

1. If M and N are two matrices defined by

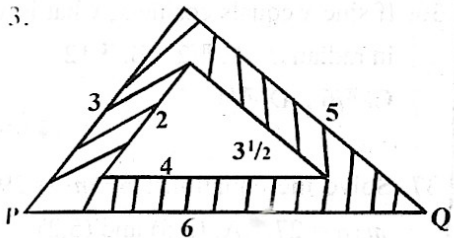
$$\begin{pmatrix} 1 & 12 & 2 \\ 4 & 5 & -1 \\ -3 & 2 & 0 \end{pmatrix} \text{ and } N = \begin{pmatrix} 1 & -2 & 3 \\ 4 & -1 & 5 \\ 2 & -3 & -1 \end{pmatrix}$$

Evaluate $2M - 3N$

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

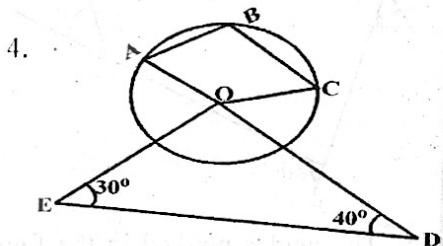
C. $\begin{pmatrix} -1 & 12 & 5 \\ 4 & 7 & 3 \\ 0 & -5 & -3 \end{pmatrix}$ D. $\begin{pmatrix} -1 & 0 & -5 \\ -4 & 7 & -17 \\ 0 & -5 & 3 \end{pmatrix}$

2. Let $P = \{1, 2, u, v, w, x\}$,
 $Q = \{2, 3, u, v, w, 5, 6, y\}$ and R
 $= \{2, 3, 4, v, x, y\}$ Determine
 $(P - Q) \cap R$. A. $\{1, x\}$ B. $\{x, y\}$
 C. $\{x\}$ D. $\emptyset$



(Numbers indicate the lengths of the sides of the triangles) if the area of $\triangle PQR$ is k^2 sq. units, what is the area of the shaded portion?

- A. $\frac{2}{3}k^2$ sq units B. $\frac{8}{9}k^2$ sq units
C. $\frac{5}{9}k^2$ sq units D. $\frac{7}{9}k^2$ sq units



In the figure above, O is the centre of the circle ABC $\angle CED = 30^\circ$,

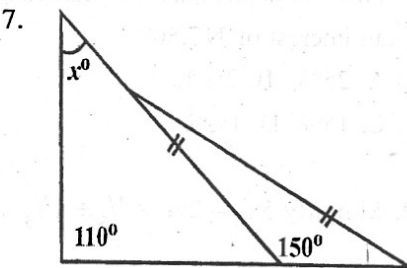
$\angle EDA = 40^\circ$, what is the size of $\angle ABC$? A. 70° B. 110° C. 105° D. 130°

5. 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. $-2\sqrt{2}$

6. Arrange the following numbers in ascending order of magnitude $\frac{6}{7}$, $\frac{13}{15}$, 0.865. A. $\frac{13}{15} < 0.865 < \frac{6}{7}$ B. $\frac{6}{7} < 0.865 < \frac{13}{15}$ C. $\frac{6}{7} < \frac{13}{15} < 0.865$ D. $0.865 < \frac{6}{7} < \frac{13}{15}$



In the diagram above, find the value of x ? A. 45° B. 15° C. 40° D. 30°

8. If n is the median and m is the mode of the following set of numbers, 2, 4, 2, 1, 1-6, 2-6, 2-6, 3-7, 2-1, 2-6 then (n, m) is
- A. (26, 2-5)
B. (2-6, 2-6) C. (2-5, 2-1)
D. (2-5, 2-6)

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

10. 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

11. Make r the subject of the formula $\frac{x}{r+a} = \frac{a}{r}$

A. $\frac{a}{x+a}$ B. $\frac{a}{x-a}$ C. $\frac{a^2}{x-a}$
D. $\frac{a^2}{x+a}$

12. Find the value of x for which the function $y = x^3 - x$ has a minimum value.
- A. $-\sqrt{3}$ B. $-\sqrt{\frac{3}{2}}$
C. $\sqrt{3}$ D. $\sqrt{\frac{3}{2}}$

13. Find the radius of a sphere whose surface area is 154cm^2 . A. 1.75cm
B. 7.00cm C. 3.50cm D. 3.00cm

14. At what rate would a sum of ₦100.00 deposited for 5 years raise an interest of ₦7.50? A. $2\frac{1}{2}\%$
B. $1\frac{1}{2}\%$ C. 15% D. 25%

- 15.

Number	1	2	3	4	5	6
Frequency	12	20	x	21	$x-1$	26

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

16. If two dice are thrown together, what is the probability of obtaining at least a score of 10?
A. $\frac{11}{12}$ B. $\frac{5}{6}$ C. $\frac{1}{12}$ D. $\frac{1}{6}$
17. If the interest of ₦150.00 for $2\frac{1}{2}$ years is ₦4.50. Find the interest on ₦250.00 for 6 months at the same rate
A. ₦1.50 B. ₦18.00
C. ₦7.50 D. ₦15.00

18. Find a positive value of p if the expression $2x^2 - px + p$ leaves a remainder 6 when divided by $x - p$.
A. 2 B. -3 C. 4 D. 1

19. The n th term of a sequence is given by $3^{1/n}$. Find the sum of the first three terms of the sequence.
A. $1/3$ B. 1 C. $13/9$ D. $1/9$

20. Find the missing point/value in the following road

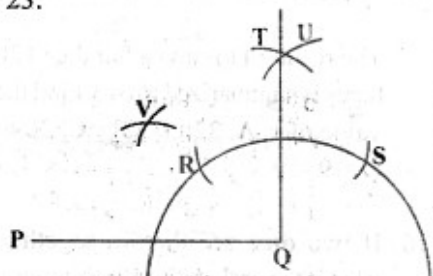
x	-2	-1	0	1	2	3
$y = x^3 - x + 3$		3	3	3	9	27

- A. 13 B. -3 C. -5 D. 3

21. Find the range of 4, 9, 6, 3, 2, 8, 10 and 11? A. 4 B. 11 C. 9 D. 8

22. Find the sum to infinity of the series $2 + \frac{3}{2} + \frac{9}{8} + \frac{27}{32} + \dots$
A. 8 B. 4 C. 2 D. 1

23.



What is the obtuse angle formed when the point U is joined to O?
A. 145° B. 120° C. 105° D. 102°

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

25. A bag contains 7 white balls and 6 red balls. Two balls are taken from the bag without replacement. What

is the probability that they are both white? A. $2/9$ B. $1/3$ C. $3/5$ D. $7/26$

26. Find the value of $\log_5 (10/40)$, given that $\log_{10} 4 = 0.6021$. A. 1.6021 B. 2.6021 C. 2.3979 D. 16021

27. A man runs a distance of 18km at a constant speed for the first 4km and then 2km/hr faster for the rest of the distance. The whole run takes him 1 hour. His average speed for the first 4km is A. 8km/hr B. 9km/hr C. 13km/hr D. 11km/hr

28. At what rate would a sum of ₦100.00 deposited for 5 years raise an interest of ₦7.50?
A. 25% B. $2\frac{1}{2}\%$ C. 15% D. $1\frac{1}{2}\%$

29. Simplify $5\frac{1}{3} - 2\frac{1}{4} \times \frac{4}{3} + 1\frac{2}{5}$

- A. $2\frac{17}{30}$ B. $4\frac{11}{36}$ C. $3\frac{9}{10}$ D. $4\frac{1}{3}$

30. Make t the subject of the formula $x = ut + at^2/4$

- A. $\frac{1}{a} \left[u \pm \sqrt{u^2 - 4ax} \right]$
B. $\frac{1}{a} \left[u \pm \sqrt{u^2 + 4ax} \right]$
C. $\frac{1}{a} \left[-u \pm \sqrt{u^2 + 4ax} \right]$
D. $\frac{1}{a} \left[-u \pm \sqrt{u^2 - 4ax} \right]$

31. The mean of the numbers 1.2, 1.0, 0.9, 1.4, 0.8, 0.8, 1.2 and 1.1 is
A. 1.0 B. 1.02 C. 1.05 D. 0.8

32. What is the number whose logarithm to base 10 is 2.3482?
A. 223.6 B. 0.2228 C. 22.37 D. 0.02229

33. What factor is common to all the expressions $x^2 - x$, $2x^2 + x - 1$ and $x^2 - 1$?
A. no common factor B. x C. $x - 1$ D. $x + 1$

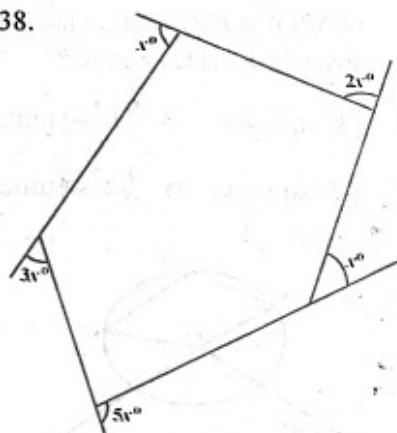
34. Find the value of p for which the equation $x^2 - (p-2)x + 2p + 1 = 0$ has equal roots. A. (4,5) B. (0,12) C. (1,2) D. (21,0)

35. If $\frac{a^2 b^{-3} c}{a^{-1} b^4 c^5} = a^p b^q c^r$.
What is the value of $p+2q$?
A. -10 B. $-25/4$ C. 1 D. $5/2$

36. If $\sin x$ equals $\cos x$, what is x in radians? A. $\pi/2$ B. $\pi/12$ C. $\pi/6$ D. $\pi/4$

37. Solve the equations: $m^2 + n^2 = 29$, $m + n = 27$. A. (2,5) and (5,2) B. (5,3) and (3,5) C. (2,3) and (3,5) D. (5,2) and (5,3)

38.



The angles marked in the figure above are measured in degrees. Find x . A. 60° B. 30° C. 90° D. 80°

39. If $a:b = 5:8$, $x, y = 25:16$,
evaluate $\frac{a}{x} : \frac{b}{y}$

A. 3:5 B. 125:128 C. 2:5 D. 3:4

40. Convert 47_{10} to another number in base three. A. 1100_3 B. 1010_3
C. 1001_3 D. 1202_3

CONSOLIDATED JAMB MATHS ANSWERS 2024

1.
$$\begin{pmatrix} 1 & 12 & 2 \\ 4 & 5 & -1 \\ -3 & 2 & 0 \end{pmatrix} - 3 \begin{pmatrix} 1 & -2 & 3 \\ 4 & -1 & 5 \\ 2 & -3 & -1 \end{pmatrix}$$

$$= \begin{pmatrix} 2 & 24 & 4 \\ 8 & 10 & -2 \\ -6 & 4 & 0 \end{pmatrix} - \begin{pmatrix} 3 & -6 & 9 \\ 12 & -3 & 15 \\ 6 & -9 & -3 \end{pmatrix}$$

$$= \begin{pmatrix} -1 & 12 & -5 \\ -4 & 13 & -17 \\ -12 & 13 & 3 \end{pmatrix} \quad (\text{A})$$

2. $P(-Q) = \{1, x\} \cap \{2, 3, 4, v, y, x\}$
 $= \{x\} \quad (\text{C})$

3. Area of shaded portion
 $= \frac{5}{3 \times 3} \times k^2 \text{ sq. unit}^2$
 $= \frac{5}{9} k^2 \text{ sq. unit}^2 \quad (\text{C})$

4. $\angle ABC = 180^\circ - \left(55^\circ + \frac{40^\circ}{2}\right)$
 $= 180^\circ - (55^\circ + 20^\circ)$
 $= 180^\circ - 75^\circ = 105^\circ \quad (\text{C})$

5.
$$\frac{p^2 - q^2}{2pq} = \frac{(1+\sqrt{2})^2 - (1-\sqrt{2})^2}{2(1+\sqrt{2})(1-\sqrt{2})}$$

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

$$= \frac{2(2\sqrt{2})}{-2} = -(2\sqrt{2}) \quad (\text{D})$$

6. $\frac{6}{7} < 0 - 865 < \frac{13}{15} \quad (\text{B})$

7. $\bar{x} + 110^\circ = 150^\circ$
 $x = 150^\circ - 110^\circ = 40^\circ \quad (\text{C})$

8. Media = 2.5
Mode = 2.6
(2.5, 2.6) (D)

9. $V = 4\pi r^2$
 $\frac{dv}{dr} = 8\pi r$
when $r = 1$
 $\frac{dv}{dr} = 8(\pi)1 = 8\pi \quad (\text{A})$

10. $\frac{dr}{r^3} = \frac{4}{16}$
 $r^2 = 4 \Rightarrow r = \sqrt{4} = 2$
 $ar = 4$
 $\frac{2a}{2} = \frac{4}{2} \Rightarrow a = 2$
 $S_4 = \frac{2(2^5 - 1)}{2 - 1} = 2(32 - 1)$
 $= 2 \times 31 = 62 \quad (\text{A})$

11. $\frac{x}{r+a} = \frac{a}{r}$
 $xr = ar + a^2$
 $xr - ar = a^2$
 $r(x - a) = a^2$
 $r = \frac{a^2}{x-a} \quad (\text{C})$

12. $y = x^3 - x$
 $\frac{dy}{dx} = 3x^2 - 1$
 $3x^2 - 1 = 0$
 $\frac{3x^2}{3} = \frac{1}{3} \Rightarrow x = \sqrt{\frac{1}{3}} = \frac{\sqrt{3}}{3} \quad (\text{D})$

13. Surface Area = $4\pi r^2$
 $154 = 4 \times \frac{22}{7} \times r^2$
 $r = \sqrt{\frac{154 \times 7}{88}} = 3.50 \text{ cm} \quad (\text{C})$

14. $R = \frac{100 \times 7.50}{100 \times 5} = 1\frac{1}{2} \% \quad (\text{B})$

15. $12 + 20 + x + 21 + x - 1 + 26 = 20$
 $x + 100 = 120$
 $x = 120 - 100 = 20 \quad (\text{C})$

Sum
16. (4, 6) = 10
(6, 4) = 10
(5, 5) = 10
(6, 5) = 11
(5, 6) = 11
(6, 6) = 12

Pr (at least 10) = $\frac{6}{36} = \frac{1}{6} \quad (\text{D})$

17. $I = \frac{100 \times 4.50}{150 \times 2.5} \times 250 \times \frac{6}{12}$
 $= \text{N}15.00 \quad (\text{D})$

18. $x - p = 6$
 $x = 6 + p$
 $2(6 + p)^2 - p(6 + p) + p = 6$
 $2(36 + 12p + p^2) - 6p - p^2 + p - 6 = 0$
 $72 + 24p + 2p^2 - 6p - p^2 + p - 6 = 0$
 $p^2 + 19p + 66 = 0$
 $p = 2 \quad (\text{A})$

19. $T_1 = 3^{1-1} = 3^0 = 1$
 $T_2 = 3^{1-2} = 3^{-1} = \frac{1}{2}$
 $T_3 = 3^{1-3} = 3^{-2} = \frac{1}{3^2} = \frac{1}{9}$
Sum = $\frac{1}{1} + \frac{1}{3} + \frac{1}{9}$
 $= \frac{9+3+1}{9} = \frac{13}{9} \quad (\text{C})$

20. $x = -2$
 $y = (-2)^3 - (-2) + 3$
 $y = -8 + 2 + 3$
 $y = -3 \quad (\text{B})$

21. Range = $11 - 2 = 9 \quad (\text{C})$

$$22. \text{ Sum to infinity} = \frac{a}{1-r}$$

$$= \frac{2}{1-\frac{3}{4}}$$

$$= \frac{2}{\frac{1}{4}} = 2 \times 4 = 8 \quad (\text{A})$$

$$23. \text{ The obtuse angle} = 60^\circ + 45^\circ$$

$$= 105^\circ \quad (\text{C})$$

$$24. y = (3 - 2x)^2$$

$$\frac{dy}{dx} = -4(3 - 2x) \text{ at } x = -2$$

$$\frac{dy}{dx} = -4((3 - 2(-2)) = -4(3 + 4)$$

$$= -4 \times 7 = 28 \quad (\text{C})$$

$$25. \text{Pr(both white)} = \frac{7}{13} \times \frac{6}{12} = \frac{7}{26} \quad (\text{D})$$

$$26. \log_5^{10} - \log_5^{40}$$

$$= \frac{\log 10}{\log 5} - \frac{\log 40}{\log 5} = 2.6021 \quad (\text{B})$$

$$27. \text{ Distance covered} = 18 \text{ km}$$

$$\text{Time covered} = 1 \frac{80}{60} \text{ hr}$$

$$\text{Speed} = \frac{18}{60}$$

$$\text{For 1st 5 km, the speed is } 26 \text{ km/hr}$$

$$\text{fast time} = \frac{5}{2}$$

$$\text{Speed for 4 km} = \frac{20}{2} \times \frac{4}{5} = 8 \text{ km/hr} \quad (\text{A})$$

$$28. \text{ Rate} = \frac{100 \times 7.50}{100 \times 5} = 1 \frac{1}{2} \% \quad (\text{D})$$

$$29. 5\frac{1}{3} - 2\frac{1}{4} \times \frac{4}{3} + 1\frac{2}{5}$$

$$\frac{16}{3} - \frac{8}{3} \times \frac{4}{3} + \frac{10}{5}$$

$$\frac{16}{3} - \frac{32}{9} + \frac{10}{5}$$

$$= \frac{80 - 45 + 30}{15} = \frac{65}{15} = \frac{13}{3}$$

$$= 4\frac{1}{3} \quad (\text{D})$$

$$30. x = ut + \frac{at^2}{2}$$

$$4x = 4ut + at^2$$

$$\Rightarrow t = \frac{1}{a} \left[-u \pm \sqrt{u^2 + 4ax} \right] \quad (\text{C})$$

$$31. \text{Mean} = \frac{1.2 + 1.0 + 0.9 + 1.4 + 0.8}{5}$$

$$= \frac{0.8 + 1.2 + 1.1}{8}$$

$$= 1.05 \quad (\text{C})$$

$$32. \text{ Let the number be } y$$

$$\log_{10} y = 2.3482$$

$$\Rightarrow y = 10^{2.3482} = 0.02229 \quad (\text{D})$$

$$33. \text{ No factor is common} \quad (\text{A})$$

$$34. \text{ For equal roots}$$

$$b^2 = 4ac$$

$$\Rightarrow (-p + 2)^2 = 4(1)(2p + 1)$$

$$\Rightarrow p^2 - 4p + 4 = 8p + 4$$

$$\Rightarrow p^2 - 12p = 0$$

$$\Rightarrow p = 0 \text{ or } p = 12 \quad (\text{B})$$

$$35. a^{2+11} = a^{13}$$

$$b^{-3-4} = b^{-7}$$

$$\Rightarrow a^{13} = a^{-p} \Rightarrow p = -13$$

$$b^q = b^7 \Rightarrow q = 7$$

$$\therefore p + 2q = -13 + 2(7)$$

$$= -13 + 14 = 1 \quad (\text{C})$$

$$36. \text{ If } \sin x = \cos x$$

$$x = 45^\circ$$

$$\text{In radius} \Rightarrow x = \frac{180^\circ}{4} = \frac{\pi}{4} \quad (\text{D})$$

$$37. m^2 + n^2 = 29$$

$$m = 7 - n$$

$$(7 - n)^2 + n^2 = 29$$

$$\text{Solving implies}$$

$$(2, 5) \text{ and } (5, 2) \quad (\text{A})$$

$$38. x + 2x + 3x + x + 5x$$

$$= (3 \times 180^\circ) - 18$$

$$12x = \frac{540^\circ}{12} - 180^\circ$$

$$\frac{12}{12} x = \frac{360^\circ}{12}$$

$$x = 30^\circ \quad (\text{B})$$

$$39. \frac{a}{x} : \frac{b}{y}$$

$$\frac{5}{25} : \frac{8}{10}$$

$$\frac{1}{5} : \frac{1}{2}$$

$$2 : 5 \quad (\text{C})$$

$$40. \begin{array}{l|l} 3 & 47 \\ 3 & 15 \text{ r } 2 \\ 3 & 5 \text{ r } 0 \\ 3 & 1 \text{ r } 2 \\ & 0 \text{ r } 1 = 12023 \\ & = 1202_3 \end{array} \quad (\text{D})$$