. polarization E. disaggregation
- The unit of quantity of electricity is called A. amperes B. the volt C. the coulomb D. the ammeter
- Which of the following is NOT a fundamental S.I. unit? A. metre B. ampere C. kelvin D. radian
- A simple pendulum with a period of 2.0s has its length doubled. Its new period is A. 1.00s B. 1.41s C. 0.35s D. 2.03s E. 2.83s
- Which of the following will convert a millimeter to a voltmeter? A. low series resistance B. low parallel resistance C. high series resistance D. high parallel resistance F. medium parallel resistance
- The distance between the fixed points of a centigrade thermometer is 20cm . What is the temperature when the mercury level is 4.5cm above the lower mark? A. 22.5°C B. 29.0°C C. 90.0°C D. 100.0°C F. 110.0°C
- The amount of heat needed to raise the temperature of 10kg of copper by 1K is its A. specific heat capacity B. heat capacity C. latent heat D. internal heat E. specific latent heat

BIOLOGY

- Hydra removes undigested food by A. passing it through the anus B. passing it through the mass C. means of a contractile vacuole D. egering it through the body surface E. passing it through the nose.
- A feature which adopts birds to flight is the possession of A. scaly legs B. light bones C. two walking legs D. a pointed beak comb
- Physiological adaptation to very dry condition in animals is called A. hibernation B. aestivation C. rejuvenation D. xeromorphism
- The organelle involved in tissue respiration is the A. endoplasmic reticulum B. vibosome C. golgi body D. mitochondrion
- The blood vessel which carries blood from the alimentary canal to the liver is A. hepatic artery B. hepatic vein C. hepatic portal vein D. mesenteric E. hepatic mesentemism
- Soil with the finest particle is called A. silt B. clay C. sand D. gravel E. latrite

27. Interveinal chlorosis is normally associated with the deficiency of A. magnesium B. potassium C. iron D. calcium E. iodine
28. In amoeba, osmoregulation is carried out by the A. pseudopodium B. food vacuole C. contractile vacuole D. nucleus
29. In animals, meiosis comes A. after fertilization B. after every mitotic division C. before fertilization D. before every mitotic division E. during fertilization
30. Which of the following is transmitted through mosquito bite A. filariasis B. typhus C. plague D. schistomaisis E. leprosy

ENGLISH LANGUAGE

31. I have theof meeting him A. privilege B. privelege C. previledge D. priviledge E. privileges
32. My price for the shoe is fifty naira. I cannot anything less than that. A. with B. settle for C. agree with D. to rate F. settle with
33. The eldest son took a foolish decision which made him.....his claim to the traditional title. A. neglect B. yield C. disclaim D. forfeit E. neglected
34. The president's speech.....at 7pm yesterday. A. is broadcast B. has been broadcast C. were broadcast D. was broadcast F. have been broadcast
35. The students were advised to look..... difficult words in the dictionary A. ill B. on C. out D. into E. up
36. The building.....because of weak structural foundation. A. tumbled B. succumbed C. somersaulted D. collapsed F. collapsed
37. Since the write did not indicate his name, the editor decided not to publish sucharticle A. a discourteous B. an anonymous C. a cowardly D. a libelous E. unfriendly

ANSWERS TO 2012/2013 POST-UTME DAY 3 TYPE W

CHEMISTRY

1. A 2. D 3. C 4. D 5. A
6. D 7. B 8. D 9. D 10. D

PHYSICS

11. C
12. $u = 44\text{m/s}$, $a = -4\text{m/s}^2$, $t = 10\text{s}$
 $v = u - at = 44 - 4 \times 10 = 4\text{m/s} \dots B$
13. $p = mgh/t = 50 \times 10 \times 5/5 = 500\text{W}$
14. D 15. C 16. D
17. $T = \frac{2\pi \sqrt{l}}{\sqrt{g}} \Rightarrow 2 = \frac{2 \times 3.142 \sqrt{l}}{\sqrt{9.8}}$
 $l = 0.98$ but this length is doubled hence $0.18 \times 2 = 1.96\text{m}$
 $T = \frac{2 \times 3.142 \sqrt{1.96}}{\sqrt{9.8}} = 2.8 \dots C$
18. C
19. $\frac{\theta}{100} = \frac{4.5}{20} \Rightarrow \theta = 22.5^\circ$
20. A

BIOLOGY

21. B 22. B 23. D 24. D 25. C
26. B 27. A 28. C 29. D 30. A

ENGLISH LANGUAGE

31. A 32. B 33. D 34. D 35. E
36. D 37. B 38. D 39. A 40. B

38. He was charged with complicity.....the abortive coup. A. in B. for C. about D. on F. with
39.of what he said made no sense A. much B. majority C. plenty D. many E. much
40.things she had in the room were thrown out A. so few B. the few C. all few D. very few E. a few

MATHEMATICS

41. If $\sin(x+30^\circ) = \cos 40^\circ$, find x. A. 10° B. 20° C. 59° D. 65° E. 80°
42. Find the 9th term of the arithmetic progression 18, 12, 6, 0, -6,..... A. -54 B. -30 C. 30 D. 42 E. 54
43. Solve the equation $\frac{1}{x} + \frac{1}{3x} = 3$ A. $2\frac{1}{2}$ B. $1\frac{2}{5}$ C. $1\frac{1}{3}$ D. $1\frac{4}{15}$ E. $2\frac{4}{5}$
44. What is the number whose algorithm to base 10 is 3.47712? A. 3.0 B. 0.3 C. 0.03 D. 0.003 E. 0.00003
45. The nth term of a sequence is given by $(-1)^{n-2} 2^{n-1}$, find the sum of the second and third terms. A. -2 B. 1 C. 2 D. 6 E. -1
46. Evaluate $\log_{10} 25 + \log_{10} 32 - \log_{10} 8$ A. 0.2 B. 2 C. 100 D. 409 E. 4
47. Which is the value of x satisfying the equation $4^{2x} 4^{3x} = 2$. A. -2 B. $-\frac{1}{2}$ C. $\frac{1}{2}$ D. 2 E. 3
48. Solve for x if $25^x + 3(5^x) = 4$ A. 1 or -4 B. 0 C. 1 D. -4 or 0 E. -1
49. Teams P and Q are involved in a game of football. What is the probability that the game ends in a draw A. B. $\frac{1}{3}$ C. $\frac{1}{2}$ D. $\frac{2}{3}$ E. $\frac{2}{5}$
50. Find the value of m if $13_m + 24_m = 41_m$ A. 8 B. 6 C. 5 D. 2 E. 6

MATHEMATICS

41. $\sin(x+30^\circ) = \cos 40^\circ$
 $\cos(x+30^\circ) = \cos(90 - 40^\circ)$
 $\therefore x+30 = 50 \Rightarrow x = 20^\circ \dots B$
42. $a + (n-1)d = \text{nth}$
 $18 + (8x - 6)d = 9^{\text{th}} \Rightarrow 9^{\text{th}} = -30$
43. $\frac{4}{23} + \frac{2}{5} = 3 \Rightarrow \frac{20+1}{5a} = 3$
 $21 = 15a \Rightarrow 21/15 = 1\frac{1}{5} \dots B$
44. Try out
45. Given $(-1)^{n-2} 2^{n-1}$
2nd term = $(-1)^0 2^1 = 2$
3rd term = $(-1)^1 2^2 = -4$
Sum = $2 + (-4) = -2 \dots A$
46. $\log\left(\frac{25 \times 32}{8}\right) = 100$
 $\log 100 = 2 \dots B$
47. $\frac{4^{2x}}{4^{3x}} = 2 \Rightarrow x = 2$
 $2^{-2} = 2^1$ (equate indices)
 $-2x = 1 \Rightarrow x = -\frac{1}{2} \dots B$
48. Given $25^x + 3(5^x) = 4$
Let $p = 5^x$
 $p^2 + 3p = 4 \Rightarrow p^2 + 3p - 4 = 0$ (solve quadratically)
But $p = 5^0 = 5^x$, hence $x = 0 \dots B$
49. Pr(P) will win = $\frac{1}{2}$

Pr(Q) will win = $\frac{1}{2}$
 Pr(P) will lose = $1 - \frac{1}{2} = \frac{1}{2}$
 Pr(Q) will lose = $1 - \frac{1}{2} = \frac{1}{2}$
 Prob that both will draw = $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ A

50. $13_m + 24_m = 41_m$
 $1 \times m + 3 \times m^0 + 2 \times m + 4 \times m^0 = 4m + 1 \times m^0$
 $m + 3 + 2m + 4 = 4m + 1$
 $3m + 7 = 4m + 1 \Rightarrow m = 6$ B

DAY 1 FUTO 2011/2012 POST UTME SCREENING

TYPE D

Answer all questions: Shade the answer sheet as appropriate with HB pencil only. Time allowed: 35 minutes

- Which of the following is a scalar quantity? A. momentum B. acceleration C. displacement D. distance E. force.
- What change in velocity would produce a body of mass 4kg if a constant force of 16N acts on it for 2s? A. 0.5ms^{-1} B. 2.0ms^{-1} C. 8.0ms^{-1} D. 32.0ms^{-1} E. $128.\text{ms}^{-1}$.
- A body accelerates uniformly from rest at the rate of 3ms^{-2} for 8 seconds. Calculate the distance covered by the body during the acceleration. A. 12m B. 24m C. 48m D. 72m E. 96m.
- Which of the following has the same unit as the moment of a force? A. Force B. power C. work D. momentum E. impulse.
- Which of the following will reduce the frequency of oscillation of a simple pendulum? A. increasing the mass of the bob B. decreasing the mass of the bob C. increasing the length of the string D. decreasing the length of the string E. increasing the amplitude of oscillation.
- A barometer can be used in determining the I. height of a mountain II. depth of a mine III. Dew point. Which of the following is/are correct? A. I, II, III B. II and III only C. I and III only D. I and II only E. III only.
- Which of the following colours of surfaces will radiate heat energy best? A. red B. white C. black D. yellow E. 20. blue.
- A gas which obeys Charles law exactly has a volume of 283cm^3 at 10°C . What is its volume at 30°C ? A. 142cm^3 B. 293cm^3 C. 303cm^3 D. 566cm^3 E. 849cm^3
- A real image of an object formed by a converging lens of focal length 15cm is 3 times the size of the object. What is the distance of the object from the lens? A. 30cm B. 25cm C. 20cm D. 15cm E. 10cm.
- How far from a cliff should a boy stand in order to hear the echo of his clap 0.9s later? (speed of sound in air = 330ms^{-1}) A. 36.67m B. 74.25m C. 748.50m D. 297.00m E. 366.67m
- Which of the following organelles is used for locomotion in paramecium? A. pseudopodium B. trichocyst C. cilium D. pellicle E. contractile vacuole.
- Which of the following is not true of the nucleus of a living cell? It contains A. chromosomes B. nucleolus C. nucleoplasm D. chromatids E. ribosome.
- The cell membranes consist of A. carbohydrates and lipids B. vitamins and proteins C. lipids and proteins D. water and sugar E. starch cellulose.
- Which of the following is not likely to be found in the cell of a ripe tomato fruit? A. plastids B. chlorophyll C. Cellulose cell wall D. mitochondrion E. mineral salts.
- Osmosis can be defined as diffusion of A. atoms and molecules through a membrane to an area of higher concentration B. water molecules for a dilute solution to a concentrated solution across a permeable membrane C. water molecules from area of high concentration to an area of low concentration D. water molecules from a dilute solution to a concentrated solution through a semi permeable membrane E. perspiration and excretion.
- The movement of diaphragm is characteristic of A. insect B. fish C. toad D. mammal E. plants.
- In cellular respiration, energy is stored in the form of A. adenosine di phosphate (ADP) B. Adenosine mono phosphate (AMP) C. Adenosine tri phosphate (ATP) D. heat energy E. electrical energy.
- The medium in which dissolved nutrients are transported in the body of vertebrates is called A. latex B. urine C. cell sap D. blood E. haemoglobin.
- Which of the following structures of the leaf contains air? A. guard cell B. palisade layer C. Intercellular space D. vascular bundle E. upper epidermis.
- Which of the following organs is specially adapted for gaseous exchange in aquatic organisms A. lungs B. trachea C. gills D. tracheoles E. alveoli
- A mixture contains 20cm^3 of hydrogen, 35cm^3 of oxygen, 15cm^3 of carbon dioxide and 10cm^3 of nitrogen at S.T.P which of the following gives the mole fraction of hydrogen in this mixture? A. 0.02 B. 0.16 C. 0.20 D. 0.25 E. 20.
- 0.07 g of a hydride of carbon occupies 56 at S.T.P when vapourised and contains 14.29% by mass of hydrogen. The formula of the hydrocarbon is A. CH_4 B. C_2H_2 C. C_2H_4 D. C_2H_6 E. C_3H_8 (C = 12, H = 1).
- The pressure on 100cm^2 of oxygen gas at 35°C is 750mm of Hg. What would be the volume of the gas if the pressure is increased to 1000mm of Hg without changing the temperature? A. 133.3cm^3 B. 85cm^3 C. 75cm^3 D. 65cm^3 E. 58cm^3
- Which of the following bonds exist in crystalline ammonium chloride (NH_4Cl)? A. ionic and covalent B. ionic and co-ordinate C. ionic covalent and co-ordinate D. covalent, co-ordinate and metallic E. ionic, covalent and metallic.

25. Which of the following is a neutralization reaction?
 Addition of A. nitric acid to hydrochloric acid B. nitric acid to sulphuric acid C. nitric acid to distilled water D. nitric acid to sodium hydroxide E. sodium chloride to distilled water.
26. In the preparation of carbon monoxide by heating ethanedioic acid with concentrated sulphuric acid, the conc. sulphuric acid acts as A. oxidizing agent B. reducing agent C. dehydrating agent D. reaction medium E. catalyst.
27. How many grammes of methyl acetylene (propyne) $\text{CH}_3\text{-C}\equiv\text{CH}$ will completely discharge the colour of 8g of bromine? (Br = 80, C = 12, H = 1). A. 0.5 B. 1.0 C. 2.0 D. 3.0 E. 4.0.
28. Brass is an alloy containing copper and A. zinc B. tin C. aluminum D. silver F. lead.
29. 60cm^3 of hydrogen are sparked with 20cm^3 of oxygen at 100°C and atmosphere. The total volume of the residual gases is A. 0cm^3 B. 10cm^3 C. 40cm^3 D. 30cm^3 E. 70cm^3
30. If the rate of diffusion of oxygen gas is taken as 1. What will be the rate of diffusion of methane whose relative molar mass is 16? A. 2.0 B. 1.8 C. 1.40 D. 1.0 E. 0.5.
31. Find n if $34n = 100112$. A. 5 B. 6 C. 7 D. 8
32. The radius of a circle is given as 5cm subject to an error of 0.1cm. What is the percentage error in the area of the circle? A. $1/25$ B. $1/4$ C. 4 D. 25
33. What is the value x satisfying the equation $4^{2x}/4^{3x} = 2$. A. -2 B. $-1/2$ C. $1/2$ D. 2
34. If $x = 3 - \sqrt{3}$, find $x^2 + 36/x^2$. A. 9 B. 18 C. 24 D. 27.
35. Solve the equation $y^2 = 11y + 24 = 0$. A. 83 B. 64.9 C. 6.4 D. 9, -8.
36. A man invested a sum of ₦280.00 partly at 5% and partly at 4%, if the total interest is ₦12.80 per annum, find the amount invested at 5%. A. ₦14.00 B. ₦120.00 C. ₦140.00 D. ₦160.00
37. Ice forms on a refrigerator ice box at rate of $(4 - 0.61)\text{g}$ per minute after 1 minute. If initially there were 2g of ice, find the mass of ice formed in 5 minutes. A. 19.5 B. 17.0 C. 14.5 D. 12.5.
38. Obtain a maximum value of the function $f(x) = x^3 - 12x + 11$. A. -5 B. -2 C. 2 D. 27.
39. Two perfect dice were thrown together. Determine the probability of obtaining a total score of 8. A. $1/12$ B. $5/36$ C. $1/6$ D. $7/36$.
40. The probability of an event P is $3/4$ while another event Q is $1/6$. If the probability of both P and Q is $1/12$. What is the probability of either P or Q? A. $1/96$ B. $1/8$ C. $5/6$ D. $11/12$.

In each of questions 41 to 50, choose the word(s) or phrase(s) which best fill(s) the gap(s).

41. The sea wave continue to the cliff on the West coast constantly. A. impair B. rub C. knock D. erode.
42. The college bus was travelling at a high when the accident occurred. A. velocity B. acceleration C. rapidity D. speed.
43. Note that only senior members of staff have the of using the toilet upstairs. A. permission B. occasion C. privilege D. habit
44. The chief priest will men into the cult today. A. indoctrinate B. usher C. convert D. initiate
45. Obi is noted for his attitude to his seniors at school. A. receptive B. respectful C. respective D. respectable.
46. The girl that my brother introduced to us last week is pretty ill-mannered. A. and B. but also C. as well as D. respectable
47. The police report was to that of the eye witness. A. contrary B. inconsistent C. different D. congruent
48. The African extended family system gives security to members? A. his B. her C. its D. their
- 49.
50. I know I read more but I am tired. A. may B. ought to C. would D. could.
51. Insects can become to insecticides. A. immunized B. resistant C. reticent D. immobilized.

FUTO 2011/2012 POST – UTME SCREENING SOLUTIONS DAY 1 TYPE B

CHEMISTRY

1. Total volume of mixture = $20\text{cm}^3 + 35\text{cm}^3 + 15\text{cm}^3 + 10\text{cm}^3 = 80\text{cm}^3$

Mole fraction of H = $\frac{20\text{cm}^3}{80\text{cm}^3} = 0.25$ D

2. Mass of Hydride = 0.07g; Mass of hydrogen = $14.29\% \times 0.07 = 0.01\text{g}$

Mass of carbon = $0.07\text{g} - 0.01\text{g} = 0.06\text{g}$

Mole ratio of H = $\frac{0.01}{1} = 0.01$; Mole ratio of C = $\frac{0.06}{12} = 0.005$

Ratio of mixture C = $\frac{0.005}{0.005} = 1$ H = $\frac{0.01}{0.005} = 2$;

Empirical formula = CH_2 ; RMM = $(12 + 1 \times 2) n = 56$;

$n = 56$; $14n = 56$; $n = 56/14 = 4$.

Molecular formula = $(\text{CH}_2)_4 = \text{C}_4\text{H}_8$.

3. $V_1 = 100\text{cm}^3$; $T_1 = 35^\circ\text{C}$; $P_1 = 750\text{mm}$ $P_2 = 100\text{mmHg}$

$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$ at constant temperature.

$P_1 V_1 = P_2 V_2 \therefore V_2 = \frac{P_1 V_1}{P_2} = \frac{750 \times 10}{100}$

75cm^3 C.

4. C – Ionic covalent and coordinate

5. D – nitric acid to sodium hydroxide note neutralization reaction is reaction of acid and base
 6. C – Dehydrating agent
 7. C – 2.0
 8. A – Zinc
 9. E – 1.0
 10. D – 10 molar of oxygen is 16 and rate of diffusion 1 since the molar mass of methane is 16 the rate is likely to be also.

USE OF ENGLISH

11. D – erode
 12. D – speed
 13. A – permission
 14. D – initiate
 15. B – respectful
 16. B – but also
 17. A – contrary
 18. C – its
 19. B – ought to
 20. B – resistant

PHYSICS

21. C – displacement
 22. M = 4kg; F = 16N; t = 25; Change in velocity = V – U

$$F - ma = m \frac{(v-u)}{t}; V - u = \frac{ft}{m} = \frac{16 \times 25}{4} = 8m/s$$

.....C

23. E U = 0; a = 3ms⁻² t = 8s; s = ut + 1/2 at²; 0 + 1/2 3ms⁻² x (8)²S²; = 96m

24. C – work

25. C – increasing the length of the string

26. E – iii only

27. C – black.

28. V₁ = 28cm³; T₁ = 10⁰C – 283K; T₂ = 30⁰C = 303K;

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}; V_2 = \frac{V_1 \times T_2}{T_1}$$

$$V_2 = \frac{283 \times 303}{283} = 303cm^3 \dots\dots C$$

29. F = 15cm; m = 3; M = $\frac{V}{u} = V \left(\frac{1}{u}\right); \frac{1}{F} = \frac{1}{u} + \frac{1}{v} \therefore$

$$\frac{1}{u} = \frac{1}{F} - \frac{1}{v}; \therefore M = V \left(\frac{1}{u}\right) = V \left(\frac{1}{F} - \frac{1}{v}\right) = \frac{V}{F} = 1$$

=> 3 = $\frac{V}{15} - 1 \frac{V}{15} = 4 \quad V = 60cm'$ where V = image distance and U = object distance

$$\therefore M = \frac{v}{u} = \frac{60cm}{20} = 3; U = \frac{60cm}{3} = 20cm \dots\dots C$$

30. V = $\frac{d}{t}$ d = v x t; v = 330ms⁻¹; t = 0.9s; d = 330 x 0.9 = 297m

The distance from the boy to the cliff is half of the total distance; $\therefore d = \frac{297}{2} = 148.5m \dots C$

FUTO 2011/2012 POST – UTME SCREENING

Answer all questions: Shade the appropriate with HB pencil only. Time allowed: 35minutes

- The organ which is sensitive to light in euglena is the A. gullet B. chloroplast C. eye spot D. contractile vacuole E. flagellum
- Which of the following is a similarity between a typical animal cell and a typical plant cell? Presence of A. cellulose B. chlorophyll C. centrally placed nucleus D. cell membrane E. large vacuole.

MATHEMATICS

31. 10011₂ to base ten; $1 \times 2^4 + 1 \times 2^1 + 1 \times 2^0 = 16 + 2 + 1 = 19$

34n to base ten = $3 \times n^1 + 4 \times n^0 = 3n + 4; \therefore 3n + 4 = 19; 3n = 15 \quad n = 5 \dots\dots A.$

32. Area = $\pi r^2 = \pi \times 5 \times 5 = 25\pi$; Area error = $\pi \times 0.1^2 = 0.01\pi$

$$\therefore \% \text{ error} = \frac{0.01\pi}{25\pi} \times 100 = \frac{0.01}{25} \times 100 = \frac{1}{25} \dots\dots A$$

33. $4^{2x} \div 4^{3x} = 2; 2^{4x} \div 2^{6x} = 2^1; 2^{4x-6x} = 2^1; \therefore 4x - 6x = 1; 2x = 1 \therefore x = -1/2 \dots\dots B$

34. $x = 3 - \sqrt{3}; x^2 + 36/x^2; x^2 = (3 - \sqrt{3})^2 = 9 - 6\sqrt{3} + 3 = 12 - 6\sqrt{3}$

$$\therefore \frac{12-6\sqrt{3}}{1} + \frac{36}{12-6\sqrt{3}} = \frac{144-144\sqrt{3}+108+36}{12-6\sqrt{3}}; =$$

$$\frac{288-144\sqrt{3}}{12-6\sqrt{3}} = \frac{24(12-6\sqrt{3})}{12-6\sqrt{3}} = 24 \dots C$$

35. $y^2 - 11y + 24 = 0; y^2 = 3y - 8y + 24 = 0; (y^2 - 3y) + (-8y + 24) = 0$

$Y(y-3) - 8(y-3) = 0; (y-8)(y-3) = 0; Y = 8 \text{ or } 3 \dots\dots A$

36. Principal of 5% = x; Principal of 4% = 280 - 4;

Interest of 5% = $\frac{x-5}{100}$

Interest of 4% = $\frac{(280-x) \times 4}{100}$; Total interest = N12.80; t = 1.

$$\therefore \frac{5x}{100} + \frac{4(280-x)}{100} = N12.80; X + 1120 = N1280; x = N1280 - N1120 = N160 \dots D.$$

37. D

38. $F(x) = x^3 - 12x + 11; \frac{dy}{dx} = 3x^2 - 12 = 0; 3x^2 = 12, x^2 = 4; x = \pm 2$

For x = +2; $(2)^3 - 12(2) + 11 = -5$; for x = -2; $(-2)^3 - 12 + 11 = 27$

\therefore The max value = 27D

39. B – 5/36

40. C – -5/6

BIOLOGY

41. C – Cilium

42. D – Chromatis

43. C lipids

44. B – chlorophyll

45. D

46. D

47. C – adenpsine triphosphate (ATP)

48. D – blood

49. C – intercellular space

50. C – gills

DAY 2 TYPE B

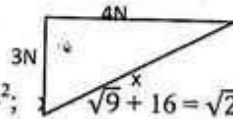
- The first scientist to describe the cell was A. Theodore Schwann B. Felix Dujardin C. Robert Hooke D. Charles E. Matllas Schleiden.
- In which of the following parts of a cell is the chromosome found? A. nucleus B. Golgi body C. cytoplasm D. cell membrane E. cell wall.
- Which of the following diseases is caused by deficiency of insulin in the body? A. malaria B. diabetes meliltus C. hepatitis D. gonorrhoea E. cholera

6. The respiratory organ found in the cockroach is the
A. air sac B. trachea C. lung book D. lung E. gill
7. Which of the following structures function as an excretory system found in flat worms
A. contractile vacuole B. nephridium C. flame cell D. malpighian tubule E. kidney
8. Which of the following organs is associated with deamination of proteins?
A. lung B. stomach C. kidney D. liver E. heart
9. Ultra filtration in the kidney takes place in the
A. loop of Henle B. renal vein C. Bowman's capsule D. pelvis E. pyramid
10. The groups of sensory cells found on the upper surface of the tongue are called
A. ampullae B. taste buds C. nerve cells D. somatic cells E. tactile cells.
11. If $263 + 441 = 714$, what number base has been used?
A. 12 B. 11 C. 100 D. 9 E. 8
12. P sold his bicycle to Q at a profit of 10%, Q sold it to R for N209.00 at a loss of 5%. How much did the bicycle cost P?
A. N200.00 B. N196.00 C. N180.00 D. N205.00 E. N150.00
13. A man invested a total of N50,000.00 in two companies. If these companies pay dividends of 6% and 8% respectively, how much did he invest at 8%, if the total yield is N13,700.00?
A. N15,000.00 B. N21,400.00 C. N27,800.00 D. N29,000.00 E. N135,000.00
14. Thirty boys and X girls sat for a test. The mean of the boys' scores and that of the girls were respectively 6 and 8. Find X if the total score was 468.
A. 38 B. 24 C. 36 D. 22 E. 41
15. James choose at random, a number between 1 and 300. What is the probability that the number is divisible by 4?
A. $\frac{1}{3}$ B. $\frac{1}{4}$ C. $\frac{1}{5}$ D. $\frac{4}{300}$ E. $\frac{1}{300}$
16. P varies directly as the square of Q and inversely as R. If $P = 36$ when $Q = 3$ and $R = 4$, find P when $Q = 5$ and $R = 2$.
A. 72 B. 100 C. 90 D. 200 E. 125
17. Factorize $6x^2 - 14x - 12$.
A. $2(x+3)(3x-2)$ B. $6(x-2)(x+1)$ C. $2(x-3)(3x+2)$ D. $6(x+2)(x-1)$ E. $(3x-4)(2x+3)$
18. If $2x + 3y = 1$ and $x - y = 11$, find $(x + y)$.
A. 5 B. -3 C. 8 D. 2 E. -2
19. Find a factor which is common to all 3 binomial expressions $4a^2 - 9b^2$, $8a^3 + 27b^3$, $(4a + 6b)^2$.
A. $4a + 6b$ B. $4a - 6b$ C. $2a + 3b$ D. $2a - 3b$ E. None
20. A cone is formed by bending a sector of a circle having an angle of 210° . Find the radius of the base of the cone. If the diameter of the circle is 12cm.
A. 7.00cm B. 1.75cm C. 21cm D. 3.50cm E. 2.21cm
21. An object of mass 0.40kg attached to the end of a string is whirled round in a horizontal circle of radius 2.0m with a constant speed of 8ms^{-1} . Calculate the angular velocity of the object.
A. 0.8rad s^{-1} B. 2.0rad s^{-1} C. 4.0rad s^{-1} D. 8.0rad s^{-1} E. 16.0rad s^{-1}
- From the alternatives provided in questions 21 – 30, select the one which most appropriately can the sentence.
21. I was seriously disappointed when the between the two teams ended in a goalless draw
A. march B. marsh C. match D. mass E. martch
22. Children's clothes have to be strong to stand rough use.
A. with B. In through C. In for D. up to E. up for
23. Shall I make the cheque you or to your firm?
A. In for B. up with C. in with D. up for E. out to
24. The hotel is at creek road
A. which I am staying B. in where I am staying C. that I am staying D. at which I am staying E. I stay
25. the main points of the lecture given by the director of the Institute
A. those were B. that was C. there were D. this was E. that is
26. I am sure that my mother will not find out. She is so that she will accept anything I tell her.
A. credible B. credulous C. creditable D. Incredible E. Incredulous
27. The boys are very naughty. They have started fighting again
A. haven't they? B. isn't it? C. not so? D. have they? E. is it?
28. If only I insured, but I wasn't. Now I have to pay a lot of money.
A. am B. have been C. had been D. would be E. was to be.
29. Do you mind if I wait for the reply? I'd rather you again tomorrow.
A. called B. will call C. can call D. call E. were calling.
30. The young man looked carefully at the document; but he couldn't make what it meant
A. up B. out C. off D. though E. do.
31. An object of mass 0.40kg attached to the end of a string is whirled round in a horizontal circle of radius 2.0m with a constant speed of 3ms^{-1} . Calculate the regular velocity of the object.
A. 0.8rads^{-1} B. 2.0rads^{-1} C. 4.0rads^{-1} D. 8.0rads^{-1} E. 16.0rads^{-1}
32. An object falls freely from a height of 25m into the roof of a building 5m high. Calculate the velocity with which the object strikes the roof. ($g = 10\text{ms}^{-2}$)
A. 17.3ms^{-1} B. 20.0ms^{-1} C. 24.5ms^{-1} D. 125.0ms^{-1} E. 200.0ms^{-1}
33. Two forces 3N and 4N act on a body in directions due north and due east respectively. Calculate their equilibrium
A. 5N , 54° east of north B. 5N , 53° west of south C. 5N , 37° north of east D. 7N , 37° west of north E. 7N , 37° south of west.
34. A solid plastic cube of side 0.2m is submerged in a liquid of density 0.8km . Calculate the up thrust of the liquid on the cube. ($g = 10\text{ms}^{-2}$)
A. 0.064N B. 0.025N C. 0.016N D. 0.008N E. 0.003N.
35. Calculate the quantity of heat released when 100g of steam at 100°C condenses to water (Take the specific latent heat of vapourisation of water as $3.3 \times 10^3\text{J}$)
A. $2.3 \times 10^2\text{J}$ B. $2.3 \times 10^3\text{J}$ C. $2.3 \times 10^4\text{J}$ D. $2.3 \times 10^5\text{J}$ E. $2.3 \times 10^7\text{J}$.

24. A - which am staying 29 A - called
 25. A - those were 30. B - out

PHYSICS

31. E - 16.0 rads⁻¹
 32. $u = 0 \frac{m}{s}$; $s = 25\text{in} - 5\text{m} = 20\text{m}$, $g = 10\text{m/m}^2$
 $v^2 = u^2 + 2gs$; $v^2 = 0 + 2 \times 10 \times 20$; $v^2 = 400$; $v = \sqrt{400} = 20\text{m/s}$.. B
 33.



$x^2 = 3^2 + 4^2$; $\sqrt{9 + 16} = \sqrt{25} = 5$; $\theta = \tan^{-1} \frac{3}{4} = \tan^{-1} 0.75 = 37^\circ \Rightarrow 5\text{N } 37^\circ \text{ north of east}$.. C

34. Volume of cube = $0.2 \times 0.2 \times 0.2 = 0.008\text{m}^3$;
 Density $\rho = \frac{m}{v}$; $\therefore m = \rho \times v$
 $m = 0.8 \times 0.008 = 0.0064\text{g}$; upthrust = $mg = 0.0064 \times 10 = 0.064\text{N}$ A

35. C - $2.3 \times 10^4\text{J}$
 36. $P_1 = 700\text{mmHg}$ $v_1 = 20\text{cm}$ $P_2 = 750\text{mmHg}$
 $v_2 = ?$; $v_2 = \frac{P_1 v_1}{P_2} = \frac{700 \times 20}{750}$
 $= 18.7\text{cm}$ C
 37. A - diffraction
 38. D - 255°
 39. A - electrical energy

40. B - diffusion

CHEMISTRY

41. D - Chromatography
 42. B - Sea water
 43. $V_1 = 2.71$ $P_1 = 0.825 \text{ atm}$ $T = 300\text{K}$
 $V_2 = 2.71/2$ $P_2 = ?$

From, ideal gas equation

$\frac{P_1 V_1}{P_2 V_2} = \frac{T_1}{T_2} = \frac{0.825 \times 2.7}{P_2 \times (2.7/2)} = \frac{300}{300}$; $P_2 = \frac{0.825 \times 2.7 \times 273}{300 \times (2.7/2)} = 1.5015 \text{ atm}$

44. C - dichloromethane
 45. A - ionic bond
 46. D - higher the possibility of the substance formed being a molecule
 47. D - coagulate small particles
 48. B - mm of crystal salt = 424gmol^{-1} ; mm of anhydrous salt = 208gmol^{-1}

If 38.9g of $\text{H}_2\text{O} \rightarrow 1 \text{ mole of } \text{H}_2\text{O}$

$X\text{g}$ of $\text{H}_2\text{O} \rightarrow 1 \text{ mole of anhydrous salt}$

$X\text{g} = 389\text{g}$ No of moles = $\frac{\text{Mass}}{\text{Molar Mass}}$; $x =$

$\frac{38.9}{208} = 0.138$

Percentage mass = $0.138 \times 100 = 13.8\%$...

- D
 50. D - 3

FUTO 2011/2012 POST - UTME SCREENING DAY 3

TYPE A

Answer questions: shade the answer sheet as appropriate with HB pencil only. Time allowed: 35minutes

In each of questions 1 to 10, fill each gap with the most appropriate option from the list following the gap.

- I have no respect for individuals who are too (A. compliance B. compliant C. compliable D. complicated)
- The police men who were to keep watch connived (A. with B. at C. to D. for) the robber's escape.
- Ekaette is (A. not only anxious B. anxious not only C. not only that she is D. anxious) to acquire knowledge, but also eager to display it.
- Ifenyinwa will not come (A. after B. provided C. unless D. because) she is asked.
- You must Forbid (A. he's B. that he is C. him for D. his) coming.
- Obi should leave for New York on Friday (A. all the things B. all other things C. other things D. other things all) being equal
- The woman warned her daughter not to (A. move B. be moving C. be keeping company D. keep company) with bad boys.
- Tamuno is crying because his mother was killed in a (A. motor B. traffic C. motor vehicle D. road) accident.
- Michael is not very bold. He's not (A. cut up for B. cut for off for D. cut out for) a rough life

10. Some of the food (A. is B. are C. were D. have) spoilt

- Which of the following levels of organization in things is in correct sequence, starting from the most complex to the simplest? A. tissue \rightarrow cell \rightarrow organ \rightarrow system B. system \rightarrow organ tissue \rightarrow cell C. cell \rightarrow tissue \rightarrow system \rightarrow organ D. cell \rightarrow tissue \rightarrow organ \rightarrow system E. organ \rightarrow system \rightarrow tissue \rightarrow cell
- A few drops of Fehlings was added to Juice extract from fresh maize grain and boiled. A red precipitate was formed, indicating the presence of A. alcohol B. protein C. non reducing sugar D. starch
- Which of the following is not a cell organelle? A. golgi body B. nucleus C. fat droplets D. ribosome E. endoplasmic reticulum
- Which of the following are the final products of aerobic respiration A. water, carbon dioxide and energy B. pyruvic acid, carbon dioxide and water C. glucose, energy and urea D. energy and carbon dioxide E. lactic acid, water and carbon dioxide.
- Movement of-water across a semi permeable membrane from a weaker solution to a stronger solution is known as A. transpiration B. Diffusion C. active transport D. plasmolysis E. osmosis
- In which of the following structures will cells undergoing melosis be seen? A. at the apices

- of stem and root B. in the cortex of the stem
C. in the palisade mesophyll of the leaf
D. in the ovary of a flower E. in the root of a seedling
17. Which of the following instrument can be used to perform an experiment on geotropism? A. potometer B. cup anemometer C. klinostat D. kymograph E. sphygmomanometer
 18. The thoracic vertebra differs from all the other vertebrae by the possession of A. long neural spine B. odontoid process C. vertebrarterial canal D. large centrum E. transverse processes
 19. The maintenance of a constant internal environment of an organism is known as A. homeostasis B. hemorhesis C. turgidity D. homolothermy E. dieresis
 20. The most sensitive part of the retina is called A. blind spot B. conjunctiva C. fovea centralis D. choroid coat E. sclerotic coat.
 21. Which of the following substances is not a homogenous mixture? A. filtered sea water B. soft drink C. flood water D. writing ink
 22. There is a large temperature interval between the melting point and the boiling point of a metal because A. metals have very high melting points B. metal conduct heat very rapidly C. melting does not break the metallic bond but boiling does D. the crystal lattice of metals is easily broken
 23. How many moles of (H^+) are there in $1dm^3$ of 0.5M solution of H_2SO_4 A. 2.0moles B. 1.0moles C. 0.5 mole D. 0.25moles.
 24. A given mass of gas occupies $2dm^3$ at 300K. At what temperature will its volume be doubled, keeping the pressure constant A. 400K B. 480K C. 550K D. 600K.
 25. If $100cm^3$ of oxygen pass through porous plug in 50 seconds, the time taken for the same volume of hydrogen to pass through the same porous plug is A. 10.0s B. 12.5s C. 17.7s D. 32.0s
 26. Which of the following is a measure of the average kinetic energy of the molecules of a substance? A. volume B. mass C. pressure D. Temperature
 27. How many lone pairs of electrons are there on the central atom of the molecule? A. 1 B. 2 C. 3 D. 4.
 28. Four elements P, Q, R and S have 1, 2, 3, and 7 electrons in their outermost shells, respectively. The element which is likely to be a metal is A. P B. Q C. D. S.
 29. Which of the following gases dissolves in water vapour to produce acid rain during rainfall? A. oxygen B. carbon (II) oxide C. Nitrogen D. sulphur (IV) oxide.
 30. Water for town supply is chlorinated to make it free from A. bad odour B. bacteria C. temporary hardness D. permanent hardness.
 31. Which of the following physical processes cannot be explained by the molecular theory of matter? A. evaporation B. thermal conduction C. radiation of heat D. convectional current in fluids.
 32. A spring balance which is suspended from the roof of a lift carries a mass of 1kg at its free end. If the lift accelerates upward at $2.5ms^{-1}$ determine the reading on the spring balance [$g = 10ms^{-2}$] A. 25.0N B. 12.5N C. 7.5N D. 4.0N.
 33. An object of weight 10N immersed in a liquid displaces a quantity of the liquid. If the liquid displaced weighs 6N, determine the up thrust on the object. A. 20N B. 40N C. 6N D. 4N.
 34. Which of the following statements about pressure is not correct? Pressure A. increases with an increase in surface area B. decreases with an increase in surface area C. increases with a decrease in surface area D. increases with an increase in the applied force.
 35. A block weighing 15N rests on a flat surface and a horizontal force of 3N is exerted on it. Determine the frictional force on the block A. 0.3N B. 0.5N C. 3.0N D. 5.0N
 36. The time rate of change of momentum is A. impulse B. force C. power D. pressure.
 37. Electrical resistance is a property of an electrical conductor that causes electrical energy to be converted into A. mechanical energy B. heat energy C. magnetic energy D. chemical energy.
 38. A simple machine with an efficiency of 75% lifts a load of 5000N when a force of 500N is applied to it. Calculate the velocity ratio of the machine A. 10.0 B. 13.3 C. 17.5 D. 25.0
 39. The amount of heat given out or absorbed when a substance change its state at a constant temperature is known as A. latent heat B. heat capacity C. specific latent heat D. specific heat capacity.
 40. Which of the following physical quantities affect the saturated vapour pressure of a liquid? A. temperature B. volume C. mass D. density
 41. Simplify $3\frac{1}{2} - 1\frac{1}{4} \times \frac{1}{3} + 1\frac{2}{3}$ A. 2 B. 3 C. 4 D. 6
 42. Express $62 + 3$ as a decimal correct to 3 significant figures A. 20.6 B. 20.667 C. 20.67 D. 20.7.
 43. Obi borrows ₦10.00 at 2% per month simple interest and repays ₦8.00 after 4 months, how much does he still owe? A. ₦10.80 B. ₦10.65 C. ₦2.80 D. ₦2.67.

44. Which of the following is a factor of $rs + tr - pt - ps$? A. $(p - s)$ B. $(s - p)$ C. $(r - p)$ D. $(r + p)$
45. Find the positive number n such that thrice its square is equal to 12 times the number A. 1 B. 2 C. 3 D. 4
46. Find the gradient of the line passing through the points $(-2, 0)$ and $(0, -4)$. A. 2 B. -4 C. -2 D. 4
47. At what value of x is the function $y = x^2 - 2x - 3$ minimum? A. 1 B. -1 C. -4 D. 4
48. Find the sum of the 20 terms in an arithmetic progression whose first term is 7 and last term

- 1177 A. 2480 B. 1240 C. 620 D. 124
49. Find the total area of the surface of a solid cylinder whose base radius is 4cm and height is 5cm. A. $56\pi\text{cm}^2$ B. $72\pi\text{cm}^2$ C. $96\pi\text{cm}^2$ D. $192\pi\text{cm}^2$.
50. A crate of soft drink contains 10 bottles of Coca cola, 8 of Fanta and 6 of Sprite. If one bottle is selected at random what is the probability that it is NOT a Coca cola bottle? A. $\frac{5}{12}$ B. $\frac{1}{3}$ C. $\frac{3}{4}$ D. $\frac{7}{12}$

POST UTME SOLUTION

2011/2012 DAY 3

$L=500\text{N}; F=500\text{N}$

$VR = 15/100 \times 100/1$

$VR = 10.0$ (A)

39. Latent heat (A)

40. Temperature (A)

41. $\frac{10}{3} - \frac{5}{4} \times \frac{2}{3} + \frac{7}{5}$

$3.3 - 1.12 \times 0.667 + 1.4 = 2$ A

42. 20.667 B

43. N2.80 (C)

$\frac{P \times 1 \times R}{100}$

100

44. $(r - P)$ (C)

45. Let no be n

$3x^2 = 12x$

$3x = 12; x = 4$ (D)

46. $\frac{Y_1 \times Y_2}{X_1 - X_2} = M$

$\frac{0 \times 4}{-2 - 0} = \frac{4}{-2} = -2$

$M = -2$ (C)

47. $y = x^2 - 2x - 3 = 0$

$2x - 2 = 0$

$2x = 2; x = 1$

$(x-1)(x-3)$

$x^2 - 3x + -3 = x^2 - 2x - 3$

$x^2 - 1$, or 3 (B)

48. $a = 71 V_2 = 117$

$\text{Sum}_{35} = a = (n-1)d$

$117 = 7 + 19d$

$110 = 19d$

$d_2 = 110/9$

$S_n \div a + (n-1)d$

$\frac{1}{2}(a + (n-1)d) = 1240$ (B)

49. Curved surface area - area of top and bottom.

Curved surface area = $(2 \times \pi \times r \times h)$

Total surface area = $(2 \times \pi \times r \times h) - 2 \times \pi \times r^2$

r = radius of base or top

h = height of the cylinder

$\pi = 3.124$

$= (2 \times \pi \times 4 \times 5) + (2 \times \pi \times 4^2)$

$(2 \times 3.142 \times 4 \times 5) + (2 \times 3.142 \times 16)$

$= (125.68) + (100.544)$

$225.229 = 72\pi\text{cm}^2$ (B)

50. D

1. Complicated (0)
2. For (D)
3. Anxious (0)
4. Because (D)
5. HIs (D)
6. Other things (C)
7. Keep company (D)
8. Road accident (D)
9. Cut for (B)
10. Have for (B)
11. Cells = tissues = organs = systems (D)
12. Reducing sugar (E)
13. Fat droplets (C)
14. $C_6H_{12} + 19O_2 \leftrightarrow 12CO_2 + 19H_2O$
Water, carbon dioxide and Energy (A)
15. Osmosis (E)
16. In the ovary of a flower (D)
17. Klnnastat (C)
18. Odontoid process (B)
19. Homeostasis (A)
20. Ctlanlactive (B)
21. Flood water (C)
22. TV crystal lattice of metals is easily broken (D)
23. 0.5 moles (C)
24. $T_1/Y_1 = T_2/V_2$
 $\frac{300K_2 \cdot 2}{\frac{2}{1200K} \cdot 4} = 600\text{Kj}$ (D)
25. 12.5(s) (B)
26. Pressure (C)
27. 2 (B)
28. Q (B)
29. Sulphuric IV oxide (D)
30. Bacteria (B)
31. Radiation of heat (C)
32. 25. ON (A)
33. 4N (D)
34. Increases with an increase in the surface area
35. $F=NR$
 $N2=F/R=15/3$
36. Time rate of change of momentum in impulse of momentum is impulse (A)
37. Heat energy (B)
38. $E = 75\%$

FUTO 2010/2011 POST-UTME SCREENING TYPE A DAY1

Answer all questions: shade the answer sheet as appropriate with HB pencil only. Day 1A, Tues, 27th July,

2010 Time Allowed: 35mins

1. The small masses of nervous tissue in which many neurons have their nuclei are called [A] dorsal roots [B] ventral roots [C] ganglia [D] synapses
2. A group of organisms of different species living in a particular area is described as [A] colony [B] community [C] population [D] niche
3. Which of the following is the direct consequence of transferring energy from one trophic level to another? [A] an increase in biomass a decrease in the efficiency of energy conversion [C]. an increase in the total numbers of resulting individuals [D] a decrease in the resulting biomass
4. The condition that encourages denitrification is [A] low soil oxygen [B] high soil nitrogen [C] absence of soil bacteria [D] lightning and thunderstorm
5. A freshwater plant such as water lily can solve the problem of buoyancy by the possession of [A] aerenchymatous tissues [B] dissected leaves [C] thin cell walls of the epidemic [D] water-repelling epidermis
6. The sequence of the biomes in Nigeria from Port Harcourt to Damaturu is [A] estuarine → rainforest → Guinea → Sahel savannah → savannah [B] rain forest → Guinea savannah estuarine → desert (C) estuarine → Guinea savannah → rain forest → Sahel savannah [D] rain forest → estuarine → Guinea savannah → desert.
7. Soil micro-organisms are beneficial because of their (A) photosynthesis [B]. translocation [C] cycling of nutrients [D] respiration using soil air
8. Which of the following groups of diseases are assumed with water I onchocerciasis II schistosomiasis III. Dracunculiasis IV Elephantiasis V. Taeniasis (A) I, II and III (B) II, IV and V (C) II, III and IV (D) I, II and V
9. One of the ways in which body cells differ from gamete cells is in the (A) type of centromeres they contain (B) number of chromosome pairs they contain (C) type of chromatide they contain (D) number of chromosomeres they contain
10. Transfusion, agglutination occurs when (A) white blood cells from two (B) two different antibodies met (C) two different antigens meet (D) contrasting antigens and antibodies meet.
11. The child's recent training has not been very effective, he is likely to _____ to his old habits (A) revert (B) convert (C) reverse (D) revise
12. The students were on whispering in _____ of the teacher (A) dishonor (B). disagreement (C) defiance (D) disobedience
13. You can never find Okwu; he is a very _____ Person (A) delusive (B) elusive (C) illusion (D) deceptive
14. You could see that Akpan did not give his evidence _____ (A) honestly completely (B) complete honestly (C) honest completely (D) completely honestly
15. The suspect defrauded his _____ victims of large sums of money (A) unsuspected (B) unsuspecting (C) unexpecting (D) unexpected
16. The _____ of the participating countries will be hold a pre-conference on the eve of the conference. (A) Auditor General (B) Auditors General (C) Auditors Generals (D) Auditors' Generals
17. The drummers struck their drums with great efforts, and the surging crowd of dancers _____ and _____ the grounds around the palace. (A) Strutted/thumped (B) Kicked/stamped (C) Thumped/licked (D) stroked/thumped
18. The chairman's laughter was with no _____ to ridicule the applicant (A) intention (B) intend (C) intendment (D) intent
19. The water is not good for drinking: it's been _____ by the dead rabbit (A) contaminated (B) infested (C) spoilt (D) diseased
20. The austerity of the limes has made people be more, _____ in their spending. (A) watchful (B) circumspect [C] misely [D] hesitant
21. Suppose x varies inversely as y, y varies directly as the square oft and x I when t=3. Find x when t = 1/3 (A) 18 (B) 27 (C) 1/9 (D) 1/27 (E) 1/81
22. If the sine x equals cosine x, what is x in radians? (A) $\pi/2$ (B) $\pi/3$ (C) $\pi/4$ (D) $\pi/6$ (E) $\pi/12$
23. The ratio of the price of a loaf of bread to the price of a packet of sugar in 1975 was r:f. In 1980 the price of a loaf went up by 25% and that of a packet of sugar by 10%. Their new ratio is now (A) 40r:50t (B) 44r:50t (C) 50r:44t (D) 55r:44t (E) 44r:55t
24. Find a two-digit number such that three times the tens digit is 2 less than twice the units digit, and twice the number is 20 greater than the number obtained by reversing the digits. (A) 24 (B) 42 (C) 74 (D) 47 (E) 72
25. Find the value of x satisfying $x/2 - 1/3 < 2x/5 + 1/6$ (A) $x < 5$ (B) $x < 7\frac{1}{2}$ (C) $x < -7\frac{1}{2}$ (D) $x < -5$ (E) $x > 5$
26. 7 pupils of average age 12 years leave a class of 25 pupils of average age 14 years. If 6 new pupils of average age of 11 years join the class, what is the average age of the pupils now in the class? (A) 13 years [B] 12 years 7 1/2 months [C] 13 years 5 months (D) 13 years 10 months (E). 11 years
27. A sum of money invested at 5% per annum simple interest amounts to \$285.20 after 3years. How long will it take the same sum to amount to \$434.00 at 7%

- % per annum simple interest? (A) 7½% years (B) 10 years (C) 5 years (D) 12 years (E) 14 years
28. By selling an article for N45.00 a man makes a profit of 8%. For how much should he have sold it in order to make a profit of 32%? (A) N180.00 (B) N59.9 (C) N63.00 (D) N58.00 (E) N55.00
 29. An isosceles triangle of sides 13cm, 13cm, 10cm is inscribed in a circle. What is the radius of the circle? (A) 7½cm (B) 12cm (C) 8cm (D) 7cm (E) 69cm
 30. A group of 14 children received the following scores in a reading test. 35, 35, 26, 26, 26, 29, 29, 12, 25, 25, 25, 17. What was the median score? (A) 29 (B) 26 (C) 24.4 (D) 25 (E) 23
 31. Which of the following types of bonding does not involve the formation of new substances? [A] Metallic [B] covalent [C] co-ordinate [D] electrovalent.
 32. The knowledge of half-life can be used to (A) create an element (B) detect an element (C) split an element (D) irradiate an element
 33. The shapes of CO₂, H₂O and CH₄ respectively are [A] bent, linear and tetrahedral [B] bent, tetrahedral and linear [C] linear, bent and tetrahedral [D] tetrahedral linear and bent
 34. The distance between the nuclei of chlorine atoms in a chlorine molecule is 0.194nm. The atomic radius of chlorine atom is [A] 0.097nm [B] 0.914nm [C] 0.388nm [D] 2.388nm
 35. The noble gas, argon, is used for [A] electrical arc welding [B] welding brass [C] underwater welding [D] steel-welding
 36. A side effect of soft water is that [A] it gives offensive taste [B] excess calcium is precipitated [C] it attacks lead contained in pipes [D] it encourages the growth of bacteria
 37. Water molecules can be liquids especially when they are bonded to [A] alkaline earth metals [B] alkali metals [C] transition metals [D] group VII elements
 38. The air pollutant unknown in nature is [A] NO [B] CO [C] HCHO [D] DDT
 39. 1.0dm³ of distilled water was used to wash 2.0g of a precipitation of AgCl. If the solubility product of AgCl is $2.0 \times 10^{-10} \text{ mol}^2 \text{ dm}^{-6}$, what quantity of silver was lost in the process? [A] $2.029 \times 10^{-3} \text{ mol dm}^{-3}$ [B] $1.414 \times 10^{-3} \text{ mol dm}^{-3}$ [C] $2.029 \times 10^{-5} \text{ mol dm}^{-3}$ [D] $1.414 \times 10^{-5} \text{ mol dm}^{-3}$
 40. Hydration of ions in solution is associated with [A] absorption of heat [B] reduction of heat [C] conduction of heat [D] liberation of heat
 41. When a known standard resistor of 2.0 is connected to the 0.0cm end of a meter bridge, the balance point is found to be at 55.0cm. What is the value of the unknown resistor? [A] 1.10Ω [B] 1.64Ω [C] 2.44Ω [D] 27.50 Ω
 42. The total energy required to send a unit positive charge round a complete electrical circuit is the [A] kinetic energy [B] potential difference [C] electromotive force [D] electrical energy
 43. Which of the following is an essential physical property of the wires used for making fuse? [A] low density [B] high thermal conductive [C] low electrical resistivity [D] low melting point
 44. Which of the following is most suitable for protecting the circuit of 2000W electric iron connected to a 250V mains? [A] 13A [B] 8A [C] 5A [D] 3A
 45. Electrical power is transmitted at a high voltage rather than low voltage because the amount of energy loss is due to. [A] heat dissipation [B] production of eddy currents [C] excessive current discharge [D] excessive voltage discharge
 46. A lamp is rated 240V, 60W. The resistance of the filament is [A] 960Ω [B] 16 Ω [C] 15 Ω [D] 4 Ω
 47. A 0 - 10mA galvanometer with a coil resistance of 30Ω can be converted to a 0-10mA ammeter by using [A] 0.03 series resistor [B] 0.03 shunt resistor [C] 9.99 shunt resistor [D] 9.99 series resistor
 48. What precaution should a manufacturer take to ensure that energy loss in a transformer is minimized? [A] the winding of the transformer should be made of high resistance wire [B] the core should be made of thin sheets of metal [C] no magnetic material should be used to make the core [D] the flux linking the primary with the secondary coils should be minimum
 49. A substance has a half life of 3min. After 6 min, the count rate was observed to be 400. What was its count rate at zero time? [A] 200 [B] 1,200 [C] 1,600 [D] 2,400
 50. The photocell works on the principle of the [A] voltaic cell [B] emission of electron by incident radiation [C] emission of protons by incident electrons [D] photographic plate

FUTO 2010/2011 POST-UTME SOLUTIONS DAY IA, TUES 27TH JULY, 2010, TIME: 35MINS TYPE A

BIOLOGY

- 1.C 2.B 3.D 4.A 5.A
6.A 7.C 8.A 9.D 10.D

ENGLISH

- 11.A 12.C 13.B 14.D 15.B
16.A 17.A 18.D 19.A 20.B

MATHEMATICS

21. $x \propto 1/y; \Rightarrow x = k/y \dots (1)$
 $y \propto t^2 \Rightarrow y = kt^2 \dots (2)$

Relation between x and t by eliminating y
Substitute for y in (1)

$x = k/t + 2t$; given $x = 1, t = 3$ to find x when $t = 1/3$

$$1 = k/3^2 \Rightarrow k = 9$$

$$x = 9/t^2 \text{ and when } t = 1/3$$

$$x = \frac{9}{(1/3)^2} = 81 \dots \dots \dots A$$

22. At 45° , $\text{Sin} x = \text{Cos} x$ i.e. $\frac{180}{4} = \frac{\pi}{4} \dots \dots \dots C$

23. Ratio price of loaf to the price of a packet of sugar in 1975 was $r:t$

In 1980, price of a loaf went up by 25%. Price of a packet of sugar went up by 10%. Ratio of increase is $125:110 = r:t$

$$\frac{125}{r} = \frac{110}{t} \quad 125t = 110r$$

$$25t = 22r \Rightarrow 50r:44t \dots\dots D$$

24. Let the tens digit of the number be x and the unit digit be y

$$3x = 2y - 2 \Rightarrow 3x - 2y = -2 \dots\dots (1)$$

If the digits are interchanged, the tens digit becomes y while the unit digit becomes x . The number obtained is equal to $10y + x$. Hence

$$2(10x + y) = 10y + x + 20$$

$$20x + 2y - (10y + x) = 20$$

$$19x = 8y - 20 \dots\dots (2)$$

Multiply (1) by 5 and (2) by 2

$$24x - 16y = -16 \dots\dots (3)$$

$$38x - 16y = 40 \dots\dots (4) \text{ solving (3) and (4)}$$

to get

$$x = 4 \text{ and } y = 7$$

Hence the original number is $10x + y = 10(4) + 7 = 47$

$\dots\dots D$

$$25. \frac{x}{2} - \frac{1}{3} < \frac{2x}{5} + \frac{1}{6}$$

$$-\frac{11}{3} - \frac{1}{6} < \frac{2x}{5} - \frac{1}{2}$$

$$-\frac{1}{210} < \frac{x}{5} \dots\dots \text{Cross multiply}$$

$$-2x < -10$$

$$\therefore x < 5 \dots\dots A$$

26. Total age of the 7 pupils = $7 \times 12 = 84$

Total age of the 25 pupils = $25 \times 14 = 350$

Total age of the 6 pupils = $6 \times 11 = 66$

7 pupils leaving a class of 25 pupils will remain 18 pupils (i.e. 25-7)

Total age of the 18 pupils = $350 - 84 = 266$

6 pupils joining 18 pupils = $24(18 + 6)$

Total age of 24 pupils = $266 + 66 = 332$

$$\therefore \text{Average age of 24 pupils now in class} = \frac{332}{24} = 13.83$$

= 13yrs. 10 months $\dots\dots D$

$$27. A = P + I$$

$$\text{Also, } A = P(1 + r)^n$$

$$285.20 = P(1 + 0.05)^3$$

$$285.20 = 1.16P \Rightarrow P = \$245.86$$

At amount of \$434, interest $I = A - P$

$$= 434 - 245.86 = 188.14$$

$$\text{Time} = \frac{100 \times T}{P \times R} = \frac{100 \times 188.14}{245.86 \times 7.5}$$

$$\text{Time} = 10 \text{ years} \dots\dots B$$

28. When $CP = N45$ at 8% profit

$$CP = \frac{100}{108} \times 45$$

$$\text{At profit of 32\%, } SP = \frac{132}{100} \times CP$$

$$= \frac{132}{100} \times \frac{100 \times 45}{108} = N55 \dots\dots E$$

$$29. AD^2 = 13^2 - 5^2 \Rightarrow AD^2 = 169 - 25 = 144$$

$$\therefore AD = 12,$$

From ADC, $9:4 = 5:13$

$$\frac{94}{513} \Rightarrow r = \frac{65}{5} = 13$$

30. Arranging in ascending or descending order

12, 17, 25, 25, 25, 26, 26, 26, 29, 29, 29, 35, 35

$$\text{Mid terms } \frac{26+26}{2} = 26 \dots\dots B$$

CHEMISTRY

31. A 32. B 33. C

34. The atomic radius is taken to be one-half the distance of the closest approach between the nuclei of atoms in the elemental substance i.e.

$$\text{Atomic radius} = \frac{0.194}{2} = 0.097 \text{ nm} \dots\dots A$$

35. A 36. C 37. C 38. C 39. D 40. D

PHYSICS

$$41. \frac{R_1}{R_2} = \frac{I_1}{I_2} \Rightarrow \frac{255}{R_2} = \frac{45}{45} \Rightarrow R_2 = 1.64 \dots\dots B$$

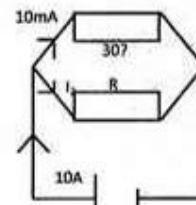
42. B 43. D

$$44. P = IV \Rightarrow I = P/V = 200/250 = 8A \dots\dots B$$

45. A

$$46. P = V^2/R \Rightarrow R = V^2/P = \frac{240 \times 240}{960} = 960 \dots\dots A$$

47.



$$I_2 = 10 - (10 \times 10^{-3}) = 9.99A$$

$$9.99R = 10 \times 10^{-3} \times 30 \Rightarrow R = 0.03 \text{ shunt resistor} \dots\dots B$$

48. B

49. Let the count rate at zero time be N

$$N \rightarrow \frac{N}{2} \rightarrow \frac{N}{4}; \therefore N/4 = 400$$

$$N \rightarrow \frac{400}{4} \times N = 1600 \dots\dots C$$

50. B

FUTO 2010/2011 POST - UTME SCREENING TYPE A

Answer all questions: shade the answer sheet as appropriate with HB pencil only Day 2A,

Wed. 28th July, 2010 Time Allowed: 35 min

- After one week of life, the weights of five chicks of the same sex hatched simultaneously from the eggs of the same hen and fed on same diet were 45g, 40g, 35g, 33g and 30g. This is an example of [A] growth rate [B] selection [C] variation [D] mutation
- The phenotype of an individual can be summed up as the [A] totality of expressed traits [B] individual's physical appearance [C] individual's entire genetically appearance [D] physiological traits of the individual.
- The correct increasing order of size for the cell components responsible for heredity is

- [A] Chromosome → DNA → Nucleus → Gene
 [B] DNA → Gene → Chromosome → Nucleus
 [C] Chromosome → Nucleus → DNA → Gene
 [D] DNA → Gene → Nucleus → Chromosome
- A sex-linked character cannot be passed on directly from [A] father to son [B] mother to mother to son [D] father to daughter
 - The biological association that contributes directly to succession in a community is [A] competition [B] predation [C] parasitism [D] commensalisms
 - The group of insects that have mouth parts adapted for both piercing and sucking is [A] cockroaches, aphids and mosquitoes [B] aphids, houseflies and moths [C] mosquitoes, tse-tse flies and aphids [D] aphids, beetles and grasshoppers
 - In the honey bee colony, the drones are [A] sterile males with reduced mouth parts [B] sterile males with well-developed mouth parts [C] fertile males with reduced mouth parts [D] fertile males with well developed mouth parts
 - In the whistling pine, leaves are reduced to brown scales and young stems are green. This is an adaptation for [A] obtaining food [B] conserving nutrients [C] storing water [D] reducing transpiration
 - The best explanation for the theories of natural selection is that [A] all organisms have equal capacity for survival in their habitats [B] organisms have varying capacities for survival in their habitats [C] organisms compete for resources and better competitors survive and thrive [D] habitats allow only organisms that will not have to compete for survival
 - The basic point of impact by changes which produce mutation is the [A] gametes [B] chromosomes [C] phenotype [D] zygote
 - A mixture of iodine and sulphur crystals can be separated by treatment with [A] water to filter off sulphur [B] carbon (IV) sulphide to filter off iodine [C] ethanoic acid to filter off sulphur [D] methanol to filter off iodine
 - Sieving is a technique used to separate mixtures containing solid particles of [A] small sizes [B] large sizes [C] different sizes [D] the same size
 - Which of the following compounds is composed of Al, Si, O and H? [A] Epson salt [B] Limestone [C] Clay [D] Urea
 - 50cm³ of carbon (II) oxide exploded with 150cm³ of air containing 20% oxygen by volume. Which of the reactants was in excess? [A] carbon (II) oxide [B] carbon (IV) oxide [C] oxygen [D] nitrogen
 - How many moles of HCl will be required to react with potassium heptaoxidichromate (VI) to produce 3 moles of chlorine? [A] 14 [B] 12 [C] 11 [D] 10
 - The ratio of the initial to the final pressure of a given mass of gas is 1:1.5. Calculate the final volume of the gas if the initial volume was 3000cm³ at the same temperature [A] 120cm³ [B] 200cm³ [C] 450cm³ [D] 750cm³
 - The partial pressure of oxygen in a sample of air is 452mmHg and the total pressure is 780mmHg. What is the mole fraction of oxygen? [A] 0.203 [B] 0.579 [C] 2.030 [D] 5.790
 - The fundamental difference between the three states of matter is the [A] shape of their particles [B] number of particles in each state [C] shape of the container they occupy [D] degree movement of their particles
 - Which of the following statements is correct about the periodic table? [A] elements in the same period have the same number of valence electrons [B] the valence electrons of the elements in the same period increase progressively across the period [C] elements in the same group have the same number of electron shell [D] the non-metallic properties of the elements tend to decrease across each period
 - The electron configuration of 22X²⁺ ion is [A] 1s22s22p63s23p64s23d2 [B] 1s22s22p63s24s23d1 [C] 1s22s22p63s23p6 [D] 1s22s22p63s23p64s2
 - In one and a half hours, the minute hand of a clock rotates through an angle of [A] 900 [B] 1800 [C] 640° [D] 450° [E] 540°
 - Which of the following fractions is less than one-third? [A] 22/63 [B] 4/11 [C] 15/46 [D] 33/98 [E] 122/303
 - Factorize $3x^3 + 4x^2 - 13x + 6$ completely, given that $x - 1$ is a factor [A] $(x-1)(x-3)(x+2)$ [B] $(x-1)(x+3)(x-2)$ [C] $(x-1)(x+2)(3x+2)$ [D] $(x-1)(x-3)(3x+2)$ [E] $(x-1)(x+3)(3x-2)$
 - In ΔXYZ , $XY = 3\text{cm}$, $XZ = 5\text{cm}$ and $YZ = 7\text{cm}$. If the bisector of $\angle XYZ$ meets XZ at W , what is the length of XW ? [A] 1.5cm [B] 25cm [C] 3cm [D] 4cm [E] None of the above
 - If $\log_2 y = 3 - \log_2 x$; $3/2$ find y when $x = 4$ [A] 8 [B] 0 [C] 2 [D] 3 [E] 1
 - A cuboid has a diagonal of length 9cm and a square base of side 4cm. What is its height? [A] 9cm [B] $\sqrt{65}\text{cm}$ [C] $4\sqrt{2}\text{cm}$ [D] 7cm [E] 6.5cm
 - Given that $10x = 0.2$ and $\log_{10} 0.3010$, Find x , [A] -1.3010 [B] -0.6990 [C] 0.6990 [D] 1.310 [E] 0.02
 - Two cars X and Y start at the same point and travel towards a point P which is 150 km away. If the average speed of Y is 60 km per hour and X arrives at P 25 minutes earlier than Y. What is the average speed of X? [A] 513/7 km per hour [B] 72 km per hour [C] 37½ km per hour [D] 66 km per hour [E] 75 km per hour
 - Simplify $(62n+1 \times 9n \times 42n) / (18n \times 2n \times 122n)$. [A] 32n [B] $3 \times 23n-1$ [C] 2n [D] 6 [E] 1
 - Evaluate, correct to 4 decimal places 827.51×0.015 [A] 8.8415 [B] 12.4127 [C] 124.1265 [D] 12.44120 [E] 114.1265

31. Are you sure he prefers a horse ride _____ a walk? [A] than to take [B] to taking [C] instead to take [D] than
32. _____ to your request, we have decided to provide the necessary information. [A] As regards [B] With regards [C] With regard [D] Regarding
33. The price of everything seems to have _____ up in the last few months. [A] climbed [B] shot [C] risen [D] flared
34. Just to convince you about my commitment to the project, I shall _____ at the office before I leave for Kano tomorrow. [A] put up an appearance [B] put in an appearance [C] put up appearance [D] put an appearance
35. There was a _____ of steps. [A] stair [B] height [C] flight [D] climb
36. Many young men of nowadays do not know how to properly _____ their clothes [A] press [B] iron [C] smoothen [D] stretch
37. The dancers were all in _____ before their departure [A] good spirits [B] good spirit [C] high spirit [D] high spirits
38. Ebum _____ the edge of the cliff after his shoes had failed to grip [A] fell down [B] fell off [C] fell away [D] fell from
39. That old lady prefers _____ and _____ clothes [A] to bake/than making [B] to bake/to making [C] baking/to making [D] baking/than to make
40. I wonder how much _____ [A] cost these earrings [B] do these earrings cost [C] are these earrings costing [D] these earrings cost
41. A light wave of frequency 5×10^{14} Hz moves through water which has refractive index of $\frac{4}{3}$. Calculate the wavelength in water if the velocity of light in air is 3×10^8 ms⁻¹ [A] 4.5×10^7 m [B] 6.0×10^7 m [C] 1.7×10^6 m [D] 2.2×10^6 m
42. A wave disturbance traveling in air enters a medium in which its velocity is less than that in air. Which of the following statements is true about the wave in the medium? [A] both the frequency of the wave and the wavelength are decreased [B] the frequency of the wave is decreased while the wavelength is increased [C] the frequency of the wave is unaltered while the wavelength is decreased [D] the frequency of the wave is decreased while the wavelength is unaltered
43. Shadows and eclipses result from the [A] refraction of light [B] rectilinear propagation of light [C] detraction of light [D] reflection of light
44. An object which is 3cm high is placed vertically 10cm in front of a concave mirror. If this object produces an image 40cm from the mirror, the height of the image is [A] 0.75cm [B] 4.00cm [C] 8.00cm [D] 12.00cm
45. A boy looks at the image of an object in a plane mirror. He observes two images, a main bright one and the other faint. The observed images result from [A] reflection only [B] refraction only [C] diffraction and interference [D] reflection and refraction
46. What must be the distance between an object and a converging lens of focal length 20cm to produce an erect image two times the object height? [A] 20cm [B] 15cm [C] 10cm [D] 5cm
47. For a short sighted person, light rays from a point on a very distant object is focused. [A] in front of the retina [B] on the retina by a converging lens [C] behind the retina by a diverging lens [D] in front of the retina at a distance of 2F from the lens
48. When light is incident on an object which is magenta in colour, which of the following colours would be absorbed? [A] red and blue [B] green only [C] red and green [D] red only
49. In a resonance tube experiment, the effective length of the air column for the first resonance is 20cm when set into vibration by a tuning fork of frequency 480Hz. Neglecting end effect the velocity of sound in air is [A] 96ms⁻¹ [B] 255ms⁻¹ [C] 340ms⁻¹ [D] 384ms⁻¹
50. An organ pipe closed at one end is 80cm long. Determine the frequency of the fundamental note assuming that the speed of sound in air is 340 ms⁻¹ [A] 106Hz [B] 213Hz [C] 318 Hz [D] 425 Hz

FUTO 2010/2011 POST – UTME SOLUTIONS DAY 2A, TYPE A, WED 28TH JULY, 2010

BIOLOGY

1. C 2. A 3. B 4. B 5. A
6. C 7. C 8. D 9. C 10. B

CHEMISTRY

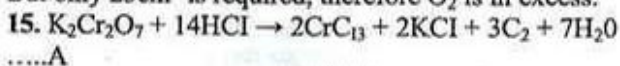
11. B 12. C 13. C
14. $2\text{CO} + \text{O}_2 \rightarrow 2\text{CO}_2$

$50\text{cm}^3 \rightarrow 25\text{cm}^3$

$20\% \times 150\text{cm}^3$

30cm^3 is the volume of oxygen available for the reactions.

But only 25cm^3 is required, therefore O_2 is in excess.



16. $\text{PIVI} = \text{P}2\text{V}2 \Rightarrow \text{V}2 = \frac{1 \times 300}{1.5} = 200\text{cm}^3$ B

17. Mole fraction = $\frac{452}{780} = 0.579$ moleB

18. D

19. B

20. D

MATHEMATICS

21. 1hr = 60mins

60mins = 3600

30mins = $\frac{3600}{2} = 1800$

$\therefore 90\text{mins} = 3600 + 1800 = 5400$ E

22. $\frac{1}{3} = 0.3333$; $\frac{15}{46} = 0.326$

$\therefore \frac{15}{46} < \frac{1}{3}$ C

23. To factorize $3x^3 + 4x^2 - 13x + 6$ given that $x-1$ is a factor. Divide the given equation by $x-1$

$$x - 1 \overline{) \begin{array}{r} 3x^3 + 4x^2 - 13x + 6 \\ \underline{3x^2 + 7x - 6} \\ 3x^2 + 4x^2 - 13x + 6 \\ \underline{3x^2 + 3x^2} \\ 7x^2 - 13x + 6 \end{array}}$$

$$\frac{7x - 7x}{6x + 6}$$

Then factorize $3x^2 + 7x - 6$

$$= 3x^2 + 9x - 2x - 6 = 0$$

$$3x(x+3) - 2(x+3)(x-1)(x+3)(3x-2) \dots \dots \dots E$$

34. Let $xw = a$

$$x^3 = 5a:7$$

$$\frac{x}{5a} = \frac{3}{7} \dots \dots \dots \text{cross multiply}$$

$$7x = 15 - 3a$$

$$10a = 15 \Rightarrow a = 1.5 \text{cm} \dots \dots \dots A$$

$$25. \log_2 y = 3 - \log_2 x^{(3/2)}$$

Find y when $x = 4$

But $x = 4$

$$\log_2 y = 3 - \log_2 4^{(3/2)}$$

$$\log_2 y = 3 - \log_2 2^{2(3/2)}$$

$$\log_2 y = 3 - 3 \log_2 2 \quad (\text{Note } \log_a a = 1)$$

$$\log_2 y = 3 - 3$$

$$\text{If } \log_2 y = 0, \text{ then } 2^0 = y \quad (\text{But } a^0 = 1)$$

$$\Rightarrow y = 1 \dots \dots \dots E$$

26. B

$$27. \text{ Given } \log_{10} 2 = 0.3010$$

$$\text{If } 10^x = 0.2$$

$$\log_{10} 0.2 = x$$

$$x = \log_{10} \left(\frac{2}{10} \right)$$

$$x = \log_{10} 2 - \log_{10} 10$$

$$x = 0.3010 - 1$$

$$= -0.6990 \dots \dots \dots B$$

28. Distance traveled by both x and $y = 150 \text{km}$

Speed of $y = 60 \text{km per hour}$

Time = distance/time

$$\text{Time spent by } y = 150/60 = 2\frac{3}{6} = 2 \text{hrs } 30 \text{mins}$$

If X arrived at P 25 minute earlier than y , then time

$$\text{spent by } x = 2 \text{hrs } 5 \text{mins} = 125 \text{mins}$$

$$X \text{ average speed} = \frac{150}{125} \times 60 = 72 \text{km/hr} \dots \dots \dots B$$

$$29. \frac{6^{2n+1} \times 9^n \times 4^{2n}}{18^n \times 2^n \times 12^{2n}} = \frac{(2 \times 3)^{2n+1} \times 3^{2n} \times 2^{4n}}{(2 \times 3)^n \times 2^n \times (6 \times 2)^{2n}} \\ = \frac{2^{2n+1} \times 3^{2n+1} \times 3^{2n} \times 2^{4n}}{2^{2n+1+4n} \times 3^{2n+1+2n}} \\ = \frac{2^{6n+1} \times 3^{4n+1}}{2^{6n+4n} \times 3^{2n+2n}} \\ = \frac{2^{6n+1.6n} \times 3^{4n+1.4n}}{2^{6n+4n} \times 3^{2n+2n}} \\ = 2 \times 3 = \dots \dots \dots D$$

$$30. 827.51 \times 0.015$$

By normal multiplication or use of four figure table

$$827.51 \times 0.015 = 12.41265 = 12.4127 \text{ to 4d.p.}$$

ENGLISH

$$31. B \quad 32. B \quad 33. B \quad 34. A \quad 35. C$$

$$36. B \quad 37. C \quad 38. B \quad 39. C \quad 40. D$$

PHYSICS

$$41. \frac{1}{4} = \frac{3 \times 10^8}{v}; \quad v = 2.25 \times 10^8 \text{ m/s}$$

$$\lambda = \frac{v}{f} = \frac{2.25 \times 10^8}{5 \times 10^{14}} \Rightarrow \lambda = 0.45 \times 10^{-6} \text{ m} \dots \dots \dots A$$

42. C

43. B

$$44. \frac{\text{Object height}}{\text{Image height}} = \frac{\text{Object distance}}{\text{Image distance}}$$

$$\frac{3}{10} = \frac{10}{40}$$

$$\text{Image height} = 12 \text{cm} \dots \dots \dots D$$

45. A

$$46. f = \frac{uv}{u+v} \text{ but } v = 2u$$

$$20 = \frac{u \times (-2u)}{u + (-2u)} \Rightarrow u = 10 \text{cm} \dots \dots \dots C$$

47. A

48. B

$$49. \lambda = 4(1+c) \text{ here } c = 0; \lambda = 4 \times 20 = 80 \text{cm}$$

$$v = \lambda f = 80 \times 10^{-2} \times 480 = 384 \text{m/s} \dots \dots \dots D$$

$$50. \lambda = 4l = 4 \times 80 = 320 \text{cm}$$

$$f = \frac{v}{\lambda} = \frac{340}{320 \times 10^{-2}} = 106 \text{Hz} \dots \dots \dots A$$

FUTO 2010/2011 POST - UTME SCREENING TYPE C

Answer the questions: shade the answer sheet as appropriate with HB pencil only Day3C,

Thurs. 29th July, 2010. Time Allowed: 35 mm

In which order are the following salts sensitive to light? [A] AgI > AgCl > AgBr [B] AgCl > AgI > AgBr [C] AgBr > AgCl > AgI [D] AgCl > AgBr > AgI

The pOH of a solution of 0.25 mol dm⁻³ of hydrochloric acid is [A] 12.40 [B] 13.40 [C] 14.40 [D] 14.60

MnO₄⁻(aq) + 8H⁺(aq) + Y - Mn²⁺(aq) + 4H₂O(l) Y in the equation represents [A] 2e [B] 3e- [C] Se- [D] 7e-

Given that M is the mass of substance deposition in electrolysis and Q the quantity of electricity consumed, then Faraday's law can be written as [A] ZQ [B] Q/Z [C] Z/2Q [D] M = QZ

0.46g of ethanol when burned raised the temperature of 50g of water by 15.3K. Calculate the heat of combustion of ethanol. [A] +33000KJ mol⁻¹ [B] -300 k .1 mol⁻¹ [C] 3000 KJ mol⁻¹ [D] -3000 KJ mol⁻¹

- Powdered marble reacts faster with hydrochloric acid solution than the granular form because the powdered form has [A] more molecules [B] more atoms [C] larger surface area [D] relatively large mass.
- For a reaction in equilibrium, the species involved in the equilibrium constant expression are [A] gaseous and solid species [B] liquid and solid species [C] solid and dissolved species [D] gaseous and dissolved species
- A phenomenon where an element exists in different forms in the same physical state is known as [A] isomerism [B] amorphism [C] allotropy [D] isotopy.
- The substance often used for vulcanization of rubber is [A] chlorine [B] hydrogen peroxide [C] sulphur [D] tetraoxosulphate (VI) acid
- A gas that is not associated with global warming is [A] CO₂ [B] SO₃ [C] CH₄ [D] H₂

11. Shadows and eclipses result from the [A] refraction of light [B] rectilinear propagation of light [C] diffraction of light [D] reflection of light
12. An object which is 3cm high is placed vertically 10cm in front of a concave mirror. If this object produces an image 40cm from the mirror, the height of the image is [A] 0.75cm [B] 4.00cm [C] 8.00cm [D] 12.00cm
13. A boy look at the image of an object in a plane mirror. He observes two images, a main bright one and the other faint. The observed images result from [A] reflection only [B] refraction only [C] diffraction and interference [D] reflection and refraction
14. What must be the distance between an object and a converging lens of focal length 20cm to produce an erect image two times the object height [A] 20cm [B] 15cm [C] 10cm [D] 5cm
15. For a short sighted person, light rays from a point on a very distant object is focused. [A] in front of the retina [B] on the retina by a converging lens [C] behind the retina by a diverging lens [D] in front of the retina at a distance of 2F from the lens
16. When light is incident on an object which is magenta in colour, which of the following colours would be absorbed? [A] red and blue [B] green only [C] red and green [D] red only
17. In a resonance tube experiment, the effective length of the air column for the first resonance is 20cm when set into vibration by a tuning fork of frequency 480Hz. Neglecting end effect the velocity of sound in air is [A] 96ms^{-1} [B] 255ms^{-1} [C] 340ms^{-1} [D] 384ms^{-1}
18. A sonometer wire of length 100cm under a tension of 10N, has a frequency of 250Hz. Keeping the length of the wire constant, the tension is adjusted to produce a new frequency of 350Hz. The new tension is [A] 5.1N [B] 7.1N [C] 14.0N [E] 19.6N
19. One of the properties of the earth's magnetic field is that the [A] north pole lies in the northern hemisphere [B] geographic and magnetic meridians coincide [C] earth's magnetic flux is entirely horizontal at a place where the magnetic dip is zero [D] earth's magnetic flux is entirely vertical at a place where the magnetic dip is zero.
20. Three cells each of e.m.f 1.5V and an internal resistance of 1.0 Ω are connected in parallel across a load resistance 2.67 Ω . Calculate the current in the load [A] 0.26A [B] 0.41A [C] 0.50A [D] 0.79A
21. Which of the following structures is capable of producing more tissues in the stem of a herbaceous flowering plant? [A] epidermis [B] pericycle [C] xylem [D] cambium
22. The manufacture of carbohydrates by plants takes place only in [A] the leaves [B] the green stems [C] chlorophyllous parts [D] flowering plants kidney
23. In a water culture experiment, a plant showed poor growth and yellowing of the leaves. These may be due to deficiency of (A) Copper (B) iron (C) Magnesium (D) Calcium
24. In Million's test, when the reagent is added to a protein food item, a white precipitate is produced which turns [A] blue on heating [B] yellow on heating [C] green on heating [D] red on heating
25. Regulation of blood sugar level takes place in the [A] pancreas [B] ileum [C] liver [D] kidney
26. Unicellular organisms transport essential nutrients directly to all parts of their bodies by the process of diffusion because they have [A] a large volume to surface area ratio [B] a large surface area to volume ratio [C] their bodies immersed in the nutrients [D] their outer membrane made of cellulose
27. The heart of the adult frog consists of [A] two auricles and two ventricle [B] one auricle and one ventricle [C] two ventricles and one auricle [D] one ventricle and two auricles
28. In adult mammalian blood, the cells which lack nuclei are the [A] erythrocytes [B] lymphocytes [C] leucocytes [D] phagocytes
29. Which of the following movements occur during exhalation? [a] the diaphragm and intercostals muscles relax [B] the thoracic cavity increases in volume [C] the diaphragm and intercostals muscles contract [D] the diaphragm contracts and the intercostals muscles relax
30. In which of the following groups of animals is the Malpighian tubule found? [A] lizards, snakes and frogs [B] crickets, house flies and grasshoppers [C] millipedes, centipedes and scorpions [D] earthworms, roundworms and flatworms
31. A government spokesman announced that efforts _____ the release of the hostages are continuing [A] to obtain [B] in obtaining [C] for obtaining [D] of obtaining
32. I know you think I'm talking nonsense, Sheba, but _____ you'll realize that I was right [A] at one time [B] on time [C] in time [D] at times
33. The inspector of Education who made several trips on the bad road returned yesterday completely _____ by fever. [A] brought down [B] put down [C] worn down [D] worn off
34. The vice principal asked the students to always _____ their answers only from the textbooks recommended for the course [A] look out [B] search out [C] look up [D] bring up
35. I know that your friend will not accept the proposal, _____ [A] and you neither [B] and neither you [C] neither do you [D] neither will
36. Mark is a very handsome fellow who informs me that he has _____ 'for pretty girls [A] a heart [B] a lip [C] an eye [D] a check
37. Wale Agun, in creating his characters, draws freely _____ his experience in life [A] by [B] in [C] on [E] of
38. When I have an appointment with someone, I hate _____ waiting [A] to be keeping [B] for being kept [C] being kept [D] in being kept

39. It's no good _____ about the result until you have sat for the examination [A] to worry [B] for worrying [C] worrying [D] to have
40. If you don't want to _____ your car to robbers, then don't travel in the night [A] loose [B] loss [C] lose [D] lost
41. The number 25 when converted from the tens and units base to the binary base (base two) is one of the following. [A] 10011 [B] 111011 [C] 111000 [D] 11001 [E] 110011
42. Evaluate $(6.3 \times 10^5) / (81 \times 10^3)$ to 3 significant figures [A] 77.80 [B] 778.0 [C] 7.870 [D] 8.770 [E] 88.70
43. The positive root of the following equation, $4t^2 + 7t - 1 = 0$, correct to 4 places of decimal, is [A] 1.0622 [B] 10.6225 [C] 0.1328 [D] 0.3218 [E] 2.0132
44. The difference between the length and width of a rectangle is 6cm and the area is 135cm^2 . What is the length? [A] 25cm [B] 18cm [C] 15cm [D] 24cm [E] 27cm
45. The first term of an Arithmetic Progression is 3 and the fifth term is 9. Find the number of terms in the progression if the sum is 81. [A] 12 [B] 27 [C] 9 [D] 4 [E] 36
46. The difference between $4\frac{5}{7}$ and $2\frac{1}{4}$ greater than the sum of $\frac{1}{14}$ and $\frac{1}{2}$ [A] $\frac{23}{28}$ [B] $\frac{24}{28}$ [C] $\frac{50}{56}$ [D] $\frac{27}{28}$ [E] $\frac{48}{56}$
47. Multiply $x^2 + x + 1$ by $x^2 - x + 1$. [A] $x^4 + 3x^2 + x + 1$ [B] $x^4 + x^2 + 1$ [C] $x^4 + 4x^2 - 6x + 1$ [D] $x^4 - 6x^2 - 4x + 1$ [E] $x^4 - x^2 - 3x^2 + 1$
48. A baking recipe calls for 2.5 kg of sugar and 4.5 kg flour. With this recipe some cakes were baked using 24.5 kg of a mixture of sugar and flour. How much sugar was used? [A] 12.25g [B] 6.5 kg [C] 8.75 kg [D] 15.75 kg [E] 8.25 kg
49. The sum of the roots of a quadratic equation is 512 and the product of its roots is 4. The quadratic equation is [A] $2x^2 + 5x + 8 = 0$ [B] $2x^2 - 5x + 8 = 0$ [C] $2x^2 - 8x + 50 = 0$ [D] $2x^2 + 8x - 5 = 0$ [E] $2x^2 - 5x + 8 = 0$ [F] $2x^2 - 5x - 8 = 0$
50. Solve the given equation $(\log_3 x)^2 - 6 \log_3 x + 9 = 0$ [A] 27 [B] 9 [C] $\frac{1}{27}$ [D] 18 [E] 81

FUTO 2010/2011 POST-UTME SCREENING DAY 3C TYPE C, THURSDAY 29TH JULY, 2010.

TIME: 35MINS

CHEMISTRY

1. D
2. $\text{pH} = -\log \text{H}^+$
 $\text{H}^+ = 0.25 \text{mol/dm}^3 = 2.5 \times 10^{-1}$
 $\log \text{H}^+ = 2.5 + \log 10^{-1} = 0.4 - 1 = -0.60$
 $\text{pH} = 0.60$
 But $\text{pH} + \text{pOH} = 14$
 $\text{pOH} = 14 - 0.60 = 13.40 \dots \text{B}$
3. $\text{MnO}_4^{2-} + 8\text{H}^+ + 5\text{e}^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O} \dots \text{C}$
4. D
5. $H = mc\theta$
 $= -50 \times 4.2 \times 14.3 = 3003 \text{kJ/mol} \dots \text{C}$
6. C
7. D
8. C
9. C
10. D
11. B
12. $\frac{\text{Object height}}{\text{Image height}} = \frac{\text{Object distance}}{\text{Image distance}}$
 $\frac{3}{\text{Image height}} = \frac{10}{40}$
 $\therefore \text{Image height} = 12 \text{cm} \dots \text{D}$
13. A
14. $f = \frac{uv}{u+v}$ but $v = 2u$
 $20 = \frac{u \times (-2u)}{u + (-2u)} \Rightarrow u = 10 \text{cm} \dots \text{C}$
15. A
16. B
17. $\lambda = 4(1+c)$ here $c = 0$; $\lambda = 4 \times 20 = 80 \text{cm}$
 $V = \lambda f = 80 \times 10^{-2} \times 480 = 384 \text{m/s} \dots \text{D}$
18. $\frac{F_1}{F_2} = \sqrt{\frac{T_1}{T_2}} = \frac{250}{350} = \sqrt{\frac{10}{7}}$
 $\therefore T_2 = 19.6n \dots \text{D}$
19. C

20. $E = 1.5\text{V}$, Total $R = \frac{1}{\frac{1}{(1)(1)(1)}} = \frac{1}{3}$

$\text{Emf} = \frac{1}{R} \Rightarrow 1.5 = \frac{1}{0.332}$
 $\therefore I = 0.5\text{A} \dots \text{C}$

BIOLOGY

21. D 22. C 23. C 24. D 25. C
 26. B 27. D 28. A 29. A 30. B

ENGLISH

31. A 32. C 33. C 34. C 35. D
 36. C 37. C 38. C 39. C 40. C

MATHEMATICS

41. $(25)_{10} \rightarrow ()_2$

2	25 R 1
2	12 R 1
2	6 R 0
2	3 R 0
2	1 R 1

 $\Rightarrow 11001 \dots \text{D}$
42. $\frac{6.3 \times 10^5}{8.1 \times 10^3} = \frac{630000}{8100} = 77.80 \dots \text{A}$
43. $4t^2 + 7t - 1 = 0$
 $a = 4, b = 7, c = 1$
 But $t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{7 \pm \sqrt{7^2 - 4(4)(-1)}}{2(4)}$
 $t = 0.1328 \dots \text{C}$
44. Area = $L \times B$
 $L - B = 6$
 $\therefore L = 6 + B$
 Area = $135 = B(6+B)$
 $B^2 + 6B - 135 = 0$ solving gives $B = 9$
 $\therefore L = 6 + 9 = 15 \dots \text{C}$
45. $a = 3, U_5 = 9$
 But $U_5 = a + (n-1)d \Rightarrow 3 + (5-1)d = 9$
 $3 + 4d = 9 \Rightarrow d = 3/2$
 Also, $S_n = \frac{n}{2}[2a + (n-1)d]$

$$81 = \frac{n}{2}[2 \times 3 + (n-1)3]$$

$$162 = n(6 + 1.5n - 1.5)$$

$$162 = n(4.5 + 1.5n)$$

$$162 = 4.5n + 1.5n^2 \text{ solve with quadratic formula to get}$$

$$N = 9 \dots\dots\dots C$$

46. Difference between $4^{5/7}$ and $2^{1/4}$ is

$$\frac{3^3}{7} - \frac{9}{4} = \frac{69}{28}$$

The sum of $1/14$ and $1/2$ is

$$1/14 + 3/2 = 11/7$$

$$\therefore \frac{69}{28} - \frac{11}{7} = \frac{25}{28} = \frac{50}{56} \dots\dots\dots C$$

$$47. (x^2 + x + 1)(x^2 - x + 1)$$

$$= x^4 - x^3 + x^2 + x^3 - x^2 + x + x - 1$$

$$= x^4 + x^2 + 1 \dots\dots\dots B$$

48. Sugar : Flour

$$2.5 : 4.5 \text{ (sum of ratio} = 2.5 + 4.5 = 7)$$

$$\text{Sugar used} = \frac{2.5}{7} \times 24.5 = 8.75\text{kg} \dots\dots\dots C$$

49. Let the two roots be x and y

$$x + y = 5/2 \dots\dots\dots (1)$$

$$xy = 4 \dots\dots\dots (2)$$

$$\text{from (2), } y = 4/x \dots\dots\dots (3)$$

substitute in (1)

$$x + \frac{4}{x} = \frac{5}{2}$$

$$\Rightarrow 2x^2 + 8 = 5x$$

$$\Rightarrow 2x^2 - 5x + 8 = 0 \text{ or use}$$

$$X^2 - (5/2)x + 4$$

$$2x^2 - 5x + 8 = 0 \dots\dots\dots B$$

$$50. (\log_3 x)^2 - 6\log_3 x + 9 = 0$$

$$\text{Let } \log_3 x = y$$

$$y^2 - 6y + 9 = 0 \text{ solving}$$

$$(y - 3)(y - 3) = 0; \therefore y = 3$$

$$\text{But } \log_3 x = y$$

$$\therefore \log_3 x = 3$$

$$3^3 = x \Rightarrow x = 27 \dots\dots\dots A$$

FUTO 2009/2010 POST- UME SCREENING

Answer all questions: shade the answer sheet as appropriate with HB pencil only

Sat. 04th July, 2009 Time Allowed: 1 Hour

- Which of the following is not an example of a force? (A) tension (B) weight (C) friction (D) mass (E) thrust
- A body moves along a circular path with uniform angular speed of 0.6 rads⁻¹ and at a constant speed of 3.0ms. Calculate the acceleration of the body towards the centre of the circle (A) 25.0ms⁻¹ (B) 5.4 ms⁻¹ (C) 5.0ms⁻¹ (D) 1.8ms⁻¹ (E) 0.2ms⁻¹
- Which of the following is a derived Unit? (A) Ampere (B) kilogramme (C) second (D) Ohm (E) Kelvin
- A boy timed 20 oscillations of a certain pendulum three times and obtained 44.3s, 45.5s and 45.7s respectively. Calculate the mean period of oscillation of the pendulum. (A) 0.13s (B) 2.22s (C) 2.26s (D) 44.30s (E) 45.17s
- A particle starts from rest and moves with a constant acceleration of 0.5ms⁻². Calculate the time taken by the particle to cover a distance of 25m (A) 2.5s (B) 7.1s (C) 10.0s (D) 50.0s (E) 100.0s
- A block of material of volume 2 x 10⁻⁵m³ and density 2.5 x 10³kgm⁻³ is suspended from a spring balance with half the volume of the block immersed in water. What is the reading of the spring balance? (Density of water 1.0 x 10³kg⁻³, g = 10ms⁻²) (A) 0.10N (B) 0.25N (C) 0.30N (D) 0.40N (E) 0.50N
- An object is projected with a velocity of 100ms⁻¹ from the ground level at an angle to the vertical. If the total time of flight of the projectile is 10s, calculate (g = 10ms⁻¹) (A) 0° (B) 30° (C) 45° (D) 60° (E) 90°
- How far will a body move in 4 seconds if uniformly accelerated from rest at the rate of 2ms⁻²? (A) 32m (B) 24m (C) 16m (D) 12m (E) 8m
- If the temperature of water is gradually increased from 0° to 40C, the density of the water within this range (A) increases for a while and then decreases (B) decreases for a while and then increases (C) increases gradually (D) decreases gradually (E) remains the same
- The expansion of solids can be considered a disadvantage in the (A) fire alarm system (B) thermostat (C) riveting of steel plates (D) balance wheel of a watch (E) fitting of wheels on rims
- A solid metal cube of side 10cm is heated from 10°C to 60°C, if the linear expansivity of the metal is 1.2 x 10⁻⁵K⁻¹, calculate the increase in its volume (A) 0.6cm³ (B) 1.2cm³ (C) 1.8cm³ (D) 3.6cm³ (E) 6.0cm³
- A gas has a volume of 546cm³ at 0°C. What is the volume of the gas at -100°C if its pressure remains constant? (A) 346cm³ (B) 446cm³ (C) 546cm³ (D) 646cm³ (E) 746cm³
- An image which cannot be formed on a screen is said to be (A) inverted (B) real (C) virtual (D) erect (E) blurred
- Longitudinal waves cannot be (A) diffracted (B) refracted (C) polarized (D) reflected (E) superposed
- The images formed by a diverging lens are always (A) diminished, virtual and inverted (B) diminished, inverted and real, (C) diminished virtual and erect (D) magnified, virtual and erect (E) magnified, real and inverted
- In the normal use of a simple microscope, a person sees an (A) inverted, virtual and magnified image (B) erect, virtual and magnified image (C) erect, real and magnified image (D) inverted, real and magnified image (E) inverted and real image the same size as the object
- A lens of focal length 15.0cm forms an upright image four times the size of an object. Calculate the distance of the image from the lens (A) 11.3cm (B) 18.8cm (C) 37.5cm (D) 45.0cm (E) 75.0cm

18. An object is placed between two mirrors which are inclined at an angle of 120° facing each other. Determine the number of images observed in two mirrors (A) 1 (B) 2 (C) 3 (D) 4 (E) 5
19. In a ripple tank-experiment, a vibrating plate is used to generate ripples in the water, if the distance between two successive troughs is 3.5cm and the wave travels a distance of 31.5cm in 1.5s, calculate the frequency of the vibrator (A) 3.0Hz (B) 6.0Hz (C) 12.0Hz (D) 27.0Hz (E) 73.5Hz
20. Which of the following have the longest wavelengths? (A) infra-red rays (B) gamma rays (C) x-rays (D) ultra-violet rays (E) radio waves
21. Simplify $125 \cdot \frac{1}{3} \times 49 \cdot \frac{1}{2} \times 10^0$ (A) 350 (B) 35 (C) $\frac{1}{35}$ (D) $\frac{1}{350}$ (E) 0
22. If $32x = 27$, what is x ? (A) 1 (B) 1.5 (C) 4.5 (D) 18 (E) 140.5
23. Express 0.00562 in standard form (A) 5.6240^{-3} (B) 5.62×10^{-2} (C) 5.62×10^{-2} (D) 5.62×10^2 (E) 5.62×10^3
24. Given that $\frac{1}{3} \log_{10} P = 1$, find the value of P. (A) $\frac{1}{10}$ (B) 3 (C) 10 (D) 100 (E) 1000
25. Simplify: $\log_8 \frac{1}{2}$ (A) $\frac{1}{3}$ (B) $\frac{1}{2}$ (C) $\frac{1}{31} \log_2$ (D) $\frac{1}{2} \log_2$
26. If $\log x = 2.3675$ and $\log y = 0.9750$, find $x + y$, correct to three significant figures (A) 1.18 (B) 1.31 (C) 9.03 (D) 9.44 (E) 9.46
27. While doing his Physics practical, Idowu recorded a reading as 1.12cm instead of 1.21cm. Calculate his percentage error (A) 1.17% (B) 6.38% (C) 7.44% (D) 8.05% (E) 9.00%
28. Find the 4th term of an AP whose first term is 2 and the common difference is 0.5 (A) 0.5 (B) 2.5 (C) 3.5 (D) 41 (E) 4.5
29. An arc of length 22cm subtends an angle of θ at the centre of the circle. What is the value of θ if the radius of the circle is 15cm? (Take $\frac{22}{7}$) (A) 700° (B) 84° (C) 96° (D) 156° (E) 168°
30. Find the sum of the first five terms of the GP 2, 6, 18. (A) 484 (B) 243 (C) 242 (D) 130 (E) 121
31. Let I be the set of positive integers. If $H = \{x : x \in J, x^2 < 3 \text{ and } x > 0\}$ then (A) I (B) H is an infinite set (C) $H = \{0, 1, 2\}$ (D) $H = \{\}$ (E) JH
32. In a class of 80 students, every student had to study Economics or Geography, or both Economics and Geography. If 65 students studied Economics and 50 studied Geography, how many studied both subjects? (A) 15 (B) 30 (C) 35 (D) 45 (E) 50
33. Factorize $x^2 + 4x - 192$ (A) $[x-4][x+48]$ (B) $[x-48][x+4]$ (C) $[x-12][x-16]$ (D) $[x-12][x-16]$ (E) $[x+12][x+16]$
34. Factorize $2e^2 - 3e + 1$ (A) $[2e-1][e-1]$ (B) $[e+1][2e+1]$ (C) $[2e+3][3-2]$ (D) $[2e-3][e-1]$ (E) $[e-3][2e-1]$
35. Solve the equation $7y^2 = 3y$. (A) $y = 3$ or 7 (B) $y = 0$ or 7 (C) $y = 0$ or $\frac{3}{7}$ (D) $y = 0$ or 9 (E) $y = 0$ or 10
36. Solve the equation $2a^2 - 3a - 27 = 0$ (A) $\frac{3}{2}, 9$ (B) $-\frac{2}{3}, 9$ (C) $\frac{3}{2}, \frac{9}{2}$ (D) $-3, -\frac{9}{2}$ (E) $-3, \frac{9}{2}$
37. A sector of a circle of radius 7cm has an area of 44cm^2 . Calculate the angle of the sector, correct to the nearest degree. (A) 6° (B) 26° (C) 52° (D) 103° (E) 206°
38. If the shadow of a pole 7m high is $\frac{1}{2}$ its length, what is the angle of elevation of the sun, correct to the nearest degree? (A) 90° (B) 63° (C) 60° (D) 26° (E) 0°
39. From the top of a building 10m high, the angle of depression of a stone lying on the horizontal ground is 69° . Calculate, correct to 11 decimal places, the distance of the stone from the foot of the building (A) 3.6m (B) 3.8m (C) 6.0m (D) 9.3m (E) 26.1m
40. The bearing of a point X from Y is 074° . What is the bearing of Y from X? (A) 106° (B) 148° (C) 164° (D) 254° (E) 286°
41. The nucleus is considered the central organelle of a cell because it (A) contains the genetic material (B) contains the nuclear sap (C) is bounded by the nuclear membrane (D) is located at the centre of the cell
42. The prokaryotic cell type is characterized by (A) complex cytoplasm in which different regions are poorly defined (B) localization of different regions of the cell into tissues (C) collection of organelles and macromolecular complexes (D) simple cytoplasm with well defined regions
43. The natural tendency of organisms as they evolve is to (A) decrease in size (B) increase in number (C) develop specialized structures (D) feed indiscriminately
44. In snails, the hard calcareous shells are secreted by the (A) radula (B) tentacles (C) pneumostome (D) mantle
45. The ability of the cockroach to live in cracks and crevices is enhanced by the possession of (A) wings and segmented body (B) compound eyes (C) claws on the dorso-ventrally flattened body
46. The caste of termites that lacks pigmentation is the (A) king (B) soldier (D) queen
47. The structures that prevent food particles from escaping through the fish gills are called gill (A) arches (B) filaments (C) rakers (D) lamellae
48. A distinguishing feature of mammals is the possession of (A) skin (B) scale (C) nail (D) hair
49. Which of the following structures is capable of producing more tissues in the stem of a herbaceous flowering plant? (A) epidermis (B) pericycle (C) xylem (D) cambium
50. The manufacture of carbohydrates by plants takes place only in (A) the leaves (B) the green stems (C) chlorophyllous parts (D) flowering plants
51. In a water culture experiment, a plant showed poor growth and yellowing of the leaves. These may be due to deficiency of (A) copper (B) iron (C) magnesium (D) calcium
52. In Millon's test, when the reagent is added to a protein food item, a white precipitate is produced which turns (A) blue on heating (B) yellow on heating (C) green on heating (D) red on heating

53. Regulation of blood sugar level takes place in the
(A) pancreas (B) ileum (C) liver (D) kidney

TYPE D

54. Unicellular organisms transport nutrients directly to all parts of their bodies by the process of diffusion because they have (A) a large volume of surface area ratio (B) a large surface area to volume ratio (C) their bodies immersed in the nutrients (D) their outer membrane made of cellulose.
55. The heart of the adult frog consists of (A) two auricles two ventricles (B) one auricle and one ventricle (C) two ventricles and one auricle (D) one ventricle and two auricles
56. In adult mammalian blood, the cell which lack nuclei are the (A) erythrocytes (B) lymphocytes (C) leucocytes (D) phagocytes
57. Which of the following movements occur during exhalation? (A) the diaphragm and muscles relax (B) the thoracic cavity increases in volume (C) the diaphragm and intercostals muscles contract (D) the diaphragm contract and the intercostals relax
58. Which of the following groups of animals is the Malpighian tubule found? (A) lizards, snakes and frogs (B) crickets, house flies and grasshoppers (C) millipedes, centipedes and scorpions (D) earthworms, roundworms and flatworms.
59. Which of the following is not a function of the mammalian skeleton? (A) protection (B) respiration (C) transportation (D) support
60. The most reliable estimate of growth is by measuring changes in (A) length (B) volume (C) surface area (D) dry weight
61. Which of the following is a physical change? (A) the bubbling of chlorine into water (B) the bubbling of chlorine into a jar containing hydrogen (C) the dissolution of sodium chloride in water (D) the passing of steam over heated iron
62. In the reaction $\text{SnO}_2 + 2\text{C} \rightarrow \text{Sn} + 2\text{CO}$, the mass of coke containing 80% carbon required to reduce 0.302kg of pure tin oxide is (A) 40kg (B) 0.20kg (C) 0.06kg (D) 0.04kg (Sn = 119; O = 16, C = 12)
63. The Avogadro number of 24g of magnesium is the same as that of (A) 1 g of hydrogen molecules (B) 16g of oxygen molecule (C) 12g of carbon molecules (D) 35.5g of chlorine molecules.
64. If gas occupies a container of volume 146cm³ at 18°C and 0.971 at its volume in cm³ at S.T.P is (A) 133 (B) 146 (C) 266 (D) 292
65. The volume occupied by 1.58g of a gas at S.T.P is 500cm³. What is the relative molecular mass of the gas? (A) 28 (B) 32 (C) 44 (D) 71 {G.M.V. at S.T.P. = 22.40dm³}
66. Equal volumes of CO₂, SO₂, NO₂, and H₂S were released into a room at the same point and time. Which of the following gives the order of diffusion of the gases to the opposite corner of the room (A) CO, SO₂, NO₂, H₂S (B) SO₂, NO₂, SO₂, H₂S, CO (C) CO, H₂S, SO₂, NO₂, (D) CO, H₂S, NO₂, SO₂ {S=32, C=12, O=16, N=14, H=1}

67. A basic postulate of the kinetic theory of gases is that the molecules of a gas move in straight lines between collisions. This implies that (A) collisions are perfectly elastic (B) forces of repulsion exist (C) forces of repulsion and attraction are in equilibrium (D) collisions are inelastic
68. Which of the following terms indicates the number of bonds that can be formed by an atom? (A) oxidation number (B) valence (C) atomic number (D) electronegativity
69. X(g) → X(s). The type of energy involved in the above transformation is (A) ionization energy (B) Sublimation energy (C) lattice energy (D) electron affinity
70. Chlorine, consisting of two isotopes of mass number 35 and 37, has an atomic mass of 35.5. The relative abundance of the isotopes of mass number 37 is (A) 20 (B) 25 (C) 50 (D) 15
71. 10.0dm³ of air containing H₂S as an impurity was passed through a solution of Pb(NO₃)₂ until all the H₂S had reacted. The precipitate of PbS was found to weigh 5.02g. According to the equation, $\text{Pb}(\text{NO}_3)_2 + \text{H}_2\text{S} \rightarrow \text{PbS} + 2\text{HNO}_3$, the percentage by volume of hydrogen sulphide (A) 50.2 (B) 47.70 (C) 4.70 (D) 0.47 {Pb = 207, S = 32 GMVat S.T.P = 22.4dm³}
72. A blue solid, T which weighed 5.0g was placed on a table. After 8 hours, the resulting pink solid was found to weigh 5.5g, it can be inferred that substance T (A) is deliquescent (B) is hygroscopic (C) has some molecules of water of crystallization (D) is efflorescent
73. The effluent of an industrial plant used in the electrolysis of concentrated brins, with a flowing mercury cathode may contain impurities like (A) oxygen (B) hydrogen (C) mercury (II) oxide (D) hydrogen chloride
74. The solubility in moles per dm³ of 20g of CuSO₄ dissolved in 100g of water at 1800° is (A) 0.13 (B) 0.25 (C) 0.25 (D) 2.00 {Cu = 63.5, S = 32, O = 16}
75. Smoke consists of (A) solid particle dispersed in liquid (B) solid or liquid particles dispersed in gas (C) gas or liquid particles disperse in liquid (D) liquid particles dispersed in liquid
76. $\text{Na}_2\text{C}_2\text{O}_4 + \text{CaCl}_2 \rightarrow \text{CaC}_2\text{O}_4 + 2\text{NaCl}$. Given a solution of 1.9g of sodium oxalate in 50g of water at room temperature, calculate the minimum volume of 0.1 M calcium chloride required to produce maximum calcium oxalate using the above equation. (A) 1.40 x 10²dm³ (B) 1.40 x 10²cm³ (C) 1.40 x 10⁻²dm³ (D) 1.40 x 10⁻²cm³
77. 2.0g of a monobasic acid was made up to 250cm³ with distilled water 25.00cm³ of this solution required 20.00cm³ of 0.1 M NaOH solution for complete neutralization. The molar mass of the acid is (A) 200g (B) 150g (C) 100g (D) 50g

78. What is the concentration of H⁺ ions in moles per dm³ of a solution of pH 4.398? (A) 4.0 x 10⁻⁵ (B) 0.4 x 10⁵ (C) 4.0 x 10⁻³ (D) 0.4 x 10⁻³)
79. What volume of 11.0M hydrochloric acid must be diluted to obtain 1dm³ of 0.05M acid? (A) 4.54cm³ (B) 5.65cm³ (C) 6.76cm³ (D) 7.87cm³
80. If 1 0.8g of silver is deposited in a silver coulometer connected in series with a copper coulometer, the volume of oxygen liberate is (A) 0.56dm³ (B) 5.60dm³ (C) 11.20dm³ (D) 22.40dm³ (Ag = 108; Cu = 64; GWVatS.T.P. 22.40dm³)

Instruction: Choose the word opposite in meaning to the underlined word.

81. The young engineer is good at terminating other people's projects but has been capable of _____ any of his. (A) integrating (B) finishing (C) completing (D) initiating (E) organizing
82. The manger who expected to be given respect was treated with _____ (A) dignity (B) scorn (C) shame (D) cruelty (E) disloyalty
83. Those who has invitation cards were admitted to the party while those who had none were _____ (A) barred (B) repelled (C) expelled (D) compelled (E) restricted
84. Nobody expects him to show _____ for his children but he certainly bestows too much affection on them. (A) love (B) concern (C) intimacy (D) devotion (E) hatred
85. The challenger was crude and inexperienced in contrast to the champion who was _____ (A) great (B) exposed (C) celebrated (D) refined (E) strong

From the words lettered A to E, choose the word that best completes each of the following sentences.

86. The fishermen threw a stone into the river and this caused a _____ (A) sprinkle (B) sparkle (C) splash (D) spring (E) storm
87. The play was so interesting that the _____ clapped for quite a long time at the end (A) spectators (B) watchers (C) congregation (D) people (E) audience
88. The building _____ because of weak structural foundation (A) tumbled (B) succumbed (C) somersaulted (D) collapsed (E) caved
89. The magazine was _____ by the government for an offensive publication. (A) proscribed

(B) proscribed (C) suspended (D) condemned (E) persecuted

90. Many people reacted to the brutal murder of the popular journalist with strong _____ (A) indignation (B) demonstration (C) mobilization (D) condemnation (E) accusation

From the words or groups of words lettered A to E below each of the following sentences, choose the word or group of words that is nearest in meaning to the underlined word or group of words as used in the sentence.

91. It takes a great deal of stamina to run the marathon race (A) courage (B) determine (C) energy (D) intelligence (E) cleverness
92. But for the principal actor the play would have been dull. (A) important (B) head (C) master (D) famous (E) main
93. An open car has no protection against the elements (A) weather (B) emergency (C) molecule (D) atoms (E) atmosphere
94. He was reluctant to grant my request disposed (B) delighted (C) reticent (D) unwilling (E) agreeable
95. The detective was detective was perplexed when the clues in the murder case pointed to at least a dozen different suspects (A) surprised (B) confused (C) excited (D) discouraged (E) disappointed
96. The Military Governor called for a concerned effort in solving the problem of the state. (A) a dramatic (B) an agitated (C) a joint (D) a directed (E) an unfailling
97. My financial situation is so precarious that very soon I may be insolvent (A) borrowing (B) stealing (C) soluble (D) dependent (E) bankrupt
98. The chairman is of the opinion that accepting the proposal would be inimical to the objectives of the association (A) harmful (B) relevant (C) irrelevant (D) indispensable (E) helpful
99. The famous political was noted for his pragmatic approach to issues of national interest (A) idealistic (B) romantic (C) compromising (D) practical (E) inconsistent
100. Kunle is very pessimistic about our chance of success (A) sad (B) despondent (C) unconvinced (D) worried (E) concerned

FUTO POST-UME SCREENING 2009/2010 SAT 4TH JULY, 2009, TIME: 1HR

PHYSICS

1. D
2. $\omega = 0.6\text{ra/s}$, $v = 3.0\text{m/s}$, but $a = v^2/r$
3. D
4. Average period = $\frac{44.3+45.5+45.7}{3}$
 $t = 45.17$ but $T = t/n$ and for 20 oscillations
 $T = 45.17/20 = 2.26\text{secs} \dots\dots\dots C$
5. $U = 0$, $a = 0.5\text{m/s}^2$, $s = 25$
 $S = u + \frac{1}{2}at^2 \Rightarrow s = \frac{1}{2}at^2$
 $2s = at^2 \Rightarrow t = \sqrt{\frac{2s}{a}} = \sqrt{\frac{2 \times 25}{0.5}} = 10\text{sec} \dots C$

6. Volume = $2 \times 10^{-5}\text{m}^3$, $\rho = 2.5 \times 10\text{kg/m}^3$,
 $\rho_{\text{water}} = 1 \times 10^3\text{kgm}^{-3}$, $g = 10$
 Volume immersed in water = $\frac{2 \times 10^{-5}}{2} - 1 \times 10^{-5}\text{m}^3$
 But $\rho = m/v \therefore$ Mass of water displaced = $\rho \times v$
 $= 1 \times 10^3 \times 1 \times 10^{-5} = 10^{-2}\text{kg}$
 Upthrust $F = mg = 10^{-2} \times 10 = 0.1\text{N}$
 Mass of block = $\rho \times v = 2.5 \times 10^3 \times 2 \times 10^{-5} = 0.05\text{kg}$
 Therefore weight of block $w = mg = 0.05 \times 10 = 0.5\text{N}$
 Tension = weight of object - upthrust = $0.5 - 0.1$

7. $T = \frac{2u \sin \theta}{g} \Rightarrow \theta = \sin^{-1} \frac{Tg}{2u}$
 $= \frac{1010}{2100} \Rightarrow \theta = \sin^{-1} 0.5 \Rightarrow \theta = 30^\circ \dots\dots B$

8. $a = 2m/s^2, t = 4secs, u = 0$
 $s = ut + \frac{1}{2}at^2$ at $u = 0$
 $s = \frac{1}{2}at^2 \Rightarrow s = \frac{1}{2} \times 2 \times 4^2 = 16m \dots\dots C$

9. C Anomalous expansion

10. C

11. $\gamma = 3\alpha = 3 \times 1.2 \times 10^{-5} = 3.6 \times 10^{-5}/K$
 $\theta = T_2 - T_1 = 60 - 10 = 50^\circ C$
 Volume of cube = $a^3 = 10^3 cm^3$
 But $\gamma = \frac{V_2 - V_1}{V_1 \theta}$
 $V_2 - V_1 = \gamma V_1 \theta = 3.6 \times 10^{-5} \times 10^3 \times 50 = 1.8 cm^3 \dots\dots C$

12. $V_1 = 546 cm^3, T_1 = 0^\circ C = 273K, T_2 = -100^\circ C = 173K$
 But $\frac{V_1}{T_1} = \frac{V_2}{T_2} \Rightarrow V_2 = \frac{V_1 T_2}{T_1} = \frac{546 \times 173}{273} = 346 cm^3 \dots\dots A$

13. C

14. C

15. C

16. B

17. $f = \frac{uv}{u+v}$ but $v = -4u$ (-ve for upright image)
 $f = \frac{-4u^2}{u + (-4u)} \Rightarrow 15 = \frac{-4u^2}{-3u}$
 $u = 45/4 = 11.3$

Hence $v = 4u = 11.3 \times 45.2 \dots\dots D$

18. $n = \frac{360}{\theta} - 1 \Rightarrow \frac{360}{120} - 1 = 4 - 1 = 3 \dots\dots C$

19. Wavelength $\lambda = \text{distance} / \text{time} = 31.5 / 1.5 = 21m/s$
 But $V = f\lambda \Rightarrow f = v/\lambda = 21/3.5 = 6Hz \dots\dots B$

20. From RIVUX - G? Increasing wavelength $\dots\dots C$

MATHEMATICS

21. $125^{-1/3} \times 49^{-1/2} \times 10^0$
 $= \frac{1}{\sqrt[3]{125}} \times \frac{1}{49} \times 1$ (note $10^0 = 1$)
 $= \frac{1}{57} \times 1 = 1/57 \dots\dots C$

22. $3^{2x} = 27 \dots$ reduce to common base
 $3^{2x} = 3^3 \Rightarrow 2x = 3 \Rightarrow x = 3/2 = 1.5 \dots\dots B$

23. $0.00562 = 5.62 \times 10^{-3} \dots\dots A$

24. $\frac{1}{3} \log_{10} P = 1 \Rightarrow \log_{10} P^{1/3} = 1$ Apply log law
 $P^{1/3} = 10^1$
 $P^{1/3} = 10 \Rightarrow P = 10^3 = 1000 \dots\dots E$

25. $\frac{\log 8}{\log 8} \Rightarrow \frac{\log 8^{\frac{1}{2}}}{\log 8} = \frac{\frac{1}{2} \log 8}{\log 8}$
 But $\log 8 / \log 8 = 1; \Rightarrow \frac{1}{2} \times 1 = \frac{1}{2} \dots\dots B$

26. $\log x = 2.3675$ and $\log y = 0.9750$ but $\log x \times \log y = \log(x+y)$
 $\log(x+y) = 2.3675 \times 0.9750 = 2.3083125$
 $\therefore x+y = 10^{2.3083} = 203.381$

27. Error reading = 1.12cm
 Correct reading = 1.21cm
 Difference = 1.21 - 1.12 = 0.09
 $\% \text{ error} = \frac{\text{Difference in reading}}{\text{Actual reading}} \times 100\%$
 $= 0.09 / 1.21 \times 100 = 7.44\% \dots\dots C$

28. $a = 2, d = 0.5$ but $U_n = a + (n-1)d$
 $U_4 = a + (n-1)d = 2 + 3 \times 0.5 = 3.5 \dots\dots C$

29. Length of an arc, $L = \frac{\theta}{360} \times 2\pi r$
 $\theta = \frac{360L}{2\pi r} = \frac{360 \times 22}{2 \times \frac{22}{7} \times 15} = 84^\circ \dots\dots B$

30. $U_n = ar^{n-1}, a = 2, r = 3, U_3 = 18$
 $U_4 = 2 \times 3^{4-1} = 2 \times 3^3 = 54$
 $U_5 = 2 \times 3^{5-1} = 2 \times 3^4 = 162$
 $\therefore S_5 = 2 + 6 + 18 + 54 + 162 = 242 \dots\dots C$

31. $H = \{x: x \in J, x^2 < 3 \text{ and } x \neq 0\}$
 $H = \{1\} \dots\dots A$

32. $n(E) = 65, n(G) = 50, n(U) = 80$
 $80 = 65 - x + x + 50 - x$
 $115 - x = 80$
 $\therefore x = 35 \dots\dots C$

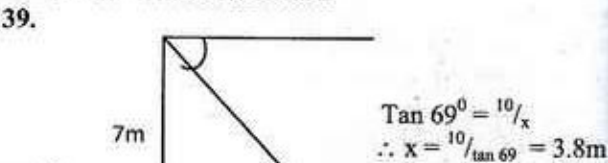
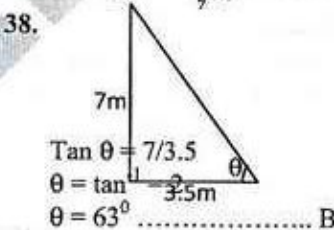
33. $x^2 + 4x - 192 = 0$
 Using Almighty Formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
 $= \frac{-4 \pm \sqrt{16 - 4 \times 1 \times (-192)}}{2 \times 1} \Rightarrow x = -16 \text{ and } 12 \text{ i.e.}$
 $(x+16)(x-12)$

34. $2e^2 - 3e + 1$, using formula $\frac{3 \pm \sqrt{9 - 4 \times 2 \times 1}}{2 \times 2}$
 $\therefore e = 1 \text{ and } \frac{1}{2} \text{ i.e. } (e-1)(2e-1) \dots\dots A$

35. $7y^2 - 3y \Rightarrow 7y^2 - 3y = 0$
 $y(7y - 3) = 0 \Rightarrow 0 \text{ and } 7y - 3 = 0$
 $\therefore y = \frac{3}{7} \dots\dots C$

36. $2s^2 - 3s - 27 = 0$ use formula
 $\frac{3 \pm \sqrt{9 - 4(2)(-27)}}{2 \times 2} \Rightarrow a = \frac{3 \pm 15}{4}$
 $a = -3 \text{ and } 9/2 \dots\dots E$

37. Area of a sector $A = \frac{\theta}{360} \times \pi r^2$
 $\therefore \theta = \frac{360A}{\pi r^2} = \frac{360 \times 44}{7 \times 7^2} = 103^\circ \dots\dots D$



$\dots\dots D$

40. D

BIOLOGY

41. A 42. A 43. C 44. D 45. D
 46. B 47. C 48. D 49. D 50. C
 51. C 52. D 53. C 54. B 55. D
 56. A 57. A 58. B 59. C 60. D

CHEMISTRY

61. C
 62. $\text{SnO}_2 + 2C \rightarrow \text{Sn} + 2CO$
 1 mole of SnO_2 reacts with 2 moles of C.
 Molar mass of $\text{SnO}_2 = 151g$
 Cake containing 80% C mass of carbon = $\frac{80}{100} \times 12 = 9.6$
 $\therefore 151g$ of SnO_2 reacts with 19.2 of carbon.

0.302kg of SnO₂ will react with $\frac{19.2 \times 0.302}{151}$
 = 0.038 = 0.04kg D

63. C

64. $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \Rightarrow V_2 = \frac{P_1 V_1 T_2}{T_1 P_2}$
 = $\frac{0.971 \times 146 \times 273}{1 \times 291} = 133 \text{cm}^3$ A

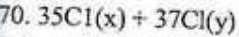
65. 500cm³ of the gas weighed 1.58g
 $\therefore 22400 \text{cm}^3$ of the gas weigh $\frac{22400 \times 1.58}{500} = 71 \text{g}$ D

66. D

67. A

68. B

69. D



$x + y = 1$

$35x + 37y = 35.5$

$\therefore Y = 0.25$ or 25% B

71. Molar mass of PbS = 239

Concentration of PbS = 5.02

Mole of PbS = $5.02/239 = 0.021$ moles

1M H₂S = 1M PbS

Volume of H₂S at stp = $0.021 \times 22.4 = 0.474 \text{dm}^3$

% by volume of H₂S = $\frac{0.474}{10} \times 100 = 4.7\%$ C

72. Solid T is cobalt II Chloride (blue) and water present in the salt turns T pink ... B

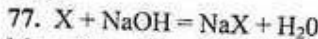
73. C

74. 100g H₂O dissolved 20g CuSO₄ or 200g/dm³

Solubility: $200/160 = 1.25 \text{m}$ 1dm³ C

75. B

76. C



$M_x = 0.1 \times 20 = 0.080 \text{m}$

Concentration of X = 2g/l

\therefore Amount of X = $\frac{2}{250 \times 10^{-3}} = 8 \text{g/dm}^3$

\therefore Molar mass = $\frac{\text{Amount of X}}{\text{Mole of X}} = \frac{8}{0.08} = 100 \text{g} \dots \text{C}$

78. $\text{pH} = -\log \text{H}^+ \Rightarrow 4.398 = -\log \text{H}^+$

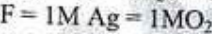
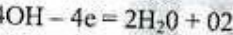
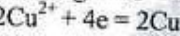
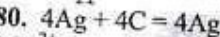
$\log \text{H}^+ = -4.398 \Rightarrow \text{H} = \text{Antilog}(-4.398)$

= 4×10^5 A

79. $M_0 V_0 = M_d V_d$

$11 V_0 = 0.05 \times 1000$

$\therefore \frac{0.05 \times 1000}{11} = 4.54 \text{cm}^3$ A



Mole of Ag = $10.8/108 = 0.10$ Cu

$0.1 \text{F} = 0.1 \text{Ag} = \frac{0.1}{4} \times 22.4 \text{dm}^3$ of O₂ = 0.56dm^3 A

ENGLISH

81. C 82. B 83. A 84. E 85. D

86. C 87. E 88. D 89. B 90. A

91. C 92. B 93. A 94. D 95. B

96. C 97. E 98. A 99. D 100. B

FUTO POST UTME SCREENING TEST 2007/2008
PLEASE ENSURE THAT YOU HAVE SUBMITTED ONE DOWNLOADED
ONLINE REGISTRATION FORM BEFORE AND AFTER THE EXAMINATION
TIME: 1Hour 30Mins.

Answer all questions

SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY

(EEE, CHM, MEE, MME, AGE, EVT, PET, PTE, CIE.).

- If $y = (1-2x)^3$, find the value of dy/dx at $x = -1$ A. 57 B. 27 C. -6 D. -54
- In how many ways can 6 colored chalks be arranged if 2 are of the same colour? A. 60 B. 120 C. 240 D. 360
- How many possible ways are there of seating seven people P, Q, R, S, T, U, V at a circular table? A. 360 B. 720 C. 2520 D. 5040
- What is the probability that an integer x , ($1 < x < 20$) chosen at random is divided by both 2 and 3? A. 1/20 B. 1/3 C. 3/20 D. 7/10
- Find ${}_{16}P_7$ A. 117₇ B. 114₇ C. 116₇ D. 115₇
- Find the sum to infinity of the series $\frac{1}{2} + \frac{1}{6} + \frac{1}{18}$ A. 1 B. $\frac{3}{4}$ C. $\frac{2}{3}$ D. $\frac{1}{3}$
- y is inversely proportional to x and $y = 4$ when $x = \frac{1}{2}$. Find x when $y = 10$. A. $\frac{1}{10}$ B. $\frac{1}{5}$ C. 2 D. 10
- Given that ${}^3v^{2x} = 16$, find x . A. 2 B. 3 C. 4 D. 6
- Simplify $1/v(3+2)$ in the form of $a + bv^3$ A. $-2-13$ B. $-2+v^3$ C. $2-v^3$ D. v^3
- Find the derivation of $(2+3x)^2(1-x)$ with respect to x . A. $6x-1$ B. $1-6x$ C. 6 D. 3
- Find the derivative of the function of $y = 2x^2(2x-1)$ at the point $x = -1$. A. -16 B. -4 C. 16 D. 18
- Find the mean deviation of 1, 2, 3, and 4 A. 1.0 B. 2 C. 3 D. 4
- In how many ways can 2 students be selected from a group of 5 students in a debating competition? A. 10 ways B. 15 ways C. 20 ways D. 25 ways
- If the interest on N150.00 for $2\frac{1}{2}$ yrs is N4.50. Find the interest on N250.00 for 6 month at the same rate. A. N1.50 B. N7.50 C. N15.00 D. N18.00
- What are the integral values of x which satisfy A. -2, 1, 0, -1 B. -1, 0, 1, 2 C. -1, 0, 1 D. 0, 1, 2
- If the 29th term of an AP is twice the third term and the sum of the first four term is 42. Find the common difference. A. 6 B. 3 C. 2 D. 1
- Find the sum of the first 20 term of the series 8, 12, 16, 96 A. 1400 B. 1500 C. 1040 D. 960

18. Given the series 2, 4, 6 find the 4th term of the GP.
A. 32 B. 68 C. 70 D. 64
19. The sum of the interior angles of a regular polygon is 1800. Calculate the size of the exterior angle of the polygon. A. 30° B. 24° C. 15° D. 12°
20. Find the remainder when $3x^3 + 5x^2 - 11x + 4$ is divided by $x + 3$. A. 4 B. 1 C. -1 D. -4
21. The first and last term of an AP is 6 and 42. If the sum of the Progression is 192, the number of the term in the AP is A. 6 B. 7 C. 8 D. 5
22. If $\sin\theta = \frac{1}{2}$, $\tan\theta$ is A. $\frac{1}{3}$ B. $\frac{\sqrt{3}}{2}$ C. $\frac{1}{2}$ D. $\frac{\sqrt{3}}{2}$
23. The real number x which satisfy the inequality $\frac{1}{3}(x \pm 1) - 1 > \frac{1}{5}(x+4)$. A. $x < 11$ B. $x = 1$ C. $x > 1$ D. $x = 11$
24. If α and β are the roots of $5x^2 - x = 10$, $\alpha + \beta$ is A. $\frac{1}{2}$ B. $\frac{1}{5}$ C. 10 D. 2
25. What is the 4th angle for the quadrilateral whose other three angles are 58°, 117°, 122°?
A. 30 B. 60° C. 63° D. 360°

PHYSICS TYPE A

26. In which of the following material would sound travel least. A. water B. oil C. metal D. gas
27. Suppose the direction of the refracted ray is required for the light incident in air at 50°, $n = 1.33$. Find the angle of refraction A. 45° B. 50° C. 70° D. 350
28. The ability of the eye lens to focus point at different distance on to the retina is A. Binocular B. Accommodation C. Hypermetropia D. Colourilization
29. When light is refracted which colour is the least refracted? A. Red B. Blue C. Violet D. indigo
30. The frequency F of the fundamental note from plucked wire is given by A. $\frac{1}{4L}V^{1/2}$ B. $\frac{1}{2L}V^{1/2}$ C. $\frac{1}{3L}V^{1/2}$ D. $\frac{1}{2L}V^{1/2}$
31. Suppose the potential difference of 2.4v at a current of 0.2A. Find the resistance A. 14? B. 12? C. 16? D. 20?
32. Which is correct for dimension of acceleration A. MLT^{-2} B. LT^{-3} C. LT^{-2} D. LT^{-4}
33. Suppose a car of mass 1000kg is accelerating at $2m/s^2$ then the force F acting on it is A. 20000N B. 2000N C. 40000N D. 4500N
34. Which of the same quantities has same unit as Joules
A. Newton x Force B. Force x acceleration C. Newton x meter D. Watt x Force
35. If the pile driver has a weight of 660N and is raised 20m, then energy of stationary pile is A. 13200J B. 134003 C. 14200J D. 15200J
36. The V.R is independent of A. Quality B. pulley C. friction D. frequency
37. The process whereby the molecules of different substance move more randomly is called
A. surface tension B. Capillarity C. diffusion D. osmosis
38. The process whereby a liquid spontaneously changes into vapour is called A. evaporation B. regulation C. boiling D. sublimation
39. The pitch of sound note depend on A. timber B. Harmonics C. Frequency D. Quality.
40. Satellite communication network makes use of A. Infra-red ray B. Sound wave C. Radio wave D. x-ray wave
41. If two inductors of inductance 3H and 6H are arrange in series, the total inductance H is A. 18.0H B. 9.0H C. 2.0H D. 5.0H
42. The charge carriers in gases are A. ions only B. electrons only C. electrons and ions D. protons only
43. The mode of heat transfer that do not require a material medium. A. conduction. B. convection C. radiation D. propagation
44. The unit for energy is A. Joule B. Ampere C. Watts D. Pascal
45. The magnetic field is produce at what angle A. 0° B. 30° C. 180° D. 90°
46. The frequency of a stationary wave of 100Hz has a wavelength of 2m. Find the velocity of waves A. 500m/s B. 200m/s C. 300m/s D. 40mls
47. A battery of e.m.f 40v and internal resistance 5Ω is connected to a resistance of 15Ω. Calculate the terminal potential difference A. 40V B. 20V C. 30V D. 75V
48. A car moving round a circular racing track takes 1 20s to do a lap of 8km. what is the speed in km/h?
A. 250km/h B. 240km/h C. 300kni/h D. 280km/h
49. Filament is commonly used at home because of its
A. high freezing point B. low melting point C. low boiling point D. high melting point.
50. Secondary cells are better referred to as A. cell B. accumulator C. battery D. charger

CHEMISTRY TYPE A

51. When sodium react with water, the resulting solution is A. weakly acidic B. neutral C. acidic D. alkaline
52. The gas that gives brown colouration in browning test is A. CO B. NO C. CO₂ D. NO₂
53. Which of the following polymer is suitable for packaging electrical insulator? A. polystyrene B. polyethylene C. polyamide D. polycarbonate
54. The boiling of fat and aqueous caustic soda is referred to as A. Acidification B. Hydrolysis C. Specification D. Etherification
55. Hydrogen is released when dilute hydrochloric acid react with A. Ag B. Au C. Cu D. Na
56. Which of the following chloride would exhibit the least ionic character? A. LiCl B. MgCl₂ C. CaCl₂ D. AlCl₃
57. When H₂S is passed into a solution of iron (ii) chloride, the solution turns A. Brown B. Pale green C. Colourless D. Red
58. The property which makes alcohol soluble in water is the A. cooling B. wetting C. covalent nature D. bonding
59. Deliquescent substance are used for A. cooling B. boiling C. drying D. melting

60. What mass of water is produced when 8.0g of hydrogen react with excess oxygen? A. 36.0g B. 8.0g C. 720g D. 16.0g (H = 1, O = 16)
61. Cancerous are cured by exposure to A. γ -ray B. α -ray C. β -ray D. x-ray
62. An oxide XO_2 has vapour density of 32. What is the atomic mass of X? A. 32 B. 20 C. 14 D. 72.
63. Petroleum oil are separated by A. Crystallization B. Fractional Distillation C. Centrifugation D. Decantation.
64. How many moles of $CaCO_3$ will be required to produce 5.6g of CaO ? (Ca = 40, C = 12, O = 16) A. 0.20mole B. 0.1 mole C. 0.25mole D. 0.40mole
65. The compound represented thus C_2H_2 is A. Alkane B. Ethyne C. Ethene D. Ethane
66. The shape of d-orbital is A. Spherical B. orthogonal C. polygonal D. dumbbell
67. The general formular for the alkanone is A. R_2CO B. ROH C. $R'COOR$ D. $RCHO$.
68. Which of the following metal burns with a brick-red flame A. Pb B. Ca C. Na D. Mg
69. A burning candle produces water and A. carbon (ii) oxide B. carbon (iv) oxide C. oxygen D. hydrogen
70. Proteins in acid solution undergo A. Polymerization B. Substitution C. Fermentation D. hydrolysis
71. Ethanoic acid is A. Tribasic B. Unionizable C. Monobasic D. Diabasic
72. What quantity will be deposited by a current of 2A at a time of 4s A. 9C B. 10C C. 8C D. 12C
73. Phosphorus is stored under water to prevent it from A. dehydrating B. becoming inert C. catching fire D. smelling
74. What is the product of bombarding $^{14}C_6$ nucleus with neutron? A. $^{22}C_6$ B. $^{13}C_6$ C. $^{15}C_7$ D. $^{16}C_7$
75. The element with the electronic configuration: $1S^2 2S^2 2P^6 3S^2 3P^2$? A. C B. Si C. N D. CO

ENGLISH LANGUAGE TYPE A

76. The principal was not aware..... the visitors on their arrival A. to have met B. that he should have met C. that he met D. to meet the visitors on their arrival

77. John was glad..... A. were the exams over B. the exams were over C. the exams to be over D. at the exams which over

78. Patrick was afraid..... A. whether he had failed B. to have failed C. he has failed D. he had failed

79. Patrick was wrong..... A. he contradicted the teacher B. to contradict the teacher C. contradicted the teacher D. to be contradicted the teacher

80. Doing snippets of work each day is not anyone A. very satisfactory B. really satisfactory to very C. really very satisfactory to D. very really satisfactory to

81. At last the aircraft was able to take off. It..... for two hours by a fault in the electrical system A. has been delayed B. delayed C. had been delayed D. is delayed

82. Mr. Momoh..... Hard for many years before he got promotion A. had been worked B. had been working C. has worked D. has been working.

83. I am sorry..... to the meeting last night A. not come B. I didn't come C. to come D. I hadn't come

84. John felt sorry..... the poor people who hadn't enough to eat A. for B. because C. of D. that

85. Mary was unable..... the work in time A. she completed B. she couldn't complete C. complete D. not to complete

86. Mr. Olayinka was delighted..... A. you to come B. that you come C. you not to come D. did you come

87. Food prices..... a lot since last year. A. have gone up B. had gone up C. went up D. go up

88. The Romans once..... most of Europe and North Africa for many years. A. have ruled B. had been ruling C. rule D. ruled

89. Eze has not heard anything of his sister Ada since she..... to the United Kingdom. A. has gone B. had gone C. had been going D. went

90. Everyone looked..... to Peter to give a lead A. to B. out C. up D. at

91. Everyone looked..... Peter as their leader A. at B. on C. for D. up

92. Mary would never have finished her homework if Patrick hadn't helped her..... A. in B. with C. out D. off

93. John spent hours looking his dictionary he couldn't find it. A. at B. in C. for D. to

94. Everyone looked..... to Peter as a great leader A. up B. down C. on D. for

95. At the beginning of the period, the geography master fired..... a series of question about South East Asia. A. up B. on C. away D. off

From each numbered list choose the word or expression which will complete the corresponding sentence correctly.

96. The answer to this sum is wrong, you a mistake A. must make B. must have made C. can have made D. may have, made

97. Hurry up, it's time to go'. Surely, it A. can't be B. must be C. must's be D. can be

98. A Bridget: I'll have to go now Ada, Ada: surely you go yet A. mustn't B. need to C. don't need to D. have got to

99. When you are ready, you..... go. A. may B. can't C. ought not to D. would

100. I wonder where Okeke is He..... by now A. arrive D. can't have arrived
 ought to arrive B. ought to have arrived C. must

FUTO POST UTME SCREENING TEST SOLUTION 2007/2008

MATHEMATICS

1. $y = (1 - 2x)^3$; $dy/dx = -6x^2$
 At $x = -1$, $dy/dx = -6(-1)^2 = -6$ C

2. ${}^6P_2 = \frac{6 \times 5 \times 4 \times 3 \times 2 \times 1}{2 \times 1} = 360$ waysD

3. $\frac{(n-1)!}{2!}$ Where $n = 7$
 $= \frac{(7-1)!}{2!} = \frac{6!}{2 \times 1} = \frac{6 \times 5 \times 4 \times 3 \times 2 \times 1}{2 \times 1} = 360$ ways
A

4. Numbers 1 = $x = 20 = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20$.

Numbers divisible by 2 and 3 = 6, 12, 18.

Prob. (choosing a number divisible by 2 and 3) = $3/20$ C

5. ${}_{45}P_6 - P_7 = 305_6$; $P_7 = 451_6 - 305_6 = 142_6$

To get the value in base 7, we first convert to base 10

$142_6 = (1 \times 6^2) + (4 \times 6^1) + (2 \times 6^0)$
 $= 36 + 24 + 2 = 62_{10}$

Converting to base 7

7	62	
7	8	r 6
7	1	r 1
	0	r 1

$P_7 = 116_7$,C

6. $\frac{1}{2} + \frac{1}{6} + \frac{1}{18}$
 $r = 1/6 \times 2/1 = 1/3$, $a = 1/2$
 $S_\infty = \frac{a}{1-r} = \frac{1/2}{1-1/3}$
 $= 1/2 \times 3/2 = 3/4$ B

7. $y \propto 1/x$; $y = k/x$
 When $y = 4$ & $x = 1/2$
 $4 = 2k$; $k = 4/2 = 2$
 When $y = 10$, $x = ?$
 $y = 2/x$; $10 = 2/x$
 $x = 2/10 = 0.2$ B

8. ${}^3\sqrt{4^{2x}} = 16$; $4^{2x/3} = 4^2$
 $2x = 3 \times 2 = 6$
 $x = 6/2 = 3$

9. $\frac{1}{\sqrt{3+2}} = \frac{1}{\sqrt{3+2}} \times \frac{\sqrt{3-2}}{\sqrt{3-2}} = \frac{\sqrt{3-2}}{3-4} = 2 - \sqrt{3}$ C

10. $y = (2 + 3x^2)(1 - x)$; $dy/dx = 1$ A

11. $y = 2x^2(2x - 1) = 4x^3 - 2x^2$; $dy/dx = 12x^2 - 4x$
 At point $x = -1$, $dy/dx = 12(1)^2 - 4(-1) = 16$
C

12. 1, 2, 3, 4
 Mean = $\frac{1+2+3+4}{4} = 2.5$

Mean deviation = $\frac{(1-2.5) + (2-2.5) + (3-2.5) + (4-2.5)}{4} = 1$ A

13. ${}^nC_r = \frac{n!}{(n-r)!r!}$

${}^5C_2 = \frac{5!}{(5-2)!2!} = \frac{5!}{3!2!}$
 $= \frac{5 \times 4 \times 3 \times 2 \times 1}{3 \times 2 \times 1 \times 2 \times 1} = 10$ ways A

14. $I = \frac{PRT}{100}$

$R = \frac{I100}{PT} = \frac{4.5 \times 100}{150 \times 2.5} = 1.2\%$

Interest on N259.00 for 6 months = $PRT = 250 \times 1.2 \times 0.5$
 $= N1.5$ A

15. D

16. $T_n = a + (n-1)d$
 $T_7 = a + 6d = 2(a + 2d)$
 $6d - 4d = 2a - 2a$
 $2d = 0$
 $d = 0$
 $S_n = n/2(2a + (n-1)d)$
 $S_4 = 2(4d + 3d) = 42$
 $14d = 42$; $d = 42/14 = 3$ B

17. $S_n = n/2(a+L)$
 $S_{20} = 10(8 + 96) = 1040$

18. $a = 2$, $r = 4/2 = 2$
 $T_n = ar^{n-1}$
 $T_4 = 2 \times 2^{4-1} = 2 \times 2^3 = 16$

19. Sum of interior angle of a polygon = $(2n - 4)90 = 1800$

$n - 2 = 1800/180 = 10$

$n = 10 + 2 = 12$

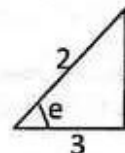
One exterior angle = $360/n = 360/12 = 30$ A

20. To find the remainder, we substitute $x = -3$ into the equation.

$3x^3 + 5x^2 - 11x + 4 = 0$
 $3(-3)^3 + 5(-3)^2 - 11(-3) + 4 = 1$ B

21. $S_n = n/2(a+L)$
 $192 = n/2(6 + 42)$
 $n = \frac{192 \times 2}{48} = 8$ sidesC

22.



$\sin \theta = 1/2$
 $\tan \theta = 1/3$

23. $\frac{x+13}{3} > \frac{x+4}{5}$
 $5(x-2) > 3(x+4)$; $2x > 12 + 10$
 $x > 22/2$; $x > 11$ C

24. $5x^2 \times 10 = 0$; $a = 5$, $b = -1$, $c = -10$
 $\alpha + \beta = -b/a = 1/5$

25. Let the 4th angle be x°
 Sum of angles = $(n-1)180$
 $58^\circ + 11^\circ + 122^\circ + x^\circ = (4-2)180$

$$297^\circ + x^\circ = 360^\circ$$

$$x^\circ = 360^\circ - 297^\circ = 63^\circ \dots\dots\dots C$$

PHYSICS

26. B, oil
27. Refractive index, $n = \frac{\sin i}{\sin r}$
 $1.33 = \frac{\sin 50^\circ}{\sin r}$
 $\sin r = \frac{\sin 50^\circ}{1.33} = 0.576$
 $r = \sin^{-1}(0.576) = 35^\circ \dots\dots\dots D$
28. B, accommodation is the ability of the eyes to focus on far and near objects
29. C, violet; the descending order is: ROYGBIV
30. D, frequency = $\frac{1}{2}LvT/m$
31. $v = IR$; $R = v/I = 2.4/0.2 = 12\Omega$
32. C, acceleration = $\frac{\text{Velocity}}{\text{Time}} = \frac{\text{Distance}}{\text{Time} \times \text{Time}} = LT^{-2}$
33. $F = ma = 1000 \times 2 = 2000N \dots\dots\dots B$
34. C, Joule(work) = Newton(force) x Meter(distance)
35. Energy = force x distance = $660 \times 20 = 13200J \dots\dots\dots A$
36. C
37. C
38. A, evaporation
39. C, frequency
40. C, radiowave
41. Total inductor = $1/3 + 1/6 = 1/H$
 $H = 6/3 = 2\text{Henry} \dots\dots\dots C$
42. B, electrons are the charge carriers in gases while in liquid it is ion
43. B, convection is the transfer of heat from one point to another without requiring a material medium.
44. A, joule
45. D, magnetic field is produced at 90°
46. $v = f\lambda = 100 \times 2 = 200m/s \dots\dots\dots B$
47. e.m.f = $I(r + R)$; $40 = 1(5 + 15)$
 $I = 40/20 = 2A$
 Terminal p.d = $IR = 2 \times 15 = 30v \dots\dots\dots C$
48. Distance = 8km, time = 120s = $1/30\text{hrs}$
 Speed = distance/time = $8 \times 30 = 240km/hr$
49. D, filament has a high melting point
50. B, accumulator

51. D 52. D, NO_2 gives brown coloration 53. B
54. C, hydrolysis 55. A, Ag 56. D, $AlCl_3$ 57. A, brown
58. ** 59. C, drying
60. Equation of reaction: $2H_2 + O_2$
 4g of H_2 gave rise to 36g of H_2O
 \therefore 8g of H_2 will give xg of H_2O
 $xg = \frac{8 \times 36}{4} = 72g \text{ of } H_2O \dots\dots\dots A$
61. D, x-ray
62. Molar mass of $H_2O = 2x + 16 = 32 \times 2$; $2x = 64$
 $x = 64/2 = 32 \dots\dots\dots A$
63. D, fractional distillation is use to separate petroleum products
64. Equation of reaction: $CaCO_3 = CaO + CO_2$
 1 mole gave 56g of CaO
 \therefore x mole 5.6g of CaO
 Cross multiplying, we have
 $x \text{ mole} = 5.6 \times 1 = 0.1\text{mole} \dots\dots\dots B$
65. B ethyne 66. D, the shape of d-orbitals is dumb-bell 67. A, R_2CO
68. B, calcium burn with a brick red flame 69. B, CO_2
70. A 71. C
72. $Q = It = 2 \times 4 = 8 \dots\dots\dots C$ 73. C, catching fire
74. B, $^{14}C_6 + \frac{1}{0}n \rightarrow ^{13}C_6$ 75. B, silicon

ENGLISH LANGUAGE

76. C, that he met 77. B, the exams were over
78. C, he has failed 79. B, to contradict the teacher
80. C 81. B, delayed
82. C, has worked 83. B
84. A, for 85. C
86. B, you came 87. C, went
88. D, ruled 90. C, out
91. B 92. C, out
93. C, for 94. A, up
95. B, on 96. B, must have made
97. C, must's be 98. A, mustn't
99. A, may 100. B, ought to have arrived

FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI
 Post UTME Screening Test 2006/2007

PHYSICS

1. The slope of a straight line displacement time graph indicates A. distance traveled B. uniform velocity C. uniform acceleration D. instant acceleration E. uniform speed.
2. A ball of mass 0.5kg moving at 10m/s collides with another ball of equal mass at rest. If the two balls move off together after the impart, calculate their common velocity A. 0.2m/s B. 0.5m/s C. 10m/s D. 3m/s
3. How much heat is given out when a piece of iron mass 50g and specific heat capacity 460J/kgK cools from $85^\circ C$ to $25^\circ C$? A. 1.38×10^6J B. 2.53×10^2J C. 1.98×10^4J D. 1.38×10^3J E. 1.27×10^3J

TYPE AA

TIME: 1Hour

4. Which of the following is not a suitable method of reducing loss of heat from a piece of hot iron? A. wrapping it in cotton wool B. painting it black C. placing it in a vacuum D. placing it in a rubber support E. keeping tin a closed wooden box
5. A bat emits a sound wave at a speed of 1650.00m/s and receives the echoe 0.15s later. Calculate the distance of the bat from the reflector A. 8.75m B. 16.6Cm C. 87.75m D. 123.75m E. 330.00m
6. Which of the following is/are characteristics of sound? i. pitch ii. Loudness iii. Quality iv. Noise A. i only B. ii only C. i & ii only D. i, ii & iii only E. i, ii, iii and iv
7. An image which can be formed on a screen is said to be A. virtual B. blurred C. inverted D. erect E. real

8. A ray of light is incident at an angle of 30° on a glass prism of refractive index 1.5. Calculate the angle through which the ray is minimally deviated in the prism. (the medium surrounding the prism is air).
A. 10.5° B. 5.5° C. 21.1° D. 38.9°
E. 40.5° .
9. At which of the following distances from the lens should a slide be placed in a slide greater than f but less than $2f$ D. equal to f E. equal to $2f$
10. What of the camera corresponds to the iris of the eye? A. shutter B. film C. lens D. diaphragm E. focusing ring
11. Which of the following is not a mechanical wave? A. wave propagated in stretched ring B. waves in closed pipes C. radio waves D. water waves E. sound waves
12. A catapult is used to project a stone. Which of the following energy conversions takes place as the stone is released? A. The kinetic energy of the stone is converted into gravitational potential energy B. The gravitational potential energy of the catapult is converted into the kinetic energy of the stone C. The elastic potential energy of the catapult is converted into elastic potential energy D. The elastic potential energy of the catapult is converted into the gravitational potential energy of the stone
13. Ball is thrown vertically upwards from the ground with an initial velocity of 5cm/s . what is the total time spent by the ball in air? ($g = 10\text{m/s}$) A. 2.5s B. 5.0s C. 10.0s D. 15.0s E. 20.0s
14. Which of the following correctly gives the relationship between linear speed v and angular speed w of a body moving uniformly in circle of radius? A. $v = wr$ B. $v = w^2r$ C. $v = wr^2$ D. $v^2 = wr$ E. $v = wr$
15. Which of the following is used to determine the relative density of the acid in a car battery? A. hypsometer B. hygrometer C. manometer D. hydrometer E. spectrometer
16. A block of material volume 20cm^3 and density 2.3g/cm^3 is suspended from a spring balance with half the volume of the block immersed in water. What is the reading of the spring balance? (Density of water = 10g/cm^3) A. 8g B. 25g C. 30g D. 40g E. 50g
17. A piece of cork which is floating on water is acted upon by the forces of A. weight and viscosity B. weight and upthrust C. upthrust and viscosity D. weight only E. upthrust only
18. Which of the following is derived unit? A. meter B. coulomb C. kilogram D. second E. ampere
19. An engine raises 100kg of water through a height of 60m in 20s . What is the power of the engine? ($g = 10\text{m/s}^2$) A. 120.00w B. 3000.00w C. 333.00w D. 300.00w E. 30.00w
20. If the temperature of a small quantity of water in a closed container is gradually increased from 0°C to 400°C . then the density of water within its range A. increases for a while and then decreases B. decreases

for a while and then increases C. increases gradually D. decreases gradually E. remains the same

MATHEMATICS

21. Simplify: $125^{-1/3} \times 49^{-1/2} \times 10^0$ A. 350 B. 35
C. $1/350$ E. 0
22. If $3^{2x} = 27$, what is x ? A. 1 B. 1.5 C. 4.5 D. 18
E. 40.5
23. Express 0.00562 in standard form. A. 5.62×10^{-3} B. 5.62×10^{-2} C. 0.562×10^{-2} D. 5.62×10^4 E. 5.62×10^3
24. Given that $1/3 \log_{10} P = 1$, find the value of P A. 3 B. $1/10$ C. 10 D. 100 E. 1000
25. Simplify $(\log_8 27) / \log_8 1$ A. $1/6$ B. $3/8$ C. 112
D. 4 E. 6
26. The population of a village is 5846. Express this number to three significant figures A. 5850 B. 5846 C. 5840 D. 585 E. 584
27. Simplify $((1/4)^{-1})^{1/2}$ A. $1/6$ B. 1 C. 2 D. 4
E. 8
28. For what value of y is the expression $(y+2)/(y^2-3y-10)$ undefined? A. $y=0$ B. $y=2$ C. $y=3$ D. $y=5$
E. $y=10$
29. Simplify $\log_6 6 + \log_6 2$ A. -4 B. -1 C. 0
D. 1 E. 4
30. Solve the equation $3a + 10 = a^2$ A. $a=5$ or $a=2$
B. $a=-5$ or $a=2$ C. $a=10$ or $a=0$ D. $a=5$ or $a=-2$
E. $a=-5$ or $a=2$
31. Evaluate $(101.2)^2 - (100.5)^2$ A. 1 B. 2.02 C. 20.02
D. 141.19 E. 202
32. Express the product of 0.06 and 0.09 in standard form A. 5.4×10^{-3} B. 5.4×10^{-2} C. 5.4×10^6 D. 5.4×10^2
E. 5.4×10^3
33. Simplify $(36)^{-1/2} \times 5^0$ A. $3/4$ B. $1/24$ C. $2/3$ D. $11/2$
E. $20/29$
34. If $\cos(A) = 1/2$, which of the following angles has a cosine $-1/2$? A. 30° B. 120° C. 150° D. 210°
E. 330°
35. A ladder 9m long leans against a vertical wall making an angle of 64° with the horizontal ground. Calculate correctly the decimal place, how far the foot of the ladder is from the wall. A. 4.0m B. 5.8m
C. 7.1m D. 8.1m E. 18cm 36.
36. If $3\log a + 5\log a - 6\log a$ what is a A. 1 B. 6 C. 8
D. 16 E. 32
37. If the second and fourth terms of a geometrical progression are 8 and 32 respectively, what is the sum of the four terms? A. 28 B. 40 C. 48 D. 60
E. 68
38. Factorize $35 - 2b - b^2$ A. $(35-2b)(b-1)$ B. $(7+b)(5-b)$
C. $(3+7)(5-b)$ D. $(35-b)(3b+7)$ E. $(7+b)(5+b)$
39. Evaluate $0.009 \div 0.012$. Leaving your answer in standard form. A. 7.4×10^2 B. 7.5×10^{-1}
C. 7.5×10^{-1} D. 7.5×10^{-2} E. 7.5×10^3
40. Factorize the following expression: $2x^2 + x - 15$. A. $(2x+5)(y-3)$ B. $(2x-5)(y+3)$ C. $(2x-5)(x-3)$ D. $(2x-3)(x+5)$
E. $(2x+5)(x+3)$

CHEMISTRY

- Complete hydrogenation of oils results in the production of A. soaps B. detergent C. alkalines D. butter E. margarine.
- A sample of orange juice is suspected to have been contaminated with a yellow dye. Which of the following methods can be used to detect the dye?
A. decantation B. Chromatography C. distillation D. filtration E. evaporation
- The heat accompanying the reaction represented by the equation $\text{H}_2\text{O}_{(g)}$ is described as the heat of A. Solution B. neutralization D. sublimation E. activation
- Which of the following compounds will undergo addition reactions? A. ethyne B. butane C. pentane D. Tetrachloro methane E. ethanol
- How many unpaired electrons are there in an atom whose atomic number is 8? A.0 B.1 C.2 D.3
- A piece of metal object of mass 60 was analysed and found to contain 20% by weight of magnesium. Calculate the number of moles of magnesium present. (Mg = 12) A. 0.5 mol B. 1mol C. 1.5mol D. 2 mol E. 2.5 mol
- What is the maximum number of electrons that can be contained in the d-sub shell A.6 B. -8 C.10 D.12
- What is the oxidation number of zinc in $\text{Zn}(\text{OH})_4^{2-}$
A. -2 B.4 C.2 D. -1 E. -4
- Write the formula of the compound whose name is iron (ii) Tetraoxosulphate (vi) heptahydrate. A. $\text{Fe}_2\text{SO}_4 \cdot 7\text{H}_2\text{O}$ B. $2\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ C. $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ D. $\text{FeSO}_4 \cdot (\text{H}_2\text{O})_7$
- Using exponential notation, express the quantity 72.8mg in terms of its basic s.i. unit
A. 7.28×10^{-5} B. $72.8 \times 10^{-3}\text{kg}$ C. $7.28 \times 10^{-3}\text{g}$ D. $7.28 \times 10^{-5}\text{kg}$
- A given mass at constant temperature occupies 500l at 700mm pressure. What volume will it occupy at 200mm pressure? A. 1750 B. 1875 C. 1645 D. 5017
- The expression $P_1 + P_2 +$

ENGLISH LANGUAGE

PHYSICS

- C
- $m_1 = 0.5\text{kg}$, $v_1 = 10\text{m/s}$, $m_2 = 0.5\text{kg}$, $v = ?$
 $m_1v_1 + m_2v_2 = (m_1 + m_2)v$
At rest $v_2 = 0$
 $0.5 \times 10 + 0 = 1v \therefore v = 5\text{m/s} \dots\dots C$
 $n = \frac{\Delta t}{\Delta x} = \frac{0.05 \times 460 \times (35-25)}{1} = 1.38 \times 10^9 \dots\dots D$
- A
- $v = \frac{2\lambda}{t}$ where $\lambda =$ wavelength
 $v1650 = \frac{2\lambda}{0.15}$
 $\lambda = \frac{1650 \times 0.15}{2} = 123.75\text{m} \dots\dots D$

- This is important..... your last essay. A. on B. with C. by D. for
- The team has suffered defeat..... A. before B. with C. over D. after
- Unemployment has been the increase since last year. A. of B. at C. on D. in
- Cat sleep..... day and hunt at night A. at B. by C. in D. during
- I don't want anything to interfere..... my project
A. with B. on C. over D. by
- The two brothers came in..... the back door. A. within B. along C. across D. through
-the terms of agreement with your landlord, you should not sub-let the house. A. on B. under C. upon D. by
- Nigeria's economy was buoyant..... the 1970s
A. through B. on C. in D. with
- The musician..... waxed that record died fifty years ago A. who B. whom C. which D. whose
- The authorbook you are reading now, won the Noble Price for literature last year A. which B. that C. whose D. whom
- The lady..... you were talking about yesterday is here now A. which B. whom C. who's D. whose
- The pencil..... you gave me yesterday is lost. A. whose B. whom C. that D. who
- I honest don't understand..... you hate that man. A. When B. Where C. why D. how
- I'd like to know..... he'll wriggle out of this ease. A. how B. whenever C. where D. what
-of the two pencil is yours? A. where B. who C. which D. whose
-university isinstitution of higher learning. A. An...an B. An... a C. A....a D. A....an
- I'd give up smoking, if I..... you, A. am B. were C. was D. are
- It is high time you..... visiting that friends of yours. A. should stop B. Stopped C. stop D. must
-had they entered when it started to rain A. hardly B. nearly C. almost D. fairy
- All your..... like you very much. A. brother-in-law B. brother-in-laws C. brother-in-laws D. brothers-in-law

SOLUTIONS TO 2006/2007 SCREENING EXERCISE

6. D 7.E 8.B 9. C 10.D 11.C 12.C

13. Total time of flight = $\frac{2u}{g} = \frac{2 \times 50}{10} = 10\text{s} \dots\dots C$

14. $A = \omega r$

15. B, hygrometer is used to determine the relative density of acids

16. $\rho = 2.5\text{g/cm}^3$, $v = 20\text{cm}^3$, $m = ?$

Recall: $\rho = m/v$

$\therefore m = \rho \times v = 2.5 \times 20 = 50\text{g} \dots\dots E$

17. C, floating objects always encounter upthrust and viscosity and not weight

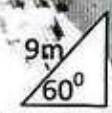
18. B, coulomb is a derived unit
 19. $p = \frac{f \times d}{t} = \frac{100 \times 10 \times 60}{20} = 3000w$ B
 20. D, density varies inversely with temperature. It decreases as temperature increases and increases as temperature decreases

MATHEMATICS

21. $125^{-1/3} \times 49^{-1/2} \times 10^0 = \frac{1}{\sqrt[3]{125}} \times \frac{1}{\sqrt{49}} \times 10^0$
 $= \frac{1}{5} \times \frac{1}{7} \times 1 = 1/35$ C
 22. $3^{2x} = 27; 3^{2x} = 3^3$
 $2x = 3; x = 3/2 = 1.5$ B
 23. Expressing 0.00562 in standard form gives: 5.6×10^{-3}
 ... A
 24. $1/3 \log_{10} P = 1$
 $10^3 = P^{1/3}$
 $\therefore P = 10^3 = 1000$ E
 25. $\frac{\log_2 27}{\log_2 81} = \frac{\log_3 3^{3/2}}{\log_3 3^4}$
 $= \frac{3/2 \log_3 3}{4 \log_3 3} = 3/2 \times 1/4 = 3/8$ B
 26. C
 27. $((1/4)^{-1})^{1/2} = 4 \times 1/2$ C
 28. An expression is undefined if its denominator is equal to zero

$$\frac{y+2}{y^2-3y-10}$$

$\therefore y^2 - 3y - 10 = 0; (y^2 + 2y)(5y + 10) = 0$
 $y(y+2) - 5(y+2) = 0$
 $y5, \text{ or } -2$ D

29. $\log 6 + \log 12 = \log 72 = 1.857$
 30. $3a + 10 = a^2$ (rearranging)
 $a^2 - 3a - 10 = 0; a^2 + 2a - 5a - 10 = 0$
 $a(a+2) - 5(a+2) = 0$
 $a - 5 = 0$ or $a + 2 = 0$
 $\therefore a = 5$ or -2
 31. $(101.2)^2 - (100.5)^2$ using differences of two squares
 $(101.2 - 100.5)(101.2 + 100.5)$
 $(0.7)(201.7) = 141.19$ D
 32. 0.06×0.09 (product of the numbers)
 $= 6 \times 10^{-2} \times 9 \times 10^{-2} = 5.4 \times 10^{-3}$ A
 33. $(36)^{1/2} \times 5^0 = \frac{1}{\sqrt{36}} \times 5^0 = \frac{1}{6} \times 1 = \frac{1}{6}$
 34. Evaluating the cosine of option A - E, it will be observed that
 $\cos 120 = -1/2$ B
 35.  $\cos 64 = x/9$
 $X = 9 \cos 64 = 4.0m$
 36. $3 \log_8 a + 6 \log_8 a \pm 6 \log_8 a = 3$
 $\log_8 a^{3 \times 6/8} = 3$
 $a^3 = 8^3; a = 8$ C
 37. The nth term of G.P; $T_n = ar^{n-1}$
 $T_2 = ar^{2-1} = ar = 8$ (1)

- $T_4 = ar^{4-1} = ar^3 = 32$ (2)
 Dividing (1) by (2)
 $r^2 = 4; r = \sqrt{4} = 2$
 Putting the values for r into (1)
 $A = 8/r = 8/2 = 4$
 $S_n = ar \frac{(r^n - 1)}{r - 1}$
 $S_4 = 4 \frac{(2^4 - 1)}{2 - 1} = 4(15) = 60$ D
 38. $35 - 2b - b^2$ factorizing we have
 $35 + 5b - 7b - b^2$
 $5(7 + b) - b(7 + b)$
 $(5 - b)(7 + b)$ B

39. $0.009 \div 0.012 = \frac{9 \times 10^{-3}}{12 \times 10^{-3}} = \frac{9}{12} = 0.75 = 7.5 \times 10^{-1}$ C
 40. $2x^2 + x - 15$ factorizing, we have
 $2x^2 + 6x - 5x - 15$
 $2x(x + 3) - 5(x + 3)$
 $(2x - 5)(x + 3)$ B

CHEMISTRY

41. The hydrogenation of oil yield margarineE
 42. B, chromatography
 43. C
 44. A, alkenes & alkynes undergoes additional reaction while alkanes undergo substitution reaction
 45. Atom with atomic number 8 has configuration 2, 6 remaining two electron to make it octet. \therefore
 Unpaired electron = 2 C
 46. Mass of magnesium = $20/100 \times 60 = 12g$
 No of moles = $\frac{\text{Given mass}}{\text{Molar mass}} = \frac{12}{12} = 1$ mole B
 47. d-subshell contains 10 electrons C
 48. $Zn(OH)_4^{2-}$, Oxidation state of zinc Zn = $42 = +2$ C
 49. C, $FeSO_4 \cdot 7H_2O$
 50. $72.8mg = \frac{72.8 \times 10^{-3} kg}{10^3} = 7.28 \times 10^{-5} kg$ D
 51. $V = 500l, P_1 = 700mm, V_2 = ?, P_2 = 200mm$
 Using: $P_1 V_1 = P_2 V_2$
 $700 \times 500 = 200 \times V_2$
 $V_2 = \frac{700 \times 500}{200} = 1750$ A
 52. B

ENGLISH LANGUAGE

1. D, for 2. D, after 3. C, on 4. B,
 during 5. B, with 6. B, through
 7. D, under 8. C, in 9. C, who 10. B,
 whose 11. A, whom 12. C, that
 13. B, why 14. A, how 15. C, which 16. C
 17. B, were 18. B, stopped
 19. A, hardly 20. C

FUTO POST UTME SCREENING TEST 2005/2006

ENGLISH LANGUAGE

Fill the blank spaces making use of the best of the five options.

1. In the past his father used to walk but nowadays heto work by bicycle A. giving B. is going C. seldomly goes D. goes E. has gone
2. It might not look such a rosy proposition A. from his viewing proposal B. when he views the proposal C. having viewed the proposal D. from his point of view E. from his seeing it
3. Nuhu told me to go ontill seven A. to work B. worked C. works D. working E. work
4. Don't study on the examination day! What did he tell you? He told meon the examination day A. no studying B. don't study C. not study D. not to study E. to not study
5. I start writing this test at 8.00am. it is 10.00am now by 11.00am Iit for three hours. A. shall be writing B. have been writing C. shall have been writing D. am writing E. was writing
6. I shall travel to Lagos bynext week A. air or with train B. aircraft or by road C. airways or by bus D. air or by road E. flight or by bus
7. Musa asked Asmart what she..... since he last saw her A. has been doing B. had been doing C. has done D. was doing E. might be doing
8. The evidence of all the accused person'sby the judge sitting at no. 2 assizes last week A. were disbelieved B. was disbelieved C. in disbelieved D. are disbelieved E. has been disbelieved.

Choose the word or phrase from options A-E which has the same meaning to the underlined word or words in each sentence.

9. The minister bit on a plan to lain his post after many months of lobbying A. beat a plan B. drew up a plan C. discovered a plan D. selected a plan E. designed a plan
10. Ekwansi's account with the naira bank is in the red, his account A. was written in red ink B. is overdrawn C. is in danger D. is special E. is heavy
11. He should be able to do it alone A. he ought to be able to do it alone B. he may be able to do it alone C. he may be able to do it alone D. he has been able to do it alone E. he will do it alone
12. You can talk to her A. you are permitted to talk to her B. you must talk to her C. you mustn't talk to her D. nothing prevents you from talking to her E. A & D
13. When you go to a foreign country to study, you will discover that life is not always a bed of roses after it is A. as pleasant as one thought B. a bed without roses C. an unmitigated disappointment D. expected E. uncomfortable
14. Ebun..... the edge of the cliff after his shoes had called to grip A. fell down B. fell off C. fell away D. fell from
15. The host insisted on..... what he called a little gift A. me to accept B. me accepting C. my accepting D. my acceptance

16. I know you think I am talking nonsense, Shehu, but..... you will realize that I was right A. at one time B. on time C. in time D. all times
17. The driver will..... all the students interested to going to Lagos tomorrow at 7.00am outside the main building A. lift B. lift up C. pick D. pick up

Choose the option similar in meaning to the underlined word(s)

18. The government is making concerted efforts at providing essential social facilities in the rural areas A. dissipated B. unconcerted C. unsuccessful D. uncontrolled
19. We cannot but talk about his invaluable contributions to the affairs of the society A. worthless B. cost C. unrecognized D. incalculable
20. Men living in an extended family know that they have to be responsible for the ware fare of some other person's children A. externals B. nuclear C. neutral D. contracted

CHEMISTRY

21. In the reaction between sodium hydroxide and sulphuric acid solutions, what volume of 0.5molar sodium hydroxide would exactly neutralize 10cm³ of 1.25molar sulphuric acid? A. 5cm³ B. 10cm³ C. 20cm³ D. 25cm³ E. 50cm³
22. A small quantity of solid ammonium chloride (NH₄Cl) was heated gently in a test tube. The solid gradually disappear to produce a mixture of two gases later a white cloudy deposit was observed on the cooler part of the test tube. The ammonium chloride is said to have undergone A. distillation B. sublimation C. precipitation D. evaporation E. decomposition
23. Elements P, Q, R, S have 6, 11, 15, & 17 electrons respectively. Therefore A. P will form an electrovalent bond with R B. Q will form a covalent bond with S C. R will form an electrovalent bond with S D. Q will form an electrovalent bond with S E. Q will form a covalent bond with R
24. An element X forms the following compounds with chlorine: NCl₄, XCl₃, XCl₂. this illustrates the A. law of multiple proportions B. law of chemical proportions C. law of simple proportion D. law of conservation of mass E. law of definite proportion.
25. The oxidation state of chlorine in potassium chlorate is A. 11 B. 12 C. 13 D. 15 E. 17
26. When carbon dioxide is bubbled into limewater, a white precipitate is formed. If the passage of the gas is continued, the precipitate disappears. The reasons for this is A. calcium carbonate is formed which on reaction dissolves B. calcium hydrogen carbonate is precipitated and then dissolves C. calcium carbonate is formed which on reaction with further carbon dioxide forms soluble calcium hydrogen carbonate D. concentration of solution has occurred with the deposition of calcium hydroxide E. the

- solution has become saturated and solid carbon dioxide has been deposited.
27. The following reactions are stages in important industrial processes:
- (i) $N_{2(g)} + O_2 \rightleftharpoons 2NH_{3(g)}$ ΔH is negative (ii) $2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$ ΔH is negative
 (iii) $N_{2(g)} + O_{3(g)} \rightleftharpoons 2NO_{(g)}$ ΔH is positive. Which of the above forward reactions is favoured by (i) a decrease in the concentration of the pressure and (ii) an increase in temperature? A. i B. ii C. iii D. i & ii E. i & iii
28. Methanoic acid mixes with water in all proportions and has about the same boiling point as water. Which of the following methods would you adopt to obtain pure water from a mixture of sand, water and methanoic acid A. fractional distillation B. filtration followed by azeotropic distillation C. neutralities with sodium hydroxide followed by distillation. D. neutralization with sodium hydroxide followed by filtration E. etherification with ethanol followed by distillation.
29. Which of the following statements applies during the electrolysis of sodium hydroxide solution using platinum electrodes? A. anions are discharge at the cathode B. hydrogen ions are discharge at the anode C. the concentration of sodium hydroxide decreases at both electrode compartments D. the concentration of sodium hydroxide increases at the cathode only E. the concentration of sodium hydroxide increases at the anode only.
30. Which of the following statement is true? When the potassium atom forms its ion A. it gains one electron and becomes neutral B. its atomic number decreases C. it achieves electronic configuration of argon D. it loses one proton E. it loses one neutron.
31. On heating under suitable conditions, 1 liter of a monoatomic gas X combines with 1.5 litres of oxygen forming an oxide. What is the formula of the oxide? A. XO B. X_2O_3 C. X_3O_2 D. XO_2 E. none of the above
32. If 1 liter of 22M sulphuric acid is poured into a bucket containing 10liters of water, and the resulting solution 25cm³ of 0.1M Na_2CO_3 to neutralize it. What is the original volume of the acid? A. 2.2M B. 1.1M C. 0.22M D. 0.11M E. 0.20M
33. A solution of HCl contains 7.3g/dm³ of the acid. What volume of it will neutralize 0.25M solution of Na_2CO_3 of volume 20ml A. 250ml B. 50ml C. 750ml D. 10ml E. 25ml
34. Which one of the following reactions is correct as written?
- A. $FeCl_2 + NH_4OH \rightleftharpoons Fe(OH)_4 + NHCl$ B. $Pb_2O_3 + 4HCl \rightleftharpoons PbCl_2 + 2H_2O$
 B. $PbNO_3 + H_2S \rightleftharpoons PbS + 2HNO_3$ D.
 NaOH + $H_2SO_4 \rightleftharpoons NaHSO + H_2O$
 E. $2NH_4NO_3 \rightleftharpoons N_2 + 2H_2O$
35. How many grams of hydrogen gas will be liberated when 6g of magnesium ribbon dissolves in 500cm³ of 6M HCl? (Mg = 24, H = 1, Cl = 35.5). A. 2.2g B. 0.7g C. 0.5g D. 0.3g E. 1.2g
36. An example of a strong electrolyte is A. ethyl acetate B. ethanol C. glucose D. sodium. Formate E. formic acid
37. The oxidation state of manganese in $KMnO_4$ is A. 44 B. 13 C. 15 D. 17 E. 12
38. For iron to rust, these should be present A. oxygen B. moisture C. carbon dioxide D. oxygen and moisture E. oxygen, moisture and carbon dioxide.
39. The mass number of an atom is A. the mass number of electrons in the atom B. the number of protons in the nucleus of the atom.
40. Sodium and potassium belong to the same group of the periodic table. This is because A. both have identical electronic configuration E. both react with water vigorously.

MATHEMATICS

41. After getting an increase of 15%, a man's new monthly salary is N345. How much per month did he earn before the increase? A. N330 B. 396.75 C. N300 D. N393.25 E. N360
42. In base ten, the number 101101 (base 2) equals A. 20₁₀ B. 45₁₀ C. 15₁₀ D. 13₁₀
43. The annual profits of a transport business were divided between the two partners A and B in the ratio 3:5. If B received N3000 more than A, the total profit was A. N5000 B. N18000 C. N12000 D. N24000 E. N8000.
44. A square of cardboard is taped at the perimeter by a piece of ribbon 20cm long. What is the area of the board? A. 20sq.cm B. 25sq.cm C. 36sq.cm D. 100sq.cm E. 16sq.cm
45. Simplify $\frac{5^x \times 25^{x-1}}{125^{x+1}}$ A. 62^{x-1} B. 5^{x+2} C. 5^{-5} D. 5^{x+1} E. 5^3
46. The median of the set of numbers 4, 94, 13, 7, 14, 10, 17 is A. 13 B. 7 C. $10\frac{1}{2}$ D. 10 E. $30\frac{1}{4}$
47. List all integer values of x satisfying the inequality: $1 < 2x - 5 = 5$ A. 2,3,4,5 B. 2,5 C. 3,4,5 D. 2,3,4 E. 3,1.
48. Find the roots of the equation $10x^2 - 13x - 3 = 0$ A. $x = 3/10$ or $-1/2$ B. $x = 3/10$ or -1 C. $x = 3/10$ or 1 D. $-1/5$ or $3/2$
49. A solid cylinder of radius 3cm has a total surface area of 366cm². Find its height. A. 2cm B. 3cm C. 4cm D. 5cm E. 8cm
50. If $\sin x = a/b$, what is $\sin(90 - x)$? A. a/b B. $1 - a/b$ C. $\frac{vb^2 - a^2}{b}$ D. $\frac{va^2 + b^2}{b^2}$ E. $vb^2 - a^2$
51. 7 pupils of average age 12years leave a class of 25 pupils of average age 14years. If 6 new pupils of average age 11 years join the class, what is the average age of the pupils now in the class? A. 13years B. 12 years $\frac{1}{2}$ months C. 13years 5 months D. 13years E. 11 years

52. A sum of money invested at 5% per annum simple interest amounts to \$434.00 at 7 1/2% per annum simple interest? A. 7 1/2 years B. 10 years C. 5 years D. 12 years E. 14 years.
53. By selling an article for N45.00 a man makes a profit of 8%. For how much should he have sold it in order to make a profit of 32%? A. N180.00 B. N59.00 C. N63.00 D. N58.00 E. N55.00
54. An isosceles triangle of sides 13cm, 13cm, 10cm is inscribed in a circle. What is the radius of the circle? A. 7 1/24 cm B. 12cm C. 8cm D. 7cm E. 6.9cm
55. A man bought a wrist watch for N150 but was only able to sell it for N120. Find the loss per cent on the transaction A. 25% B. 11/8% C. 20% D. 80% E. 30%
56. Find the median of the set of numbers 110, 116, 113, 118, 127, 118, 117, 113. A. 117.5 B. 118 C. 117 D. 116 E. 113.
57. Given a regular hexagon, calculate each interior angle of the hexagon. A. 60° B. 30° C. 120° D. 45° E. 135°
58. Solve the following equations: $4x - 3 = 3x + y = 2y + 5x - 12$; A. $x = 5, y = 2$ B. $x = 2, y = 5$ C. $x = 2, y = -5$ D. $x = 5, y = -3$
59. If $x - 1$ is a root of the equation: $x^3 - 2x^2 - 5x + 6$. Find the other roots, A. -3 & 2 B. 2 & C. 3 & -2 D. 1 & 3 E. -3 & 1.
60. Which, of the following lines is not parallel to the line $3y + 2x - 17 = 0$? A. $3y + 2x - 7 = 0$ B. $9y + 6x + 17 = 0$ C. $24y + 16x + 19 = 0$ D. $3y - 2x + 7 = 0$ E. $15y + 10x - 10x^3 - 13 = 0$
- PHYSICS**
61. A piece of rubber 10cm long stretches 6mm when a load of 100N is hung from it. What is the area stretched if the young modulus is 50 N/m^2 . A. 60 m^2 B. 150 m^2 C. 33.33 m^2 D. 15 m^2
62. To determine the weight of an object you would A. use a balance B. use a spring balance C. find the force necessary to give it a certain acceleration D. use none of these methods E. use any of these methods.
63. A gas at pressure $P \text{ N/m}^2$ and temperature 27°C is heated to 77°C at constant volume. The new pressure is A. $0.85P \text{ N/m}^2$ B. $0.86P \text{ N/m}^2$ C. $1.16P \text{ N/m}^2$ D. $1.18P \text{ N/m}^2$ E. $2.85P \text{ N/m}^2$
64. Two lamps rated 40w and 220w, each are connected in series. The total power dissipated in both lamp is A. 10w B. 20w C. 40w D. 80w E. none
65. A magnet is moved through a coil of wire. The e.m.f. produced in the wire depends on A. the number of turns in the coil B. the strength of the magnet C. the speed at which the magnet is moved D. all of the above E. none of the above
66. A potential difference of 6v is used to produce a current of 5A for 200s through a heating coil. The heat produced is A. 4800cal B. 6000cal C. 2400j D. 240kcal E. 600j
67. Two boys are communicating with each other by stretching a string passing through a hole punched in the bottom of each of the two tin cans. The physical principle employed is that sound travels A. mainly through air B. fainter in stretched string C. faster through gasses than in solids and liquids D. with greater ease through a string than in air E. none of the above is correct.
68. The hatch door of a submarine has an area of 0.5 m^2 , the specific gravity of sea water is 1.03. Assume that $g = 10 \text{ m/s}^2$ and neglect the atmospheric pressure. The force exerted by the sea water on the hatch door at a depth of 20m is A. $1.03 \times 10^5 \text{ N}$ B. $1.03 \times 10^4 \text{ Nm}^2$ C. $2.6 \times 10^3 \text{ Nm}^2$ D. $2.06 \times 10^{11} \text{ N}$ E. $1.03 \times 10^3 \text{ N}$.
69. When equal weights of iron and water are subjected to an equal supply of heat, it is found that the piece of iron becomes much hotter than water after a short time because A. The specific heat of iron is higher than water B. Iron is in solid form C. water is in liquid form D. the specific heat of water is higher than that of iron E. the specific heat of iron is infinite.
70. The speed of light in is $3.0 \times 10^8 \text{ m/s}$. Its speed in glass having a refractive index of 1.65 is A. $1.82 \times 10^8 \text{ m/s}$ B. $3 \times 10^6 \text{ m/s}$ C. $6.0 \times 10^8 \text{ m/s}$ D. $1.82 \times 10^2 \text{ m/s}$
71. An electric iron is rated at 100watts 250v. The corresponding maximum resistance and accompanying current is A. 62.5?, 4.0321 B. 16.0?, 6.251 C. $4.95 \times 10^2 \text{ m/s}$ D. 40?, 62.51 E. 4.0?, 2501.
72. 250g of lead at 170°C is dropped into 0°C of water at 10°C if the final temperature is 12°C , the specific heat of lead is (specific heat capacity of water is $4,200 \text{ J/kg}^\circ\text{C}$) A. $39.5 \text{ J/kg}^\circ\text{C}$ B. $50.4 \text{ J/kg}^\circ\text{C}$ C. $127.6 \text{ J/kg}^\circ\text{C}$ D. $154.6 \text{ J/kg}^\circ\text{C}$ E. $173.4 \text{ J/kg}^\circ\text{C}$.
73. If the refractive index of a medium is $\sqrt{2}$, what is the critical angle? A. 45° B. $50^\circ 12'$ C. $56^\circ 25'$ D. 75° E. 90°
74. As a positively charged rod is brought nearer to the top cap of a positively charged gold leaf electroscope, the divergence of the leaves will A. decrease to zero B. steadily increase C. decrease to zero and then increase D. remain constant E. increase to a maximum and then decrease.
75. A rocket burns 0.01kg of fuel each second and ejects it as a gas with velocity of 5,000m/s. What force does the gas exert on the rocket? A. 500,000N B. 500N C. 50N D. 5,000N E. 50,000N.
76. Which of the following assumptions is made in a simple pendulum experiment? The suspending string is inextensible B. bob has a finite size C. bob has a definite mass D. initial angle of oscillation must be large.
77. A rectangular tank contains water to a depth of 2m. if the base is $4 \text{ m} \times 3 \text{ m}$, calculate the force on the base (density of water 10^3 kgm^3 , $g = 10 \text{ m/s}^2$) A. $2.4 \times 10^5 \text{ N}$ B. $2.4 \times 10^4 \text{ N}$ C. $2.0 \times 10^4 \text{ N}$ D. $1.7 \times 10^3 \text{ N}$

78. The expansion of solids can be considered as disadvantage in the A. balance wheel of water B. fitting of wheels on our vehicle C. fire alarm D. thermostat.
79. When two objects P & Q are supplied with the same quantity of heat, the temperature change in P is observed to be twice that of Q. the ratio of the specific heat capacity of P to Q is A. 1:4 B. 4:1 C. 1:1 D. 2:1
80. A lens of focal length 12.0cm form an upright image three times the size of a real object. The distance between the object and the images is A. 8.0cm B. 16.0cm C. 24.0cm D. 32.0cm

BIOLOGY

81. Anatomy is the study of..... and..... A. forms and structure B. forms and cell C. Tissue and organ D. system and structure E. A
82. Is the systematic study of the natural phenomena in the environment A. Anatomy B. cell C. Science D. botany E. polymer
83. Cell comes from pre-existing cell was a law given by A. Charles Darwin B. Charles Lams C. Robert Hooke D. Robert Korch E. A & B
84. Using the punnet square given by Whitaker, the genotypic ratio in the second law is A. 3:1 B. 1:3:1 C. 1:2:1 D. 2:1 E. 4:3:1
85. Groups of cell grouped together link up to produce A. Cells B. Tissue C. Organ D. system E. A & B.
86. The capacity of living organism to respond to internal and external stimuli is A. Excretion B. nutrition C. irritability D. respiration
87.organism posses living and non living quality A. Viruses B. Fungi C. Algae D. A & B E. A & C

88. Carl Linnaeus proposed..... System of naming A. 10 B. 5 C. 6 D. 7 E. 12
89. The role of organism, in the environment is termed A. Biome B. Niche C. Ecosystem D. Catalyst E. A & C
90. Protoplasm + Nucleus +
91. The outer covering of plant cell is A. membrane B. cell wall C. cytoplasm D. plasma
92. The heart pumps blood to all part of the body True/ False
93.Blood vessel carries blood away from the, heart. A. vein B. capillaries C. arteries D. Nodules
94. The shoulder blade is also called A. Scalp B. Tissue C. Scapular D. Tendon E. Ligament
95. Ribosome's is one of the organelle responsible for A. fighting foreign bodies B. synthesis of protein C. building of fats D. disintegrate lipids.
96. The study of how living organism interact in its environment is termed..... A. ecology B. ecosystem C. Niche D. Zoology
97. Mendel's law on genetics is termed as the law of A. Selection B. Assortment C. Segregation D. Build up E. A & C
98. Pairs of gene with alternating form is termed..... A. Pure line B. Chromosome C. Allele D. Genes
99. Strands of genetic materials are termed as..... A. Pure line B. Chromosome C. Autosome D. Manosomes
100.is not a vertebrae A. Cervical vertebrae B. Caudal vertebrae C. Kosal vertebrae D. Sacral vertebrae.

SOLUTION TO 2005/2006 FUTO ADMISSIONS SELECTION TEST

ENGLISH LANGUAGE

1. D, goes 2. A, from his viewing proposal
3. D, working
4. D, not to study 5. A, shall be writing
6. D, air or by road
7. D, was doing 8. B, was disbelieved
9. C, discovered a plan
10. C, is in danger 11. C, he may be able to do it alone 12. B
13. A, as pleasant as one thought 14. D, fell from
15. D, my acceptance
16. C, in time 17. A, lift
18. A, dissipated
19. A, worthless 20. C, neutral

CHEMISTRY

21. This is a molarity problem: $C_A = 1.25M$, $C_B = 0.5M$, $V_A = 10cm^3$, $V_B = ?$
Equation of reaction: $H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$; $n = \frac{1}{2}$

$$\text{Using the formula: } \frac{C_A V_A}{C_B V_B} = n; \frac{1.25 \times 10}{0.5 \times V_B} = \frac{1}{2}$$

$$V_B = \frac{1.25 \times 10}{0.5 \times \frac{1}{2}} = 50cm^3$$

22. B, sublimation

23. D, P has configuration 2, 4 (metalloid)
Q has configuration 2, 8, 1 (metal)
R has configuration 2, 8, 5 (non metal)
S has configuration 2, 8, 7 (non metal)

\therefore Q (metal) combining with a non metal S will form an electrovalent bond.

24. A, law of multiple proportions

25. Potassium chlorate Z $KClO_3$

$$1 + Cl + (-2 \times 3) = 0; Cl = 6 - 1 = 5$$

The oxidation state of chlorine is +5 remaining 3 electrons to make it octet. Thus our answer is option C

26. When CO_2 is bubbled into lime water $Ca(OH)_2$, it forms a precipitate of $CaCO_3$, which is insoluble in water. On further bubbling of CO_2 , calcium hydrogen carbonate $CaHCO_3$ (which is soluble) is then formed.C

27. In (i)

* Pressure has no effect since the number of molecules of both sides are equal

* Increasing the temperature favours the backward reaction since ΔH is negative

In (ii)

- * Decreasing the pressure favours the backward reaction according to Lechateliers principle
- * Increasing the temperature favours the backward reaction since ΔH is negative

In (iii)

- * Pressure has no effect
- * Increasing the temperature favours the forward reaction since ΔH is positiveC

28. The water and methanoic acid is separated from the sand by filtration. The mixture of water and methanoic acid can then be separated by distillation. B

29. In the electrolysis of NaOH using platinum electrode, hydrogen ions are discharged at the anode.B

30. The electronic configuration of K is 2, 8, 8, 1. when it forms an ion (i.e. K^+) it loses one electron. The configuration now becomes 2, 8, 8 which is the same as that of argon. C

31. X + $3/2O_2$ Z X_2O_3
1 liter 1 1/2 liter oxide Ans: B

32. C

33. Equation of reaction: $2HCl + Na_2CO_3 \rightarrow 2NaCl + H_2O + CO_2$

From neutralization equation: $\frac{C_A V_A}{C_B V_B} = \frac{n_b}{n_a}$

$C_A = 7.3g/dm^3 = 0.2mol/dm^3$, $V_A = ?$ $C_B = 0.25mol/dm^3$, $V_B = 20ml$, $n_a = 2$, $n_b = 1$

$$\frac{0.2 \times V_A}{0.25 \times 20} = \frac{2}{1}$$

$$V_A = \frac{0.25 \times 20 \times 2}{0.2} = 50ml \quad \text{Ans: B}$$

34. D

35. Equation of reaction: $Mg + 2HCl \rightarrow MgCl_2 + H_2$

24g of Mg liberated 2g of H_2

6g of Mg will liberate Xg of H_2

$$X = \frac{6 \times 2}{24} = 0.5g \text{ of } H_2 \quad \text{Ans: C}$$

36. E

37. The oxidation state of $KMnO_4$ is obtained thus

$$KMnO_4 = 1 + Mn + (-2 \times 4) = 0$$

$$1 + Mn = 8$$

$$Mn = 8 - 1 = +7$$

This is the electron in the outermost shell of manganese. Looking at the options you will observe that option D (i.e. 17) has 7 electrons in its outermost shell.

Thus our answer is option D

38. D, For rusting to occur, oxygen and moisture must be present.

39. An atom is represented as ${}_Z^AX$; $A = Z + N$ Where N is the mass number which is the sum of the atomic number and neutron number Ans: E

40. Elements in the same group has identical electronic configuration

MATHEMATICS

41. Let his salary before the increase be X

$$\frac{115}{100} \times x = 345$$

$$x = \frac{345 \times 100}{115} = N 300 \quad \text{Ans: C}$$

$$42. 101101_2 = 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$$

$$= 32 + 8 + 4 + 1 = 45_{10}$$

43. Total ratio = 3 + 5 = 8

Let the annual profit be X

A's share $3x/8$; B's share $5x/8$

$$\therefore B's \text{ share} - A's \text{ share} = 3000$$

$$5x/8 - 3x/8 = 3000$$

$$x = \frac{8 \times 3000}{2} = \#12000 \quad \text{Ans: C}$$

44. B

$$45. \frac{5^x \times 25^{x-1}}{125^{x+1}} = \frac{5^x \times 5^{2x-2}}{5^{3x+3}}$$

$$\frac{5^{x+2x-2}}{5^{3x+3}} = 5^{3x-2-2x+3} = 5^{-5} \quad \text{Ans: C}$$

46. Re-arranging the numbers in ascending order: 4, 7, 10, 13, 14, 17, 94;

Median is the middle number = 13 Ans: A

47. C

$$48. 10x^2 - 13x - 3 = 0$$

Factorizing we have: $(5x + 1)(2x - 3) = 0$

$$5x + 1 = 0 \quad \& \quad 2x - 3 = 0$$

$$\therefore x = -3/5 \text{ or } 1.5$$

49. Total surface area of a cylinder is given by: $2\pi r^2 + 2\pi rh$

$$366 = 2\pi r(r + h)$$

$$r + h = 366/2\pi$$

$$\therefore h = 19.42 - 3 = 16.42cm$$

50. $\sin x = a/b$; $\sin(90 - x) = \cos x$

$$\cos x = \frac{b^2 - a^2}{b} \quad \text{Ans: C}$$

51. Age of pupils that left the class = $7 \times 12 = 84$ years

Age of total pupils in class = $25 \times 14 = 350$ years

Age of pupil remaining in the class = $25 - 7 =$

18pupils

When 6 new pupils of average age 11 years join the class

Age of 6 new pupils = $6 \times 11 = 66$ years

Total age of pupil = $226 + 66 = 292$ years

Total number of pupil = $18 + 6 = 24$ pupils

Average age = $292/24 = 12$ years 3 months

52. B 53. B 54. E 55. C 56. C 57. C 58. B
59. C 60. B

PHYSICS

61. $e = 6mm = 0.6cm$, $l = 10cm$, $F = 100N$,

young modulus = $50N/cm^2$, Area = ?

$$\text{From young modulus} = \frac{F/A}{e/l}$$

$$50 = \frac{100 \times 10}{0.6A}$$

$$\therefore A = \frac{100 \times 10}{50 \times 0.6} = 33.33cm^2 \quad \text{Ans: C}$$

62. B

63. At constant volume, $\frac{P_1}{T_1} = \frac{P_2}{T_2}$

$P_2 = \frac{P_1 T_2}{T_1} = \frac{P \times 350}{300} = 1.16 \text{PN/m}$ Ans: C

64. E

65. A

66. Heat = $lvt = 5 \times 6 \times 200 = 6000 \text{cal}$ Ans: B

67. D

68. Pressure = $I \times \text{depth} = 1.03 \times 200 = 206 \text{N/m}^2$
Force = pressure \times Area = $206 \times 0.5 = 1.03 \times 10^3 \text{N}$
Ans: E

69. A

70. Refractive index = $\frac{\text{speed in air}}{\text{speed in glass}}$

Speed in glass = $\frac{3 \times 10^8}{1.65} = 1.82 \times 10^8 \text{m/s}$ Ans: A

71. $P = Iv$; $I = P/v = 1000/250 = 4 \text{A}$

$P = I^2 R$; $R = P/I^2 = 1000/4^2 = 62.5 \Omega$ Ans: D

72. C

73. Refractive index = $1/\sin C$

$\sin C = \frac{1}{2}$

$C = \sin^{-1}(0.7071) = 45^\circ$ Ans: A

74. B

75. $f = mv/t = 0.01 \times 500/1 = 50 \text{N}$ Ans: C

76. A

77. Volume of rectangular tank $2 \times 4 \times 3 = 24 \text{m}^3$

Mass = density \times volume = $10^3 \times 24 = 24000 \text{kg}$

Force = $24000 \times 10 = 2.4 \times 10^5 \text{N}$ Ans: A

78. B

79. D

80. $M = \frac{UF}{F+U}$; $F = 3 \text{cm}$, $M = 3$, $U = ?$

$3 = \frac{12U}{12+U}$ Z $12U = 36 + 3U$ Z $9U = 36$

$U = 4 \text{cm}$

U is the object distance from the focal length but the distance between the object and the image is

$2U = 2 \times 4 = 8 \text{cm}$ Ans: A

BIOLOGY

81. A	82. C	83. C	84. C
	85. B	86. C	87. A
88. B	89. B	90. **	91. B
	92. True	93. C	94. C
95. B	96. B	97. C	98. C
99. B	100. C		

EVERBEST QUICK REVISION GUIDE

CHEMISTRY

1. Mole = $\frac{\text{Mass of Compound}}{\text{Molar Mass}} = \frac{\text{Volume at STP}}{22.4}$

2. Mole = $\frac{\text{No of atoms}}{6.023 \times 10^{23}}$

3. Density = mass/volume

4. Density = $\frac{\text{Pressure} \times \text{Molar Mass}}{R \times \text{Temperature}}$

5. % by mass = $\frac{\text{Mass of that element (cpd)}}{\text{Mass of total cpd}}$

6. Empirical formula (i) = $\frac{\% \text{ Mass of element in cpd}}{\text{Molar mass of the element}}$

(ii) Divide each element by the smallest ratio

7. Nucleon = Neutron + proton

8. Atomic number = Atomic number

9. Mass number = proton + neutron

10. Boyle's law = $P_1 V_1 = P_2 V_2$

11. Charles law = $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

12. Gay Lussac's pressure law: $\frac{P_1}{T_1} = \frac{P_2}{T_2}$

13. Ideal Gas Law: $pv = nRT$

14. Grahams law: $\frac{t_A}{t_B} = \frac{\text{Rate B}}{\text{Rate A}} = \sqrt{\frac{M_A}{M_B}} = \sqrt{\frac{\rho_A}{\rho_B}}$

15. General Gas Equation = $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

16. Vapour Density of Gas / Vapor (i) =

$\frac{\text{mass of } x \text{ vol of gas/vapour}}{\text{mass of } x \text{ vol of hydrogen}}$

(ii) = $\frac{\text{mass of } x \text{ molecule of gas/vapour}}{\text{mass of } x \text{ molecule of hydrogen}}$

(iii) $2 \times \text{V.D.} = \frac{\text{mass of 1 molecule of gas/vapour}}{\text{mass of 1 atom of hydrogen}}$

N.B. hydrogen molecule is diatomic

V.D. = Vapour Density

(iv) $\text{V.D.} = \frac{1}{2} \text{ Relative Molecular Mass of Gas / Vapour}$

17. Water of Crystallization = $\frac{x \text{H}_2\text{O}}{\text{Molar mass of hydrate}}$

$\frac{\text{Mass of H}_2\text{O driven off}}{\text{Given mass of hydrate}}$

Note that molar mass $\text{H}_2\text{O} = 18$

$\frac{18x}{M_{m_h}} = \frac{M_{\text{H}_2\text{O}}}{M_b}$

18. Volumetric Analysis: concentration = amount / volume