University of Calabar (UNICAL)
Post UTME
Past Questions and Answers

Science, Medicine & Agriculture/Forestry & Wildlife Resources
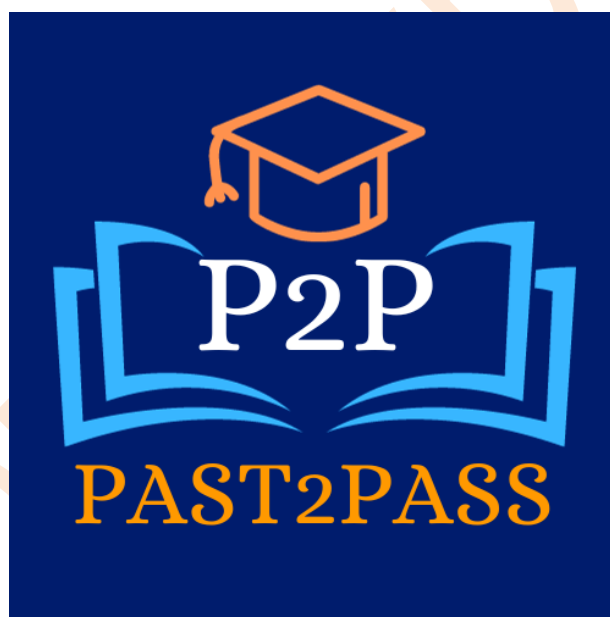
UNIVERSITY OF CALABAR, CALABAR
PAST POST-UTME SCREENING QUESTIONS
SCIENCE, MEDICINE &
AGRICULTURE/FORESTRY & WILDLIFE
RESOURCES

ENGLISH LANGUAGE

Choose the expression or word which BEST COMPLETES each sentence
1. I am intent _____continuing my course
    A. on   **B.** with **C.** as   **D.** to   **E.** at
2. _____equations use letters to stand for numbers
    A. Silmultenous   **B.** Simultanous
    C.Simultanous   **D.** Simultaneous

From the options A to D, choose the expression that is OPPOSITE IN MEANING to the underlined word(s).
3. Elemi's **sagacity** contrasted sharply with his friend's_____
    A. Timidity **B.** Wisdom   **C.** Fluency   **D.** Foolishness
4. Some people keep **ferocious** animals as pets.
    A. Gentle   **B.** Wild **C.** Fierce   **D.** Domestic

From the options listed A – D select the word that best CAPTURES THE MEANING of the italicized part of the sentences
5. Every visitor to Calabar must visit *where photographs and artifacts of early European colonial presence in Nigeria are kept*
    A. Archives **B.** Ranch   **C.** Market   **D.** museum

From the options A to D, choose the expression that is NEAREST IN MEANING to the underlined word
6. Ebire's generosity turned out to be her **Achilles' heel**
    A. Strong point   **B.** Favourite habit   **C.** Weak point   **D.** Less popular virtue

Choose the expression or word which BEST COMPLETES each sentence
7. The giant hydro-electric project is among the _____of colonial rule in Southern Africa
    A. Inheritance   **B.** Remnants   **C.** Legacies   **D.** Evidence
8. Ukpabio is proficient _____tailoring
    A. With   **B.** In   **C.** Of   **D.** At

Choose the word or phrase that is OPPOSITE IN MEANING to the underlined
9. The demonstration was organized by hoodlums
    A. Criminals   **B.** Activists   **C.** Thugs   **D.** Soldiers
10. The plaintiff convinced the court that the murder was inadvertent
    A. Brutal   **B.** Wicked   **C.** Careless   **D.** Premeditated
11. The bush burning festival will further renew our forest resource
    A. Increase**B.** Reduce   **C.** Deplete   **D.** Remove

Choose from the options lettered A – E the one that has the correct stress with the word given. In each word only the stressed part is in CAPITAL
12. Planetarium
    A. PLAN-e-tar-i-um**B.** plan-E-tar-i-um   **C.** plan-e-TAR-i-um   **D .**plan-e-tar-I-um

Choose from the options the word which has THE SAME SOUND as the underlined
13. COURTESY   **A.** our   **B.** Court   **C.** Shirt   **D.** Tour

From the options listed A – D select the word that best CAPTURES THE MEANING of the italicized part of the sentences.
14. Lecturers assisted Prof. Atahiru Jega when *Nigerians chose their political leaders*
    A. election **B.** nomination   **C.** appointment **D.** selection
15. Mother always *pays attention to details*
    A. frivolous **B.** interesting   **C.** rigid   **D.** meticulous

Choose the option that BEST EXPLAINS the information conveyed in the sentences below
16. The rampage in England shows that youths react the same way under provocation
    A.youths in England are very good   **B.**youths in England are miscreants
    C.youths act the same way when provoked **D.**youths provoke people in England
17.

From the options choose the appropriate STRESS pattern. The stressed syllables are written in CAPITAL letters.

18. Intimacy
   A. INtimacy **B.** inTImacy   **C.** intiMAcy   **D.** INTImacy
19. consideration
    A. CONsideration **B.** consideration **C.** consiDERation   **D.** considerAtion
From the words lettered A – D choose the word that rhymes with the given word
20. purity
   A. plentiful **B.** security   **C.** purify   **D.** nonentity
From the words lettered A – D choose the word that rhymes with the given word
21. beautiful
   A. beautify   **B.** beautification   **C.** dutiful   **D.** dignify
Choose from the options lettered A – E the one that has the correct stress with the word given. In each word only the stressed part is in CAPITAL
22. constitutional
   A. con-sti-tu-tion-AL **B.** con-sti-TU-tion-al   **C.** CON-sti-tu-tion-al   **D.** con-STI-tu-tion-al
23. abnormality
   A. AB-nor-ma-li-ty   **B.** ab-nor-ma-li-TY   **C.** ab-nor-ma-LI-ty   **D.** ab-nor-MA-li-ty
From the options A to D, choose the expression that is NEAREST IN MEANING to the underlined word
24. The use of Latin expressions in English is now **dated**
   A. well-established **B.** historical   **C.** old- fashioned   **D.** popular
25. His uncle showed **affected** interest in his welfare.
   A. pretended   **B.** loving   **C.** genuine   **D.** deep
From the options choose the expression that BEST COMPLETES each sentence
26. I am qualified for the job;-----?
   A. haven't I   **B.** Isn't it   **C.** aren't I   **D.** ain't I
27. My sister along with her colleagues -----the museum today.
   A. are visiting   **B.** have visited **C.** were visiting **D.** is visiting
Choose the word that has the SAME SOUND as the one represented by the underlined letter
28. mansion
   A. cheap   **B.** leisure   **C.** peace   **D.** action
29. time
   A. print   **B.** might   **C.** flip   **D.** illegal
From the options choose the expression that BEST COMPLETES each sentence.
30. Every student   before the principal entered the hall
   A. has arrived   **B.** have arrived   **C.** had arrived   **D.** arrived
31. The workers presented   to the National Assembly
   A. five pages document   **B.** five-paged document
   C. a five - paged document   **D.** a five - page document
From the options A to D, choose the expression that is NEAREST IN MEANING to the underlined word(s).
32. A **dogged** student is likely to succeed
   A. Studious   **B.** Clever   **C.** Curious   **D.** Determined
Choose the option that best explains the information conveyed in the sentence below
33. When I visited Okon I only gave him a congratulatory card
   A. the only person I visited was Okon and nobody else
   B. it was only Okon that I gave a congratulatory card
   C. Okon only wanted a congratulatory card
   D. All that I gave Okon when I visited him was a congratulatory card
From the options choose the expression that BEST COMPLETES each sentence
34. The police ------------up a list of suspects in the recent bombings.
   A. Has drawned B. Has drawn C. have drawned D. Have drawn
Choose the word that has the same sound as the one represented by the underlined letter
35. book
   A. lamb   **B.** flock   **C.** slump   **D.** club

36. key
    A kite   **B.** quay   **C.** kindred   **D.** quarter

Choose the expression or word which best completes each sentence

37. Since Atim hasn't come till now I am in doubt _____ what to do
    A. to   **B.** with   **C.** about   **D.** of

38. The method _____ does not give the expected results
    A. you recommended   **B.** you visited   **C.** you told me   **D.** you sent me

From the options listed A – E select the word that best captures the meaning of the italicized part of the sentences

39. Wolves are *meat eaters*
    A. herbivores   **B.** carnivores   **C.** animals   **D.** omnivores

40. Miss Suzuki has *published the life stories of three movies stars*
    A. historian   **B.** autobiographer   **C.** writer   **D.** biographer

41. Most of the birds my grandfather described are *no longer available* in our village forest
    A. travelled   **B.** migrated   **C.** hibernated   **D.** extinct

Select the word that best captures the meaning of the italicised part of the sentence.

42. The principles of American government are *the direct opposite of* communist doctrine
    A. apex   **B.** antithesis   **C.** anathema   **D.** ambivalence

43. Superstition has it that certain foods and drinks are *able to increase sexual desire or potency*
    A. Apocryphal   **B.** Amorous   **C.** Amorphous   **D.** Aphrodisiac

44. Collins had little understanding of the game, and most of his moves were *random, based on caprice rather than reasoning*
    A. Assiduous   **B.** Astute   **C.** Arbitrary   **D.** Acute

45. Eddy vowed to live a long and happy life, *shun* temptation and *avoid* extremes
    A. Deny   **B.** Devolve   **C.** Eschew   **D.** Emulate

Choose the expression or word which best completes each sentence.

46. By the end of this year _____ in this town for eleven years
    A. I'm living   **B.** I'd be living   **C.** I have lived   **D.** I'll have lived

Fill in the blank in the following sentences making use of the best of the five options.

47. He was reported _____ the policeman
    A. to be assaulting   **B.** to assault
    C. assaulting   **D.** to have assaulted

48. He devoted himself _____ homeless children
    A. to helping   **B.** to help   **C.** with helping   **D.** helping

49. My younger brother looked ill last night and evidently _____ this morning.
    A. Worse   **B.** Worst   **C.** More ill   **D.** leaner

After each of the following sentences, a list of possible interpretation of all or part of the sentence is given. Choose the interpretation that you consider most appropriate for each sentence:

50. For us to succeed in this task all hands must be on deck. This means that everybody
    A. should push with his hands   **B.** will have to place his hands on the deck
    C. must cooperate   **D.** should take a test to qualify

51. Kate was at home with all the questions asked by the examiner. This means that Kate was:
    A. Familiar with the questions   **B.** Went home with the questions
    C. Prepared to go home with the questions   **D.** Conceited about the questions

52. Mike flies off the handle each time there is an argument. This means:
    A. Mike holds the door handle when he argues   **B.** Mike allows the handle to fly
    C. Mike easily loses his temper   **D.** Mike can cope with any argument

Complete the following sentences with the right option from the words supplied after each sentence.

53. When the fire broke out in the hostel, students in _____ rushed out in all directions.
    A. Crisis   **B.** Panic   **C.** Haste   **D.** Hurry

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54. Astronomers keep a close watch of the night sky in order not to miss the _____appearance of some stars
    A. Parallel   **B.** Periodic   **C.** Regular   **D.** Constant

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

55. My mother has refused to come to live in Lagos because she prefers the tranquil life in the village to the hurly burly of the city.
    A. Sweet   **B.** Prosperous   **C.** Peaceful   **D.** Decent

56. A lorry larger than an elephant was struck on the bridge
    A. As large as an elephant   **B.** Carrying an elephant.
    C. That looked like an elephant   **D.** Of enormous proportions.

Choose the option that best completes the sentence.

57. The dentist found that his patient's teeth____
    A. Have long decayed   **B.** Have long been decayed
    C. Have long being decayed   **D.** Had long decayed

58. In order to catty out the necessary examination, the dead body was_____
    A. Extracted   **B.** Exhumed   **C.** Extradited   **D.** Expelled

59. He went abroad with a view_____a business partner
    A. To fund   **B.** To funding   **C.** To be funding   **D.** To have funded

In question 59, which of the options express the same idea as the one in quote?

60. 'To put something aside' is to
    A. Put it one's side.   **B.** Put it in a side pocket for future use.
    C. Keep something for some special purpose.   **D.** Keep in safety.

Select the option that best explains the sentence:

61. The painting was beautifully faked
    A. The painting was a good deceptive replica   **B.** The painting was well framed and displayed
    C. The painting was deceptively decorated   **D.** The painting was carefully hung

From the alternatives provided select the one which best completes the sentence

62. If only I _____insured? But I wasn't. But I have to pay a lot of money
    A. am   **B.** have been   **C.** had been   **D.** was to be

63. Since the petition writer did not include his name, the vice chancellor refused to act on such_____letter
    A. a spontaneous   **B.** an anonymous   **C.** a scandalous   **D.** a cowardly

64. The first graduation ceremony of the university was attended by men from all_____of life
    A. works   **B.** areas   **C.** walks   **D.** walk

Choose the word or phrase from options A – D which has the nearest meaning to the underlined word or words in each sentence

65. He should be able to do it alone
    A. he would be able to do it alone   **B.** he ought to be able to do it alone
    C. he has to be able to do it alone   **D.** he will do it alone

66. The old man was said to have died intestate
    A. without an estate   **B.** in his estate
    C. without a will   **D.** in good state

From the alternatives provided select the one which best completes the sentence

67. If only I _____insured? But I wasn't. But I have to pay a lot of money
    A. am   **B.** have been   **C.** had been   **D.** was to be

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Choose the word or phrase from options A – D which has the nearest meaning to the underlined word or words in each sentence
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    A. he would be able to do it alone   **B.** he ought to be able to do it alone
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In each of the following questions, the word in capital letter has the emphatic stress. Choose the option that best fits the expression in the sentence.
72. The man BOUGHT the newspaper
    A. Is this the newspaper which the man bought?   **B.** Did the man read the newspaper?
    C. Who bought the newspaper?   **D.** What did the man buy?
73. The chief RAN to the place
    A. Where did the chief run to?   **B.** Did the chief walk to the place?
    C. Did the princess run to the place   **D.** Who ran to the place?

From the options lettered A – D choose the word opposite in meaning to the underlined words in the following sentences
74. Ebere's _____contrasts with his brother's indolence
    A. indulgence   **B.** laziness   **C.** labour   **D.** diligence
75. The discussion ended on an amicable note even though there was grave _____at the beginning
    A. hostility   **B.** incompatibility   **C.** irresponsibility   **D.** camaraderie

Select the word that best captures the meaning of the italicized part of the sentence
76. Some politicians in the area were said to be engaged in *double dealing*
    A. eschewing   **B.** effeteness   **C.** duplicity   **D.** dubiousness

MATHEMATICS

1. Find the average of the first four prime numbers greater than 10
   A. 20   **B.** 19   **C.** 17   **D.** 15

2. Given that $P \propto \frac{1}{\sqrt{r}}$ and p = 3 when r = 16, find the value of r when $p = \frac{3}{2}$

   A. 48   **B.** 64   **C.** 72   **D.** 324
3. $4 \times 10^{-5} =$
   A. - 40,000 **B.** - 200   **C.** 0.0004   **D.** 0.00004
4. Which of the following equations corresponds the data in the table?

x	y
-20	-1/8
-10	-1/3
0	1/2
5	2/9
0	1/12

   A. y = 1 / (x + 2)   **B.** y = 2 / (x + 4)
   C. y = (x - 1) / (x + 2)   **D.** y = 2 / (x - 2)
5. The quadratic equation whose roots are at x = 3 and x = 5 is given by
   A. (x - 3)(x - 5) = 1   **B.** (x + 3)(x + 5) - 9 = (x + 3)(x + 5) – 25
   C. (x + 3)(x + 5) = 0 **D.** x^2 - 8x = -15
6. There are 15 balls in a box: 8 balls are green, 4 are blue and 3 are white. Then 1 green and 1 blue balls are taken from the box and put away. What is the probability that a blue ball is selected at random from the box?
   A. 3/13   **B.** 4/15   **C.** 3/15   **D.** 4/13
7. If -3/(a - 3) = 3/(a + 2), then a = ?
   A. -3   **B.** -2   **C.** 1/2   **D.** 2
8. What is the average of 7/8 and 3/4?|
   A. 13/8   **B.** 5/6   **C.** 5/3   **D.** 13/16
9. If the hypotenuse of a right triangle is 10 inches long and one of its legs is 5 inches long, how long is the other leg?
   A. 5   **B.** 5√3   **C.** 5√5   **D.** 75
10. If 8y = 3x - 11, then x =
    A. (88/3) y   **B.** (8/3) y + 11   **C.** (8/3) y - 11   **D.** (8y + 11)/3
11. Which of the statements describes the solution set for -2(x + 8) = -2x + 20?
    A. x = - 2 only   **B.** x = 0 only   **C.** x = 20 only   **D.** There are no solutions for this equation.
12. When graphed in the (x,y) coordinate plane, at what point do the lines 2x + 3y = 5 and x = -2 intersect?
    A. (-2,0)   **B.** (-2,5)   **C.** (0,5/3)   **D.** (-2,3)
13. Which of the following is equal to √45
    A. 15   **B.** 5√3   **C.** 9√5   **D.** 3√5
14. If a = 3, then 2 / (1/7 + 1/a) = ?
    A. 5   **B.** 21/10   **C.** 20   **D.** 21/5
15. If the expression x^3 + 2hx - 2 is equal to 6 when x = -2, what is the value of h?
    A. 0   **B.** -2   **C.** -4   **D.** 4
16. Which of the graphs below is the solution set of -3x ≤ 12

17. If the domain of function f given by $f(x) = -x^2 + 6x$ is given by the interval $[0, 6]$, then the range of f is given by the interval
   A. $[0, 9]$ **B.** $[0, 6]$ **C.** $[0, 3]$ **D.** $[3, 6]$
18. The x intercepts of the graph of $y = -x^2 + 3x + 18$ are given by
   A. $(6, -3)$ **B.** $(-3, 6)$ **C.** $(-3, 0)$ and $(6, 0)$ **D.** $(3, 0)$ and $(-6, 0)$
19. The sum of the first n terms of a linear sequence $Sn = n^2 + 2n$. Determine the general term of the sequence
   A. n+1   **B.** 2n+1   **C.** 3n+1
   D. 4n+1
20. The length of a rectangle is 3 times its width. If the width of the rectangle is 5 inches, what is the rectangle's area, in square inches?
   A. 15   **B.** 20   **C.** 30   **D.** 75
21. What is the slope of the line
   $4x = -3y + 8$
   A. 4   **B.** -3/4 **C.** -4/3 **D.** 8
22. The length of a rectangle is 3 times its width. If the width of the rectangle is 5 inches, what is the rectangle's area, in square inches?
   A. 15   **B.** 20   **C.** 30   **D.** 75
23. If $1.56^x = 2$, then x =
   A. ln 1.56 / ln 2   **B.** ln 2 / ln 1.56 **C.** 2 / ln 1.56   **D.** ln 2 / 1.56
24. A machine valued at ₦20, 000 depreciates by 10% every year. What will be the value of the machine at the end of two years?
   A. ₦16, 200   **B.** ₦14, 000   **C.** ₦12, 000   **D.** ₦16, 000
25. $x^3 - 2x^2 + 4x - 8 = 0$ if x =
   A. 4   **B.** 8   **C.** 2   **D.** -8   **E.** -4
26. The sum of integers from 4 to 8 plus the sum from 12 to 16 is
   A. 80   **B.** 120   **C.** 100   **D.** 110   **E.** 90
27. If the diagonals of a quadruplet are equal then the quadruplet is a
   A. square   **B.** parallelogram   **C.** rhomboid
   D. trapezoid   **E.** rectangle
28. The sum of four powers of q starting from power 0 is 85. Then q =
   A. 2   **B.** 3   **C.** 4   **D.** 5   **E.** 6

Amount (in Naira)	3	6	9	12	15	18
Number of Students	3	9	6	15	3	12

29. What is the mode
   A. ₦3   **B.** ₦6   **C.** ₦9   **D.** ₦12   **E.** ₦15
30. Find the median of the distribution
   A. ₦3.00   **B.** ₦9.00   **C.** ₦12.00   **D.** ₦15.00   **E.** ₦18.00

31. Factorize: $3a^2 - 11a + 6$
    A. $(3a-2)(a-3)$ **B.** $(2a-2)(a-3)$ **C.** $(3a-2)(a+3)$ **D.** $(3a+2)(a-3)$
    E. $(2a-3)(a+2)$

32. The number of telephone call N between two cities A and B varies directly as the population P_A, P_B in A and B respectively and inversely as the square of the distance D between A and B. which of the following equations represents this relation?
    A. $N = \dfrac{kp_A}{D^2} + \dfrac{CP_B}{D^2}$ **B.** $N = \dfrac{kp_A P_B}{D^2}$ **C.** $N = kDP_A P_B$
    D. $N = kDP_A + CDP_B$ **E.** $N = kD^2 P_A B_B$

33. In a soccer competition in one season, a club had scored the following goals: 2, 0, 3, 3, 2, 1, 4, 0, 0, 5, 1, 0, 2, 2, 1, 3, 1, 4, 1 and 1. The mean, median and mode are respectively
    A. 1, 1.8 and 1.5   **B.** 1.8, 1.5 and 1   **C.** 1.8, 1 and 1.5
    D. 1.5, 1 and 1.8

34. Add the same number to the numerator and denominator of $\dfrac{3}{18}$. If the resulting fraction is $\dfrac{1}{2}$ then the number added is
    A. 13   **B.** 14   **C.** 15   **D.** 12

35. $x^5 - 3x^4 + 4x - 12 = 0$ if $x =$
    A. 4   **B.** 3   **C.** 2   **D.** -8

36. Simplify $\dfrac{a-b}{a+b} - \dfrac{a+b}{a-b}$
    A. $\dfrac{-4ab}{a^2-b^2}$ **B.** $\dfrac{a^2}{a^2-b^2}$ **C.** $\dfrac{b^2}{(a-b)^2}$ **D.** $\dfrac{4ab}{a^2-b^2}$

37. If opposite sides of a quadruple are equal then it is a
    A. square   **B.** trapezoid   **C.** parallelogram   **D.** rhomboid   **E.** no such quadruple

38. The sum of even numbers from 12 to 18 is
    A. 80   **B.** 40   **C.** 70   **D.** 60   **E.** 90

39. The sum of powers of 3 starting from power 2 is 117. Then the number of added powers is
    A. 4   **B.** 2   **C.** 3   **D.** 5   **E.** 1

40. What is the relationship between 2ab and a+b where a, b are numbers?
    A. $2ab \le a+b$ **B.** $2ab \ge a+b$ **C.** $2ab \ne a+b$
    D. $2ab = a+b$ **E.** $2ab > a+b$

41. There are four visitors in a party. There are two tables with two seats each. In how many different ways can these guests sit down?
    A. 16   **B.** 24   **C.** 20   **D.** 12   **E.** 18

42. What is the modal goal scored
    A. 0   **B.** 1   **C.** 2   **D.** 5

43. $\begin{pmatrix} x^3 & 8 \\ 2 & x \end{pmatrix} \dfrac{2x}{x^2-4} =$ **A.** $\dfrac{1}{x^2+4}$ **B.** 1   **C.** $\dfrac{x^2-4}{x^2+4}$ **D.** x^2+4

44. The value of $\dfrac{3}{2} \times \dfrac{10}{21} \times \dfrac{4}{22} \times \dfrac{77}{5} =$ **A.** 5   **B.** 1/5   **C.** 2   **D.** 7

45. $\tan x + \cot x =$ **A.** $\sin 2x$ **B.** $2/\sin 2x$ **C.** $1/\cos 2x$ **D.** $\cos 2x$

46. $\dfrac{27x^3-8}{3x-2} =$ **A.** $9x^2 - 6x + 4$ **B.** $9x^2 + 3x + 4$ **C.** $9x^2 - 2x + 4$ **D.** $9x^2 + 6x + 4$

47. $\left(\left| \sqrt[6]{(3)^{12}} \right| \right)^{\frac{1}{2}} =$ **A.** 9   **B.** $3^{1/2}$ **C.** 3   **D.** 27

48. Express 0.00562 in standard form
    A. 5.62×10^{-3} **B.** 5.62×10^{-2} **C.** 5.62×10^2 **D.** 5.62×10^3

49. If $3^{2x} = 27$
    A. 1   **B.** 1.5   **C.** 4.5   **D.** 18

50. The population of a village is 5846. Express this number to three significant figures
    A. 5850   **B.** 5846   **C.** 584   **D.** 585

51. Simplify $\left(\frac{3}{4} - \frac{1}{3}\right) \times 4\frac{1}{2} \div 3\frac{1}{4}$

    A. $\frac{3}{2}$ **B.** $\frac{13}{12}$ **C.** $\frac{13}{9}$ **D.** $\frac{17}{12}$

52. Write as a single fraction $\dfrac{5}{6r} - \dfrac{3}{4r}$

    A. $\frac{r}{12}$ **B.** $\frac{1}{12r}$ **C.** $\frac{r}{6}$ **D.** $\frac{1}{6r}$

53. Simplify $\log_{10} 4 + \log_{10} 25$
    A. 3   **B.** 1   **C.** 2   **D.** 4

No. of goals	0	1	2	3	4	5
No. of matches	3	5	7	4	1	0

54. What is the mean goal scored?
    A. 0.75   **B.** 1.75   **C.** 1.9   **D.** 2

55. $\dfrac{\left(\frac{1}{4} - \frac{1}{5}\right)}{\left(\frac{1}{3} - \frac{1}{4}\right)} \times \dfrac{\left(\frac{1}{2} - \frac{1}{3}\right)}{\left(1 - \frac{1}{5}\right)} \times 8 =$

    A. 2   **B.** 1/6   **C.** 1   **D.** 4   **E.** 3

56. ₦1, 000,000.00 is put for 4% yearly interest for three years with the interest added at the end of each year to the base. At the end of the three years the money will be
    A. ₦1, 122,416.00   **B.** ₦1, 124,864.00
    C. ₦1, 241,232.00   **D.** ₦1, 422,232.00   **E.** ₦1, 441,122.00

57. Joe gets N40.00 to buy erasers for N5.00 each, pencils for N7.00 each and rulers for N8.00 each so that minimum number of items are bought and all the money is spent, then the number of pencils bought is
    A. 6   **B.** 3   **C.** 2   **D.** 1   **E.** 4

58. $\log_a x^2 - c\log_a x = 0$ then c
    A. 4   **B.** 3   **C.** 5   **D.** 2   **E.** -3

59. $x^3 - 3x^2 + 4x - 12 = 0$ if $x =$
    A. 4   **B.** 8   **C.** 2   **D.** 3   **E.** -4

60. Evaluate $\frac{1}{2} + \frac{3}{4}$ of $\frac{2}{5} \div 1\frac{3}{5}$

    A. $\frac{15}{16}$ **B.** $\frac{5}{16}$ **C.** $\frac{49}{50}$ **D.** $3\frac{1}{5}$

61. Given that $y = px + q$ and $y = 5$ when $x = 3$, while $y = 4$ when $x = 2$ find the values of p and q
    A. p= 1, q= 3   **B.** p = 1, q = 2   **C.** p = -2, q = 3   **D.** p = 3, q = -2

62. If $\frac{y-3}{2} < \frac{2y-1}{3}$, which of the following is true?
    A. y>7   **B.** y<-7   **C.** y>-7   **D.** y<7

63. A boy estimated his transport fare for a journey as ₦190 instead of ₦200. Find the percentage error in his estimate.
    A. 95%   **B.** 47.5%   **C.** 5.26%   **D.** 5%

64. The value of $\dfrac{3}{2} \times \dfrac{10}{21} \times \dfrac{7}{5} =$ **A.** 5   **B.** 1/5   **C.** 1   **D.** 7

65. There are three boys and three girls in a party. In how many different ways can they dance?
    A. 12   **B.** 6   **C.** 9   **D.** 8

66. If a sweet costs N2.00, a chocolate costs N3.00 and a cake costs N5,00 then buy from each item at least one and as many items as possible from N20.00. The number of sweets you by then is
    A. 10   **B.** 6   **C.** 8   **D.** 6

67. $\left(\left| \sqrt[6]{} (3)^{12} \right| \right)^{\frac{1}{2}} =$ **A.** 9   **B.** $3^{1/2}$ **C.** 3   **D.** 27

68. $\log x^{\log x} = 1$ where $\log x = \log_{10} x$. Then $x =$
    A. 10 or 1/10   **B.** 0   **C.** 2   **D.** 3

69. If the elements of a series are 1, 2, 3, 5, 8, 13 … then the next element is
    A. 22   **B.** 19   **C.** 16   **D.** 21

70. $\log_{27} x =$ **A.** $2\log_9 x$ **B.** $3\log_3 x$ **C.** $2\log_6 x$ **D.** $2\log_3 x$

BIOLOGY

1. The wavelike motion of the muscles of the oesophagus to push each bolus of food downwards is known as
   A. Anti-peristalsis **B.** Digestion **C.** Peristalsis **D.** Oesophageal motion
2. Which of these diseases cannot be controlled by killing the vectors?
   A. River blindness **B.** Malaria **C.** Polio **D.** Cholera
3. If a tall man (TT) marries a dwarf woman (tt) and they have four children, what will be the ratio of tall to dwarf children?
   A. 0 tall:4 dwarf **B.** 3 tall:1 dwarf **C.** 2 dwarf:2 tall **D.** 4 tall:0 dwarf
4. The chromosome is found in which organelle
   A. The Nucleus **B.** The Mitochondria **C.** The Vesicle **D.** The Cytosol
5. Photosynthetic organisms are classified as _____
   A. Autotrophs **B.** Heterotrophs **C.** Herbivorous **D.** Omnivorous
6. Which of the organisms listed below is not a micro-organism?
   A. Virus **B.** Tapeworm **C.** *Coccus* **D.** *Vibro cholera*
7. The nervous system is made up of
   A. Kidney, bladder and liver **B.** Testes and ovaries
   C. Brain and spinal cord **D.** Muscles and skeleton
8. The synthesis of protein takes place in _____
   A. Golgi body **B.** Ribosome **C.** Mitochondria **D.** Nucleus
9. Mutations involving alterations in the genes are called
   A. Gene mutations **B.** Gene changes
   C. Chromosomal mutations **D.** Chromosomal changes
10. Which vertebra has a projection on the centrum called odontoid process?
    A. Atlas **B.** Axis **C.** Thoracic **D.** Lumber
11. Deamination occurs in
    A. Kidney **B.** Pancreas **C.** Spleen **D.** Liver
12. The ability of an organisms to live successfully in an environment is known as
    A. Succession **B.** Resistance **C.** Adaptation **D.** Competition
13. The following are connected with the movement of a reflex action
    (1) Central nervous system, (2) Muscle, (3) Skin, (4) Sensory nerve, (5) Motor nerve
    Which of the following sequences indicates a correct path?
    A. 1-2-3-4-5 **B.** 2-1-4-5-3 **C.** 3-4-1-2-5 **D.** 3-4-1-5-2
14. Which of the following statements is NOT true of symbiosis?
    A. Symbionts must be living **B.** It is an association of 'give and take'
    C. The association may involve two plants **D.** Association between two similar species
15. The deficiency of Vitamin D leads to:
    A. Scurvy **B.** Pellagra **C.** Rickets **D.** Beriberi
16. Hepatic portal vein is unique because it
    A. Carries deoxygenated blood **B.** Begins and ends with capillaries
    C. Is the largest vein in mammals **D.** Carried digested food
17. The thoracic vertebrae of a mammal is characterized by the
    A. Vertebraterial canal **B.** Prominent neural arch
    C. Prominent neural process **D.** Prominent neural spine
18. A grasshopper respires by means of its
    A. Lung-books **B.** Gills **C.** Lungs **D.** Tracheal tubes
19. The inactive state exhibited by an animal during hot dry seasons is termed
    A. Aestivation **B.** Dormancy
    C. Resting **D.** Hibernation

20. Auxins are produced in the
    A. petiole of leaves
    B. parenchyma of roots and shoots
    C. epidermis of roots and shoots
    D. apical regions of roots and shoots
21. Which of the following methods of reproduction is common in Paramecium and Amoeba?
    A. Conjugation
    B. Sexual reproduction
    C. Binary Fission
    D. Budding
22. An example of cryptic coloration is the:
    A. Mottled colours on moths that rest on lichens
    B. Bright colour of an insect pollinated flower
    C. Green colour of a plant
    D. Bright marks on a poisonous tropical frog on variegated leaves
23. Which of the following organs is responsible for controlling the body temperature regulation and water balance in mammals?
    A. Kidney
    B. Hypothalamus
    C. Parathyroid
    D. Adrenal
24. A man and his wife are both heterozygous for the sickle cell trait. The likely percentage of their offspring that will either be carriers or 'sicklers' is
    A. 75%
    B. 50%
    C. 25%
    D. 100%
25. The brain and the spinal cord make up the
    A. Peripheral nervous system.
    B. Autonomic nervous system
    C. Central nervous system.
    D. Somatic nervous
26. The hormone which regulates the amount of sugar in the blood is
    A. Thyroxine
    B. Auxin
    C. Insulin
    D. Adrenalin
27. Which of the following is the effect of using artificial pollination in plant breeding?
    A. production of healthy crops
    B. improvement of the variety of crops
    C. lengthening the maturity time
    D. making crops susceptible to diseases
28. Which of the following processes will not introduce carbon dioxide into the atmosphere?
    A. breathing
    B. photosynthesis
    C. Respiration
    D. Putrefaction
29. Which of the following does not contribute to the biomass in an ecosystem?
    A. producer's
    B. food chain
    C. consumer's
    D. micro-organisms
30. Which of these diseases cannot be prevented by immunization
    A. Onhcocerciasis
    B. Poliomyelitis
    C. Cholera
    D. Tuberculosissis
31. Which of the following specialized structures are stimulated by touch, pressure, pain, heat and cold?
    A. receptors
    B. synapse
    C. cell bodies
    D. myelin
32. The process by which plants and animals are modified in structure, physiology and behavior in order to survive is known as
    A. evolution
    B. adaptation
    C. succession
    D. hibernation
33. Thunderstorm can be beneficial to plants because it
    A. kills pests that attack crops
    B. adds lime to the soil
    C. adds nitrates to the soil
    D. makes rain water available to plants
34. When large numbers of organisms share limited space and resources, the result is
    A. immigration
    B. symbiosis
    C. extinction
    D. competition
35. Even though some flowering plants contain accessory pigments which give them colors, they still contain the pigment
    A. melanin
    B. chlorophyll
    C. carotene
    D. xanthophill
36. Which structure in the maize grain stores food?
    A. radicle.
    B. embryo
    C. cytoplasm
    D. endosperm
37. Which of the following statements is not associated with the theory of natural selection?
    A. There is a struggle for existence
    B. There is competition among the offspring
    C. The weaker offspring's are eliminated
    D. Food and other needs are abundant
38. Nitrogen fixing micro-organisms in leguminous plants live symbiotically in the
    A. branch roots
    B. tap roots
    C. root nodules
    D. root hairs

39. The epidermis of the mammalian skin is an example of a tissue because the cells
    A. prevent light from passing through them   **B.** Have a similar structure and function
    C. prevent excessive loss of water   **D.** are impregnated with keratin
40. The phenomenon whereby some organisms with certain features get established in an environment is known as
    A. Partial selection   **B.** Artificial selection   **C.** Natural selection   **D.** Mutation
41. Who formulated the theory of natural selection in evolution?
    A Gregor Mendel.   **B** Jean Lamarck   **C.** Mathias Scheiden   **D**. Charles Darwin
42. Which of the following statements is not correct of respiration?
    A. Gaseous exchange occurs by diffusion
    B. Oxygen combines with hemoglobin in the respiratory surface
    C. Carbon dioxide produced in the tissues is removed by the process of osmosis
    D. there are no special organs of respiration in plants
43. Which of the following constitutes the main internal tissues of a leaf?
    A. Cuticle   **B.** Mesophyll   **C.** Vascular tissue   **D.** Lower epidermis
44. Which of the following is an autotrophic mode of nutrition?
    A. Chemosynthesis   **B.** Saprophytism
    C. Parasitism   **D.** Symbiosis

45. Which of the following structures differentiates an animal cell from a plant cell?
    A. Ribosomes   **B.** Cell membrane
    C. Chloroplast   **D.** Mitochondrion

46. The change in colour of the chameleon serves as a means of
    A. attraction to the opposite sex   **B.** repulsion of the enemy
    C. a camouflage from a predator   **D.** regulation of body temperature
47. At which of the following stages of mitosis do the two daughter chromosomes separate completely?
    A. early prophase   **B.** telophase
    C. Anaphase   **D.** late prophase
48. The role of dead organic matter in the soil is to
    A. Make the soil black.   **B.** Increase the mineral salt content.
    C. Provide food for all living organisms   **D.** Increase the acidity of the soil.
49. If the petals of a flowering plant are removed, which of the following processes is likely to be affected?
    A. Transpiration   **B.** Pollination   **C.** Germination   **D.** Photosynthesis
50. Which of these substances is likely to be deficient in the diet of a person having goiter?
    A. Potassium   **B.** Calcium   **C.** Iodine   **D.** Sodium
51. Banana, plantain and pineapple can be grouped together because they
    A. produce small seeds   **B.** are multiple fruits
    C. produce suckers   **D.** have runners
52. The structure in the cell that controls the movement of substances in and out of the cell is the
    A. Cytoplasmic membrane   **B.** Nuclear membrane
    C. Cytoplasm   **D.** Protoplasm
53. Which of the following statements is not true of osmotic process?
    A. There must be a selectively permeable membrane
    B. The two solutions must be of different concentrations initially
    C. It involves only the movement of water molecules
    D. The two solutions are of equal concentration at the beginning of the experiment.
54. The pulmonary artery carries
    A. de-oxygenated blood from the right ventricle to the lungs
    B. oxygenated blood from the right ventricle to the lungs
    C. oxygenated blood from the left ventricle to the right auricle
    D. de-oxygenated blood from the left ventricle to the right auricle
55. Which of the following parts of the mammalian brain is involved in taking the decision to run rather than walk?

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A. Cerebellum B. Medulla oblongata
C. Cranial nerves D. Cerebrum

56. Water rises most rapidly in
    A. Sandy soil. B. Clayey soil
    C. Sandy-loam soil D. Loamy soil
57. Euglena moves by:
    A. Whipping of its flagellum B. Beating of its cilia
    C. Rotating action of the flagella D. pushing out a jet of water from an organelle
58. The following life processes are common to both plants and animal except
    A. respiration B. growth
    C. reproduction D. photosynthesis
59. Which of the following statements is correct of hormones? Hormones are
    A. secreted into the blood through ducts B. secreted directly into the blood stream
    C. inactive chemical substances in the blood stream D. non-specific in their mode of action
60. Which of the following statements is not associated with the theory of natural selection?
    A. there is a struggle for existence B. there is a competition among offspring
    C. the weaker offspring are eliminated D. Food and other needs are abundant
61. Water is necessary for a germinating seed because it
    A. promotes aerobic respiration B. activates the enzymes
    C. wets the soil for proper germination D. protects the seed from desiccation.
62. The farming practice by which an exhausted land is left for a number of years before cultivation is known as
    A. crop rotation B. continuous cropping
    C. mono cropping D. bush fallowing
63. Which of the following instruments is used for determining the turbidity of the water?
    A. thermometer B. Secchi Disc.
    C. Rain Gauge. D. Hygrometer
64. The surest way to combine the best qualities of both parents in the offspring is by
    A. cross-breeding B. in breeding
    C. selective breeding D. all of the above
65. Which of the following is not true about gene mutation?
    A. it introduces new traits into a population B. causes changes in the DNA
    C. is a source of new genes D. always affects the chromosome number
66. In unicellular organisms, essential nutrients can be transported directly to all parts of the body by the process of diffusion only because unicellular organisms have:
    A. A large surface area to volume ratio B. A large volume to surface area ration
    C. Permeable cell membrane D. Their body is always immersed in the nutrient material
67. Which of the following is not present in the nucleus of a cell?
    A. Chromosommes B. Nucleolus
    C. Mitochondrion D. Genes
68. The structure in the cell that controls the movement of substance in and out of the cell is the
    A. Cytoplasmic membrane B. Nuclear membrane
    C. Cytoplasm D. Protoplasm
69. Which of these is not an excretory product of plant?
    A. Tannin B. Gum
    C. Alkaloid D. Sweat
70. Which of the following processes will not introduce carbon dioxide into the atmosphere?
    A. Breathing B. Photosynthesis
    C. Respiration D. Putrefaction

CHEMISTRY

1. _____ are allotropes of carbon
   A. graphite and sulphur   **B.** amorphous charcoal and coke
   C. diamond and graphite   **D.** carbon monoxide and coke

2. A substance is said to be hygroscopic if it _____
   A. does not absorb moisture   **B.** is suspended in water
   C. dissolves when it absorbs moistures   **D.** hydrolysis in water

3. $CH_3CO_2H + CH_3CH_2OH$? The functional group under and in the equation is a/an
   _____group
   A. Alkanol   **B.** Carbonyl   **C.** Keto **D.** Carboxylic acid

4. The gas equation $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ is made up of Charles' Law and _____ law
   A. Le Chateliers' **B.** Gay-Lussac's **C.** Boyle's **D.** Newton's

5. The acid in butter is called _____ acid
   A. Butanonoic   **B.** Butyric   **C.** Benzoic   **D.** Butandioic

6. The oxidation state of calcium is $CaCl_2$ is _____
   A. +1   **B.**+2   **C.**+3   **D.**+4

7. The mass number of an atom of an element is the sum of its
   A. Electrons, neutrons and protons   **B.** Electrons and protons
   C. Protons and neutrons   **D.** Valence electrons

8. The existence of two or more forms of the same element in the same physical state is known as.
   A. Allotropy **B.** Resonance   **C.** Hybridization **D.** Isotopy

9. In which of the following are radioactive isotopes used?
   A. Scientific research   **B.** Dating techniques
   C. Treatment of cancer   **D.** All of the above

10. The phenomenon observed when dust particles collide randomly in a beam of sunlight is known as
    A. Tyndal effect   **B.** Diffusion   **C.** Osmosis   **D.** Brownian movement

11. The main characteristic features of transition metals are that they
    A. Have the same atomic size   **B.** Are reducing agents
    C. Forms ions easily   **D.** Have variable oxidation states

12. In 1898, which scientist proposed that the atom is a sphere of positively charged matter in which negatively charged electrons are embedded
    A. Earnest Rutherford   **B.** Max Planck   **C.** J.J Thomson   **D.** Robert Millikan

13. Oxygen gas is collected in the laboratory by _____
    A. upward displacement of air   **B.** upward displacement of water
    C.downward displacement of water   **D.** using a gas layer

14. $CuO + H_2$ $Cu + H_2O$ In the reaction above CuO is _____
    A. oxidized to copper   **B.** reduced to copper
    C. chemically converted to copper   **D.** reversed to copper

15. Isotopes are atoms if the same element with _____
    A. different protons   **B.**mass above 50
    C.inter convertible masses   **D.** different masses

16. A reaction is in equilibrium when _____
    A. the rate of the forward reaction is equal to the rate of the reverse reaction
    B. the reaction rates of the forward and backward reaction are zero
    C. its rate is reversible
    D. it does not produce ant product again

17. The boiling point of a liquid such as methanol is the temperature at which its
    A. vapour pressure is equal to 1 atmosphere

    B. vapour pressure is equal to the atmospheric pressure

    C. reactants and products are at standard states

    D. vapour pressure doubles atmospheric pressure

18. Alkenes and _____ are compounds that contain a multiple bond each
    A. Alkanes   **B.** Benzene   **C.** Alkynes   **D.** Benzaldehyde

19. A palm fruit dropped to the ground from the top of a tree 45m tall, how long does it take to reach the ground? (take g=10ms^{-2})
    A. 1s   **B.** 2s   **C.** 3s   **D.** 5s

20. _____ is due to the formation of hydrogen gas bubbles around the copper plate of a simple cell
    A. polarization   **B.** depolarization   **C.** local action   **D.** amalgamation

21. Which of the following can be explained by the kinetic theory?
    I. The physical state of matter   II. Diffusion of gases
    III. Melting of solid   IV. Evaporation of liquids
    A. IV   **B.** I & II   **C.** III & IV   **D.** I, II & III   **E.** I, II, III & IV

22. The properties of electrovalent compounds include the following except
    A. High melting point and boiling point
    B. Conduction of electricity in the molten state
    C. High volatility at room temperature
    D. Ionization in aqueous solution

23. Which of the following statements is not corrected about electrolysis?
    A. Reduction occurs at the anode
    B. Anions migrate to the anode
    C. Positive ions migrate to the cathode
    D. Concentration affects the discharge of ions

24. Separation of mixtures of solids by physical methods can be based on differences in the following except
    A. Melting point
    B. Solubility
    C. Particle size
    D. Molar mass

25. The following are major gaseous pollutants except.
    A. CO   **B.** CO_2 **C.** SO_2 **D.** CFC

26. Brass is an alloy containing copper and
    A. zinc   **B.** tin   **C.** silver   **D.** lead

27. Which of the following reduces the activation energy of a chemical reaction?
    A. freezing mixture   **B.** reducing agent
    C. water   **D.** catalyst

28. In the electrolysis of brime, the anode is
    A. carbon   **B.** platinum   **C.** zinc   **D.** copper

29. What current in ampere will deposit 0.27g of aluminium in 2 hours? [Al=27, F=96500C].
    A. 3.2   **B.** 8   **C.** 0.4   **D.** 16

30. What is the likely formula of a compound formed between element M in group 2 and between element X in group 7?
    A. M_7X_2 **B.** MX_2 **C.** M_2X_7 **D.** M_2X

31. Which of the following can be explained by the kinetic theory?
    I. The physical state of matter   II. Diffusion of gases   III. Melting of solid   IV. Evaporation of liquids
    A. IV   **B.** I & II   **C.** III & IV   **D.** I, II & III   **E.** I, II, III & IV

32. The properties of electrovalent compounds include the following except
    A. High melting point and boiling point   **B.** Conduction of electricity in the molten state
    C. High volatility at room temperature   **D.** Ionization in aqueous solution
    E. Decomposition of their solutions by electric current

33. Which of the following statements is not correct about electrolysis?
    A. Reduction occurs at the anode   **B.** Anions migrate to the anode
    C. Positive ions migrate to the cathode   **D.** Concentration affects the discharge of ions
    E. Electrolysis conduct electric current

34. Separation of mixtures of solids by physical methods can be based on differences in the following except
    A. Melting point   **B.** Solubility   **C.** Particle size **D.** Molar mass

35. The following are major gaseous pollutants except.
    A. CO   **B.** CO_2 **C.** SO_2 **D.** CFC

36. The ration of reactants to products is 1: 3: 2 in the reaction represented by the equation below: $N_{2(g)}$ + $3H_{2(g)} \rightarrow 2NH_{3(g)}$ which of the following laws is demonstrated by this?
    A. Boyle's law   **B.** Law of multiple proportion
    C. Gay Lussac's law   **D.** Law of constant composition

37. PH of a 0.0001M acid is
    A. 1   **B.** 2   **C.** 3   **D.** 4

38.
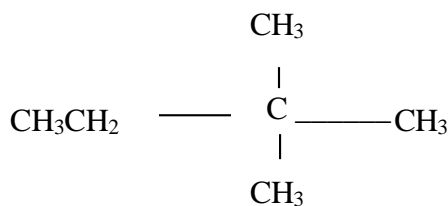
    How many isomers of the compound above can be obtained?
    A. 5   **B.** 4   **C.** 3   **D.** 2

39. Alkanoates are produced from alkanols by
    A. Esterification   **B.** Fermentation
    C. Saponification   **D.** Oxidation

40. Esters are employed in the following except
    A. Making perfumes   **B.** Nail vanisher
    C. Making solvent for cellulose trioxonitrate(V)   **D.** Making cement

41. What mass of anhydrous sodium trioxocarbonate(IV) is present in $500cm^3$ of $0.1mol\ dm^{-3}$ of the solution [Na=23, C=12, O=16]
    A. 10.6g   **B.** 106g
    C. 5.3g   **D.** 53g

42. The oxidation state of oxygen in tetraoxosulphate(IV) acid is
    A. -4   **B.** +4
    C. -2   **D.** +2

43. Metals of the first transition series have special properties which are different from those of groups I and II elements because they have partially filled
    A. S orbital   **B.** P orbital   **C.** D orbital   **D.** F orbital

44. Separation of different carotenes from carrot root uses a method
    A. centrifugation   **B.** Distillation   **C.** chromatography
    D. carotinization

45.

Solution	W	X	Y	Z
Ph	8	12	4	2

    From the table, which of the solutions W, C, Y and Z will liberate carbon (IV) oxide from a trioxocarbonate (IV) salt?
    A. Z   **B.** Y   **C.** W
    D. X

46. $50cm^3$ of a saturated solution of KNO_3 at $40°C$ contained 5.05g of the salt. What is the solubility of KNO_3 at $40°C$ [K=39, N=14, O=16]
    A. $1.0moldm^{-3}$ **B.** $1.5moldm^{-3}$ **C.** $2.0moldm^{-3}$
    D. $5.0moldm^{-3}$

47. A brand of ink containing cobalt (III), copper (II) and iron(II) ions can best be separated into its various components by
    A. fractional crystallization   **B.** fractional distillation   **C.** sublimation   **D.** chromatography

48. If the rate law obtained for a given reaction is given as rate = $K[X]^n [Y]^m$, what is the overall order of the reaction.
    A. nm   **B.** $\frac{n}{m}$ **C.** n+m   **D.** n-m

49. A molecular formula shows＿＿＿＿＿＿in a molecule
    A. the elements present   **B.** the number of atoms of each element
    C. cations and anions   **D.** chemical symbols and number of atoms

50. Give the total mass of copper in 1gm of copper (II) sulphate
    [Cu = 40; S = 32; O = 16]
    A. 0.25g   **B.** 0.50g   **C.** 10g   **D.** 2.5g

51. $^{114}_{55}Cs \longrightarrow ^{A}_{Z}E + ^{4}_{2}\alpha$
    Find the value of A and Z in the equation above
    A. 119, 53   **B.** 110, 57   **C.** 110. 53   **D.** 110, 58

52. How many moles of H_2 molecules are needed to convert 5 mol of O_2 molecules to water?
    A. 5 mol H_2 **B.** 10 mol H_2 **C.** 15 mol H_2 **D.** 20 mol H_2

53. $^{226}_{88}Ra \rightarrow ^{x}_{86}Rn + \alpha$. What is the value of X in the nuclear reaction above?
    A. 220   **B.** 222   **C.** 226   **D.** 227.

54. When naphthalene on heating changes from solid state directly to the gaseous state, it undergoes
    A. sublimation   **B.** evaporation   **C.** combustion   **D.** decomposition

55. Which of the following is an electrolyte?
    A. alcohol   **B.** sodium ethanoate   **C.** solid potassium hydroxide   **D.** mercury

56. The equation $^{14}_{7}N + ^{4}_{2}He \rightarrow ^{17}_{8}O + ^{1}_{1}P$ represents.
    A. nuclear fusion   **B.** nuclear fission
    C. artificial radioactivity   **D.** nuclear fission using positron

57. Which of the following is a general method of preparing acids?
    A. Direct combination of constituent elements   **B.** Double decomposition involving a salt solution
    C. Reaction between an anhydride and water   **D.** Reaction between a base and an amphoteric oxide
    E. Dissolution of hydroxides followed by neutralization

58. Monosaccharides are
    A. hydrolysable   **B.** non-hydrolysable   **C.** not soluble in water   **D.** sweet but sometimes non sugary

59. The major air pollutants that can result from smoky vehicles include
    A. Acid fumes   **B.** Hydrogen sulphide
    C. Carbon (II) oxide   **D.** Carbon particles

60. If an element has the electronic configuration $1s^2, 2s^2, 2p^6, 3s^2, 3p^4$, it is
    A. metal   **B.** An alkaline earth metal
    C. An S-block element   **D.** A P-block element

61. Compounds that have the same molecular formula but different structures are said to be
    A. Allotropic   **B.** Isotopic
    C. Polymeric   **D.** Isomeric

62. Which of the following statements is not correct?
    A. Carbon exhibits allotropy   **B.** Sulphur exhibits allotropy
    C. Chlorine exhibits allotropy   **D.** Hydrogen is a gas

63. $300cm^3$ of a gas has a pressure 400mmHg. If the pressure is reduced to 150mmHg. Find its volume.
    A. $700cm^3$ **B.** $800cm^3$
    C. $350cm^3$ **D.** $112.5cm^3$

64. The ideal gas equation can be written as

    A. $\dfrac{V_1}{T_1} = \dfrac{V_2}{T_2}$ **B.** $P_1V_1 = P_2V_2$

    C. $V_2 = \dfrac{P_1V_1T_1}{P_2T_2}$ **D.** $P_1V_1T_2 = P_2V_2T_1$

65. Ethyne, Ethene, Cyclohexane and Propene can be classified as _____
    A. alkenes   **B.** aromatic compounds
    C. saturated compounds   **D.** multiple bond hydrocarbons
66. If the PH of a compound is 3.2 that compound is_____
    A. Amphoteric   **B.** A Salt   **C.** An Acid   **D.** A Base
67. Which is the most ionic in the group below
    A. Cl_2 **B.** NaCl **C.** $AlCl_3$ **D.** $CaCl_2$
68. Hydrogenation of palm oil results in a solid compound called
    A. candle   **B.** solid palm oil **C.** palm oil   **D.** ester
69. An Amphoteric compound _____
    A. Reacts with alcohols   **B.** Reacts both as an acid and as a base
    C. It is solid at room temperature   **D.** has a PH of 7
70. In structural isomerism same atoms are linked to _____
    A. carbon atoms   **B.** similar atoms
    C. different neighbouring atoms   **D.** different functional groups

PHYSICS

1. The weakest form of bonding in materials is
   A. Ionic   **B.** Metallic   **C.** Covalent   **D.** Van der Waals
2. The period of a simple pendulum oscillating in a vacuum depends on
   A. The mass of the pendulum   **B.** The length of the pendulum
   C. The acceleration due to gravity   **D.** The volume of the pendulum
3. Which one of the following phenomenon cannot be explained by the wave theory of light?
   A. Refraction   **B.** Interference   **C.** Diffraction   **D.** Photoelectric effect
4. Which of these best describes the power of a lens
   A. $P = \frac{1}{f}$ **B.** $P = \frac{f}{\mu}$ **C.** $P = f\lambda$ **D.** $P = f\mu$
5. Which of the following attributes of a machine does not depend on friction?
   (1) Mechanical advantage (2) Velocity ratio (3) Efficiency
   A. 1 only   **B.** 2 only   **C.** 3 only   **D.** 1 and 2 only
6. A cell is a device which converts
   A. Kinetic energy to potential energy   **B.** Sound energy to electrical energy
   C. Chemical energy to heat energy   **D.** Chemical energy to electrical energy
7. In which of the following media would sound waves travel fastest
   A. kerosene   **B.** alcohol   **C.** water   **D.** iron
8. Which of the following is not a use of plain mirrors
   A. as wing mirrors on cars   **B.** as a looking glass
   C. in a periscope   **D.** In a kaleidoscope
9. If V is the velocity of a wave, λ is its wavelength and T its period. The V, λ and T are related by the expression
   A. $\lambda = \frac{V}{T^2}$ **B.** $V = \lambda T$ **C.** $\lambda = VT$ **D.** $\frac{T}{\lambda}$
10. Three 3.0 ohm resistors are connected in parallel. What is the equivalent resistance?
    A. 9.0 ohm   **B.** 1.0 ohm   **C.** 6.0 ohm   **D.** 3.0 ohm
11. The distance between two successive crest or trough is
    A. amplitude   **B.** wavelength   **C.** frequency   **D.** wave distance
12. An object is placed 15cm in front of a convex mirror and an image is produced 5cm behind the mirror, calculate the focal length of the mirror
    A. -7.5cm   **B.** 10cm   **C.** 7.5cm   **D.** 20cm
13. A ball is projected horizontally at 15m/s from a point 20m above a horizontal surface (g=10m/s^2). The magnitude of its velocity in m/s when it hits the surface is
    A. 10   **B.** 15   **C.** 20   **D.** 25
14. A malaria patient has a body temperature of 39.5^{o}C. Convert this temperature to ^{o}F.
    A. 83.2^{o}F   **B.** 103.1^{o}F   **C.** 77.4^{o}F   **D.** 147.
15. Positive charges usually move from
    A. Higher to lower potential areas   **B.** Lower to higher potential areas
    C. North to south   **D.** Higher resistance to lower resistance areas
16. A truck traveling with a velocity of 40m/s applies the brakes and comes to a halt after 20 seconds. What is distance traveled by the truck before coming to a halt
    A. 40m   **B.** 800m
    C. 400m   **D.** 10m
17. In a harmonic oscillation of a simple pendulum, one of the following statements is correct
    A. The potential energy and the kinetic energy of the bob are equal at all times
    B. The potential energy is equal to the kinetic energy at the central position of the oscillation
    C. The potential and the kinetic energies of the bob are maximum at the maximum height of the oscillation
    D. None of the above
18. If the linear expansivity of a metal rod is 4 x 10^{-5} per ^{o}C, what will be the new length of the rod if it is heated from 15°C to 95°C from its original length of 20cm
    A. 0.064 cm   **B.** 0.64 cm
    C. 20.64 cm   **D.** 20.064 cm

19. The heat required to melt ice at 0°C to water at the same temperature is called
    A. Apparent heat of fusion   **B.** Apparent heat of vaporization
    C. Latent heat of vaporization   **D.** Latent heat of fusion
20. Which of the following is used in a nuclear reactor to slow down fast moving electrons?
    A. Carbon dioxide gas
    B. Liquid sodium metal
    C. Concrete shield
    D. Graphite rods.
21. Calculate the power-rating of a heating element which melted in 20g of ice at 0°C and raised the temperature of the resulting water to 60°C in 2 minutes
    Specific latent heat of fusion of ice = 340 J/g
    Specific heat capacity of water = 4.2 J/g/°C
    A. 5.92kw   **B.** 98.6w   **C.** 107w   **D.** 42w
22. If a man cannot see objects very close to him the following can be used to correct the problem.
    A. Convex lens   **B.** Convex mirror   **C.** Concave lens   **D.** Concave mirror
23. when the bob of a simple pendulum is at it's highest displacement, one of the following happens:
    A. kinetic energy is maximum   **B.** potential energy is maximum
    C. total energy is zero   **D.** momentum is maximum
24. When the atmospheric pressure is very low in a given location, boiling point of water:
    A. increases   **B.** decreases   **C.** remains   **D.** cannot boil
25. Which of these statements is correct about cathode rays. They are fast moving
    A. atoms   **B.** neutrons   **C.** electrons   **D.** ions
26. Which of the following has the highest surface tension.
    A. soapy water   **B.** cold water
    C. warm water   **D.** Salt water
27. A truck traveling with a velocity of 40m/s applies the brakes and comes to a halt after 20 seconds. What is the distance traveled by the truck before coming to a halt
    A. 40m   **B.** 800m   **C.** 400m   **D.** 10m
28. If the linear expansivity of a metal rod is 4 x 10⁻⁵ per °C, what will be the new length of the rod if it is heated from 15°C to 95°C from its original length of 20cm
    A. 0.064 cm   **B.** 0.64 cm   **C.** 20.64 cm   **D.** 20.064 cm
29. 44KJ of heat was used in raising the temperature of 2kg of paraffin oil from 360K to 370K. Calculate the specific heat capacity of paraffin oil
    A. 2.2 J/kg/K   **B.** 2.2 x 10³ J/kg/K   **C.** 2.2 x 10⁵ J/kg/K   **D.** 220 J/kg/K
30. A simple machine overcomes a load of 4000N when a force of 200N is applied. If the velocity ration of the machine is 25, calculate the efficiency of the machine?
    A. 1.25%   **B.** 80%   **C.** 125%   **D.** 0.8%
31. A long sighted person is to read a book held at a distance of 20cm from the eyes. Which of the following will the person require to read the book with ease?
    A. Nothing   **B.** Concave lens   **C.** Convex lens   **D.** Concave mirror
32. An object at the bottom of a pool of liquid 10m depth is seen by an observer as if it is at 8m depth. What is the refractive index of the liquid
    A. 0.25   **B.** 0.20   **C.** 1.25   **D.** 0.8
33. Which of the following has the highest surface tension?
    A. soapy water   **B.** cold water   **C.** warm water   **D.** Salt water
34. The emf developed in a circuit is directly proportional to the rate of change of magnetic flux. The above was a finding from
    A. Maxwell   **B.** Faraday   **C.** Ampere   **D.** Lenz
35. Which of the following is stored by a dry leclanche cell?
    A. Chemical energy   **B.** Solar energy   **C.** Electrical energy   **D.** Heat energy
36. A ball is projected horizontally from the top of a hill with a velocity of 20m/s. if it reaches the ground 4 seconds later. What is the height of the hill? (g=10m/s²).
    A. 200m   **B.** 20m   **C.** 160m   **D.** 40m

37. The expansion of solids can be considered a disadvantage in
    A. fire-alarm system **B.** thermostat
    C. riverting of steel plates **D.** balance wheel of a watch
38. An object is placed between 2 mirrors inclined at an angle of 120° and facing each other. Determine the number of images observed in the 2 mirrors
    A. 2 **B.** 3 **C.** 4 **D.** 1
39. Which of these instruments is suitable for making the most accurate measurement of the internal diameter of a test tube?
    A. metre rule **B.** venire callipers
    C. micrometer screw gauge **D.** spectrometer
40. Which of the following instruments would be best suited in studying the stars?
    A. periscope **B.** microscopes
    C. telescopes **D.** spectroscope
41. A gas which obeys Charles law exactly has a volume of 283cm³ at 10°C. what is the volume at 30°C?
    A. 142cm³ **B.** 293cm³ **C.** 303cm³ **D.** 566cm³
42. Electrical resistance is a property of an electric conductor that causes electrical energy to be converted to
    A. mechanical energy **B.** solar energy **C.** heat energy **D.** chemical energy
43. Which of the following has the greatest penetrating power?
    A. beta particles **B.** Alpha particles **C.** gamma rays **D.** Neutrons
44. The change in direction of a wave front as a result of a change in the velocity of the wave in another medium is called
    A. interference **B.** diffraction **C.** refraction **D.** reflection
45. Which of the following is a reason why concrete floor feels colder to the bare feet than a mat on the same floor during the rainy season?
    A. mat is a better conductor of heat than the feet
    B. mat loses heat to the bare feet at a faster rate than concrete floor.
    C. mat loses heat to the bare feet while the concrete floor extracts heat from them.
    D. concrete floor is a better conductor of heat than the mat.
46. A short-sighted person needs one of the following types of lens to correct the vision
    A. convex lens **B.** concave lens **C.** plano-convex lens **D.** plano-concave lens
47. The motion of a body is simple harmonic if the
    A. acceleration is always directed towards a fixed point **B.** path of motion is a straight line
    C. acceleration is directed towards a fixed point and proportional to its distance from the point
    D. acceleration is proportional to the square of the distance from a fixed point.
    E. acceleration is constant and directed towards a fixed point.
48. An object is placed 25cm in front of a convex lens of focal length 10cm. The image of the object will be
    A. real inverted and magnified **B.** real upright and magnified
    C. real upright and diminished **D.** real inverted and diminished
49. Any successful lift-off of space-craft uses the application of
    A. Newton's First Law **B.** Newton's Second Law **C.** Newton's Third Law **D.** All of the above
50. When a carpenter screws a nail into an object, the distance travelled into the object at a full circle of the head of the screw is called
    A. pitch **B.** thimble **C.** wavelength **D.** moment
51. One of the following is true of Boyle's law when the pressure of a given volume of gas increases:
    A. volume increases **B.** the temperature increases
    C. the volume decreases **D.** the temperature decreases
52. If two resistors of 10Ω and 20 Ω are connected in series and then placed in parallel with another 20 Ω resistor, calculate the effective resistance of the combination
    A. 50 Ω **B.** 12 Ω **C.** 10 Ω **D.** 0.02 Ω
53. Converging lenses with focal lengths 4cm, 40cm and 4m are available for use. Which of them will you use as a magnifying glass
    A. 4cm **B.** 40cm **C.** 4m **D.** None of the above

54. A piece of aluminium of mass 0.5kg at a temperature of 100°C is placed in water of mass 0.4kg at a temperature of 10°C. If the final temperature of the mixture is 40°C. Find the specific heat capacity of aluminium if that of water is 4200J/Kg/°C
    A. 960J/Kg/°C   **B.** 908J/Kg/°C   **C.** 1860J/Kg/°C   **D.**1680J/Kg/°C

55. Hardness of X-rays is a measure of its
    A. Intensity   **B.** Density   **C.** Penetration power   **D.** Picture it produces

56. The half life of a radioactive substance is 2 seconds. Calculate the decay constant
    A. 0.035s   **B.** 0.347s   **C.** 0.151s   **D.** 0.576s

57. A body moves with a constant speed but has an acceleration. This is possible if it
    A. moves in a straight line   **B.** moves in a circle   **C.** is oscillating   **D.** is in equilibrium

58. A 500kg truck moving with a velocity of 6m/s collides with a stationary 100kg car. The truck and the car move together after collision. What is their common velocity?
    A. 5m/s   **B.** 10m/s   **C.** 30m/s   **D.** 1m/s

59. The process by which a metal heated to a high temperature gives off electrons from its surface is known as:
    A. radioactive emission   **B.** field emission
    C. photoelectric emission   **D.** thermionic emission

60. A total internal reflection occurs in the glass-air boundary when the angle of incidence is
    A. greater than the right angle   **B.** greater than critical angle
    C. greater than angle of prism   **D.** greater than angle of deviation

61. At what temperature will the Celsius scale coincide with the Fahrenheit scale?
    A. 4°   **B.** -273°   **C.**100°   **D.**-40°

62. Which of these statements is correct about cathode rays. They are fast moving
    A. atoms   **B.** neutrons   **C.** electrons   **D.** ions

63. The upthrust experienced by an object immersed in a fluid makes the object feel
    A. Heavier   **B.** Lighter   **C.** sink lower   **D.** none of the above

64. Which of the following has the highest surface tension.
    A. soapy water   **B.** cold water
    C. warm water   **D.** Salt water

65. Which of these is NOT a consequence of hydrogen bubbles covering the upper plate of a primary cell?
    A. Polarization   **B.** Local action
    C. Generation of less current by the cell   **D.** Increase in the resistance of the cell.

66. What is the current in a circuit if the charge of 240 coulombs pass each point in 2 minutes
    A. 120 A   **B.** 480 A   **C.** 4 A   **D.** 2 A

67. An electric in Nigeria has a number of 60w coloured bulb. How many can be connected to a 240V supply through a 5A fuse
    A. 20   **B.** 48   **C.** 5   **D.** 4

68. A radio station broadcasts on a frequency of 100MHz. If the sped of the radio wave is 3×10^8m/s, what is the wavelength of the radio wave from this station
    A. 3×10^6m   **B.** 3×10^3m   **C.** 300m
    D. 3m

69. If you need to clearly see an object that is at a very far distance, then you need to use
    A. periscope   **B.** microscope
    C. telescope   **D.** prismscope

70. Michael Faraday found that the EMF developed across a conductor is directly proportional to the
    A. current applied   **B.** voltage applied
    C. rate of change of magnetic flux   **D.** rate of change of electric flux

COMPUTER

1. The following are output devices except:
   A. Mouse **B.** Plotter **C.** Printer **D.** Speakers **E.** Monitor
2. What type of device is a computer monitor?
   A. Input **B.** Output **C.** Software **D.** Storage **E.** Processing
3. What type of device is a computer keyboard
   A. Input **B.** Output **C.** Software **D.** Storage **E.** Processing
4. What type of devices are computer speakers or headphones?
   A. Input **B.** Output **C.** Software **D.** Storage **E.** Processing
5. What type of device is a computer printer?
   A. Input **B.** Output **C.** Software **D.** Storage **E.** Processing
6. What type of device is a 3 1/2 inch floppy drive?
   A. Input **B.** Output **C.** Software **D.** Storage **E.** Processing
7. What type of device is a computer mouse?
   A. Input **B.** Output **C.** Software **D.** Storage **E.** Processing
8. What type of devices are CDs or DVDs?
   A. Input **B.** Output **C.** Software **D.** Storage **E.** Processing
9. What type of device is a digital camera?
   A. Input **B.** Output **C.** Software **D.** Storage **E.** Processing
10. A program that can copy itself and infect a computer without the permission or knowledge of the owner is called what?
    A. Floppy **B.** Virus **C.** Java **D.** Monitor **E.** Flash
11. Which of these is a correct format of IP address?
    A. 192.168.1.1**B.**192.168.111.1111**C.**192.168.900.1**D.**192.900.168.1
    E. 192.16.168.111
12. Which was the first web browser?
    A. WorldWideWeb**B.** Netscape Navigator **C.** Internet Explorer **D.** Safari
    E.Chrome
13. It is a small piece of text stored on a user's computer by a web browser for maintaining the state. What we are talking about?
    A. Application **B.** Session **C.** Cookie **D.** QueryString**E.** Applets
14. Which of these is a correct format of Email address?
    A. contact.website.info**B.** contactwebsite.info**C.** contact@website.info
    D. contact@website@info**E.** Contact.website@info
15. What does HTTP stands for?
    A. Hypertext Transfer Protocol **B.** Hypertext Transfer Plotter **C.** Head Tail Transfer Plot
    D. Head Tail Transfer Protocol **E.** Hypertext Transmission Process
16. In computers, what is the smallest and basic unit of information storage?
    A. Bit**B.** Byte **C.** Newton **D.** Mega byte **E.** Kilo byte
17. What is Windows XP?
    A. Operating System **B.** Storage Device **C.** Processor **D.** Output Device **E.** Input Device
18. Which of the following is responsible for the management and coordination of activities and the sharing of the resources of the computer?
    A. Application Software **B.** Motherboard **C.** Operating System **D.** RAM
    E. System Software
19. MP3 file format is associated with what type of files?
    A. Video **B.** Audio **C.** Image **D.** Word Document **E.** Flash file
20. MS-Word is an example of
    A. Application Software **B.**System Software **C.** Operating System **D.** Scanner **E.** ALU
21. Which software application is used for accessing sites or information on a network (as the World Wide Web)?
    A. Operating System **B.** Web Browser **C.** Microsoft Word **D.** Microsoft Excel **E.** FileZilla
22. What are the two broad categories of software?
    A. MS Word and Spreadsheet **B.** Transaction and Application **C.** Microsoft and Mac OS **D.** System and Application **E.** Transaction and System

23. One kilobyte contains how many bytes?
    A. 1000**B.** 1001**C.** 100**D.** 1024**E.** 10
24. Who Owns the Internet?
    A. Internet Engineering Task Force **B.** ICANN **C.** Internet Architecture Board
    D. No one owns it **E.** InterNIC
25. What is the shortcut key of printing a document for computer having windows?
    A. Ctrl + P **B.** Shift + P **C.** Alt + P **D.** Shift + PP **E.**Fn + P
26. In computers, '.TMP' extension refers usually to what kind of file?
    A. Temporary file **B.** Image file **C.** Video file **D.** Text file **E.** Database file
27. The way of manipulating data into information is called
    A. Storing **B.** Processing **C.** Deletion **D.** Organizing **E.** Transmission
28. What Does BIOS Stand For?
    A. Better Integrated Operating System **B.** Basic Input Output System
    C. Battery Integrated Operating Setup **D.** Backup Input Output System
    E. Battery Input Operating System
29. Memory management is a feature of
    A. Processor **B.** Operating System **C.** MS Word **D.** Animation **E.** UPS

30. Which of the following is not a storage device?
    A. DVD **B.** Hard Disk **C.** Floppy Disk **D.** Mouse **E.** Flash Drive

ANSWERS
ENGLISH
1. A
2. D
3. D
4. A
5. D
6. C
7. C
8. D
9. B
10. D
11. C
12. C
13. C
14. A
15. D
16. C
17. A
18. D
19. B
20. C
21. B
22. D
23. C
24. A
25. C
26. D
27. D
28. B
29. C
30. D
31. D
32. D
33. D
34. D
35. B
36. C
37. A
38. B
39. D

40. D
41. B
42. D
43. C
44. C
45. D
46. D
47. A
48. A
49. C
50. A
51. C
52. B

53. B
54. C
55. D
56. D
57. B
58. B
59. C
60. A
61. C
62. B
63. C
64. A
65. D
66. C
67. B
68. C
69. A
70. D
71. B
72. B
73. D
74. B
75. C

MATHEMATICS

1. D
2. B
3. D
4. B
5. D
6. A
7. C
8. D
9. B
10. D
11. D
12. D
13. D
14. D
15. C
16. C
17. A
18. C
19. B
20. D
21. D
22. D
23. B

24. A
25. C

26. C
27. E
28. C
29. D
30. C
31. A
32. B
33. B
34. D
35. B
36. A
37. C
38. D
39. C
40. A
41. B
42. C
43. D
44. C
45. B
46. D
47. C
48. A
49. B
50. D
51. A
52. B
53. C
54. B
55. C
56. B
57. C
58. D
59. D
60. B
61. B
62. C
63. D
64. C
65. B
66. C
67. C
68. A
69. D
70. B

BIOLOGY

1. C
2. D
3. D
4. A
5. A
6. B
7. C
8. B
9. A
10. B
11. D
12. C
13. D
14. D
15. C
16. D
17. D

18. D
19. A
20. D
21. C
22. D
23. B
24. A
25. C
26. C
27. B
28. B
29. B
30. A
31. A
32. B
33. C
34. D
35. B
36. D
37. D
38. C
39. B
40. C
41. D
42. C
43. B
44. A
45. C
46. C
47. C
48. B
49. B
50. C
51. C

52. A
53. D
54. A
55. D
56. A
57. A
58. D
59. B
60. D
61. B
62. D
63. B
64. A
65. D
66. A
67. C
68. A
69. D
70. B

CHEMISTRY
1. C
2. C
3. D
4. C
5. B
6. B
7. C
8. A
9. D
10. A
11. D
12. C
13. C
14. B
15. D
16. A
17. B
18. C
19. C

20. A
21. E
22. C
23. A
24. D
25. B
26. A
27. D
28. A
29. C
30. B
31. E32. C

33. A
34. D
35. B
36. C
37. D
38. B
39. A
40. D
41. C
42. C
43. C
44. C
45. B
46. A
47. D
48. C
49. D

50. A
51. C
52. B
53. C
54. A
55. B
56. C
57. A
58. B
59. C
60. D
61. D
62. C
63. B
64. D
65. D
66. C
67. B
68. C
69. B
70. C

PHYSICS

1. D
2. C
3. D
4. A
5. B
6. D
7. D
8. A
9. C
10. B
11. B
12. A
13. D
14. B

15. A
16. A
17. D
18. D
19. D
20. C
21. B
22. A
23. B
24. B
25. C
26. B
27. A

28. D
29. B
30. B
31. C
32. C
33. B
34. B
35. A
36. C

37. D
38. A
39. B
40. C
41. C
42. C
43. C
44. C
45. D
46. B
47. C
48. D
49. D

50. A
51. C
52. B
53. A
54. D

55. C
56. B
57. B
58. A
59. D
60. B
61. D
62. C
63. B
64. B
65. B
66. D
67. A
68. D
69. C
70. C

COMPUTER
1. A
2. B
3. A
4. B
5. B
6. D
7. A
8. D
9. A
10. B
11. A
12. A
13. C
14. C
15. A
16. A
17. A
18. C
19. B
20. A
21. B
22. D
23. D
24. D
25. A
26. A
27. B
28. B
29. B
30. D