UTME 2001

***Questions* - Type U**

1. Evaluate 21.05347 - 1.6324 x 0.43, to 3 decimal places.
   A. 20.980 B. 20.351
   C. 20.981 D. 20.352

2. Simplify $\left(\sqrt[3]{64a^3}\right)^{-1}$
   A. 4a B. $\frac{1}{8a}$ C. 8A D. $\frac{1}{4a}$

3. Given that p = 1 + $\sqrt{2}$ and q = 1 - $\sqrt{2}$, evaluate $\frac{p^2 - q^2}{2pq}$.
   A. $2(2+\sqrt{2})$ B. $-2(2+\sqrt{2})$
   C. $2\sqrt{2}$ D. $-2\sqrt{2}$.

4. A car dealer bought a second-hand car for #250,000.00 and spent #70,000.00 refurbishing it. He then sold the car for #400,000.00. What is the percentage gain?
   A. 60% B. 32% C. 25% D. 20%

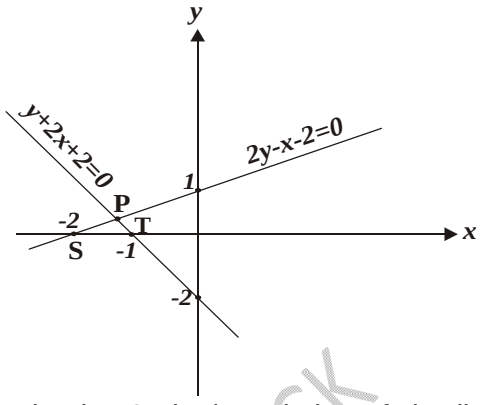
5. If $\frac{y}{2} = x$, $evaluate\left(\frac{x^3}{y^3}+\frac{1}{2}\right) \div \left(\frac{1}{2}-\frac{x^2}{y^2}\right)$.
   A. $\frac{5}{8}$ *B.* $\frac{5}{2}$ *C.* $\frac{5}{4}$ *D.* $\frac{5}{16}$.

6. Find the principal which amounts to #5,500 at simple interest in 5 years at 2% per annum.
   A. #4,900 B. #5,000
   C. #4,700 D. #4,800

7. Evaluate $\frac{(0.14)^2 \times 0.275}{7(0.02)}$, correct to 3 decimal places.
   A. 0.039 B. 0.358
   C. 0.033 D. 0.308.

8. Divide $a^{3x} - 26a^{2x} + 156a^x - 216$ by $a^{2x} - 24a^x + 108$.
   A. $a^x - 2$ B. $a^x + 2$
   C. $a^x - 18$ D. $a^x - 6$

9.



Triangle PST is the solution of the linear inequalities
   A. $2y - x - 2 \leq 0,\ y + 2x + 2 \geq 0,$ $-2 \leq x \leq -1$
   B. $-2 \leq x \leq 2,\ y \geq 0,\ y + 2x + 2 \leq 0,$ $x \leq 0$
   C. $2y - x - 2 \leq 0, y + 2x + 2 \leq 0,\ y \geq 0,$ $x \leq 0$
   D. $2y - x - 2 \geq 0,\ y + 2x + 2 \leq 0,\ x \leq 0.$

10.

⊗	k	*L*	m
k	*I*	M	k
I	m	K	*I*
m	k	*L*	m

The identity element with respect to the multiplication shown in the table above is
   A. 0 B. m C. *I* D. k

11. A man saves #100.00 in his first year of work and each year saves #20.00 more than in the preceding year. In how many years will he save #5,800.00?
   A. 100 years B. 58 years
   C. 29 years D. 20 years

12. If P = $\begin{pmatrix} 3 & -2 & 4 \\ 5 & 0 & 6 \\ 7 & 5 & -1 \end{pmatrix}$, then, -2P is
   A. $\begin{pmatrix} -6 & 4 & -8 \\ -10 & 0 & -12 \\ -14 & -10 & 2 \end{pmatrix}$

B. $\begin{pmatrix} -6 & -4 & 2 \\ -10 & -2 & -12 \\ -14 & -10 & 2 \end{pmatrix}$

C. $\begin{pmatrix} -6 & 4 & -8 \\ -10 & 0 & 6 \\ -14 & 5 & -1 \end{pmatrix}$

D. $\begin{pmatrix} -6 & 4 & -8 \\ 5 & 0 & 6 \\ 7 & 5 & -1 \end{pmatrix}$

13. Given the matrix K = $\begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$, the matrix K^2 + K + I where I is the 2 x 2 identity matrix, is

A. $\begin{pmatrix} 7 & 2 \\ 12 & 21 \end{pmatrix}$ B. $\begin{pmatrix} 6 & 3 \\ 13 & 20 \end{pmatrix}$

C. $\begin{pmatrix} 9 & 8 \\ 22 & 23 \end{pmatrix}$ D. $\begin{pmatrix} 10 & 7 \\ 21 & 24 \end{pmatrix}$

14. If two graphs $y = px^2 + q$ and $y = 2x^2 - 1$ intersect at x = 2, find the value of p in terms of q.

A. $\frac{q-8}{7}$ B. $\frac{7-q}{4}$ C. $\frac{8-q}{2}$ D. $\frac{7+q}{8}$

15. Find the integral values of x and y satisfying the inequality $3y + 5x \leq 15$, given that $y > 0$, $y < 3$ and $x > 0$.

A. (1, 1), (1, 2), (1, 3)
B. (1, 1), (2, 1), (1, 3)
C. (1, 1), (3, 1), (2, 2)
D. (1, 1), (1, 2), (2, 1)

16. Evaluate $\begin{vmatrix} -1 & -1 & -1 \\ 3 & 1 & -1 \\ 1 & 2 & 1 \end{vmatrix}$.

A. –12 B. –4 C. 4 D. –2

17. Solve the equations $m^2 + n^2 = 29$; $m + n = 7$.

A. (2, 3) and (3, 5) B. (2, 5) and (5, 2)
C. (5, 2) and (5, 3) D. (5, 3) and (3, 5)

18. An operation * is defined on the set of real numbers by a * b = a + b + 1. If the identity element is –1, find the inverse of the element 2 under *.

A. 4 B. 0 C. –2 D. –4

19. The sixth term of an arithmetical progression is half of its twelfth term. The first term is equal to

A. zero
B. half of the common difference
C. double the common difference
D. the common difference.

20. Factorize $4x^2 - 9y^2 + 20x + 25$

A. (2x – 3y + 5)(2x – 3y – 5)
B. (2x – 3y)(2x + 3y)
C. (2x – 3y + 5)(2x + 3y + 5)
D. (2x + 5)(2x – 9y + 5)

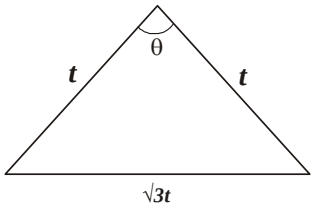
21. A sector of a circle of radius 7.2cm which subtends an angle of 300^0 at the center is used to form a cone. What is the radius of the base of the cone?

A. 8cm B. 6cm C. 9cm D. 7cm.

22. A point P moves such that it is equidistant from points Q and R. Find /QR/ when /PR/ = 8cm and <PRQ = 30^0.

A. $4\sqrt{3}cm$ B. $8cm$ C. $8\sqrt{3}cm$ D. $4cm$

23.



Find the value of θ in the diagram above.

A. 100^0 B. 120^0 C. 30^0 D. 60^0

24. A straight line makes an angle of 30^0 with the positive x-axis and cuts the y-axis at y = 5. Find the equation of the straight line.

A. $y = \frac{1}{10}x + 5$
B. y = x + 5
C. $\sqrt{3}y = -x + 5\sqrt{3}$
D. $\sqrt{3y} = x + 5\sqrt{3}$

25. Find the value of p if the line joining (p, 4) and (6, -2) is perpendicular to the line joining (2, p) and (-1, 3).
A. 4 B. 6 C. 3 D. 0

26. Find the number of sides of a regular polygon whose interior angle is twice the exterior angle.
A. 6 B. 2 C. 3 D. 8

27. P(-6, 1) and Q(6, 6) are the two ends of the diameter of a given circle. Calculate the radius.
A. 6.5 units B. 13.0 units
C. 3.5 units D. 7.0 units.

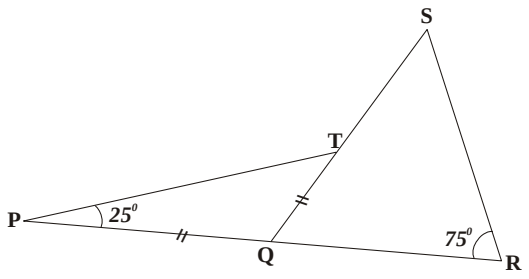
28. The bearings of P and Q from a common point N are 020^0 and 300^0 respectively. If P and Q are also equidistant from N, find the bearing of P from Q.
A. 040^0 B. 070^0 C. 280^0 D. 320^0

29. A cylindrical tank has a capacity of $3080m^3$. What is the depth of the tank if the diameter of its base is 14m?
A. 23m B. 25m C. 20m D. 22m

30. Find the locus of a point which moves such that its distance from the line y = 4 is a constant, k.
A. $y = k \pm 4$ B. $y = 4 \pm k$
C. y = 4 + k D. y = k – 4

31. The chord ST of a circle is equal to the radius, r, of the circle. Find the length of arc ST.
A. $\frac{\pi r}{6}$ B. $\frac{\pi r}{2}$ C. $\frac{\pi r}{12}$ D. $\frac{\pi r}{3}$

32.



In the figure above, PQR is a straight line segment, /PQ/ = /QT/. Triangle PQT is an isosceles triangle, <SRQ is 75^0 and <QPT is 25^0. Calculate the value of <RST.
A. 45^0 B. 55^0 C. 25^0 D. 50^0

33. If the gradients of the curve $y = 2kx^2 + x + 1$ at x = 1 is 9, find k.
A. 4 B. 3 C. 2 D. 1

34. Evaluate $\int 2(2x-3)^{\frac{2}{3}} dx$
A. $\frac{3}{5}(2x-3)^{\frac{5}{3}} + k$ B. $\frac{6}{5}(2x-3)^{\frac{5}{3}} + k$
C. 2x – 3 + k D. 2(2x – 3) + k.

35. Differentiate $(2x + 5)^2(x – 4)$ with respect to x.
A. 4(2x + 5)(x – 4)
B. 4(2x + 5)(4x – 3)
C. (2x + 5)(2x – 13)
D. (2x + 5)(6x – 11)

36. Find the area bounded by the curves $y = 4 – x^2$ and y = 2x + 1.
A. $20\frac{1}{3}\ sq.units$ B. $20\frac{2}{3}\ sq.units$
C. $10\frac{2}{3}\ sq.units$ D. $10\frac{1}{3}\ sq.units$

37. Find the rate of change of the volume, V, of a sphere with respect to its radius, r, when r = 1.
A. 12π B. 4π C. 24π D. 8π

38. If y = xsinx, find $\frac{dy}{dx}\ when\ x = \frac{\pi}{2}$.
A. $\frac{-\pi}{2}$ B. -1 C. 1 D. $\frac{\pi}{2}$

39. Find the dimensions of the rectangle of greatest area which has a fixed perimeter, p.
A. Square of sides p
B. Square of sides 2p
C. Square of sides $\frac{p}{2}$
D. Square of sides $\frac{p}{4}$

Use the table below to answer questions 40 and 41

Score	4	7	8	11	13	8
Frequency	3	5	2	7	2	1

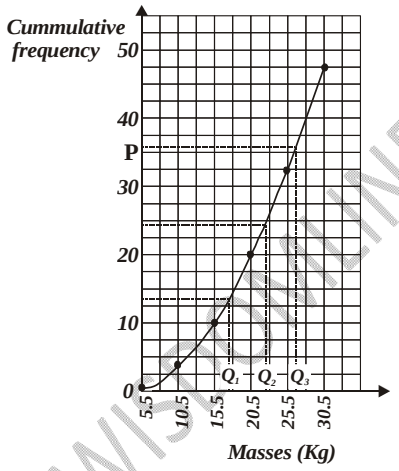
40. Find the square of the mode.
A. 49 B. 121 C. 25 D. 64

41. The mean score is
A. 7.0 B. 8.7 C. 9.5 D. 11.0

42. Teams P and Q are involved in a game of football. What is the probability that the game ends in a draw?
A. $\frac{2}{3}$ *B.* $\frac{1}{2}$ *C.* $\frac{1}{3}$ *D.* $\frac{1}{4}$

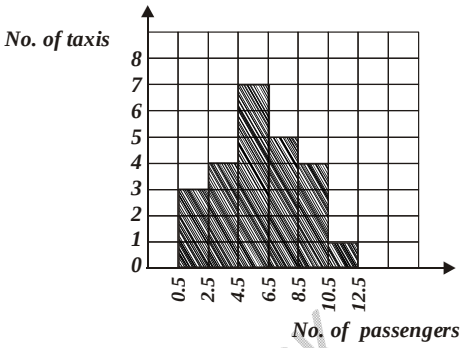
43. If ${}^{6}P_{r} = 6$, *find the value of* ${}^{6}P_{r+1}$.
A. 30 B. 33 C. 35 D. 15

44.



The graph above shows the cummulative frequency of the distribution of masses of fertilizer for 48 workers in one institution. Which of the following gives the inter-quartile range?
A. $Q_3 - Q_2$ B. $\frac{1}{2}(Q_3 - Q_1)$
C. $Q_3 - Q_1$ D. $Q_2 - Q_1$

45.



The histogram above shows the distribution of passengers in taxis of a certain motor pack. How many taxis have more than 4 passengers?
A. 16 B. 17 C. 14 D. 15

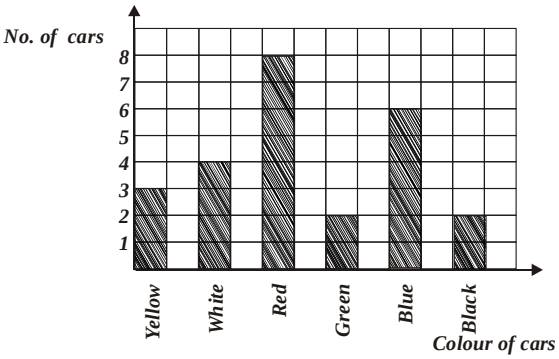
46.

Colour	Blue	Black	Yellow	White	Brown
No. of Beads	3	5	2	7	2

The distribution of colours of beads in a bowl is given above. What is the probability that a bead selected at random will be blue or white?
A. $\frac{7}{15}$ *B.* $\frac{2}{5}$ *C.* $\frac{1}{3}$ *D.* $\frac{1}{15}$

47. Find the variance of 2, 6, 8, 6, 2 and 6.
A. 6 B. 5 C. $\sqrt{6}$ *D.* $\sqrt{5}$

48.



The bar chart above shows different colours of cars passing a particular point of a certain street

in two minutes. What fraction of the total number of cars is yellow?

A. $\frac{3}{25}$ *B.* $\frac{2}{25}$ *C.* $\frac{1}{5}$ *D.* $\frac{4}{15}$

49. Find the number o0f ways of selecting 8 subjects from 12 subjects for an examination.
A. 490 B. 495 C. 496 D. 498.

50. Find the range of $\frac{1}{6}, \frac{1}{3}, \frac{3}{2}, \frac{2}{3}, \frac{8}{9}$ *and* $\frac{4}{3}$.
A. $\frac{3}{4}$ *B.* $\frac{5}{6}$ *C.* $\frac{7}{6}$ *D.* $\frac{4}{3}$.

2001 Solutions

1. Option D.
2. Option D.
3. Option D.
4. Option C.
5. Option B.
6. Option B.
7. Option A.
8. Option A.
9. Option C.
10. Option B.
11. Option D.
12. Option A.
13. Option D.
15. Option D.
16. Option B.
17. Option B.
18. Option D.
19. Option D.
20. Option C.
21. Option B.
22. Option C.
23. Option B.
24. Option D.
25. Option A.
26. Option A.
27. Option A.
28. Option B.
29. Option C.
30. Option B.
31. Option D.
32. Option B.
33. Option C.
34. Option B.
35. Option D.
36. Option C.
37. Option B.
38. Option C.
39. Option D.
40. Option B.
41. Option B.
42. Option B.
43. Option A.
44. Option C.
45. Option B.
46. Option B.
47. Option B.
48. Option A.
49. Option B.
50. Option D.

UTME 2002

***Questions* - Type Y**

1. Simplify $\left(\sqrt{0.7} + \sqrt{70}\right)^2$
A. 70.7 B. 84.7
C. 217.7 D. 168.7

2. Without using tables, evaluate
$(343)^{\frac{1}{3}} \times (0.14)^{-1} \times (25)^{-\frac{1}{2}}$
A. 12 B. 10 C. 8 D. 7

3. In a school, 220 students offer Biology or Mathematics or both. 125 offer Biology and 110 Mathematics. How many offer Biology but not Mathematics?
A. 110 B. 95 C. 80 D. 125

4. Evaluate $\frac{0.21 \times 0.072 \times 0.00054}{0.006 \times 1.68 \times 0.063}$,
correct to four significant figures.
A. 0.01285 B. 0.1286
C. 0.1285 D. 0.01286

5. A trader bought goats for N4,000 each. He sold them for N180,000 at a loss of 25%. How many goats did he buy?
A. 50 B. 60 C. 36 D. 45

6. Simplify 52.4 – 5.7 – 3.45 – 1.75
A. 42.1 B. 41.4
C. 42.2 D. 41.5

7. The range of the data k + 2, k – 3, k + 4, k – 2, k, k – 5, k + 3, k – 1 and k + 6 is
   A. 11 B. 10 C. 8 D. 6

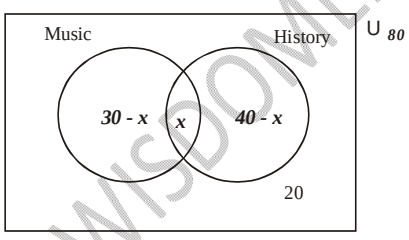
8. The acres of rice, pineapple, cassava, cocoa and palm oil in a certain district are given respectively as 2, 5, 3, 11 and 9. What is the angle of the sector for cassava in a pie chart?
   A. 180^0 B. 36^0 C. 60^0 D. 108^0

9. The probability of a student passing any examination is $\frac{2}{3}$. If the student takes three examinations, what is the probability that he will not pass any of them?
   A. $\frac{4}{9}$ B. $\frac{2}{3}$ C. $\frac{1}{27}$ D. $\frac{8}{27}$

10. The mean of a set of six numbers is 60. If the mean of the first five is 50, find the sixth number in the set.
    A. 95 B. 100 C. 110 D. 105

11. Calculate the mean deviation of the set of numbers 7, 3, 14, 9, 7 and 8
    A. $1\frac{1}{6}$ B. $2\frac{1}{6}$ C. $2\frac{1}{3}$ D. $2\frac{1}{2}$

12.



The Venn diagram above shows the number of students offering Music and History in a class of 80 students. If a student is picked at random from the class, what is the probability that he offers Music only?
A. 0.25 B. 0.38 C. 0.50 D. 0.13

13. Find the mean of the data
    7, -3, 4, -2, 5, -9, 4, 8, -6, 12
    A. 4 B. 3 C. 2 D. 1

14.

No. of days	1	2	3	4	5	6
No. of students	20	x	50	40	2x	60

The distribution above shows the number of days a group of 260 students were absent from school in a particular term. How many students were absent for at least four days in the term?
A. 210 B. 160 C. 120 D. 40

15. How many three-digit numbers can be formed from 32564 without any digit being repeated?
    A. 60 B. 120 C. 10 D. 20

16. Find the derivative of $y = \sin^2(5x)$ with respect to x.
    A. 5 sin5x cos5x B. 2 sin5x cos5x
    C. 15 sin5x cos5x D. 10 sin5x cos5x

17. The slope of the tangent to the curve $y = 3x^2 – 2x + 5$ at the point (1, 6) is
    A. 6 B. 5 C. 4 D. 1

18. Evaluate $\int \sin 3x dx$
    A. $-\frac{1}{3}\cos 3x + c$
    B. $\frac{1}{3}\cos 3x + c$
    C. $\frac{2}{3}\cos 3x + c$
    D. $-\frac{2}{3}\cos 3x + c$

19. If $y = x^2 - \frac{1}{x}$, find $\frac{dy}{dx}$.
    A. $2x + \frac{1}{x^2}$ B. $2x + x^2$
    C. $2x - \frac{1}{x^2}$ D. $2x - x^2$

20. If $\frac{dy}{dx} = 2x - 3$ and y = 3 when x = 0, find y in terms of x.
A. $x^2 - 3x - 3$ B. $2x^2 - 3x$
C. $x^2 - 3x + 3$ D. $x^2 - 3x$

21. A circle with a radius 5cm has its radius increasing at the rate of $0.2cms^{-1}$. What will be the corresponding increase in the area?
A. π B. 2π C. 4π D. 5π

22. Find the maximum value of y in the equation $y = 1 - 2x - 3x^2$
A. $\frac{4}{3}$ B. $\frac{5}{4}$ C. $\frac{3}{4}$ D. $\frac{5}{3}$

23. Find the range of values of x for which
$\frac{x+2}{4} - \frac{2x-3}{3} < 4$
A. x < 8 B. x > -6
C. x < 4 D. x > -3

24. Make r the subject of the formula
$\frac{x}{r+a} = \frac{a}{r}$
A. $\frac{a^2}{x+a}$ B. $\frac{a}{x-a}$ C. $\frac{a}{x+a}$ D. $\frac{a^2}{x-a}$

25. If $\mathbf{P} = \begin{pmatrix} 2 & 1 \\ -3 & 0 \end{pmatrix}$ and **I** is a 2 x 2 unit matrix, evaluate $\mathbf{P}^2 - 2\mathbf{P} + 4\mathbf{I}$
A. $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ B. $\begin{pmatrix} 9 & 4 \\ -12 & 1 \end{pmatrix}$
C. $\begin{pmatrix} 1 & 4 \\ 4 & 1 \end{pmatrix}$ D. $\begin{pmatrix} -3 & 0 \\ 0 & -3 \end{pmatrix}$

26. If –2 is the solution of the equation 2x + 1 – 3c = 2c + 3x – 7, find the value of c.
A. 2 B. 3 C. 4 D. 1

27. The inverse of the function f(x) = 3x + 4 is
A. $\frac{1}{4}(x+3)$ B. $\frac{1}{5}(x-5)$ C. $\frac{1}{3}(x-4)$
D. $\frac{1}{3}(x+4)$

28. Solve for x in the equation
$x^3 - 5x^2 - x + 5 = 0$
A. –1, 1 or -5 B. 1, -1 or 5
C. 1, 1or 5 D. 1, 1, or -5

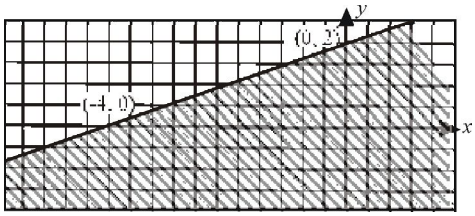
29. If the 9th term of an A.P. is five times the 5th term, find the relationship between a and d.
A. 3a + 5d = 0 B. a + 2d = 0
C. 2a + d = 0 D. a + 3d = 0

30. The time taken to do a piece of work is inversely proportional to the number of men employed. If it takes 45 men to do a piece of work in 5 days, how long will it take 25 men?
A. 15 days B. 12 days
C. 9 days D. 5 days

31. The binary operation * is defined on the set of integers p and q by
p * q = pq + p + q. Find 2 * (3 * 4).
A. 67 B. 19 C. 38 D. 59

32. If $\mathbf{N} = \begin{pmatrix} 3 & 5 & -4 \\ 6 & -3 & -5 \\ -2 & 2 & 1 \end{pmatrix}$, find $|\mathbf{N}|$.
A. 65 B. 23 C. 17 D. 91

33. The sum to infinity of the series
$1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \ldots$ is
A. $\frac{10}{3}$ B. $\frac{11}{3}$ C. $\frac{3}{2}$ D. $\frac{5}{2}$

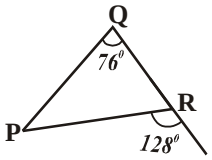
34.


Use the graph above to find the values of p and q if $px + qy \leq 4$
A. p = 2, q = -1 B. p = -1, q = 2
C. p = 2, q = 1 D. p = 1, q = 2

35. If x varies directly as $\sqrt{n}$ and x = 9 when n = 9, find x when n = $\frac{17}{9}$

A. $\sqrt{3}$ B. 4 C. $\sqrt{17}$ D. 27

36.



The triangle **PQR** above is

A. an isosceles triangle
B. an obtuse-angled triangle
C. a scalene triangle
D. an equilateral triangle

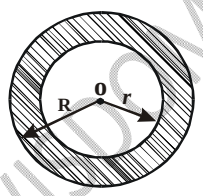
37. The sum of the interior angles of a polygon is 20 right angles. How many sides does the polygon have?

A. 40 B. 20 C. 10 D. 12

38. The locus of a point P which is equidistant from two given points S and T is

A. the angle bisector of $\overline{PS}$ and $\overline{ST}$
B. a perpendicular to $\overline{ST}$
C. the perpendicular bisector of $\overline{ST}$
D. a line parallel to $\overline{ST}$

39.

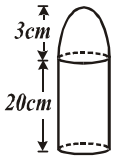


In the diagram above are two concentric circles of radii ***r*** and R respectively with centre **O**. If r = $\frac{2}{5}R$, express the area of the shaded portion in terms of π and R.

A. $\frac{5}{9}\pi R^2$ B. $\frac{21}{25}\pi R^2$

C. $\frac{21}{23}\pi R^2$ D. $\frac{9}{25}\pi R^2$

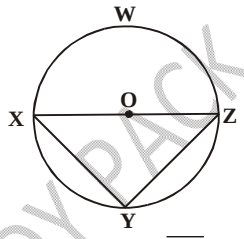
40.



In the diagram above, a cylinder is surmounted by a hemispherical bowl. Calculate the volume of the solid.

A. 198π cm^3 B. 180π cm^3
C. 162π cm^3 D. 216π cm^3.

41.



In the diagram above, $\overline{XZ}$ is the diameter of the circle **XYZW**, with the centre **O** and radius $\frac{15}{2}$ cm.

If **/XY/** = 12cm, find the area of the triangle **XYZ**.

A. 45 cm^2 B. 27 cm^2
C. 75 cm^2 D. 54 cm^2

42. Find the coordinate of the midpoint of x and y intercepts of the line 2y = 4x – 8.

A. (1, -2) B. (2, 0)
C. (-1, -2) D. (1, 2)

43. A bucket is 12cm in diameter at the top, 8cm in diameter at the bottom and 4cm deep. Calculate its volume.

A. $\frac{128}{3}\pi$ cm^3 B. 72π cm^3

C. $\frac{304}{3}\pi$ cm^3 D. 144π cm^3.

44. A hunter 1.6m tall, views a bird on top of a tree at an angle of 45^0. If the distance between the hunter and the tree is 10.4m, find the height of the tree.

A. 12.0m B. 10.4m
C. 9.0m D. 8.8m

45. A chord of a circle subtends an angle of 120^0 at the centre of a circle of diameter

$4\sqrt{3}$cm. Calculate the area of the major sector.

A. $8\pi cm^2$ B. $32\pi cm^2$

C. $4\pi cm^2$ D. $16\pi\ cm^2$.

46. If $\tan\theta = \frac{4}{3}$, *calculate* $\sin^2\theta - \cos^2\theta$.

A. $\frac{24}{25}$ B. $\frac{16}{25}$ C. $\frac{9}{25}$ D. $\frac{7}{25}$

47. Find the equation of the set of points which are equidistant from the parallel lines x = 1 and x = 7.

A. x = 3 B. x = 4 C. y = 4 D. y = 3

48. A solid hemisphere has radius 7cm. Find the total surface area.

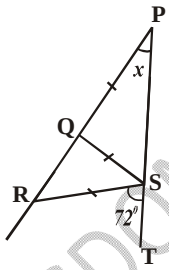
A. 66 cm^2 B. 308 cm^2

C. 400 cm^2 D. 462 cm^2

49. Find the value of α if the line $2y - \alpha x + 4 = 0$ is perpendicular to the line $y + \frac{1}{4}x - 7 = 0$

A. 8 B. 4 C. – 4 D. – 8

50.



In the diagram above, PST is straight line, /PQ/ = /QS/ = /RS/. If $\angle RST = 72^0$, find x.

A. 24^0 B. 72^0 C. 18^0 D. 36^0

2002 Solutions

1. Option B.
2. Option B.
3. Option A.
4. Option D.
5. Option B.
6. Option D.
7. Option A.
8. Option B.
9. Option C.
10. Option C.
11. Option C.
12. Option A.
13. Option C.
14. Option B.
15. Option A.
16. Option D.
17. Option C.
18. Option A.
19. Option A.
20. Option C.
21. Option B.
22. Option A.
23. Option B.
24. Option D.
25 Option A.
26. Option A.
27. Option C.
28. Option B.
29. Option D.
30. Option C.
31. Option D.
32. Option C.
33. Option C.
34. Option B.
35. Option C.
36. Option A.
37. Option D.
38. Option C.
39. Option B.
40. Option A.
41. Option D.
42. Option A.
43. Option C.
44. Option A.
45. Option A.
46. Option D.
47. Option B.
48. Option D.
49. Option A.
50. Option A.

UTME 2003

***Questions* - Type 9**

1. In a class of 40 students, 32 offer Mathematics, 24 offer Physics and 4 offer neither Mathematics nor Physics. How many offer both Mathematics and Physics?
   A. 4 B. 8 C. 16 D. 20

2. If $\frac{9^{2x-1}}{27^{x+1}} = 1$, find the value of x.
   A. 3 B. 8 C. 2 D. 5

3. Simplify $\frac{\sqrt{98} - \sqrt{50}}{\sqrt{32}}$
   A. $\frac{1}{4}$ B. $\frac{1}{2}$ C. 3 D. 1

4. Simplify $1 - (2\frac{1}{3} \times 1\frac{1}{4}) + \frac{3}{5}$
   A. $-2\frac{7}{15}$ B. $-1\frac{1}{15}$
   C. $-2\frac{31}{60}$ D. $-1\frac{19}{60}$

5. Simplify $213_4 \times 23_4$
   A. 10321_4 B. 12231_4
   C. 13211_4 D. 10311_4

6. Given:
   U={Even numbers between 0 and 30}
   P = { Multiples of 6 between 0 and 30}
   Q = { Multiples of 4 between 0 and 30}
   Find $(P \cup Q)^c$.
   A. {0, 2, 6,22,26}
   B. {2,10,14,22, 26}
   C. {0, 10, 14, 22, 26}
   D. {2, 4, 14, 18, 26}

7. The sum of four numbers is 1214_5. What is the average expressed in base five?
   A. 411 B. 401 C. 114 D. 141

8. Find $\left(\frac{1}{0.06} \div \frac{1}{0.042}\right)^{-1}$, correct to two decimal places
   A. 3.14 B. 1.43 C. 1.53 D. 4.42

9. Evaluate $\log_{\sqrt{2}} 4 + \log_{\frac{1}{2}} 16 - \log_4 32$
   A. 2.5 B. 5.5 C. –5.5 D. –2.5

10. A woman buys 270 oranges for ₦1,800.00 and sells at 5 for ₦40.00. What is her profit?
    A. N1,620.00 B. N630.00
    C. N360.00 D. N2,160.00

11. A cinema hall contains a certain number of people. If $22\frac{1}{2}\%$ are children, $47\frac{1}{2}\%$ are men and 84 are women, find the number of men in the hall.
    A. 113 B. 133 C. 84 D. 63

12. Find the values of x and y respectively if
    $3x - 5y + 5 = 0$ and $4x - 7y + 8 = 0$
    A. 4, 5 B. 5, 4
    C. –5, –4 D. – 4, – 5

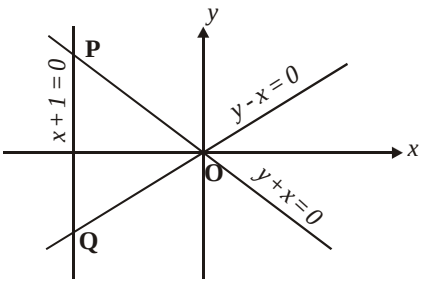
13. If $\begin{vmatrix} -x & 2 \\ 4x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 3x \\ 4 & -5 \end{vmatrix}$,
    find the value of x.
    A. –5 B. –2 C. 2 D. 5

14. Find the range of values of x satisfying the inequalities $5 + x \leq 8$ and $13 + x \geq 7$.
    A. $-6 \leq x \leq -3$ B. $-6 \leq x \leq 3$
    C. $-3 \leq x \leq 3$ D. $3 \leq x \leq 6$

15. x varies directly as the product of u and v and inversely as their sum. If x = 3 when u = 3 and v = 1, what is the value of x if u = 3 and v = 3?
    A. 9 B. 3 C. 4 D. 6

16. Three consecutive terms of a geometric progression are given as n – 2, n and n + 3. Find the common ratio.
    A. $\frac{3}{2}$ B. $\frac{2}{3}$ C. $\frac{1}{2}$ D. $\frac{1}{4}$

17.



Triangle **OPQ** above is the solution of the inequalities

A. $x - 1 \leq 0, y + x \leq 0, y - x \leq 0$
B. $x - 1 \leq 0, y - x \geq 0, y + x \geq 0$
C. $x + 1 \geq 0, y + x \leq 0, y - x \geq 0$
D. $y + x \leq 0, y - x \geq 0, x - 1 \geq 0$

18. The graphs of the function $y = x^2 + 4$ and a straight line PQ are drawn to solve the equation $x^2 - 3x + 2 = 0$. What is the equation of $\overline{PQ}$?

A. $y = 3x + 4$ B. $y = 3x - 2$
C. $y = 3x + 2$ D. $y = 3x - 4$

19. A matrix **P** has an inverse $\mathbf{P}^{-1} = \begin{pmatrix} 1 & -3 \\ 0 & 1 \end{pmatrix}$. Find **P.**

A. $\begin{pmatrix} 1 & 3 \\ 0 & -1 \end{pmatrix}$ B. $\begin{pmatrix} 1 & -3 \\ 0 & -1 \end{pmatrix}$
C. $\begin{pmatrix} 1 & 3 \\ 0 & 1 \end{pmatrix}$ D. $\begin{pmatrix} -1 & 3 \\ 0 & -1 \end{pmatrix}$

20. The length a person can jump is inversely proportional to his weight. If a 20 kg person can jump 1.5m, find the constant of proportionality.

A. 20 C. 15 C. 30 D. 60

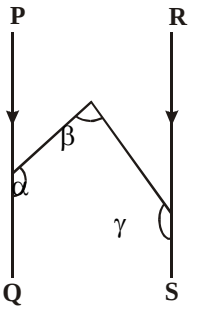
21. The sum of the first n terms of an arithmetic progression is 252. If the first term is –16 and the last term is 72, find the number of terms in the series.

A. 9 B. 8. C. 7 D. 6

22. Factorize completely $4abx - 2axy - 12b^2x + 6bxy$.

A. $2x(2b - a)(3b - y)$
B. $2x(a - 3b)(2b - y)$
C. $2x(3b - a)(2b - y)$
D. $2x(a - 3b)(y - 2b)$

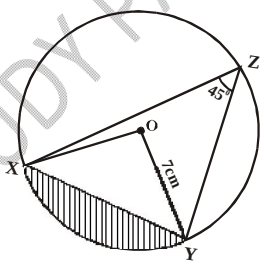
23.



In the diagram above $\overline{PQ}$ is parallel to $\overline{RS}$. What is the value of $\alpha + \beta + \gamma$?

A. 180^o B. 90^o C. 360^o D. 200^o

24.



XYZ is a circle centre **O** and radius 7cm. Find the area of the shaded region.

A. 38 cm^2 B. 14 cm^2 C. 77 cm^2
D. 84 cm^2 $\left[\pi = \frac{22}{7}\right]$

25. A trapezium has two parallel sides of lengths 5cm and 9cm. If the area is 21cm^2, find the distance between the parallel sides.

A. 4 cm B. 7 cm
C. 3 cm D. 6 cm

26. Find the equation of the locus of a point **P**(x, y) which is equidistant from **Q** (0, 0) and **R**(2, 1)

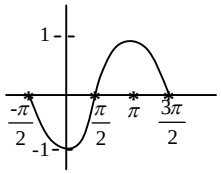
A. $2x + y = 5$ B. $4x + 2y = 5$
C. $4x - 2y = 5$ D. $2x + 2y = 5$

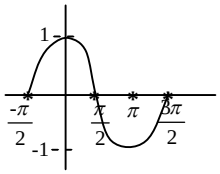
27. Find the value of *p,* if the line which passes through (-1, -p) and (-2p, 2) is parallel to the line $2y + 8x - 17 = 0$.

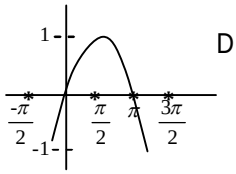
A. $\frac{6}{7}$ B. $-\frac{2}{7}$ C. $-\frac{6}{7}$ D. $\frac{7}{6}$

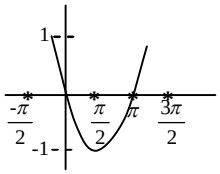
28. The locus of a point **P** which moves on one side only of a straight line **XY** so that ∠**XPY** = 90° is
    A. an arc of a circle through **X, Y**
    B. the perpendicular bisector of $\overline{XY}$
    C. a circle D. a semicircle

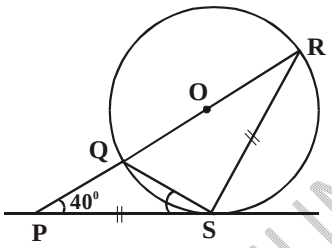
29. Which of the following is the graph of sinθ for $-\frac{\pi}{2} \leq \theta \leq \frac{3\pi}{2}$?

A. 

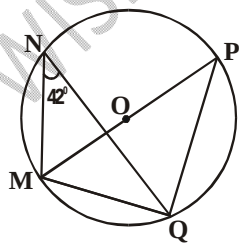
B. 

C. 

D. 

30. 

In the diagram above, **PQR** is a straight line and $\overline{PS}$ is a tangent to the circle **QRS** with **|PS|** = **|SR|** and ∠**SPR** = 40°. Find ∠**PSQ.**
A. 20° B. 40° C. 10° D. 30°

31. 

In the diagram above, **O** is the centre of the circle, **POM** is a diameter and ∠**MNQ = 42°**. Calculate ∠**QMP.**
A. 48° B. 132° C. 138° D. 42°

32. An aeroplane flies due north from airports **P** to **Q** and then flies due east to **R.** If **Q** is equidistant from **P** and **R,** find the bearing of **P** from **R**.
    A. 225° B. 090° C. 270° D. 135°

33. A triangle has vertices **P** (-1, 6), **Q**(-3, -4) and **R**(1, -4).
    Find the midpoints of $\overline{PQ}$ and $\overline{QR}$ respectively.
    A. (-2, 1) and (0, 1)
    B. (0, -2) and (-1, -4)
    C. (-2, 1) and (-1, -4)
    D. (-1, 0) and (-1, -1)

34. If $\frac{\pi}{2} \leq \theta \leq 2\pi$, find the maximum value of $f(\theta) = \frac{4}{6 + 2\cos\theta}$
    A. $\frac{1}{2}$ B. 4 C. 1 D. $\frac{2}{3}$

35. An arc of a circle subtends an angle of 30° on the circumference of a circle of radius 21cm. Find the length of the arc.
    A. 44 cm B. 11 cm
    C. 66cm D. 22cm

36. If $y = 3\sin(-4x)$, $\frac{dy}{dx}$ is
    A. 12 sin (-4x) B. –12 cos (-4x)
    C. 12x cos (4x) D. –12x cos (-4x)

37. Determine the maximum value of $y = 3x^2 - x^3$.
    A. 2 B. 4 C. 6 D. 0

38. Find the slope of the curve $y = 2x^2 + 5x - 3$ at (1,4).
    A. 9 B. 7 C. 6 D. 4

39. Evaluate $\int_2^3 (x^2 - 2x)dx$.
    A. 2 B. $\frac{1}{3}$ C. 4 D. $\frac{4}{3}$

40.

Value	0	1	2	3	4
Frequency	1	2	2	1	9

Find the mean of the distribution above.
A. 3 B. 1 C. 4 D. 2

41. On a pie chart, there are four sectors of which three angles are 45^o, 90^o and 135^o. If the smallest sector represents ₦28.00, how much is the largest sector?
A. ₦84.00 B. ₦42.00 C. ₦48.00
D. ₦96.00

42. If ${}^nP_3 - 6({}^nC_4) = 0$, find the value of *n*.
A. 7 B. 5 C. 8 D. 6

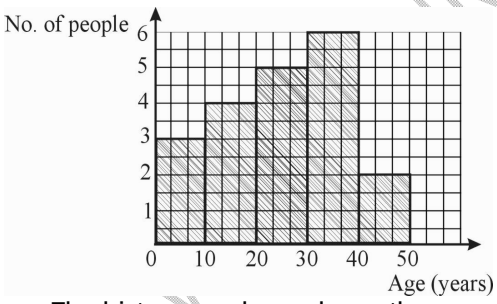
43.

Number	1	2	3	4	5	6
Frequency	12	20	x	21	x-1	28

The result of tossing a fair die 120 times is summarized above. Find the value of x.
A. 20 B. 22 C. 19 D. 21

44. The mean of the numbers 3, 6, 4, x and 7 is 5. Find the standard deviation.
A. 3 B. $\sqrt{2}$ C. $\sqrt{3}$ D. 2

45.



The histogram above shows the ages of the victims of pollution. How many people were involved in the pollution?
A. 20 B. 21 C. 15 D. 18

46. A bag contains 5 black balls and 3 red balls. Two balls are picked at random without replacement. What is the probability that a black and a red balls are picked?
A. $\frac{3}{14}$ B. $\frac{15}{28}$ C. $\frac{13}{28}$ D. $\frac{5}{14}$

47. By how much is the mean of 30, 56, 31, 55, 43 and 44 less than the median?
A. 0.50 B. 0.33 C. 0.17 D. 0.75

48. Find the number of committees of three that can be formed consisting of two men and one woman from four men and three women.
A. 6 B. 24 C. 3 D. 18

49. Two dice are thrown. What is the probability that the sum of the numbers is divisible by 3?
A. $\frac{1}{4}$ B. $\frac{2}{3}$ C. $\frac{1}{2}$ D. $\frac{1}{3}$

50. The range of 4, 3, 11, 9, 6, 15, 19, 23, 27, 24, 21 and 16 is
A. 24 B. 23 C. 21 D. 16

2003 Solutions

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

27. Option A.
28. Option D.
29. Option C.
30. Option B.
31. Option A.
32. Option A.
33. Option C.
34. Option A.
35. Option D.
36. Option B.
37. Option B.
38. Option A.
39. Option D.
40. Option A.
41. Option A.
42. Option A.
43. Option A.
44. Option B.
45. Option A.
46. Option B.
47. Option B.
48. Option D.
49. Option D.
50. Option A.

UTME 2004
***Questions* - Type 4**

1. In how many ways can 2 students be selected from a group of 5 students in a debating competition?
   A. 25 ways B. 20 ways
   C. 15 ways D. 10 ways

2. **I. Rectangular bars of equal width**
   II. The height of each rectangular bar is proportional to the frequency of the corresponding class interval.
   III. Rectangular bars have common sides with no gaps in between.
   A histogram is described completely by
   A. **I** and **II** B. **I, II** and **III**
   C. **II** and **III** D. **I** and **II**

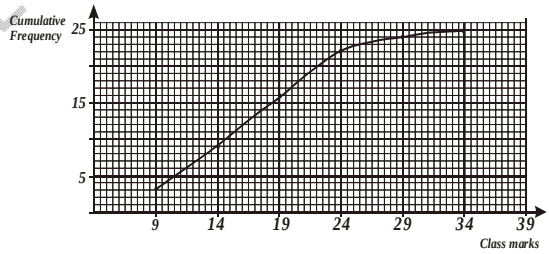
3. An unbiased die is rolled 100 times and the outcome is tabulated as follows:

Number	1	2	3	4	5	6
Freq.	13	15	22	14	20	16

   What is the probability of obtaining 5?
   A. $^1/_2$ B. $^1/_6$ C. $^1/_5$ D. $^1/_4$

4. The weights of 10 pupils in a class are 15kg, 16kg, 17kg, 18kg, 16kg, 17kg, 17kg, 17kg, 18kg and 16kg. What is the range of this distribution?
   A. 2 B. 1 C. 4 D. 3

5. A committee of six is to be formed by a state governor from nine state commissioners and three members of the house of assembly. In how many ways can the members of the committee be chosen so as to include one member of the house of assembly?
   A. 462 ways B. 378 ways
   C. 840 ways D. 924 ways.

6. 

   The graph above shows the cumulative frequency curve of the distribution of marks in a class test. What percentage of the students scored more than 20?
   A. 8% B. 68% C. 28% D. 17 %

7. Find the mean deviation of 1, 2, 3 and 4.
   A. 2.0 B. 2.5 C. 1.5 D. 1.0

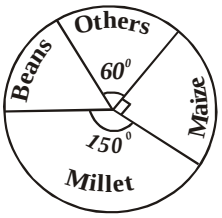
8. Some white balls were put in a basket containing twelve red balls and sixteen black balls. If the probability of picking a white ball from the basket is $^3/_7$, how many white balls were introduced?
   A. 21 B. 12 C. 32 D. 28

9. The mean age of a group of students is 15 years. When the age of a teacher, 45 years old, is added to the ages of the students,

the mean of their ages becomes 18 years. Find the number of students in the group.

A. 42 B. 15 C. 7 D. 9

10.



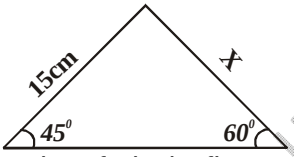
The pie chart above shows the distribution of the crops harvested from a farmland in a year. If 3,000 tonnes of millet is harvested, what amount of beans is harvested?

A. 1,500 tonnes B. 1,200 tonnes
C. 6,000 tonnes D. 9,000 tonnes.

11. A container has 30 gold medals, 22 silver medals and 18 bronze medals. If one medal is selected at random from the container, what is the probability that it is not a gold medal?

A. $\frac{3}{7}$ B. $\frac{11}{35}$ C. $\frac{9}{35}$ D. $\frac{4}{7}$

12.



Find the value of ***x*** in the figure above.

A. 5√6 B. 3√6 C. 20√6 D. 15√6

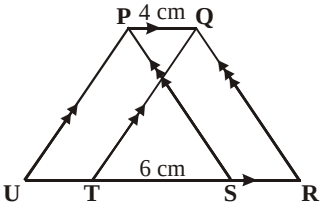
13. The sum of the interior angles of a pentagon is 6x + 6y. Find y in terms of x.

A. y = 150 – x B. y = 120 – x
C. y = 60 – x D. y = 90 – x

14. The locus of a point which is 5cm from the line **LM** is a

A. line parallel to $\overline{\mathbf{LM}}$ and 5cm from $\overline{\mathbf{LM}}$
B. line distance 10cm from $\overline{\mathbf{LM}}$ and parallel to $\overline{\mathbf{LM}}$
C. pair of lines on opposite sides of $\overline{\mathbf{LM}}$ and parallel to it, each distance 5cm from $\overline{\mathbf{LM}}$
D. pair of parallel lines on one side of $\overline{\mathbf{LM}}$ and parallel to $\overline{\mathbf{LM}}$.

15.



In the diagram above, |PQ| = 4cm and |TS| = 6cm. If the area of parallelogram PQTU is 32cm^2, find the area of the trapezium PQRU.

A. 72cm^2 B. 60cm^2
C. 48cm^2 D. 24cm^2

16. Find the midpoint of the line joining P(-3, 5) and Q(5, -3).

A. (2, 2) B. (1, 1)
C. (4, 4) D. (4, -4)

17. PQRSTV is a regular polygon of side 7cm inscribed in a circle. Find the circumference of the circle PQRSTV.

[$\pi = {}^{22}/_{7}$]

A. 44cm B. 22cm
C. 56cm D. 42cm

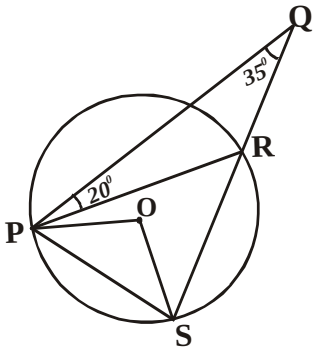
18. Determine the locus of a point inside a square PQRS which is equidistant from $\overline{\mathbf{PQ}}$ and $\overline{\mathbf{QR}}$.

A. The perpendicular bisector $\overline{\mathbf{PQ}}$.
B. The diagonal PR.
C. The diagonal QS.
D. Side SR.

19. Find the value of $\alpha^2 + \beta^2$ if $\alpha + \beta = 2$ and the distance between the points $(1, \alpha)$ and $(\beta, 1)$ is 3 units.

A. 14 B. 11 C. 3 D. 5

20.

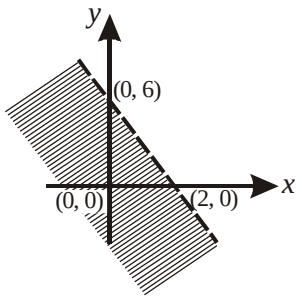


P, **R** and **S** lie on a circle centre **O** as shown above, while **Q** lies outside the circle. Find <**PSO**.
A. 40^0 B. 45^0 C. 55^0 D. 35^0

21. The shadow of a pole $5\sqrt{3}$ m high is 5m. Find the angle of elevation of the sun.
A. 60^0 B. 75^0 C. 45^0 D. 30^0

22. An arc of a circle of length 22cm subtends an angle of $3x^0$ at the centre of the circle. Find the value of x if the diameter of the circle is 14cm.
A. 180^0 B. 120^0 C. 60^0 D. 30^0

23.



The shaded area in the diagram above is represented by
A. {(x, y): y + 3x < -6}
B. {(x, y): y – 3x < 6}
C. {(x, y): y – 3x < -6}
D. {(x, y): y + 3x < 6}

24. Find the values of x where the curve $y = x^3 + 2x^2 – 5x – 6$ crosses the x-axis.
A. 2, -1 and –3 B. 2, 1 and 3
C. –2, -1 and 3 D. –2, 1 and –3

25. Find the sum to infinity of the series $\frac{1}{2}, \frac{1}{6}, \frac{1}{18}, \ldots$
A. $\frac{2}{3}$ B. 1 C. $\frac{1}{3}$ D. $\frac{3}{4}$

26. The length L of a simple pendulum varies directly as the square of its period T. If a pendulum with period 4sec. is 64cm long, find the length of a pendulum whose period is 9 sec.
A. 96cm B. 36cm
C. 324cm D. 144cm

27. What are the integral values of x which satisfy the inequality $–1 < 3 – 2x \leq 5$?
A. 0, 1, 2 B. –1, 0, 1
C. –2, 1, 0, -1 D. –1, 0, 1, 2

28. Find the remainder when $3x^3 + 5x^2 – 11x + 4$ is divided by x + 3.
A. 1 B. – 4 C. 4 D. – 1

29. If the operation $*$ on the set of integers is defined by $p*q = \sqrt{pq}$, find the value of $4*(8*32)$.
A. 3 B. 16 C. 8 D. 4

30. Given that the first and fourth terms of a G.P. are 6 and 162 respectively, find the sum of the first three terms of the progression.
A. 48 B. 78 C. 27 D. 8

31. Factorize completely $ac – 2bc – a^2 + 4b^2$.
A. (a – 2b)(c – a + 2b)
B. (a – 2b)(c + a + 2b)
C. (a – 2b)(c + a - 2b)
D. (a – 2b)(c – a - 2b)

32. The inverse of the matrix $\begin{pmatrix} 2 & 1 \\ 1 & 1 \end{pmatrix}$ is
A. $\begin{pmatrix} 1 & -1 \\ -1 & 2 \end{pmatrix}$ B. $\begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix}$
C. $\begin{pmatrix} 1 & -1 \\ 1 & 2 \end{pmatrix}$ D. $\begin{pmatrix} 1 & 1 \\ -1 & 2 \end{pmatrix}$

33. y is inversely proportional to x and y = 4 when x = ½ . Find x when y = 10.
A. 2 B. 10 C. $\frac{1}{10}$ D. $\frac{1}{5}$

34. The nth terms of two sequences are $Q_n = 3.2^{n-2}$ and $U_m = 3.2^{2m-3}$. Find the product of Q_2 and U_2.
A. 12 B. 18 C. 6 D. 3

35. If $P = \begin{pmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ -1 & 0 & 1 \end{pmatrix}$, then |P| is

A. 0 B. –8 C. 8 D. 4

36. If $6\log_x 2 - 3\log_x 3 = 3\log_5 0.2$, find x.
A. $\frac{4}{3}$ B. $\frac{3}{8}$ C. $\frac{8}{3}$ D. $\frac{3}{4}$

37. Find p, if $451_6 - p_7 = 305_6$
A. 116_7 B. 62_7 C. 142_7 D. 611_7

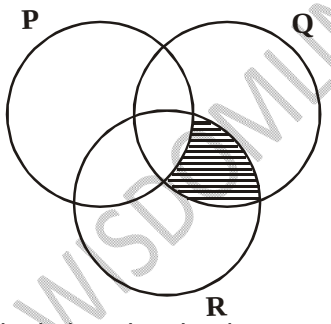
38. A farmer planted 5,000 grains of maize and harvested 5,000 cobs, each bearing 500 grains. What is the ratio of the number of grains sowed to the number harvested?
A. 1 : 250,000 B. 1 : 25,000
C. 1 : 5,000 D. 1 : 500

39.
$$\begin{array}{rcccc} & 4 & 2 & 4 & 3 \\ - & 1 & 3 & x & 4 \\ \hline & y & 3 & 4 & 4 \end{array}$$

Find x and y respectively in the subtraction above carried out in base 5.
A. 4, 3 B. 4, 2 C. 2, 4 D. 3, 2

40. Given that $\sqrt[3]{4^{2x}} = 16$, find the value of x.
A. 3 B. 4 C. 6 D. 2

41.



The shaded region in the Venn diagram above is
A. $P^c \cap (Q \cup R)$ B. $P^c \cap (Q \cap R)$
C. $P \cap Q$ D. $P^c \cup (Q \cap R)$

42. Evaluate $\frac{\frac{1}{10} \times \frac{2}{3} + \frac{1}{4}}{\frac{1}{2} \div \frac{3}{5} - \frac{1}{4}}$
A. $\frac{19}{60}$ B. $\frac{7}{12}$ C. $\frac{19}{35}$ D. $\frac{2}{25}$

43. In a class of 40 students, each student offers at least one of Physics and Chemistry. If the number of students that offer Physics is three times the number that offers both subjects and the number that offer Chemistry is twice the number that offer Physics, find the number of students that offer Physics only.
A. 10 B. 5 C. 25 D. 15.

44. Simplify $\frac{1}{\sqrt{3}+2}$ in the form $a + b\sqrt{3}$.
A. $2 + \sqrt{3}$ B. $-2 - \sqrt{3}$
C. $-2 + \sqrt{3}$ D. $2 - \sqrt{3}$

45. Three teachers shared a packet of chalk. The first teacher got $^2/_5$ of the chalk and the second teacher received $^2/_{15}$ of the remainder. What fraction did the third teacher receive?
A. $\frac{8}{15}$ B. $\frac{13}{25}$ C. $\frac{12}{25}$ D. $\frac{11}{25}$

46. Find the derivative of (2 + 3x)(1 – x) with respect to x.
A. –3 B. 6 C. 6x – 1 D. 1 – 6x

47. If $y = 3\cos\left(\frac{x}{3}\right)$, find $\frac{dy}{dx}$ when $x = \frac{3\pi}{2}$.
A. –1 B. –3 C. 1 D. 2

48. Evaluate $\int_1^3 \left(x^2 - 1\right) dx$.
A. $-6\frac{2}{3}$ B. $6\frac{2}{3}$ C. $\frac{2}{3}$ D. $-\frac{2}{3}$

49. Find the derivative of the function $y = 2x^2(2x - 1)$ at the point x = -1.
A. – 4 B. – 6 C. 18 D. 16

50. What is the rate of change of volume v of a hemisphere with respect to its radius r when r = 2?
A. 4π B. 8π C. 16π D. 2π

2004 Solutions

1. Option D.
2. Option B.

3. Option C.
4. Option D.
5. Option B.
6. Option C.
7. Option D.
8. Option A.
9. Option D.
10. Option B.
11. Option D.
12. Option A.
13. Option D.
14. Option C.
15. Option A.
16. Option B.
17. Option A.
18. Option C.
19. Option B.
20. Option D.
21. Option A.
22. Option C.
23. Option D.
24. Option A.
25. Option D.
26. Option C.
27. Option B.
28. Option A.
29. Option C.
30. Option B.
31. Option D.
32. Option A.
33. Option D.
34. Option B.
35. Option A.
36. Option D.
37. Option A.
38. Option D.
39. Option B.
40. Option A.
41. Option B.
42. Option C.
43. Option A.
44. Option D.
45. Option B.
46. Option D.
47. Option A.
48. Option B.
49. Option D.
50. Option B.

UTME 2005

Questions - Type D

1. Find the value of *m* if $13_m + 24_m = 41_m$
   A. 8 B. 6 C. 5 D. 2

2. If 321_4 is divided by 23_4 and leaves a remainder *r*, what is the value of *r*?
   A. 0 B. 1 C. 2 D. 3

3. Simplify $3\frac{1}{2} - \left(2\frac{1}{3} \times 1\frac{1}{4}\right) + \frac{3}{5}$
   A. $2\frac{11}{60}$ B. $2\frac{1}{60}$
   C. $1\frac{11}{60}$ D. $1\frac{1}{60}$

4. A father decided to give 20% of his monthly income to his three children as their monthly allowance. The eldest child got 45% of the allowance and the youngest got 25%. How much was the father's monthly income if the second child got #3 000?
   A. #33,000 B. #45,000
   C. #50,000 D. #60,000

5. If the interest of #150.00 for 2½ years is #4.50, find the interest on #250.00 for 6 months at the same rate.
   A. #1.50 B. #7.50
   C. #15.00 D. #18.00

6. Three boys shared some oranges. The first received $^1/_3$ of the oranges and the second received $^2/_3$ of the remainder. If the third boy received the remaining 12 oranges, how many oranges did they share?
   A. 60 B. 54 C. 48 D. 42

7. Evaluate $\frac{81^{\frac{3}{4}} - 27^{\frac{1}{3}}}{3 \times 2^3}$
   A. 3 B. 1 C. $^1/_3$ D. $^1/_8$

8. If $\log_{10}2 = 0.3010$ and $\log_{10}3 = 0.4771$, evaluate $\log_{10}4.5$
   A. 0.9542 B. 0.6532
   C. 0.4771 D. 0.3010

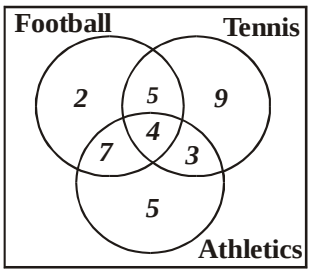
9. Simplify $\frac{\sqrt{12}-\sqrt{3}}{\sqrt{12}+\sqrt{3}}$

A. 0 B. $^1/_3$ C. $^3/_5$ D. 1

10. If $U = \{x/x$ is a positive integer less than 10$\}$ and P = $\{x/x$ is a prime factor of 30$\}$, find the complement of P.

A. {1, 2, 4, 7, 8, 9}
B. {1, 2, 4, 6, 7, 8, 9}
C. {1, 4, 6, 7, 8, 9)
D. { 1, 4, 7, 8, 9}

11.



The Venn diagram above shows a class of 40 students with the games they play. How many of the students play two games only?

A. 19 B. 16 C. 15 D. 4

12. If m = 3, p = -3, q = 7 and r = $^5/_2$, evaluate m (p +q + r).

A. 19.50 B. 19.15 C. 18.95 D. 18.05

13. Divide $6x^2 - 13x + 5$ by 2x - 1

A. 3x + 5 B. 3x – 5
C. 5x – 3 D. 5x + 3

14. A polynomial in x whose zeros are –2, -1 and 3 is

A. $x^3 - 7x + 6$ B. $x^3 + 7x - 6$
C. $x^3 + 7x + 6$ D. $x^3 - 7x - 6$

15. The time taken to do a piece of work is inversely proportional to the number of men employed. If it takes 30 men to do a piece of work in 6 days, how many men are required to do the work in 4 days?

A. 20 B. 35 C. 45 D. 60

16. The weight W kg of a metal bar varies jointly as its length L metres and the square of its diameter *d* metres.

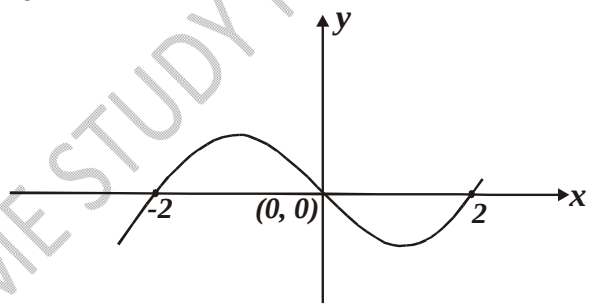
If W = 140 when $d = 4^2/_3$ and L = 54, find *d* in terms of W and L.

A. $\sqrt{\frac{42W}{5L}}$ B. $\sqrt{\frac{5L}{42W}}$
C. $\frac{42W}{5L}$ D. $\frac{5L}{42W}$

17. Find the range of values of x for which $7x - 3 > 25 + 3x$.

A. $x > 7$ B. $x < 7$
C. $x > -7$ D. $x < -7$

18.



The diagram above is the graph of the function f(x). Determine the range of values of x for which $f(x) \leq 0$.

A. $x \leq 2$ B. $0 \leq x \leq 2$
C. $-2 \leq x \leq 0, x \geq 2$ D. $x \leq -2, 0 \leq x \leq 2$

19. If the 7th term of an AP is twice the third term and the sum of the first four terms is 42, find the common difference.

A. 6 B. 3 C. 2 D. 1

20. Find the sum of the first 20 terms of the series 8, 12, 16,..., 96

A. 1400 B. 1040 C. 960 D. 920

21. An operation * is defined on the set of real numbers by a*b = ab + 2(a + b + 1). Find the identity element.

A. 2 B. 1 C. -1 D. -2

22. If M and N are two matrices defined by

$$M = \begin{pmatrix} 1 & 3 & 2 \\ 4 & 5 & -1 \\ -3 & 2 & 0 \end{pmatrix} \text{ and } N = \begin{pmatrix} 1 & -2 & 3 \\ 4 & -1 & 5 \\ 2 & -3 & -1 \end{pmatrix},$$

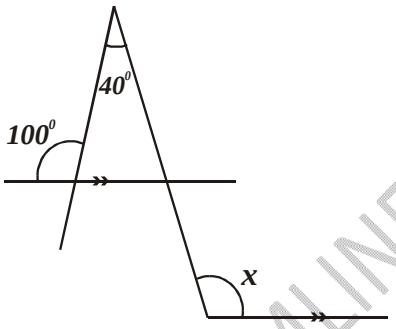
Evaluate 2M – 3N.

A. $\begin{pmatrix} -1 & 12 & 5 \\ 4 & 7 & 13 \\ 0 & -5 & -3 \end{pmatrix}$ B. $\begin{pmatrix} -1 & 0 & -5 \\ -4 & 7 & -17 \\ 0 & -5 & 3 \end{pmatrix}$

C. $\begin{pmatrix} -1 & 12 & -5 \\ 4 & 13 & -17 \\ -12 & 13 & 3 \end{pmatrix}$ D. $\begin{pmatrix} -1 & 12 & -5 \\ 4 & 13 & 13 \\ -12 & 13 & 3 \end{pmatrix}$

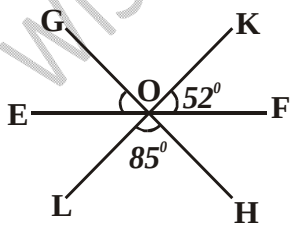
23. If P = $\begin{pmatrix} 1 & 3 & 2 \\ 4 & 5 & -1 \\ -3 & 2 & 0 \end{pmatrix}$, find the determinant of matrix P.
A. 75 B. 57 C. –57 D. –75

24.



In the diagram above, calculate the value of x.
A. 60^0 B. 100^0 C. 120^0 D. 140^0

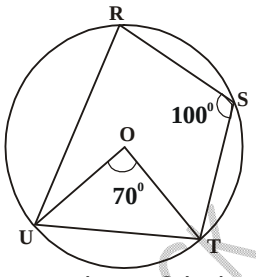
25.



Three straight lines **EF**, **GH** and **LK** intersect at **O** as shown above, If ∠**KOF** = 52^0 and ∠**LOH**= 85^0, calculate the size of ∠**EOG**.
A. 26^0 B. 43^0 C. 52^0 D. 85^0

26. The sum of the interior angles of a regular polygon is 1800^0. Calculate the size of one exterior angle of the polygon.
A. 30^0 B. 24^0 C. 18^0 D. 12^0

27.



In the diagram above, **O** is the centre of the circle, ∠**UOT** = 70^0 and ∠**RST** = 100^0. Calculate ∠**RUO**.
A. 20^0 B. 25^0 C. 50^0 D. 80^0

28. A chord of a circle subtends an angle of 60^0 at the centre of a circle of radius 14cm. Find the length of the chord.
A. 7 cm B. 14 cm
C. 21 cm D. 28 cm

29. A sector of a circle has an area of 55 cm^2. If the radius of the circle is 10 cm, calculate the angle of the sector.
A. 45^0 B. 63^0 C. 75^0 D. 90^0

$$\left[\pi = \frac{22}{7}\right]$$

30. Find the curved surface area of a cone with circular base diameter 10 cm and height 12 cm.
A. $25\pi cm^2$ B. $65\ \pi cm^2$
C. $120\ \pi cm^2$ D. $156\ \pi cm^2$

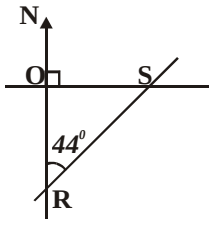
31. Two lines PQ and ST intersect at 75^0. The locus of points equidistant from $\overline{PQ}$ and $\overline{ST}$ lies on the
A. perpendicular bisector of $\overline{PQ}$
B. perpendicular bisector of $\overline{ST}$
C. bisector of the angles between lines PQ and ST
D. bisector of the angles between lines PT and QS

32. Find the equation of the perpendicular at point (4, 3) to the line y + 2x = 5.
A. 2y - x = 4 B. y + 2x = 3
C. y + 2x = 5 D. 2y - x = 2

33. Find the coordinates of the midpoint of the line joining (3, -4) and (-1, 10).
A. (1, 3) B. (1, 2) C. (2, 3) D. (3, 2)

34. If $\sin\theta = -\frac{1}{2}$ for $0 < \theta < 360^0$, the value of θ is
A. 30^0 and 150^0 B. 150^0 and 210^0
C. 210^0 and 330^0 D. 150^0 and 330^0

35.



From the diagram above, find the bearing of **R** from **S**.
A. 226^0 B. 224^0 C. 136^0 D. 134^0

36. If $y = (1 - 2x)^3$, find the value of $\frac{dy}{dx}$ at x = -1.
A. 57 B. 27 C. –6 D. –54

37. Find the derivative of
$y = \sin(2x^3 + 3x - 4)$.
A. $\cos(2x^3 + 3x - 4)$
B. $-\cos((2x^3 + 3x - 4)$
C. $(6x^2 + 3)\cos(2x^3 + 3x - 4)$
D. $-(6x^2 + 3)\cos(2x^3 + 3x - 4)$

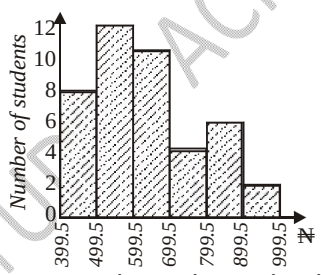
38. The radius r of a circular disc is increasing at the rate of 0.5cm/sec. At what rate is the area of the disc increasing when its radius is 6cm?
A. 36π cm^2/sec B. 18πcm^2/sec
C. 6π cm^2/sec D. 3πcm^2/sec

39. The maximum value of the function $f(x) = 2 + x - x^2$ is
A. $\frac{9}{4}$ B. $\frac{7}{4}$ C. $\frac{3}{2}$ D. $\frac{1}{2}$

40. Find the area of the figure bounded by the given pair of curves $y = x^2 - x + 3$ and $y = 3$
A. $\frac{17}{6}$ units (sq) B. $\frac{7}{6}$ units (sq)
C. $\frac{5}{6}$ units (sq) D. $\frac{1}{6}$ units (sq)

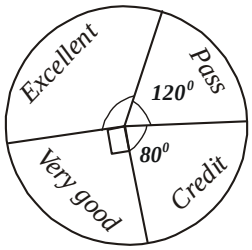
41. Evaluate $\int_0^{\frac{\pi}{2}} \sin 2x dx$
A. 1 B. 0 C. $-1/2$ D. –1

42.



The histogram above shows the distribution of the monthly incomes of the workers in a company. How many workers earn more than #700.00?
A. 16 B. 17 C. 8 D. 6

43.



The grades of 36 students in a test are shown in the pie chart above. How many students had 'excellent'?
A. 7 B. 8 C. 9 D. 12

44

Score	1	2	3	4	5	6
No. of students	1	4	5	6	*x*	2

The table above shows the scores of a group of students in a test. If the average score is 3.5, find the value of x.

A. 1 B. 2 C. 3 D. 4

45. The modal height and range of heights 1.35, 1.25, 1.35, 1.40, 1.35, 1.45, 1.50, 1.35, 1.50 and 1.20 are m and r respectively. Find m + 2r.
A. 1.35 B. 1.65 C. 1.95 D. 3.00

46. Find the value of t if the standard deviation of 2t, 3t, 4t, 5t and 6t is $\sqrt{2}$.
A. 1 B. 2 C. 3 D. 4

47. In how many ways can 6 coloured chalks be arranged if 2 are of the same colour?
A. 60 B. 120 C. 240 D. 360

48. How many possible ways are there of seating seven people P, Q, R, S, T, U and V at a circular table?
A. 360 B. 720 C. 2520 D. 5040

49. A box contains 5 blue balls, 3 red balls and 2 white balls. Two balls are selected from the box with replacement. Find the probability of obtaining two blue or two red balls.
A. $\frac{17}{50}$ B. $\frac{3}{25}$ C. $\frac{1}{50}$ D. $\frac{3}{250}$

50. What is the probability that an integer x, ($1 \leq x \leq 20$) chosen at random is divisible by both 2 and 3?
A. $\frac{1}{20}$ B. $\frac{1}{3}$ C. $\frac{3}{20}$ D. $\frac{7}{10}$

2005 Solutions

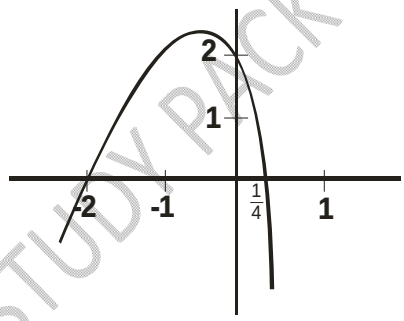
1. Option B.
2. Option C.
3. Option C.
4. Option C.
5. Option A.
6. Option B.
7. Option B.
8. Option B.
9. Option B.
10. Option C.
11. Option C.
12. Option A.
13. Option B.
14. Option D.
15. Option C.
16. Option A.
17. Option A.
18. Option B.
19. Option B.
20. Option D.
21. Option C.
22. Option C.
23. Option B.
24. Option C.
25. Option B.
26. Option A.
27. Option B.
28. Option B.
29. Option B.
30. Option B.
31. Option C.
32. Option D.
33. Option A.
34. Option C.
35. Option B.
36. Option D.
37. Option C.
38. Option C.
39. Option A.
40. Option D.
41. Option A.
42. Option B.
43. Option A.
44. Option B.
45. Option C.
46. Option A.
47. Option D.
48. Option B.
49. Option A.
50. Option C.

UTME 2009

Questions

1. Subtract 16418_9 from 18630_9.
A. 1121_9 B. 2112_9 C. 2113_9 D. 2211_9
2. If $55_x + 52_x = 77_{10}$, find x
A. 5 B. 6 C. 7 D. 10
3. Simplify $7\frac{1}{12} - 4\frac{3}{4} + 2\frac{1}{2}$

A. 4 B. $4\frac{1}{6}$ C. $4\frac{5}{6}$ D. $5\frac{1}{6}$

4. Evaluate $\frac{81.81+99.44}{20.09+36.16}$ correct to 3 significant figures.
   A. 6.21 B. 3.22 C. 2.78 D. 2.13
5. A man bought a second-hand photocopying machine for N34.00. He serviced it at a cost of N2,000 and then sold it at a profit of 15%. What was the selling price?
   A. #37,550 B. #40,400
   C. #41,400 D. #42,400.
6. A student spent $\frac{1}{5}$ of his allowances on books, $\frac{1}{3}$ of the reminder on food and kept the rest for contingencies. What fraction was kept?
   A. $\frac{7}{15}$ B. $\frac{8}{15}$ C. $\frac{2}{3}$ D. $\frac{4}{5}$
7. Solve $5^{2(x-1)} \times 5^{x+1} = 0.04$
   A. $\frac{1}{3}$ B. $\frac{1}{4}$ C. $-\frac{1}{5}$ D. $-\frac{1}{3}$
8. If $\log_{10}2 = 0.3010$ and $\log_{10}7 = 0.8451$, evaluate $\log_{10}280$.
   A. 3.4471 B. 2.4471
   C. 1.4471 D. 1.4071.
9. Simplify $\frac{5+\sqrt{7}}{3+\sqrt{7}}$.
   A. $17 - \sqrt{7}$ B. $4 - \sqrt{7}$
   C. $15 + \sqrt{7}$ D. $7 - \sqrt{7}$
10. If $X = \{n^2 + 1 : is\ a\ positive\ integer\ and\ 1 \leq n \leq 5\}$,
    $Y = \{5n : n\ is\ a\ positive\ integer\ and\ 1 \leq n \leq 5\}$
    find $X \cap Y$.
    A. $\{5, 10\}$ B. $\{5, 10, 15\}$
    C. $\{2, 5, 10\}$ D. $\{5, 10, 15, 20\}$
11. **I.** $S \cap T \cap W = S$
    II. $S \cup T \cup W = W$
    III. $T \cap W = S$
    If $S \subset T \subset W$, which of the above statements are true?
    A. **I** and **II** B. **I** and **III**
    C. **II** and **III** D. **I**, **II** and **III**.
12. If $P = \sqrt{\frac{rs^2}{t}}$, express r in terms of P, s and t.
    A. $\frac{p^2t}{s^2}$ B. $\frac{p^2t}{s^2}$ C. $\frac{p^2t}{s^2}$ D. $\frac{pt}{s^2}$
13. A polynomial in x whose roots are $\frac{4}{3}$ and $-\frac{3}{5}$ is
    A. $15x^2 - 11x - 12$ B. $15x^2 + 11x - 12$
    C. $12x^2 - x - 12$ D. $12x^2 + 11x - 15$
14. 

    Which of the following equations represents the graph above?
    A. $y = 2 + 7x + 4x^2$
    B. $y = 2 - 7x + 4x^2$
    C. $y = 2 + 7x - 4x^2$
    D. $y = 2 - 7x - 4x^2$
15. W is directly proportional to U. If W = 5, when U = 3, find U when W = $\frac{2}{7}$.
    A. $\frac{6}{35}$ B. $\frac{10}{21}$ C. $\frac{21}{10}$ D. $\frac{35}{6}$
16. Determine the value of x for which $(x^2 - 1) > 0$.
    A. $x < -1\ or\ x > 1$
    B. $-1 < x < 1$
    C. $x > 0$
    D. $x < -1$.
17. Find the range of values of x for which $3x - 7 \leq 0\ and\ x + 5 > 0$
    A. $-5 < x < \frac{7}{3}$ B. $-5 \leq x \leq \frac{7}{3}$
    C. $-5 < x \leq \frac{7}{3}$ D. $-5 \leq x < \frac{7}{3}$
18. The sum of the first n terms of the arithmetic progression 5, 11, 17, 23, 29, 35, ... is
    A. n(3n – 0.5) B. n(3n + 2)
    C. n(3n + 2.5) D. n(3n + 5)

19. Find to infinity, the sum of the sequence $1, \frac{9}{10}, \left(\frac{9}{10}\right)^2, \left(\frac{9}{10}\right)^3, \ldots$
A. 10 B. 9 C. $\frac{10}{9}$ D. $\frac{9}{10}$

20. If $m * n = n - (m + 2)$ for any real numbers m and n, find the value of $3 * (-5)$.
A. -6 B. -8 C. -10 D. -12

21. A binary operation $\otimes$ defined on the set of integers is such that m $\otimes$ n = m + n + mn for all integers m and n. find the inverse of -5 under this operation, if the identity element is 0.
A. $-\frac{5}{4}$ B. $-\frac{5}{6}$ C. 0 D. 5

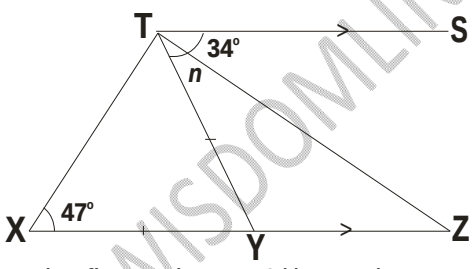
22. If $Q = \begin{pmatrix} 9 & -2 \\ -7 & 4 \end{pmatrix}$, then $|Q|$ is
A. – 50 B. -22 C. 22 D. 50

23. If $P = \begin{pmatrix} x+3 & x+2 \\ x+1 & x-1 \end{pmatrix}$, evaluate x if $|P| = -10$.
A. -5 B. -2 C. 2 D. 5

24. Find the acute angle between the straight lines $y = x$ and $y = \sqrt{3}x$.
A. 15^0 B. 30^0 C. 45^0 D. 60^0.

25. A regular polygon has 150^0 as the size of each interior angle. How many sides does it have?
A. 12 B. 10 C. 9 D. 8

26.



In the figure above, TS//XY and XY = TY, ∠STZ = 34^0, ∠TXY = 47^0, find the angle marked n.
A. 47^0 B. 52^0 C. 56^0 D. 99^0

27. If the hypotenuse of a right-angled isosceles triangle is 2cm, what is the area of the triangle.?
A. $\frac{1}{\sqrt{2}}cm^2$ B. 1
C. $\sqrt{2}\,cm^2$ D. $2\sqrt{2}\,cm^2$

28. A chord is drawn 5cm away from the centre of a circle of radius 13cm. calculate the length of the chord.
A. 7cm B. 9cm C. 12cm D. 24cm

29. Find the radius of a sphere whose surface area is $154cm^2$.
A. 7.00cm B. 3.50cm
C. 3.00cm D. 1.75cm
[$\pi = \frac{22}{7}$].

30. Find the locus of a particle which moves in the first quadrant so that it is equidistant from the lines x = 0 and y = 0 (where k is a constant).
A. x + y = 0 B. x – y = 0
C. x + y + k = 0 D. x – y – k = 0

31. What is the locus of the mid-point of all chords of length 6cm with a circle of radius 5cm and with centre O?
A. A circle of radius 4cm and with centre O.
B. The perpendicular bisector of the chords.
C. A straight line passing through centre O.
D. A circle of radius 6cm and with centre O.

32. What is the value of p if the gradient of the line joining (-1, p) and (p, 4) is $\frac{2}{3}$?
A. -2 B. -1 C. 1 D. 2

33. What is the value of r if the distance between the points (4, 2) and (1, r) is 3 units?
A. 1 B. 2 C. 3 D. 4

34. Find the value of $\sin 45^0 - \cos 30^0$.
A. $\frac{2+\sqrt{6}}{4}$ B. $\frac{\sqrt{2}+\sqrt{3}}{4}$
C. $\frac{\sqrt{2}+\sqrt{3}}{2}$ D. $\frac{\sqrt{2}-\sqrt{3}}{4}$

35. A cliff on the bank of a river is 300 metres high. If the angle of depression of a point on the opposite side of the river is 60^0, find the width of the river.
A. $100m$ B. $75\sqrt{3}\,m$
C. $100\sqrt{3}\,m$ D. $200\sqrt{3}\,m$

36. If $y = 3\cos 4x$, $\frac{dy}{dx}$ equals
A. $6\sin 8x$ B. $-24\sin 4x$
C. $12\sin 4x$ D. $-12\sin 4x$

37. If $s = (2 + 3t)(5t - 4)$,

$find\ \frac{ds}{dt}\ when\ t = \frac{4}{5}\ secs.$

A. 0 unit per sec B. 15 units per sec.
C. 22 units per sec D. 26 units per sec.

38. What value of x will make the function $x(4-x)$ a maximum?
A. 4 B. 3 C. 2 D. 1

39. The distance travelled by a particle from a fixed point is given as $s = (t^3 - t^2 - t + 5)cm$. Find the minimum distance that the particle can cover from the fixed point.
A. 2.3cm B. 4.0cm C. 5.2cm D. 6.0cm

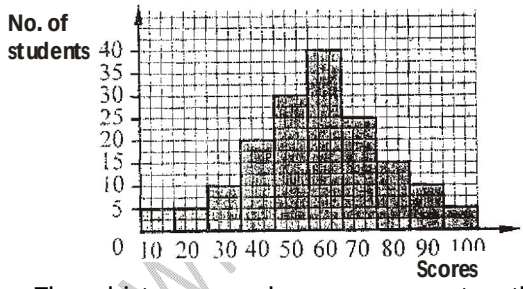
40. Evaluate $\int sec^2\theta\ d\theta$.
A. $sec\ \theta\ tan\ \theta + k$ B. $tan\ \theta + k$
C. $2sec\ \theta + k$ D. $sec\ \theta + k$

41.

No of days	1	2	3	4	5	6
No. of students	20	2x	60	40	x	50

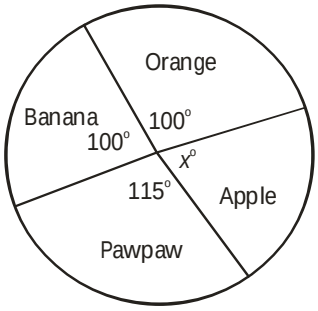
The distribution above shows the number of days a group of 260 students were absent from school in a particular term. How many students were absent for at least four days in the term?
A. 180 B. 120 C. 110 D. 40

42.



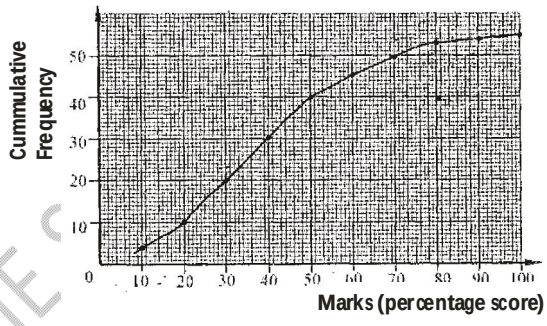
The histogram above represents the number of candidates that sat for Mathematics examination in a school. How many candidates scored more than 50 marks?
A. 80 B. 95 C. 100 D. 115

43.



The pie chart above represents 400 fruits on display in a grocery store. How many apples are in the store?
A. 45 B. 50 C. 60 D. 75

44.



The cumulative frequency curve above shows the distribution of the scores of 50 students in an examination. Find the 36th percentile score.
A. 18% B. 28% C. 36% D. 50%

45. 5, 8, 6 and k occur with frequencies 3, 2, 4, and 1 respectively and have a mean of 5.7. Find the value of k.
A. 4 B. 3 C. 2 D. 1

46. What is the mean deviation of x, 2x, x + 1 and 3x, if their mean is 2?
A. 0.5 B. 1.0 C. 1.5 D. 2.0

47. In how many ways can a delegation of 3 be chosen from 5 men and 3 women, if at least 1 man and 1 woman must be included?
A. 15 B. 28 C. 30 D. 45

48. In how many ways can 9 people be seated if 3 chairs are available?
A. 720 B. 504 C. 336 D. 210

49. The probability of a student passing any examination is $\frac{2}{3}$. If the student takes three examinations, what is the probability that he will not pass any of them?
A. $\frac{2}{3}$ B. $\frac{4}{9}$ C. $\frac{8}{27}$ D. $\frac{1}{27}$

50.

Marks	2	3	4	5	6	7	8	9
No of students	3	4	1	0	4	5	2	1

The table above shows the distribution of marks of students in a test. Find the probability of passing the test if the pass mark is 5.

A. $\frac{3}{5}$ B. $\frac{2}{5}$ C. $\frac{7}{20}$ D. $\frac{1}{5}$

2009 Solutions

1. Option D.
2. Option D.
3. Option C.
4. Option B.
5. Option C.
6. Option B.
7. Option D.
8. Option B.
9. Option B.
10. Option A.
11. Option A.
12. Option A.
13. Option A.
14. Option D.
15. Option A.
16. Option A.
17. Option C.
18. Option B.
19. Option C.
21. Option A.
22. Option C.
23. Option D.
24. Option A.
25. Option A.
26. Option B.
27. Option B.
28. Option D.
29. Option B.
30. Option B.
31. Option A.
32. Option D.
33. Option B.
34. Option D.
35. Option C.
36. Option D.
37. Option C.
38. Option C.
39. Option B.
40. Option B.
41. Option B.
42. Option B.
43. Option B.
44. Option B.
45. Option C.
46. Option A.
47. Option D.
48. Option D.
49. Option D.
50. Option A.

UTME 2010 - Type D

Questions

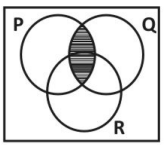
1. What Mathematics Question Paper Type is given to you?
   A. Type A B. Type B
   C. Type C D. Type D
2. Find r, if $6r7_8 = 511_9$.
   A. 3 B. 2 C. 6 D. 5
3. Simplify $\left(\frac{3}{4} \text{ of } \frac{4}{9} \div 9\frac{1}{2}\right) \div 1\frac{5}{19}$
   A. $\frac{1}{5}$ B. $\frac{1}{4}$ C. $\frac{1}{36}$ D. $\frac{1}{25}$
4. A student measures a piece of rope and found that it was 1.26m long. If the actual length of the rope was 1.25m, what was the percentage error in the measurement?
   A. 0.25% B. 0.01%
   C. 0.80% D. 0.40%
5. At what rate will the interest on N400 increase to N24 in 3 years reckoning in simple interest?
   A. 3% B. 2% C. 5% D. 4%
6. If p : q = $\frac{2}{3} : \frac{5}{6}$ and q : r = $\frac{3}{4} : \frac{1}{2}$, find p : q : r.
   A. 12 : 15 : 10 B. 12 : 15 : 16
   C. 10 : 15 : 24 D. 9 : 10 : 15
7. Evaluate $\left(\frac{81}{16}\right)^{-\frac{1}{4}} \times 2^{-1}$.
   A. 3 B. 6 C. $\frac{1}{6}$ D. $\frac{1}{3}$

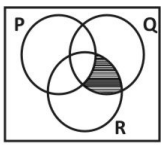
8. Given that log2 = 0.3010, log7 = 0.8451, evaluate log 112.
   A. 2.1461 B. 2.0491
   C. 3.1461 D. 2.5441

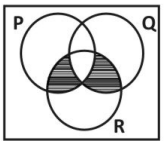
9. Rationalize $\frac{2\sqrt{3}+\sqrt{5}}{\sqrt{5}-\sqrt{3}}$.
   A. $3\sqrt{15}-11$ B. $\frac{3\sqrt{15}-11}{2}$
   C. $3\sqrt{15}+11$ D. $\frac{3\sqrt{15}+11}{2}$

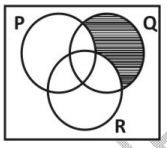
10. Express the product of 0.21 and 0.34 in standard form
    A. 7.14×10^{-2} B. 7.14×10^{-1}
    C. 7.14×10^{-4} D. 7.14×10^{-3}

11. Which of the Venn diagrams below represents $P' \cap Q \cap R'$?

A. 

B. 

C. 

D. 

12. In a survey of 50 newspaper readers, 40 read Champion and 30 read Guardian, how many read both papers?
    A. 10 B. 5 C. 20 D. 15

13. Make Q the subject of the formula if $P = \frac{M}{5}(X + Q) + 1$.
    A. $\frac{5P - MX + 5}{M}$ B. $\frac{5P - MX - 5}{M}$
    C. $\frac{5P + MX + 5}{M}$ D. $\frac{5P + MX - 5}{M}$

14. If $9x^2 + 6xy + 4y^2$ is a factor of $27x^3 - 8y^3$, find the other factor.
    A. 2y + 3x B. 2y – 3x
    C. 3x + 2y D. 3x – 2y

15. Factorize completely $\frac{x^3 + 3x^2 - 10x}{2x^2 - 8}$.
    A. $\frac{x(x-5)}{2(x+2)}$ B. $\frac{x(x+5)}{2(x+2)}$
    C. $\frac{x(x-5)}{2(x-2)}$ D. $\frac{x^2+5}{2x+4}$

16. Solve for x and y if x – y = 2 and $x^2 - y^2 = 8$.
    A. (-1, 3) B. (3, 1) C. (-3, 1)
    D. (1, 3)

17. If y varies directly as the square root of x and y = 3 when x = 16, calculate y when x = 64.
    A. 6 B. 12 C. 3 D. 5

18. If x is inversely proportional to y and x = 2½ when y =2, find x if y = 4.
    A. 4 B. 5 C. $1\frac{1}{4}$ D. $2\frac{1}{4}$

19. For what range of values of x is $\frac{1}{2}x + \frac{1}{4} > \frac{1}{3}x + \frac{1}{2}$?
    A. $x < \frac{3}{2}$ B. $x > \frac{3}{2}$
    C. $x < -\frac{3}{2}$ D. $x > -\frac{3}{2}$

20. Solve the inequalities $-6 \leq 4 - 2x < 5 - x$.
    A. $-1 < x < 5$ B. $-1 < x \leq 5$
    C. $-1 \leq x \leq 6$ D. $-1 \leq x < 6$

21. Find the sum of infinity of the following series. 0.5 + 0.05 + 0.005 + 0.0005 + ...
    A. $\frac{5}{8}$ B. $\frac{5}{7}$ C. $\frac{5}{11}$ D. $\frac{5}{9}$

22. The 3rd term of an arithmetic progression is -9 and the 7th term is -29. Find the 10th term of the progression.
    A. -44 B. -165 C. 165 D. 44

23. If $x * y = x + y^2$, find the value of (2 * 3) * 5.
    A. 25 B. 11 C. 55 D. 36

24. If p and q are two non zero numbers and 18(p + q) = (18 + p)q, which of the following must be true?
    A. p < 1 B. p = 18 C. q < 1
    D. q = 18

25. If $\begin{vmatrix} x & 3 \\ 2 & 7 \end{vmatrix} = 15$, find the value of x.
    A. 4 B. 5 C. 2 D. 3

26. Evaluate $\begin{vmatrix} 2 & 0 & 5 \\ 4 & 6 & 3 \\ 8 & 9 & 1 \end{vmatrix}$

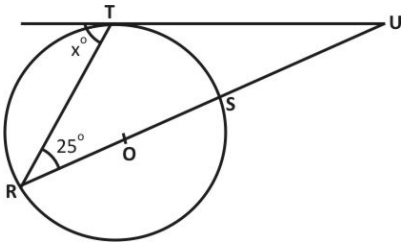
A. 18 B. 102 C. -102 D. -42

27. If $P = \begin{pmatrix} 2 & -3 \\ 1 & 1 \end{pmatrix}$, what is P^{-1}?

A. $\begin{pmatrix} -\frac{1}{5} & \frac{3}{5} \\ -\frac{1}{5} & \frac{2}{5} \end{pmatrix}$ B. $\begin{pmatrix} \frac{1}{5} & \frac{3}{5} \\ -\frac{1}{5} & \frac{2}{5} \end{pmatrix}$

C. $\begin{pmatrix} -\frac{1}{5} & -\frac{3}{5} \\ -\frac{1}{5} & -\frac{2}{5} \end{pmatrix}$ D. $\begin{pmatrix} \frac{1}{5} & \frac{3}{5} \\ \frac{1}{5} & \frac{2}{5} \end{pmatrix}$

28.



From the diagram above, find x.

A. 55° B. 50°

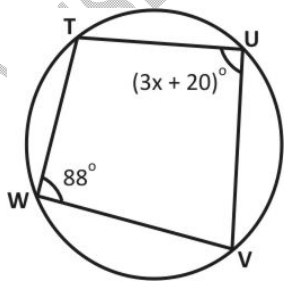
C. 75° D. 65°

29. The interior angles of a quadrilateral are $(x + 15)^{\circ}$, $(2x - 45)^{\circ}$, $(x - 30)^{\circ}$ and $(x + 10)^{\circ}$. Find the value of the least interior angle.

A. 82° B. 52°

C. 112° D. 102°

30.



From the cyclic quadrilateral TUVW above, find the value of x.

A. 24° B. 26° C. 20° D. 23°

31. If the two smaller sides of a right angled triangle are 4 cm and 5 cm, find its area.

A. 8 cm^2 B. 6 cm^2

C. 24 cm^2 D. 10 cm^2

32. An arc subtends an angle 50° at the centre of circle of radius 6 cm. Calculate the area of the sector formed.

A. $\frac{100}{7}cm^2$ B. $\frac{110}{7}cm^2$

C. $\frac{80}{7}cm^2$ D. $\frac{90}{7}cm^2$ $\left[\pi = \frac{22}{7}\right]$

33. A cylindrical pipe 50 m long with radius 7m has one end open. What is the total surface area of the pipe?

A. 350π m^2 B. 98π m^2

C. 749π m^2 D. 700π m^2

34. What is the locus of points equidistant from points P(1, 3) and Q(3, 5)?

A. y = -x – 6 B. y = x + 6

C. y = x – 6 D. y = -x + 6

35. Find the distance between the points $\left(\frac{1}{2}, \frac{1}{2}\right)$ and $\left(-\frac{1}{2}, -\frac{1}{2}\right)$.

A. 1 B. 0 C. $\sqrt{3}$ D. $\sqrt{2}$

36. Find the gradient of the line passing through the points P(1, 1) and Q(2, 5).

A. 3 B. 2 C. 5 D. 4

37. Find the equation of a line parallel to y = -4x + 2 passing through (2, 3).

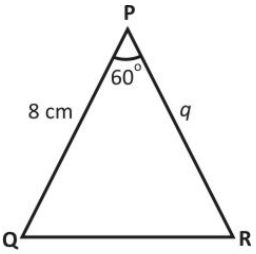
A. y + 4x + 11 = 0 B. y – 4x – 11 = 0

C. y + 4x – 11 = 0 D. y – 4x + 11 = 0

38. If $\cot\theta = \frac{8}{15}$, where θ is acute, find $\sin\theta$

A. $\frac{8}{17}$ B. $\frac{15}{17}$ C. $\frac{16}{17}$ D. $\frac{13}{15}$

39.



If the area of ΔPQR above is $12\sqrt{3}cm^2$, find the value of q.

A. 7 cm B. 8 cm

C. 5 cm D. 6 cm

40. If $y = (2x + 1)^3$, find $\frac{dy}{dx}$.
    A. $6(2x + 1)$ B. $3(2x + 1)$
    C. $6(2x + 1)^2$ D. $3(2x + 1)^2$

41. If $y = x\sin x$, find $\frac{dy}{dx}$.
    A. $\sin x - x\cos x$ B. $\sin x + x\cos x$
    C. $\sin x - \cos x$ D. $\sin x + \cos x$

42. At what value of x does the function $y = -3 - 2x + x^2$ attain minimum value?
    A. -1 B. -4 C. 4 D. 1

43. Evaluate $\int_0^2 (x^3 + x^2)dx$.
    A. $4\frac{5}{6}$ B. $6\frac{2}{3}$
    C. $1\frac{5}{6}$ D. $2\frac{5}{6}$

44. Find $\int (\sin x + 2)dx$.
    A. $-\cos x + 2x + k$ B. $\cos x + 2x + k$
    C. $-\cos x + x^2 + k$ D. $\cos x + x^2 + k$

45.

Marks	2	3	4	5	6	7	8
No. of students	3	1	5	2	4	2	3

From the table above, if the pass mark is 5, how many students failed the test?
A. 6 B. 2 C. 9 D. 7

Use the table below to answer questions 46 and 47.

Marks	1	2	3	4	5
Frequencies	2	2	8	4	4

The table above shows the marks obtained in a given test.

46. How many students took the test?
    A. 16 B. 20 C. 13 D. 15

47. Find the mean mark.
    A. 3.1 B. 3.0 C. 3.3 D. 3.2

48. Find the standard deviation of 2, 3, 5 and 6.
    A. $\sqrt{6}$ B. $\sqrt{10}$
    C. $\sqrt{\frac{2}{5}}$ D. $\sqrt{\frac{5}{2}}$

49. In how many ways can a committee of 2 women and 3 men be chosen from 6 men and 5 women?
    A. 100 B. 200 C. 30 D. 50

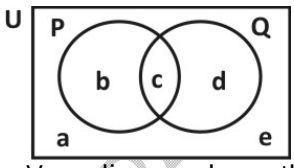
50. If three unbiased coins are tossed, find the probability that they are all heads.
    A. $\frac{1}{6}$ B. $\frac{1}{3}$ C. $\frac{1}{9}$ D. $\frac{1}{8}$

2010 Solutions

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

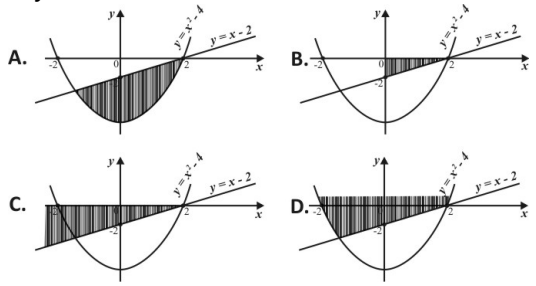
35. Option D
36. Option D
37. Option C
38. Option B
39. Option D
40. Option C
41. Option B
42. Option D
43. Option D.
44. Option B
45. Option C
46. Option B
47. Option C
48. Option D
49. Option B
50. Option D

UTME 2011 Questions (TYPE C)

1. Which question Paper Type of Mathematics is given to you?
   A. Type A B. Type B
   C. Type C D. Type D
2. If $2q3_5 = 77_8$, find q
   A. 1 B. 2
   C. 4 D. 0.
3. Simplify $\frac{3\frac{2}{5} \times \frac{5}{6} \times \frac{2}{3}}{\frac{11}{15} \times \frac{3}{4} \times \frac{2}{27}}$
   A. 30 B. $5\frac{2}{3}$
   C. $4\frac{1}{3}$ D. 50.
4. A man invested N5000 for 9 months at 4%. What is the simple interest?
   A. N220 B. N150
   C. N130 D. N250
5. If the numbers M, N, Q are in the ratio 5:4:3, find the value of $\frac{2N-Q}{M}$.
   A. 3 B. 2
   C. 1 D. 4.
6. Simplify $\left(\frac{16}{81}\right)^{\frac{1}{4}} \div \left(\frac{9}{16}\right)^{-\frac{1}{2}}$
   A. $\frac{1}{2}$ B. $\frac{2}{3}$
   C. $\frac{8}{9}$ D. $\frac{1}{3}$.
7. If $\log_3 18 + \log_3 3 - \log_3 x = 3$
   A. 2 B. 1
   C. 0 D. 3.
8. Rationalize $\frac{2-\sqrt{5}}{3-\sqrt{5}}$
   A. $\frac{1-\sqrt{5}}{4}$ B. $\frac{1-\sqrt{5}}{2}$
   C. $\frac{\sqrt{5}-1}{2}$ D. $\frac{1+\sqrt{5}}{4}$
9. Simplify $\left(\sqrt{2}+\frac{1}{\sqrt{3}}\right)\left(\sqrt{2}-\frac{1}{\sqrt{3}}\right)$
   A. $\frac{5}{3}$ B. $\frac{7}{3}$
   C. $\frac{5}{2}$ D. $\frac{3}{2}$.
10. 

    From the Venn diagram above, the complement of the set P∩Q is given by
    A. {b,d} B. {a, b, d, e}
    C. {a, e} D. {c}.
11. Ralia has 7 different posters to be hanged in her bedroom, living room and kitchen. Assuming she has plans to place at least a poster in each of the 3 rooms, how many choices does she have?
    A. 170 B. 49
    C. 21 D. 210.
12. Make R the subject of the formula if $T = \frac{KR^2 + M}{3}$
    A. $\sqrt{\frac{3T+M}{K}}$ B. $\sqrt{\frac{3T-K}{M}}$
    C. $\sqrt{\frac{3T+K}{M}}$ D. $\sqrt{\frac{3T-M}{K}}$
13. Find the remainder when $x^3 - 2x^2 + 3x - 3$ is divided by $x^2 + 1$.
    A. x + 3 B. 2x – 1
    C. 2x + 1 D. x – 3.
14. Factorize completely $9y^2 - 16x^2$
    A. (3y + 4x)(3y + 4x)
    B. (3y - 2x)(3y + 4x)
    C. (3y + 2x)(3y - 4x)
    D. (3y + 4x)(3y - 4x)
15. Solve for x and y respectively in the simultaneous equation
    -2x – 5y = 3
    x + 3y = 0
    A. 9, -3 B. -3, -9
    C. -9, 3 D. 3, -9

16. If x varies directly as square root of y and x = 81 when y = 9, find x when y = $1\frac{7}{9}$.
    A. 27 B. $20\frac{1}{4}$
    C. $2\frac{1}{4}$ D. 36.
17. T varies inversely as the cube of R. When R = 3, T = $\frac{2}{81}$, find T when R = 2.
    A. $\frac{1}{12}$ B. $\frac{1}{18}$
    C. $\frac{1}{24}$ D. $\frac{1}{6}$.
18. Which of the following diagrams represents the solution of the inequalities $y \leq x - 2$ and $y \geq x^2 - 4$?



19. Solve the inequality $-6(x + 3) \leq 4(x - 2)$
    A. $x \geq -1$ B. $x \leq 2$
    C. $x \geq -2$ D. $x \leq -1$.
20. Solve the inequality $x^2 + 2x > 15$.
    A. $-5 < x < 3$
    B. $x < -3$ or $x > 5$
    C. $x < 3$ or $x > 5$
    D. $x > 3$ or $x < -5$.
21. Find the sum of the first 18 terms of the series 3, 6, 9, ..., 36.
    A. 513 B. 505
    C. 433 D. 635.
22. The second term of a geometric series is 4 while the fourth term is 16. Find the sum of the first five terms.
    A. 62 B. 60
    C. 54 D. 64.
23. A binary operation $\oplus$ on real numbers is defined by $x \oplus y = xy + x + y$ for two real numbers x and y, find the value of $3 \oplus -\frac{2}{3}$.
    A. $\frac{1}{3}$ B. $-\frac{1}{2}$
    C. -1 D. 2.
24. If $\begin{vmatrix} 2 & 3 \\ 5 & 3x \end{vmatrix} = \begin{vmatrix} 4 & 1 \\ 3 & 2x \end{vmatrix}$, find the value of x.
    A. 6 B. -6
    C. -12 D. 12.
25. Evaluate $\begin{vmatrix} 4 & 2 & -1 \\ 2 & 3 & -1 \\ -1 & 1 & 3 \end{vmatrix}$
    A. 45 B. 25
    C. 15 D. 55.
26. The inverse of matrix N = $\begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}$ is
    A. $\frac{1}{5}\begin{pmatrix} 4 & -3 \\ -1 & 2 \end{pmatrix}$
    B. $\frac{1}{5}\begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$
    C. $\frac{1}{5}\begin{pmatrix} 2 & -1 \\ -3 & 4 \end{pmatrix}$
    D. $\frac{1}{5}\begin{pmatrix} 4 & 3 \\ 1 & 2 \end{pmatrix}$.
27. What is the size of each interior angle of a 12-sided regular polygon?
    A. 150^0 B. 120^0
    C. 30^0 D. 180^0.
28. A circle of perimeter 2cm is opened to form a square. What is the maximum possible area of the square?
    A. $49cm^2$ B. $56cm^2$
    C. $98cm^2$ D. $28cm^2$.
29. A chord of a circle of radius 7cm is 5cm from the centre of the circle. What is the length of the chord?
    A. $3\sqrt{6}$ cm B. $4\sqrt{6}$ cm
    C. $6\sqrt{6}$ cm D. $2\sqrt{6}$ cm
30. A solid metal cube of side 3cm is placed in a rectangular tank of dimensions 3, 4 and 5 cm. what volume of water can the tank now hold?
    A. $33cm^3$ B. $48cm^3$
    C. $60cm^3$ D. $27cm^3$
31. The perpendicular bisector of a line XY is the locus of a point
    A. whose distance from Y is always twice its distance from X
    B. whose distance from X is always twice its distance from Y
    C. which moves on the line XY
    D. which is equidistant from the points X and Y
32. The midpoint of P(x,y) and Q(8,6) is (5,8). Find x and y.
    A. (2,8) B. (2,10)
    C. (2,12) D. (2,6)
33. Find the equation of a line perpendicular to line $2y = 5x + 4$ which passes through (4,2)

A. 5y + 2x – 18 = 0
B. 5y - 2x – 18 = 0
C. 5y - 2x + 18 = 0
D. 5y + 2x – 2 = 0

34. In a right angled triangle, if tan θ = $\frac{3}{4}$. What is cos θ – sin θ?
A. $\frac{3}{5}$ B. $\frac{2}{5}$
C. $\frac{1}{5}$ D. $\frac{4}{5}$

35. A man walks 100m due West from a point X to Y, he then walks 100m due North to a point Z. Find the bearing of X from Z.
A. 135^0 B. 195^0
C. 225^0 D. 045^0

36. The derivative of (2x + 1)(3x + 1) is
A. 6x + 5 B. 12x + 1
C. 6x + 1 C. 12x + 5

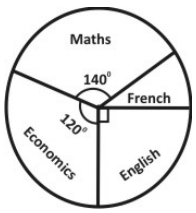
37. Find the derivative of $\frac{\sin\theta}{\cos\theta}$.
A. tanθcosecθ
B. $\sec^2\theta$
C. cosecθsecθ
D. $\text{cosec}^2\theta$

38. Find the value of x at the minimum point of the curve $y = y^3 + x^2 – x + 1$.
A. $-\frac{1}{3}$ B. $\frac{1}{3}$
C. 1 D. -1

39. Evaluate $\int_0^1 (3 - 2x)\,dx$
A. 5 B. 3
C. 2 D. 6

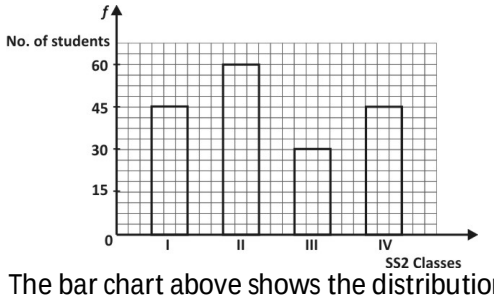
40. Find $\int cos4xdx$
A. $-\frac{1}{4}\sin 4x + k$
B. $\frac{3}{4}\sin 4x + k$
C. $-\frac{3}{4}\sin 4x + k$
D. $\frac{1}{4}\sin 4x + k$.

41.



The pie chart above shows the distribution of courses offered by students. What percentage of the students offers English?
A. 25% B. 30%
C. 35% D. 20%

42.



The bar chart above shows the distribution of SS2 students in a school. Find the total number of students.

A. 135 B. 180
C. 210 D. 105

43. The sum of four consecutive integers is 34. Find the least of these numbers.

A. 6 B. 7
C. 8 D. 5

44.

No.	0	1	2	3	4	5
Frequency	1	4	3	8	2	5

From the table above, find the median and range of the data respectively.

A. (3, 5) B. (8, 5)
C. (5, 8) D. (5, 3)

45.

Class Interval	0-2	3-5	6-8	9-11
Frequency	3	2	5	3

Find the mode of the above distribution.

A. 8 B. 9
C. 10 D. 7

46.

Find the standard deviation of the above distribution

A. $\sqrt{3}$ B. $\sqrt{5}$
C. $\sqrt{7}$ D. $\sqrt{6}$

47. In how many ways can the letters of the word ELATION be arranged?

A. 7! B. 6!
C. 5! D. 8!

48. In how many ways can five people sit round a circular table

A. 60 B. 24
C. 12 D. 120

49. Find the probability that a number picked at random from the set {43, 44, 45, ..., 60} is a prime number.

A. $\frac{1}{3}$ B. $\frac{2}{5}$ C. $\frac{2}{9}$ D. $\frac{7}{9}$

50. In a class of 60 students, 30 offer Physics and 40 offer Chemistry. If a student is picked at random from the class, what is the probability that the student offer both Physics and Chemistry?

A. $\frac{1}{4}$ B. $\frac{1}{5}$
C. $\frac{1}{2}$ B. $\frac{1}{6}$

UTME 2011 Answers (TYPE C)

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

Class Interval	3-5	6-8	9-11
Frequency	2	2	2

18. Option A
19. Option D
20. Option C
21. Option D
22. Option D
23. Option D
24. Option A
25. Option A
26. Option D.
27. Option D.

28. Option D.
29. Option A
30. Option D
31. Option C
32. Option A
33. Option D
34. Option B
35. Option B
36. Option C
37. Option A
38. Option B
39. Option B
40. Option C
41. Option D
42. Option A
43. Option A
44. Option D
45. Option D
46. Option D
47. Option A
48. Option A
49. Option B
50. Option C

UTME 2012 - Type RED

1. Which Question Paper Type of Mathematics as indicated above is given to you?
   A. Type Green
   B. Type Purple
   C. Type Red
   D. Type Yellow

2. Convert 72_6 to a number in base three.
   A. 2211
   B. 2121
   C. 1212
   D. 1122

3. Simplify: $\dfrac{2\frac{2}{3} \times 1\frac{1}{2}}{4\frac{4}{5}}$
   A. $1\frac{1}{4}$
   B. $1\frac{1}{6}$
   C. $\frac{5}{6}$
   D. $\frac{4}{5}$

4. Evaluate $\frac{21}{9}$ to 3 significant figures.
   A. 2.30
   B. 2.31
   C. 2.32
   D. 2.33

5. A man earns N3 500 per month out of which he spends 15% on his children's education. If he spends additional N1 950 on food, how much does he have left?
   A. N 525
   B. N 1 025
   C. N 1 950
   D. N 2 975.

6. If $27^{x+2} \div 9^{x+1} = 3^{2x}$, find x.
   A. 3
   B. 4
   C. 5
   D. 6

7. If $\log_3 x^2 = -8$, what is x?
   A. $\frac{1}{3}$
   B. $\frac{1}{9}$
   C. $\frac{1}{27}$
   D. $\frac{1}{81}$

8. Simplify: $(\sqrt{6} + 2)^2 - (\sqrt{6} - 2)^2$
   A. $2\sqrt{6}$
   B. $4\sqrt{6}$
   C. $8\sqrt{6}$ $8\sqrt{6}$
   D. $16\sqrt{6}$

9. If P is a set of all prime factors of 30 and Q is a set of all factors of 18 less than 10, find $P \cap Q$.
   A. $\{3\}$
   B. $\{2, 3\}$
   C. $\{2, 3, 5\}$
   D. $\{1, 2\}$

10. In a class of 46 students, 22 play football and 26 play volleyball. If 3 students play both games, how many play neither?
   A. 1
   B. 2
   C. 3
   D. 4

11. Make n the subject of the formula if $w = \frac{v(2+cn)}{1-cn}$.
   A. $\frac{1}{c}\left(\frac{w-2n}{v+w}\right)$
   B. $\frac{1}{c}\left(\frac{w-2n}{v-w}\right)$
   C. $\frac{1}{c}\left(\frac{w+2n}{v-w}\right)$
   D. $\frac{1}{c}\left(\frac{w+2n}{v+w}\right)$

12. Find the remainder when $2x^3 - 11x^2 + 8x - 1$ is divided by $x + 3$.
   A. – 871
   B. – 781
   C. – 187
   D. – 178

13. Solve for x and y in the equations below.
   $x^2 - y^2 = 4$
   $x + y = 2$
   A. x = 0, y = 2
   B. x = 0, y = 2
   C. x = 2, y = 0
   D. x = – 2, y = 0

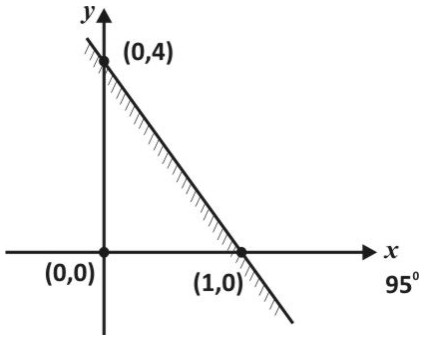
14. If y varies directly as $\sqrt{n}$ and y = 4 when n = 4, find y when n = $1\frac{7}{9}$.
   A. $\sqrt{17}$
   B. $\frac{4}{3}$
   C. $\frac{8}{3}$
   D. $\frac{2}{3}$

15. U is inversely proportional to the cube of V and U = 81 when V = 2. Find U when V = 3.
   A. 24
   B. 27
   C. 32
   D. 36

16. The value of y for which $\frac{1}{5}y + \frac{1}{5} < \frac{1}{2}y + \frac{2}{5}$ is
   A. $y > \frac{2}{3}$
   B. $y < \frac{2}{3}$
   C. $y > \frac{-2}{3}$
   D. $y < \frac{-2}{3}$

17. Find the range of values of m which satisfy $(m - 3)(m - 4) < 0$.
   A. $2 < m < 5$
   B. $-3 < m < 4$
   C. $3 < m < 4$
   D. $-4 < m < 3$

18.



The shaded region above is represented by the equation

A. $y \leq 4x + 2$
B. $y \geq 4x + 2$
C. $y \leq -4x + 4$
D. $y \leq 4x + 4$

19. The nth term of a sequence is $n^2 - 6n - 4$. Find the sum of the 3rd and 4th terms.
A. 24
B. 23
C. -24
D. -25

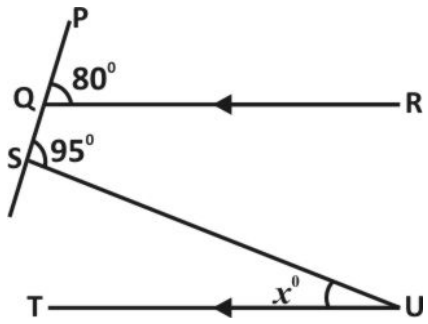
20. The sum of infinity of a geometric progression is $-\frac{1}{10}$ and the first is $-\frac{1}{8}$. Find the common ratio of the progression.
A. $-\frac{1}{5}$
B. $-\frac{1}{4}$
C. $-\frac{1}{3}$
D. $-\frac{1}{2}$

21. The binary operation $*$ is defined on the set of integers such that $p * q = pq + p - q$. Find $2 * (3 * 4)$.
A. 11
B. 13
C. 15
D. 22

22. A binary operation on the set of real numbers is defined by $m * n = \frac{mn}{2}$ for all m, $n \in R$. If the identity element is 2, find the inverse of –5.
A. $-\frac{4}{5}$
B. $-\frac{3}{5}$
C. 4
D. 5

23. If $\begin{vmatrix} 5 & 3 \\ x & 2 \end{vmatrix} = \begin{vmatrix} 3 & 5 \\ 4 & 5 \end{vmatrix}$, find the value of x.
A. 3
B. 4
C. 5
D. 7

24. Given that I_3 is a unit matrix of order 3, find $|I_3|$
A. -1
B. 0
C. 1
D. 2

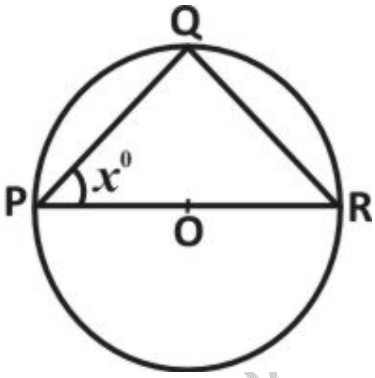
25.


In diagram above, **QR//TU**, ∠PQR = 80° and ∠PSU = 95°. Calculate ∠SUT.
A. 15°
B. 25°
C. 30°
D. 80°

26. The exterior angles of a polygon are given by x, 2x, 3x, 4x and 5x respectively. Find the value of x.

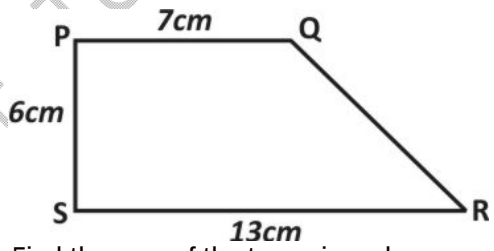
A. 24^o
B. 30^o
C. 33^o
D. 36^o

27.



In the diagram above, PQR is a circle centre O. If $\angle QPR$ is x^o, find $\angle QRP$.
A. x^o
B. $(90 - x)^o$
C. $(90 + x)^o$
D. $(180 - x)^o$

28.



Find the area of the trapezium above.
A. 91 cm^2
B. 78 cm^2
C. 60 cm^2
D. 19 cm^2

29. A circular arc subtends angle 150^o at the centre of a circle of radius 12 cm. Calculate the area of the sector of the arc.
A. 30π cm^2
B. 60π cm^2
C. 120π cm^2
D. 150π cm^2

30. Calculate the volume of a cuboid of length 0.76 cm, breadth 2.6 cm and height 0.82 cm.
A. 3.92 cm^3
B. 2.13 cm^3
C. 1.97cm^3
D. 1.62cm^3

31. The locus of a point equidistant from the intersection of lines
$3x - 7y + 7 = 0$ and $4x - 6y + 1 = 0$ is a
A. line parallel to $7x + 13y + 8 = 0$
B. circle
C. semicircle
D. bisector of the line $7x + 13y + 8 = 0$

32. The gradient of the straight line joining the points P(5, – 7) and Q(– 2, – 3) is
A. $\frac{1}{2}$
B. $\frac{2}{5}$
C. $-\frac{4}{7}$
D. $-\frac{2}{3}$

33. The distance between the point (4, 3) and the intersection of $y = 2x + 4$ and $y = 7 - x$ is
A. $\sqrt{13}$
B. $3\sqrt{12}$
C. $\sqrt{26}$
D. $10\sqrt{5}$

34. Find the equation of the line through the points (– 2, 1) and $\left(-\frac{1}{2}, 4\right)$.
A. $y = 2x - 3$
B. $y = 2x + 5$
C. $y = 3x - 2$
D. $y = 2x + 1$

35. If angle θ is 135^o, evaluate $\cos\theta$.
A. $\frac{1}{2}$
B. $\frac{\sqrt{2}}{5}$
C. $-\frac{\sqrt{2}}{2}$
D. $-\frac{1}{2}$

36. A man stands on a tree 150 cm high sees a boat at an angle of depression of 74^o. Find the distance of the boat from the base of the tree.
A. 52cm
B. 43cm
C. 40cm
D. 15cm

37. If $y = x^2 - \frac{1}{x}$, find $\frac{dy}{dx}$.
A. 52cm
B. 43 cm
C. 40cm
D. 15cm

38. Find $\frac{dy}{dx}$ if $y = \cos x$.
A. $\sin x$
B. $-\sin x$
C. $\tan x$
D. $-\tan x$

39. Evaluate $\int_1^2 (x^2 - 4x)\, dx$
A. $\frac{11}{3}$
B. $\frac{3}{11}$
C. $-\frac{3}{11}$
D. $-\frac{11}{3}$

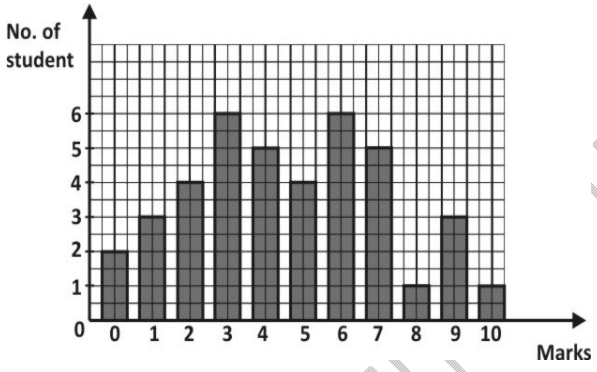
40. Evaluate $\int_0^{\pi/4} \sec^2\theta\, d\theta$.
A. 1
B. 2
C. 3
D. 4

41.

The grades of 36 students in a class test are as shown in the pie chart above. How many students have excellent?

A. 12
B. 9
C. 8
D. 7

42.



The bar chart above shows the distribution of marks in a class test. If the pass mark is 5, what percentage of students failed the test?

A. 10%
B. 20%
C. 50%
D. 60%

43. The mean of seven numbers is 96. If an eighth number is added, the mean becomes 112. Find the eighth number.

A. 126
B. 180
C. 216
D. 224

44. Find the median of 2, 3, 7, 3, 4, 5, 8, 9, 9, 4, 5, 3, 4, 2, 4 and 5.

A. 9
B. 8
C. 7
D. 4

45. Find the range of 4, 9, 6, 3, 2, 8, 10 and 11.

A. 11
B. 9
C. 8
D. 4

46. Find the standard deviation of 2, 3, 8, 10 and 12

A. 3.9
B. 4.9
C. 5.9
D. 6.9

47. Evaluate ${}^{n+1}C_{n-2}$ if n = 15.

A. 3630
B. 3360
C. 1120
D. 560

48. In how many ways can the letters of the word TOTALITY be arranged?

A. 6720
B. 6270
C. 6207
D. 6027

49. The probability that a student passes a physics test is $\frac{2}{3}$. If he takes three physics tests, what is the probability that he passes two of the tests?

A. $\frac{4}{9}$
B. $\frac{6}{9}$
C. $\frac{4}{27}$
D. $\frac{2}{27}$

50. The probabilities that a man and his wife live for 80 years are $\frac{2}{3}$ and $\frac{3}{5}$ respectively. Find the probability that at least one of them will live up to 80 years.
    A. $\frac{2}{15}$
    B. $\frac{3}{15}$
    C. $\frac{7}{15}$
    D. $\frac{13}{15}$

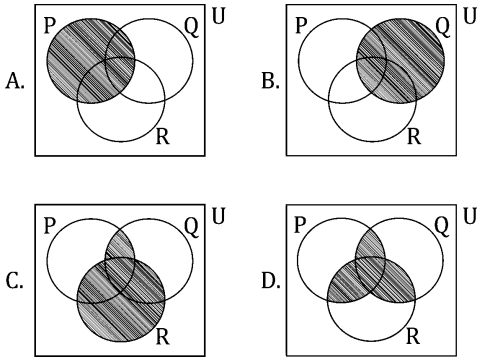
UTME 2012 - RED
Answers

1. Option C.
2. Option D.
3. Option C.
4. Option D.
5. Option B.
6. Option B.
7. Option D.
8. Option C.
9. Option B.
10. Option A.
11. Option A.
12. Option D.
13. Option C.
14. Option C.
15. Option A.
16. Option C.
17. Option C.
18. Option C.
19. Option D.
20. Option C.
21. Option B.
22. Option A.
23. Option C.
24. Option C.
25. Option A.
26. Option A.
27. Option B.
28. Option C.
29. Option B.
30. Option D.
31. Option B.
32. Option C.
33. Option B.
34. Option B.
35. Option C.
36. Option B.
37. Option D.
38. Option B.
39. Option D.
40. Option A.
41. Option B.
42. Option C.
43. Option D.
44. Option D.
45. Option B.
46. Option A.
47. Option D.
48. Option A.
49. Option A.
50. Option D.

UTME 2013 MATHEMATICS TYPE B

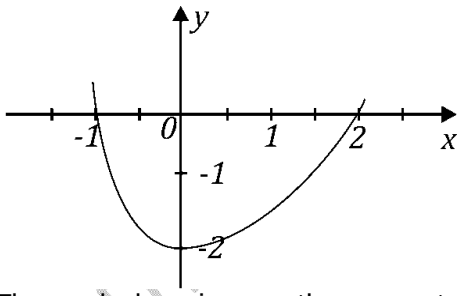
1. What Question Paper Type of Mathematics is given to you?
   A. Type D B. Type I
   C. Type B D. Type U
2. Convert 27_{10} to another number in base three.
   A. 1010_3 B. 1100_3 C. 1000_3
   D. 1001_3
3. 3 girls share a number of apples in the ratio 5:3:2. If the highest share is 40 apples, find the smallest share.
   A. 24 B. 16 C. 38 D. 36
4. Evaluate $\frac{1.25 \times 0.025}{0.05}$, correct to 1 decimal place.
   A. 6.2 B. 6.3 C. 0.5 D. 0.6
5. Calculate the time taken for N3,000 to earn N600 if invested at 8% simple interest.
   A. 3 years B. $3\frac{1}{2}$ years C. $1\frac{1}{2}$ years
   D. $2\frac{1}{2}$ years.

6. Simplify $\frac{3^{-3n}}{9^{1-n}} \times 27^{n+1}$
   A. 3^3 B. 3^5 C. 3 D. 3^2
7. If $\log_{10}4 = 0.6021$, evaluate $\log_{10}4^{\frac{1}{5}}$
   A. 0.9021 B. 1.8063 C. 0.2007
   D. 0.3011
8. Simplify $\frac{\sqrt{5}\left(\sqrt{147}-\sqrt{12}\right)}{\sqrt{15}}$
   A. $\frac{1}{5}$ B. $\frac{1}{9}$ C. 9 D. 5
9. P, Q and R are subsets of the universal set U. The venn diagram showing the relationship $(P \cap Q) \cup R$ is



10. If P = $\{x : x \text{ is odd}, -1 < x \leq 20\}$ and Q = $\{y : y \text{ is prime}, -2 < y \leq 25\}$, find P ∩ Q
    A. {3,5,11,13,17,19}
    B. {3,5,7,11,13,17,19}
    C. {2,3,5,7,11,13,17,19}
    D. {3,5,7,11,17,19}

11. If $S = \sqrt{t^2 - 4t + 4}$, find *t* in terms of *S*.
    A. S + 2 B. S – 2 C. $S^2 + 2$ D. $S^2 - 2$
12. if *x* – 4 is a factor of $x^2 - x - k$, then k is
    A. 12 B. 20 C. 2 D. 4
13. The remainder when $6p^2 - p^2 - 47p + 30$ is divided by *p* – 3 is
    A. 42 B. 63 C. 18 D. 21
14. P varies jointly as *m* and *u*, and varies inversely as *q*. Given that *p=4, m=3* and *u= 2* when *q = 1*, find the value of *p* when *m = 6, u = 4* and *q* = $\frac{8}{5}$.
    A. 15 B. 10 C. $\frac{288}{5}$ D. $\frac{128}{5}$
15. If *r* varies inversely as the square root of *s* and *t*, how does *s* vary with *r* and *t*?
    A. s varies inversely as r^2 and t.
    B. s varies directly as r^2 and t^2.
    C. s varies directly as r and t.
    D. s varies inversely as r and t^2.
16. Evaluate 3(x + 2) > 6(x + 3)
    A. x > –4 B. x < –4 C. x > 4 D. x < 4
17.

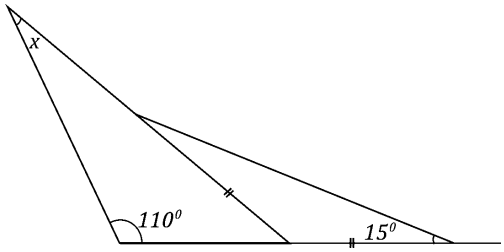


    The graph above is correctly represented by
    A. $y = x^2 - 3x + 2$ B. $y = x^2 - x - 1$
    C. $y = x^2 + x - 2$ D. $y = x^2 - x - 2$
18. Solve for x: $|x - 2| < 3$
    A. –2 < x < 3 B. –1 < x < 5
    C. x < 1 D. x < 5
19. If the sum of the first two terms of a G. P is 3, and the sum of the second and the third terms is –6, find the sum of the first term and the common ratio.
    A. –3 B. –5 C. 5 D. –2
20. The nth term of the progression $\frac{4}{2}, \frac{7}{3}, \frac{10}{4}, \frac{13}{5}$ ... is
    A. $\frac{3n+1}{n+1}$ B. $\frac{3n+1}{n-1}$
    C. $\frac{3n-1}{n+1}$ D. $\frac{1-3n}{n+1}$
21. If a binary operation $*$ is defined by $x * y = x + 2y$, find $2 * (3 * 4)$
    A. 16 B. 14 C. 26 D. 24
22. If $P = \begin{bmatrix} 5 & 3 \\ 2 & 1 \end{bmatrix}$ and $Q = \begin{bmatrix} 4 & 2 \\ 3 & 5 \end{bmatrix}$, find 2P + Q.
    A. $\begin{bmatrix} 14 & 8 \\ 7 & 7 \end{bmatrix}$ B. $\begin{bmatrix} 7 & 7 \\ 8 & 14 \end{bmatrix}$
    C. $\begin{bmatrix} 8 & 14 \\ 7 & 7 \end{bmatrix}$ D. $\begin{bmatrix} 7 & 7 \\ 14 & 8 \end{bmatrix}$
23. Find the inverse of $\begin{bmatrix} 5 & 3 \\ 6 & 4 \end{bmatrix}$

A. $\begin{bmatrix} 2 & -\frac{3}{2} \\ -3 & \frac{5}{2} \end{bmatrix}$ B. $\begin{bmatrix} 2 & \frac{3}{2} \\ -3 & -\frac{5}{2} \end{bmatrix}$

C. $\begin{bmatrix} 2 & \frac{3}{2} \\ -3 & \frac{5}{2} \end{bmatrix}$ D. $\begin{bmatrix} 2 & -\frac{3}{2} \\ -3 & -\frac{5}{2} \end{bmatrix}$

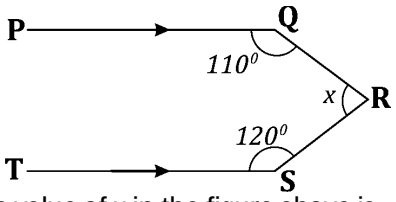
24.



In the diagram above, find the value of x.

A. 40^0 B. 45^0 C. 15^0 D. 30^0

25.



The value of x in the figure above is

A. 100^0 B. 70^0 C. 130^0 D. 110^0

26. If the angles of a quadrilateral are $(3y + 10)^0$, $(2y + 30)^0$, $(y + 20)^0$ and $4y^0$, find the value of y.

A. 42^0 B. 66^0 C. 12^0 D. 30^0

27. A square tile has side 30 cm. How many of these tiles will cover a rectangular floor of length 7.2m and width 4.2m?

A. 576 B. 720 C. 336 D. 420

28. Find the length of a chord which subtends an angle 90^0 at the centre whose radius is 8cm.

A. $8\sqrt{2}$ cm B. $8\sqrt{3}$ cm C. 4 cm D. 8 cm

29. A chord of a circle subtends an angle 120^0 at the centre of a circle of diameter $4\sqrt{3}$ cm. Calculate the area of the major sector.

A. 16π cm^2 B. 32π cm^2 C. 4π cm^2 D. 8π cm^2

30. The locus of the points which is equidistant from the line PQ forms a

A. pair of parallel lines to PQ
B. perpendicular line to PQ
C. circle centre P
D. circle centre Q.

31. If the mid-point of the line PQ is (2, 3) and the point P is (–2, 1), find the coordinate of the point Q.

A. (6, 3) B. (8, 6) C. (5, 6) D. (0, 4)

32. Find the equation of the perpendicular bisector of the line joining P(2, –3) to Q(–5, 1).

A. 8y + 14x – 13 = 0 B. 8y + 14x + 13 = 0
C. 8y – 14x + 13 = 0 D. 8y – 14x – 13 = 0

33. In triangle PQR, q = 8 cm, r = 6 cm and cos P = $\frac{1}{12}$. Calculate the value of p.

A. 10 cm B. $\sqrt{108}$ cm C. 9 cm D. $\sqrt{92}$ cm

34. If tanθ = $\frac{3}{4}$, find the value of sin θ + cos θ.

A. $1\frac{2}{5}$ B. $1\frac{1}{3}$ C. $1\frac{2}{3}$ D. $1\frac{3}{5}$

35. If $y = (2x + 2)^3$, find $\frac{dy}{dx}$

A. $6(2x + 2)$ B. $3(2x + 2)$ C. $6(2x + 2)^2$ D. $3(2x + 2)^2$

36. If y = x sin x, find $\frac{dy}{dx}$

A. cos x – x sin x B. cos x + x sin x
C. sin x + x sin x D. sin x – cos x.

37. The radius of a circle is increasing at the rate of 0.02 cms^{-1}. Find the rate at which the area is increasing when the radius of the circle is 7cm.

A. 0.53 cm^{2}s^{-1} B. 0.35 cm^{-2}s^{-1}
C. 0.88 cm^{-2}s^{-1} D. 0.75cm^{-2}s^{-1}

38. Integrate $\left(\frac{1+x}{x^2}\right) dx$

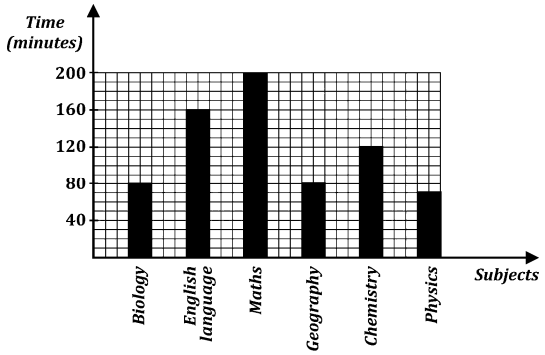
A. $x^2 - \frac{1}{x} + k$ B. $2x^2 - \frac{1}{x} + k$

C. $-\frac{1}{2x^2} - \frac{1}{x} + k$ D. $-\frac{x^2}{2} - \frac{1}{x} + k$

39. Evaluate $\int_0^{\frac{\pi}{2}} \sin x \, dx$

A. –1 B. –2 C. 2 D. 1

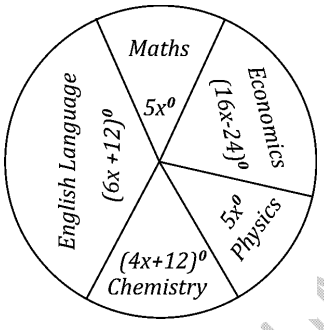
40.



The bar chart above shows the allotment of time (in minutes) per week for selected subjects in a certain school. What is the total time allocated to the six subjects per week?

A. 720 mins. B. 960 mins.
C. 200 mins. D. 460 mins.

41.



The pie chart above shows the statistical distribution of 80 students in five subjects in an examination. Calculate how many students offer Mathematics.

A. 40 B. 50 C. 12 D. 30

42. Find the mean of t + 2, 2t – 4, 3t + 2 and 2t.

A. 2t B. 2t + 1 C. t D. t + 1

43. The mean of seven numbers is 10. If six of the numbers are 2, 4, 8, 14, 16 and 18, find the mode.

A. 8 B. 14 C. 2 D. 6

44.

Age	20	25	30	35	40	45
No. of people	3	5	1	1	2	3

Calculate the median age of the frequency distribution in the table above.

A. 30 B. 35 C. 20 D. 25

45. If the variance of 3 + x, 6, 4, x and 7 – x is 4 and the mean is 5, find the standard deviation.

A. 2 B. 3 C. $\sqrt{2}$ D. $\sqrt{3}$

46.

Score	3	4	5	6	7	8	9	10
Freq.	1	0	7	5	2	3	1	1

The table above shows the scores of 20 students in Further Mathematics test. What is the range of the distribution?

A. 6 B. 3 C. 10 D. 7

47. In how many ways can a student select 2 subjects from 5 subjects?

A. $\frac{5!}{2!2!}$ B. $\frac{5!}{2!3!}$ C. $\frac{5!}{2!}$ D. $\frac{5!}{3!}$

48. In how many ways can 3 seats be occupied if 5 people are willing to sit?

A. 20 B. 5 C. 120 D. 60

49. What is the probability that an integer x $(1 \leq x \leq 25)$ chosen at random is divisible by both 2 and 3?

A. $\frac{1}{5}$ B. $\frac{4}{25}$ C. $\frac{3}{4}$ D. $\frac{1}{25}$

50. A basket contains 9 apples, 8 bananas and 7 oranges. A fruit is picked from the basket, find the probability that it is neither an apple nor an orange.

A. $\frac{1}{3}$ B. $\frac{7}{24}$ C. $\frac{2}{3}$ D. $\frac{3}{8}$

2013 UTME Solutions

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

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