

MOCK EXAM 5
MATHEMATICS Compulsory Part
PAPER 2

(1 $\frac{1}{4}$ hours)

INSTRUCTIONS

1. Read carefully the instructions on the Answer Sheet.
2. When told to open this book, you should check that all the questions are there. Look for the words **'END OF PAPER'** after the last question.
3. All questions carry equal marks.
4. **ANSWER ALL QUESTIONS.** You are advised to use an HB pencil to mark all the answers on the Answer Sheet, so that wrong marks can be completely erased with a clean rubber. You must mark the answers clearly; otherwise you will lose marks if the answers cannot be captured.
5. You should mark only **ONE** answer for each question. If you mark more than one answer, you will receive **NO MARKS** for that question.
6. No marks will be deducted for wrong answers.

There are 30 questions in Section A and 15 questions in Section B.

The diagrams in this paper are not necessarily drawn to scale.

Choose the best answer for each question.

Section A

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

A. $x^3 - 1.$

B. $(x-1)^3.$

C. $x^3 - x^2 + x - 1.$

D. $x^3 - 2x^2 + 2x - 1.$

2. $\frac{2x^4}{(2x^2)^6} =$

A. $\frac{1}{6x^2}.$

B. $\frac{1}{6x^4}.$

C. $\frac{1}{32x^3}.$

D. $\frac{1}{32x^8}.$

3. If $2p + 3q = 3$ and $3p + 5q = 7$, then $p =$

A. $-6.$

B. $-3.$

C. $3.$

D. $6.$

4. Let $f(x) = x^3 + x^2 + kx + 9$. If $x + 3$ is a factor of $f(x)$, then $k =$

- A. -15 .
- B. -9 .
- C. -3 .
- D. 3 .

5. If $a > b$ and $k < 0$, which of the following must be true?

I. $ak^2 > bk^2$

II. $a^2 > b^2$

III. $a - k > b - k$

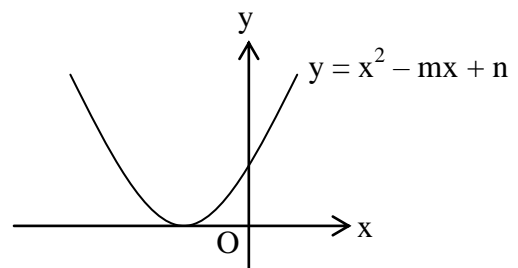
- A. I only
- B. II only
- C. I and III only
- D. II and III only

6. The solution of $7 - 2x < 9$ or $3x + 8 > -1$ is

- A. $x > -3$.
- B. $x > -1$.
- C. $x > 1$.
- D. $-3 < x < -1$.

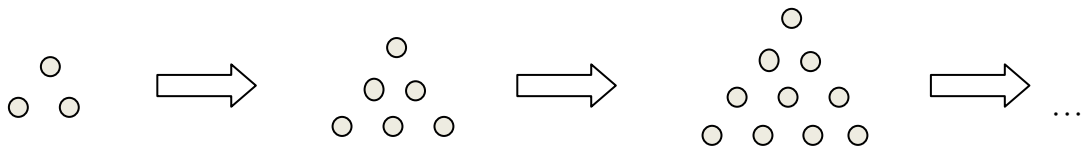
7. The figure shows the graph of $y = x^2 - mx + n$, where m and n are constants. Which of the following is true?

- A. $m < 0$ and $n > 0$
- B. $m < 0$ and $n < 0$
- C. $m > 0$ and $n > 0$
- D. $m > 0$ and $n < 0$



8. If α is a root of the equation $5x^2 - 2x + 4 = 0$, then $1 + 6\alpha - 15\alpha^2 =$
- A. 11.
 - B. 13.
 - C. 15.
 - D. 17.
9. If the price of a car is increased by 80% and then decreased by 70%, find the percentage change in the price of the car.
- A. -46%
 - B. -44%
 - C. 10%
 - D. 26%
10. In a factory, 54.5% of the workers are male. If 75% of the female workers and 50% of the male workers are married, then find the number of unmarried workers given that there are 273 married female workers.
- A. 218
 - B. 273
 - C. 309
 - D. 364
11. Let a , b and c are non-zero numbers. If $a : b = 5 : 8$ and $a : c = 3 : 4$, then $(b - a) : (c - a) =$
- A. 3 : 1.
 - B. 9 : 5.
 - C. 6 : 5.
 - D. 5 : 9.

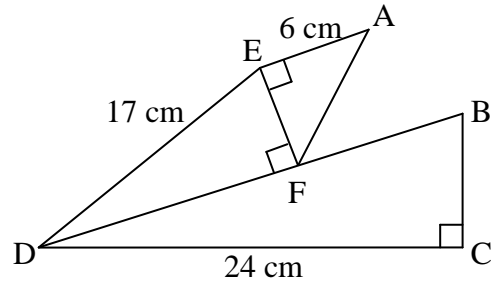
12. In the figure, the 1st pattern consists of 3 dots. For any positive integer n , the $(n + 1)$ th pattern is formed by adding $n + 2$ dots to the n th pattern. Find the number of dots in the 6th pattern.



- A. 21
 B. 28
 C. 30
 D. 36
13. $0.002016789 =$
- A. 0.002016 (correct to 6 decimal places).
 B. 0.002017 (correct to 6 decimal places).
 C. 0.002017 (correct to 6 significant figures).
 D. 0.00201678 (correct to 6 significant figures).
14. There are packets of salt. The weight of salt in a packet is measured as 100 g correct to the nearest g. If n packets of salt are packed into a bag such that the weight of salt in each bag is measured as 15 kg correct to the nearest kg, find the least possible value of n .
- A. 144
 B. 145
 C. 150
 D. 155
15. It is given that z varies directly as x^2 and inversely as y^3 . When $x = 2$ and $y = 1$, $z = 32$. When $x = -1$ and $y = 2$, $z =$
- A. -32 .
 B. -1 .
 C. 1 .
 D. 32 .

16. In the figure, F is a point lying on BD. If $EF = 8$ cm and $AF = BF$, then the area of $\triangle BCD$ is

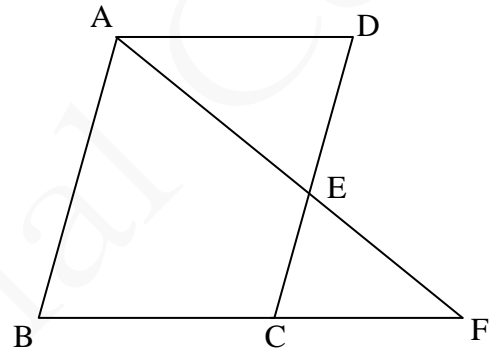
- A. 24 cm^2 .
- B. 60 cm^2 .
- C. 84 cm^2 .
- D. 168 cm^2 .



17. In the figure, ABCD is a parallelogram. E is a point lying on CD such that $DE : EC = 4 : 3$. AE produced and BC produced meet at F. If the area of $\triangle CEF$ is 18 cm^2 , then the area of the parallelogram ABCD is

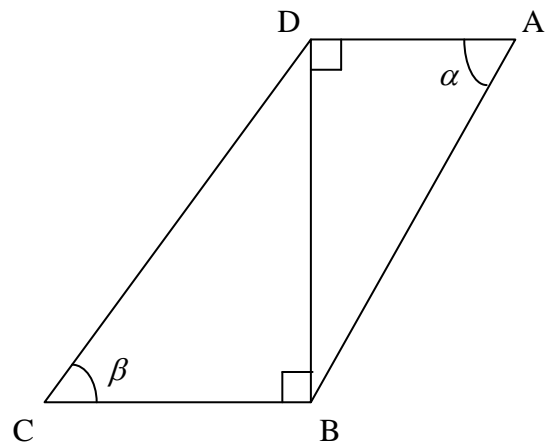
ABCD is

- A. 72 cm^2 .
- B. 80 cm^2 .
- C. 98 cm^2 .
- D. 112 cm^2 .



18. In the figure, $\frac{AB}{CD} =$

- A. $\frac{\cos \beta}{\cos \alpha}$.
- B. $\frac{\sin \beta}{\sin \alpha}$.
- C. $\sin \alpha \sin \beta$.
- D. $\cos \alpha \cos \beta$.

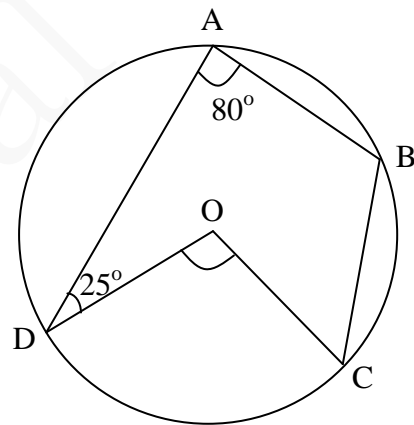


19. $\frac{\sin 150^\circ}{1 - \sin(90^\circ + \theta)} + \frac{\sin 330^\circ}{1 - \sin(270^\circ + \theta)} =$

- A. 0.
 B. $\frac{1}{\cos \theta}$.
 C. $\frac{1}{\sin^2 \theta}$.
 D. $\frac{\cos \theta}{\sin^2 \theta}$.

20. In the figure, O is the centre of the circle ABCD. If $\angle BAD = 80^\circ$, $\angle ADO = 25^\circ$ and $AB = BC$, then $\angle COD =$

- A. 90° .
 B. 100° .
 C. 105° .
 D. 115° .



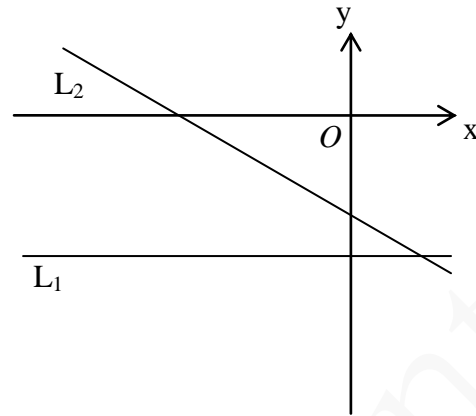
21. The chords AC and BD of the circle ABCD intersect at the point E. If $\angle AEB = 90^\circ$, $CE = 3$ cm, $DE = 4$ cm and $BD = 10$ cm, then the area of $\triangle AEB$ is

- A. 6 cm^2 .
 B. 12 cm^2 .
 C. 24 cm^2 .
 D. 48 cm^2 .

22. If an interior angle of a regular polygon is larger than an exterior angle of the polygon by 90° , which of the following is/are true?
- I. Each interior angle of the polygon is 135° .
 - II. The number of diagonals of the polygon is 16.
 - III. The number of folds of rotational symmetry is 8.
- A. I only
 - B. II only
 - C. I and III only
 - D. II and III only
23. The rectangular coordinates of the point P are $(1, -\sqrt{3})$. If P is reflected with respect to the y-axis, then the polar coordinates of its image are
- A. $(1, 210^\circ)$.
 - B. $(1, 240^\circ)$.
 - C. $(2, 210^\circ)$.
 - D. $(2, 240^\circ)$.
24. If P is a moving point in the rectangular coordinate plane such that the distance between P and the point $(2, 6)$ is equal to 10, then the locus of P is a
- A. circle.
 - B. straight line.
 - C. parabola.
 - D. square.
25. If a diameter of the circle $x^2 + y^2 + kx - 14y + 45 = 0$ passes through the points $(-3, 9)$ and $(5, 5)$, then $k =$
- A. -5 .
 - B. -2 .
 - C. 1 .
 - D. 7 .

26. In the figure, the equations of the straight lines L_1 and L_2 are $cy = 1$ and $ax + by = 1$ respectively. Which of the following are true?

- I. $c < 0$
 II. $b < c$
 III. $a > 0$
- A. I and II only
 B. I and III only
 C. II and III only
 D. I, II and III

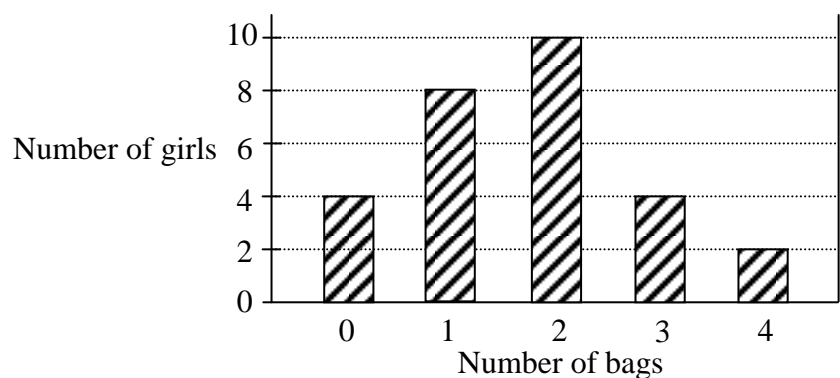


27. A fair coin is thrown three times in a game. If 3 heads are obtained, 80 tokens will be awarded; otherwise, 8 tokens will be awarded. Find the expected number of tokens of the game.

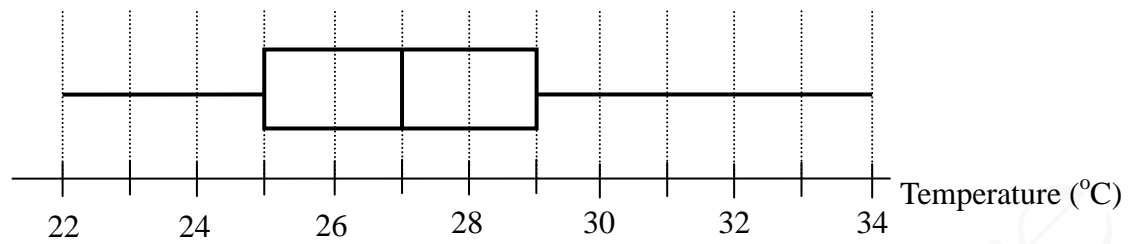
- A. 17
 B. 18
 C. 70
 D. 71

28. The bar chart below shows the distribution of the number of bags owned by a group of girls. Find the probability that a randomly selected girl from the group owns less than 2 bags.

- A. $\frac{1}{5}$
 B. $\frac{5}{14}$
 C. $\frac{3}{7}$
 D. $\frac{11}{14}$



29. The box-and-whisker diagram drawn below shows the distribution of the temperatures in a month. Find the inter-quartile range of the distribution.



- A. 4°C
 B. 5°C
 C. 7°C
 D. 9°C
30. Consider the following integers:
 11 12 12 13 14 14 14 14 16 16 19 19 20 20 20 21 k
- Let a , b and c be the mean, the median, and the mode of the above integers respectively. If $14 \leq k \leq 16$, which of the following must be true?
- I. $a > c$
 II. $b > c$
 III. $a > b$
- A. I only
 B. II only
 C. I and III only
 D. II and III only

Section B

31. $\frac{1}{x^2 - 5x + 6} + \frac{1}{x^2 - 7x + 12} =$

A. $\frac{2}{(x-2)(x-3)}$.

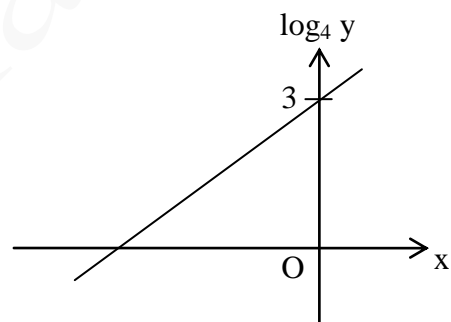
B. $\frac{2}{(x-3)(x-4)}$.

C. $\frac{2}{(x-2)(x-4)}$.

D. $\frac{x-6}{(x-2)(x-3)(x-4)}$.

32. The graph in the figure shows the linear relation between $\log_4 y$ and x . If $y = mn^x$, then $m =$

- A. 3.
- B. 4.
- C. 12.
- D. 64.



33. $2^1 + 2^7 + 2^8 + 2^{12} =$

- A. 1000110010101_2 .
- B. 1001101010101_2 .
- C. 10000110010101_2 .
- D. 10001101010101_2 .

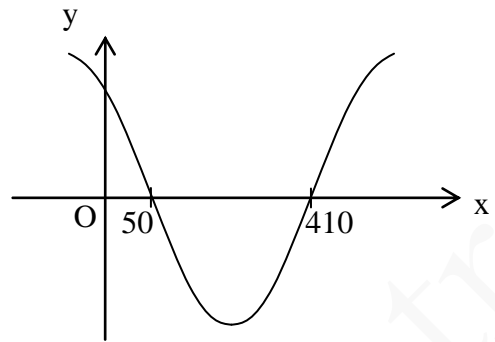
34. Let k be a constant. If the roots of the quadratic equation $x^2 - kx - 4 = 0$ are α and β , then $\alpha^3 + \beta^3 =$

- A. k^3 .
- B. $k^3 + 8k$.
- C. $k^3 + 12k$.
- D. $k^3 - 12k$.

35. Let $f(x) = 4x^2 + kx + 20$, where k is a constant. If the y -coordinate of the vertex of the graph of $y = f(x)$ is 16, then $k =$
- A. 4.
 - B. 4 or -4 .
 - C. 8 or -8 .
 - D. 16 or -16 .
36. If k is a real number, then $5k - \frac{4 + ki}{i} =$
- A. $4k + 4i$.
 - B. $4k - 4i$.
 - C. $6k + 4i$.
 - D. $6k - 4i$.
37. The n th term of a sequence is $3n - 28$. Which of the following is/are true?
- I. -16 is a term of the sequence.
 - II. The sequence has 8 negative terms.
 - III. The sum of the first n terms of the sequence is $\frac{3n^2 - 53n}{2}$.
- A. I only
 - B. II only
 - C. I and III only
 - D. II and III only
38. For $0^\circ \leq x \leq 360^\circ$, how many roots does the equation $3\cos^2 x + \sin x = 3$ have?
- A. 2
 - B. 3
 - C. 4
 - D. 5

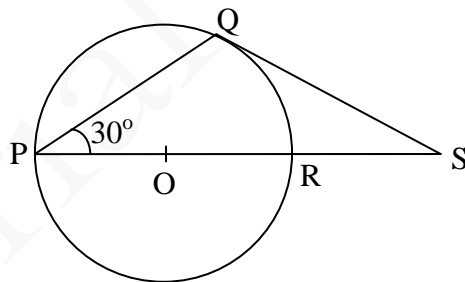
39. Let k be a positive constant and $-90^\circ < \theta < 90^\circ$. If the figure shows the graph of $y = \cos(kx^\circ + \theta)$, then

- A. $k = 2, \theta = 65^\circ$.
 B. $k = 2, \theta = -65^\circ$.
 C. $k = \frac{1}{2}, \theta = 65^\circ$.
 D. $k = \frac{1}{2}, \theta = -65^\circ$.



40. In the figure, O is the centre of the circle PQR . If $PORS$ is a straight line and QS is a tangent to the circle with radius 3 cm, find the length of QS .

- A. 1.5 cm
 B. $\sqrt{3}$ cm
 C. $2\sqrt{3}$ cm
 D. $3\sqrt{3}$ cm



41. Find the values of k such that the circle $x^2 + y^2 + kx - 4y + 6 = 0$ and the straight line $x - y + 6 = 0$ intersect at only one point.

- A. 4 or -20
 B. 4 or 20
 C. -4 or 20
 D. -4 or -20

42. Let O be the origin. If the coordinates of points A and B are $(0, 36)$ and $(24, 0)$ respectively, then the x -coordinate of the circumcentre of $\triangle OAB$ is

- A. 12.
 B. 18.
 C. 24.
 D. 36.

43. Amy and Bill form a queue with 7 other students. If Amy and Bill are not next to each other, how many different queues can be formed?
- A. 10 080
 - B. 80 640
 - C. 282 240
 - D. 322 560
44. Bag A contains 4 red balls, 4 green balls and 3 blue balls while bag B contains 2 red balls, 5 green balls and 4 brown balls. If one ball is drawn from each bag, then the probability that the two balls drawn are of different colours is
- A. $\frac{28}{121}$.
 - B. $\frac{40}{121}$.
 - C. $\frac{61}{121}$.
 - D. $\frac{93}{121}$.
45. Let x_1 , y_1 and z_1 be the median, the inter-quartile range and the standard deviation of a group of numbers $\{a, b, d, e\}$ respectively while x_2 , y_2 and z_2 be the median, the inter-quartile range and the standard deviation of a group of numbers $\{a + 1, b + 1, c + 1, d + 1, e + 1\}$ respectively where $a < b < c < d < e$. Which of the following must be true?
- I. $x_1 < x_2$
 - II. $y_1 = y_2$
 - III. $z_1 > z_2$
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III only

END OF PAPER