PAPER III

Answer **all** questions.

Each question is followed by five options lettered A to E. Choose the correct option for each question and shade in pencil on your answer sheet the answer space that bears the same letter as the option you have chosen. Give only one answer to each question and erase completely any answer you wish to change. Do all rough work on this question paper.

An example is given below:

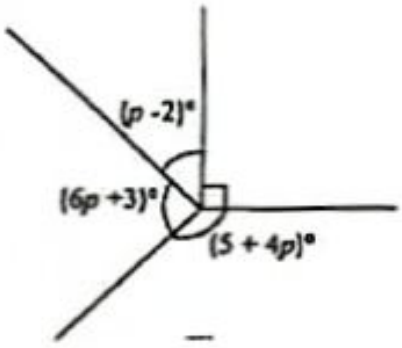
The product of three numbers is 3876. Two of the numbers are 17 and 19. What is the third number?

A. 57
B. 12
C. 6
D. 3
E. 2

The correct option is "12" which is lettered **B**. Therefore, answer space **B** would be shaded as shown below:

[A] [B] [C] [D] [E]

1. Find the value of p in the figure below.

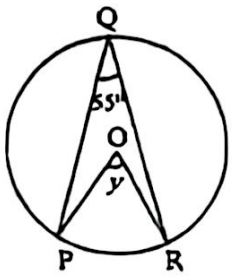


A. 48
B. 26
C. 88
D. 24
E. 96

2. What must be added to the expression $x^2 + \frac{8x}{3}$ to make it a perfect square?

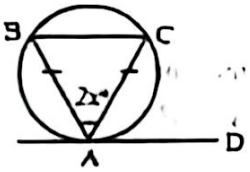
A. $\frac{16}{9}$
B. $\frac{4}{3}$
C. $\frac{64}{9}$
D. $\frac{16}{3}$
E. $\frac{8}{3}$

3. Find the value of y in the figure below, given that O is the centre of the circle.



A. 45°
B. 110°
C. 60°
D. 105°
E. 90°

4. In the figure below, AD is a tangent to the circle ABC, $|AB| = |AC|$ and $\angle BAC = 2x°$. Find $\angle DAC$.



A. $(180 - 2x)°$
B. $(90 - x)°$
C. 90°
D. $(90 - 2x)°$
E. $(45 - x)°$

5. A fair die is rolled once. What is the probability of obtaining a 3 or 4?

A. $\frac{2}{6}$
B. $\frac{1}{3}$
C. $\frac{2}{5}$
D. $\frac{1}{3}$
E. $\frac{2}{3}$

6. Find the midpoint of a line joining the points A(2, 2) and B(6, 4).

A. (4, 3)
B. (2, 3)
C. (5, 3)
D. (3, 2)
E. (4, 5)

7. Find the distance between the points A(3, −3) and B(4, −3).

A. $\sqrt{7}$
B. $\sqrt{35}$
C. $3\sqrt{3}$
D. 1
E. $\sqrt{85}$

8. If the equation $4x^2 - 4\sqrt{P}x + 3 = 0$ has equal roots, find the value of P

A. 1
B. 0
C. 3
D. 2
E. 4

9. If $\begin{vmatrix} 4 & x \\ 5 & 3 \end{vmatrix} = 42$, find the value of x.

A. −6
B. 6
C. 8
D. −4
E. 11

10. Two places F and G both on the parallel of latitude 43° N differ in longitude by 55° E. Calculate the radius of the parallel of latitude, correct to the nearest kilometre. (R = 6,400 km)

A. 3,671
B. 4,681
C. 6,146
D. 2,756
E. 4,495

11. Simplify $\frac{2x+1}{6x} + \frac{4y-3}{2y}$.

A. $\frac{14xy-9x+y}{6xy}$
B. $\frac{15xy-9x+y}{6xy}$
C. $\frac{10xy-9x+y}{6xy}$
D. $\frac{14xy+9x+y}{6xy}$
E. $\frac{14xy-9x-y}{6xy}$

12. Find the value of y in the figure below.

A. 54°
B. 110°
C. 56°
D. 124°
E. 70°

13. A bag contains 3 green and 2 brown identical balls. If 2 balls are picked at random from the bag one after the other without replacement, find the probability that they are of the same colour.

A. $\frac{1}{2}$
B. $\frac{1}{4}$
C. $\frac{1}{10}$
D. $\frac{3}{10}$
E. $\frac{2}{5}$

14. Evaluate $\frac{2x^2yz}{2y-z}$, when $x = 3$, $y = -4$ and $z = -5$.

A. −300
B. −360
C. 120
D. −120
E. 360

15. Evaluate $11001_{two} + 1111_{two} - 1011_{two}$.

A. 10100_{two}
B. 101000_{two}
C. 1100_{two}
D. 11101_{two}
E. 1011_{two}

16. An aircraft flies from Q (25° N, 38° E) to R (72°S, 38° E). Calculate the distance QR along the line of longitude, correct to the nearest kilometre.
(Take R = 6,400 km, $\pi = \frac{22}{7}$)

A. 10,839
B. 1,039
C. 29,839
D. 3,930
E. 9,810

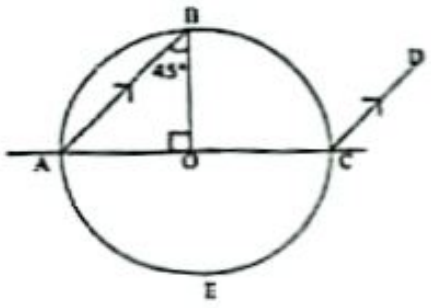
17. Find the gradient of the curve $y = 2x^2 + 3x + 4$ at the point $x = 2$.

A. 13
B. 5
C. 0
D. 5
E. 13

18. Evaluate log8 log16.

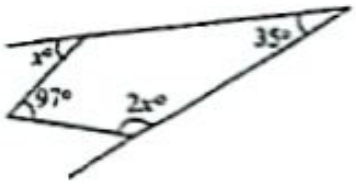
A. $\frac{3}{4}$
B. $\frac{4}{5}$
C. $\frac{2}{3}$
D. $\frac{1}{2}$
E. $\frac{1}{3}$

19. In the figure below, O is the centre of the circle ABCE and AB//CD. If ∠ ABO = 45°, calculate ∠ OCD



A. 60
B. 90
C. 135
D. 120
E. 45

20. Find the value of x in the figure below.



A. 46
B. 52
C. 47
D. 42
E. 48

21. The volume of a sphere is 840 cm³. Find its surface area, correct to the nearest whole number.
(Take $\pi = \frac{22}{7}$)

A. 200 cm²
B. 430 cm²
C. 250 cm²
D. 421 cm²
E. 380 cm²

22. Find the value of x if $58 \equiv x \bmod 8$.

[redacted] 2
B. 0
C. 3
D. 7
E. 5

23. Find the gradient of a line joining the points (2, 5) and (3, 1).

[redacted] 5
B. 6
C. 6
D. 5
E. 7

24. If p varies inversely as the square root of $(m + 2)$ and $p = 12$ when $m = 7$, find m when $p = 6$.

A. 36
B. 9
C. 18
D. 6
[redacted] 34

25. Find the radius of a hemisphere whose volume is $\frac{99}{14}$ cm^3. (Take $\pi = \frac{22}{7}$)

A. $1\frac{1}{3}$ cm
B. $\frac{2}{3}$ cm
C. $3\frac{3}{8}$ cm
[redacted] $1\frac{1}{2}$ cm
E. $2\frac{1}{4}$ cm

26. Solve the equation $16^x = 2^{\frac{1}{2}} \times 8$.

[redacted] $\frac{7}{8}$
B. $\frac{1}{7}$
C. $\frac{8}{9}$
D. $\frac{2}{7}$
E. $\frac{9}{11}$

27. The table below shows the scores obtained by students in a Mathematics test. Use it to answer the questions.

Scores of students

Scores	1	2	3	4	5	6	7	8	9	10
Frequency	3	5	3	7	5	1	5	6	3	2

What percentage of the students scored at least 6 marks?

A. 44.5
B. 41.5
C. 40.5
D. 42.3
[redacted] 42.5

28. Town A is 61 km due north of C and town B is 23 km due west of C. Calculate the bearing of A from B to the nearest degree.

A. 059
B. 069
C. 027
[redacted] 021
E. 072

29. Use the information below to answer the question.
The table below shows the scores obtained by 20 students in a Mathematics test.

Scores of students

Scores	8	10	12	15	18	20
No. of Students	3	5	6	3	2	1

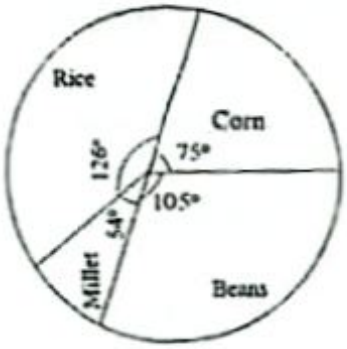
Find the median score.

A. 20
B. 15
C. 10
[redacted]12
E. 8

30. If $x \propto \frac{1}{y}$ and $x = 2$, when $y = 3$, find the value of x when $y = 4$.

A. $\frac{8}{3}$
B. 6
C. $\frac{1}{2}$
[redacted] $\frac{3}{2}$
E. 1

31. In the figure below shows the distribution of crops harvested in a farm. The total bags harvested for all the crops is 300.



What percentage of the crops harvested is Beans?

[redacted]29.2
B. 18.0
C. 15.1
D. 25.0
E. 33.4

32. A laptop costs ₦180,000.00. If its value depreciates by 27% in the first year and 24% the second year, find its value after 2 years.

[redacted] ₦99,864.00
B. ₦31,536.00
C. ₦131,400.00
D. ₦80,136.00
E. ₦48,600.00

33. Find the area bounded by the curve $y = x^2 + \frac{1}{x^2}$, x-axis and the ordinates $x = 2$ and $x = 3$.

A. $15\frac{5}{6}$ square units

B. $2\frac{5}{6}$ square units

C. $6\frac{1}{2}$ square units

D. $9\frac{1}{3}$ square units

E. $12\frac{1}{6}$ square units

34. Express the square root of 0.000264 in standard form.

A. 1.62×10^{2}
B. 1.62×10^{-2}
C. 1.62×10^{3}
D. 1.62×10^{-1}
E. 1.62×10^{1}

35. If $x = -2$, $y = 6$ and $z = 3$, evaluate $\frac{x^2(y+z)}{2y-2z}$.

A. 11
B. 3
C. 7
D. 9
E. 6

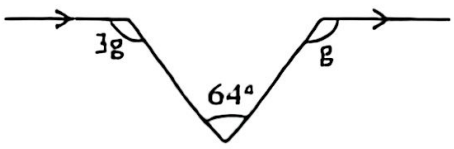
36. Determine the point of intersection of the lines $y=5x+6$ and $y=6x+9$.

A. $(-3, 9)$
B. $(3, -9)$
C. $(2, 9)$
D. $(-3, -9)$
E. $(3, 9)$

37. If $111111_2 = X_{10} + 1111_2$, find the value of X.

A. 19
B. 32
C. 27
D. 48
E. 13

38. Calculate the value of g in the figure below.



A. 224°
B. 34°
C. 61°
D. 112°
E. 64°

39. The quadratic equation whose roots are $\frac{7}{4}$ and $\frac{-1}{2}$ is

A. $y^2 - 10y - 7 = 0$.
B. $8y^2 - 10y + 7 = 0$.
C. $8y^2 + 10y - 7 = 0$.
D. $8y^2 - 10y - 7 = 0$.
E. $4y^2 - 5y + 7 = 0$.

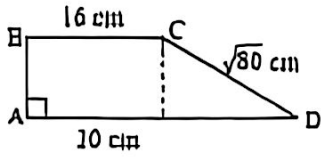
40. If the mean score of the first 2 students in a Mathematics test is 85%, the next 3 students is 70% and the last 3 students is 60%, find the mean score of the whole class in percent.

A. 74
B. 68
C. 75
D. 72
E. 70

41. A sequence is given by $x + y$, $2x + 3y$, $3x + 5y + \ldots$
If the nth term is $9x + 17y$, find n.

A. 8
B. 19
[redacted] 9
D. 6
E. 13

42. If $|AD| = 20$ cm, calculate the area of the trapezium ABCD in the figure below.



A. 154 cm^2
B. 160 cm^2
C. 104 cm^2
D 164 cm^2
[redacted] 144 cm^2

43. If y varies inversely as x^2 and $y = 20$ when $x = 4$, find y when $x = 8$.

[redacted] 5
B. 40
C. 10
D. 20
E. 80

44. Consider the following statements:
p : Ade lives in Abuja
q : Ade lives in Nigeria
Write in symbolic form the statement "If Ade lives in Abuja then he lives in Nigeria".

[redacted] $p \Rightarrow q$

B. $p \wedge q$

C. $\sim q \Rightarrow p$

D. $\sim p \Rightarrow q$

E. $p \vee q$

45. Calculate the variance of the following data: 6, 4, 5, 9

[redacted] 3.5
B. 6.0
C. 1.8
D. 3.4
E. 2.4

46. If 15 is the mean of the following set of numbers: 4, 6, x, 10, 5, find the value of x.

[redacted] 50
B. 55
C. 75
D. 42
E. 65

47. A chord of a circle subtends an angle 120° at the centre with radius 6 cm. Find the area of the minor segment, correct to three significant figures.
$\left(\text{Take } \pi = \frac{22}{7}\right)$

A. 37.7 cm^2
B. 113.0 cm^2
C. 15.6 cm^2
[redacted] 22.1 cm^2
E. 53.3 cm^2

48. From a point T, the bearings of two cities M and N are N67°W and N23°E respectively.
If the bearing of N from M is N70°E and |TM|=160m, calculate|TN| to the nearest metre

A. 439
B. 117
C. 149
D. 440
E. 109

49. Use the information below to answer the question.

The roots of the equation $2x^2-10x+8=0$ are α and β.

Calculate $\frac{1}{\alpha}+\frac{1}{\beta}$.

A. $\frac{1}{2}$
B. $\frac{5}{4}$
C. $\frac{1}{4}$
D. $\frac{3}{2}$
E. $\frac{3}{4}$

50. A man is four times as old as his son. If the difference between their ages is 36, find the sum of their ages.

A. 65
B. 60
C. 144
D. 45
E. 40

51. Two cities are both on longitude 55°E. If their latitudes are 19°S and 64°S and R = 6,400 km, what is their distance apart in km? Leave your answer in terms of π.

A. 1200π
B. 800π
C. 1800π
D. 1600π
E. 1400π

52. If $\tan\theta=\frac{15}{8}$ and θ is acute. evaluate $\sin^2\theta-\cos^2\theta$

A. $\frac{64}{225}$
B. $\frac{161}{289}$
C. $\frac{64}{289}$
D. $\frac{225}{64}$
E. $\frac{225}{289}$

53. Find the equation of a curve which passes through the point $(2,-5)$ and its gradient at any point is given by $3x^2-6x+5$.

A. $y=x^3-3x^2-5x+11$
B. $y=x^3-3x^2+5x-11$
C. $y=x^3-3x^2+5x-1$
D. $y=x^3-x^2+5x-10$
E. $y=3x^3-6x^2+5x-11$

54. The angle of a sector of a circle with radius 9.1 cm is 100°. Find the perimeter of the sector, correct to the nearest centimetre.
(Take $\pi=\frac{22}{7}$)

A. 36
B. 8
C. 18
D. 34
E. 10

55. If $\begin{vmatrix} 2 & 3 & -1 \\ 5 & x & 3 \\ -3 & 5 & 2 \end{vmatrix} = -106$,

find the value of x.

A. 6
B. 5
C. 5
D. 6
E. 4

56. Solve the equation $2x^2 - 32 = 0$.

A. $x = 0$ or 2
B. $x = 4$ or -4
C. $x = 0$ or -4
D. $x = -2$ or 4
E. $x = 2$ or -4

57. Find the sum and the product of the roots of the equation $3x^2 - 2x - 6 = 0$ respectively.

A. $-2, -\frac{1}{3}$
B. $\frac{2}{3}, -2$
C. $-2, \frac{2}{3}$
D. $-2, -\frac{2}{3}$
E. $-\frac{1}{3}, -2$

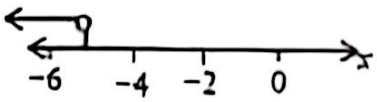
58. Given that $P = \begin{pmatrix} -2 & 1 \\ 3 & 4 \end{pmatrix}$ and $Q = \begin{pmatrix} 5 & -3 \\ 2 & -1 \end{pmatrix}$, find the value of $2P + Q$.

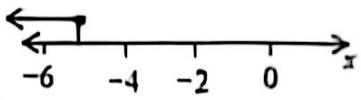
A. $\begin{pmatrix} -1 & 1 \\ 7 & 4 \end{pmatrix}$
B. $\begin{pmatrix} -4 & 2 \\ 6 & 8 \end{pmatrix}$
C. $\begin{pmatrix} 4 & 7 \\ -1 & 1 \end{pmatrix}$
D. $\begin{pmatrix} 8 & 6 \\ 2 & -4 \end{pmatrix}$
E. $\begin{pmatrix} 1 & -1 \\ 8 & 7 \end{pmatrix}$

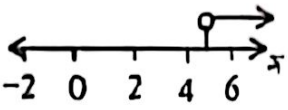
59. The bearing of two points Q and R from a point P are 030° and 120° respectively. If $|PQ| = 12$ m and $|PR| = 5$ m, find $|QR|$.

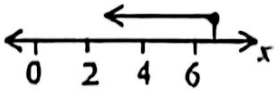
A. 7 m
B. 9 m
C. 5 m
D. 13 m
E. 11 m

60. Solve the inequality $-2(12 + x) \geq 11 + 5x$. Represent the solution on a number line

A. 

B. 

C. 

D. 

E.