MOCK EXAM 7

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. $9^{250} \cdot 7^{500} =$

   A. 21^{500}.

   B. 21^{750}.

   C. 63^{500}.

   D. 63^{750}.

2. If $\frac{a+x}{b+x} = \frac{c}{d}$, then $x =$

   A. $\frac{c}{d} - \frac{a}{b}$.

   B. $\frac{a-c}{b-d}$.

   C. $\frac{ad-bc}{c-d}$.

   D. $\frac{bc-ad}{c-d}$.

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

   A. 0.

   B. $8y^2$.

   C. $12xy$.

   D. $24xy$.

4. 0.0235576 =

   A. 0.024 (correct to 3 significant figures).

   B. 0.0235 (correct to 4 decimal places).

   C. 0.002356 (correct to 5 significant figures).

   D. 0.023558 (correct to 6 decimal places).

5. The price of 3 oranges and 5 pears is $44. If the price of 4 oranges and 6 pears is $54, then the price of 7 oranges and 3 pears is

   A. $34

   B. $42

   C. $50

   D. $58

6. Let $f(x) = x^3 - 3x^2 - 5x + 1$. Find the remainder when $f(x)$ is divided by $x + 2$.

   A. –9

   B. –5

   C. 5

   D. 9

7. The solution of $\frac{2-3x}{4} \geq 2$ or $6 + 7x \leq -1$ is

   A. $x \leq -2$

   B. $x \leq -1$

   C. $-2 \leq x \leq -1$

   D. $x \leq -2$ or $x \geq -1$

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8. Let a be a constant. If the quadratic equation $x^2 + ax + a = -8$ has equal roots, then $a =$

A. 8 or –4.

B. 0 or –4.

C. 0 or 4.

D. –8 or 4.

9. Which of the following statements about the graph of $y = -2(-x + 6)^2 + 8$ is true?

A. The graph opens downwards.

B. The graph does not cut the x-axis.

C. The y-intercept of the graph is 8.

D. The graph passes through the point (–6, 8).

10. The price of mobile phone A is 20% higher than that of mobile phone B while the price of mobile phone B is 20% lower than that of mobile phone C. It is given that the price of mobile phone A is \$4 800. The price of mobile phone C is

A. \$4 608.

B. \$4 800.

C. \$5 000.

D. \$6 912.

11. If $x : y = 3 : 4$ and $y : z = 6 : 1$, then $(x + y) : (y + z) =$

A. 1 : 8.

B. 1 : 1.

C. 3 : 2.

D. 9 : 5.

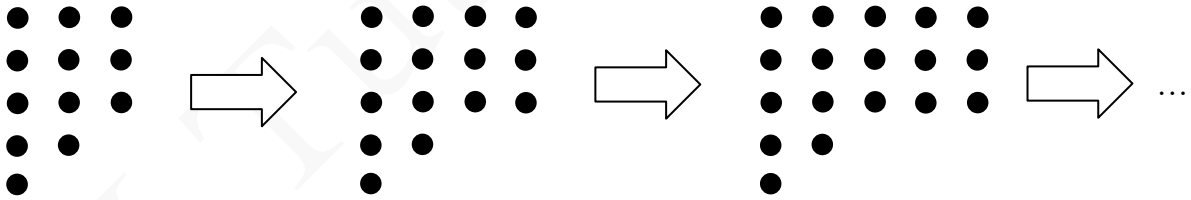
12. It is given that z varies directly as $\sqrt{x}$ and inversely as y. If x is increased by 44% and z is decreased by 4%, then y is

    A. increased by 25%.
    B. increased by 75%.
    C. decreased by 40%.
    D. decreased by 4.8%.

13. The cost of Tea A is \$12 / kg. If 300 g of Tea A and 200 g of Tea B are mixed so that the cost of the mixture is \$18 / kg, find the cost of Tea B.

    A. \$15 / kg
    B. \$22 / kg
    C. \$24 / kg
    D. \$27 / kg

14. In the figure, the 1st pattern consists of 12 dots. For any positive integer n, the $(n + 1)$th pattern is formed by adding 3 dots to the nth pattern. Find the number of dots in the 8th pattern.



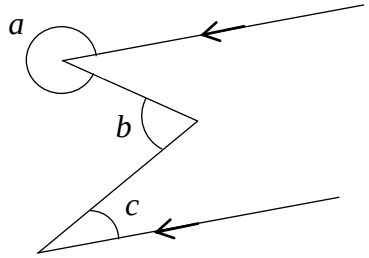
    A. 36
    B. 33
    C. 30
    D. 27

15. According to the figure, which of the following must be true?

I. $a + c = 360^o$

II. $a + b - c = 360^o$

III. $b + c = 180^o$



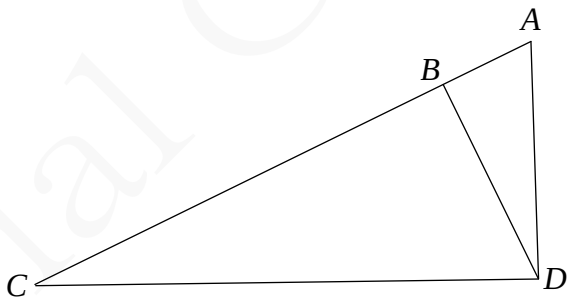
A. I only

B. II only

C. I and III only

D. II and III only

16. In the figure, ABC is a straight line. If $AB = 7$ cm, $AD = 25$ cm, $BD = 24$ cm and $AC = 52$ cm, then $CD =$



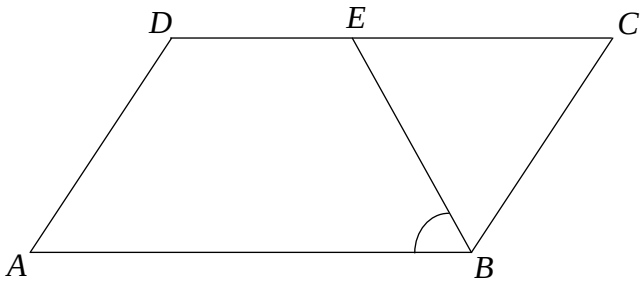
A. 69 cm.

B. 51 cm.

C. 49 cm.

D. 32 cm.

17. In the figure, $ABCD$ is a parallelogram. E is a point lying on CD such that $BC = BE$. If $\angle ADC = 122^o$, then $\angle ABE =$



A. 58^o

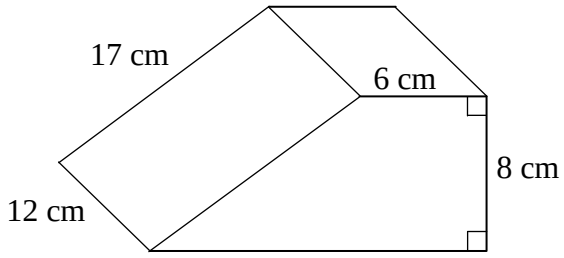
B. 61^o

C. 62^o

D. 64^o

18. The figure shows a right prism. Find the total surface area of the prism.

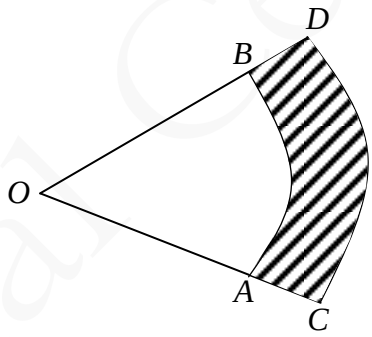
A. 624 cm^2.
B. 720 cm^2.
C. 840 cm^2.
D. 1296 cm^2.



19. In the figure, *OAB* and *OCD* are sectors with centre *O*, where *OA* = 16 cm, *AC* = 4 cm and $\overset{\frown}{CD}$ = 5π cm. Which of the following is/are true?

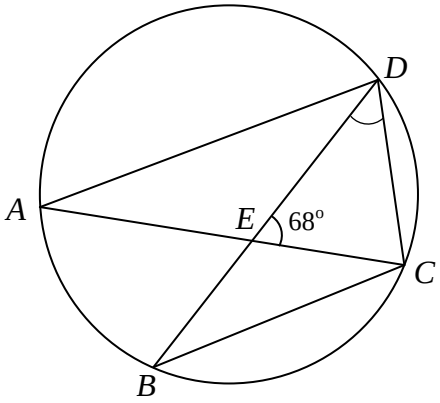
I. The angle of the sector *OAB* is 45°.
II. The perimeter of the sector *OAB* is 4π cm.
III. The area of the shaded region is 18π cm^2.

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



20. In the figure, *ABCD* is a circle. *AC* and *BD* intersect at *E*. If *AD* // *BC*, ∠*DEC* = 68° and *AD* = *BD*, then ∠*CDE* =

A. 34°.
B. 39°.
C. 56°.
D. 73°.



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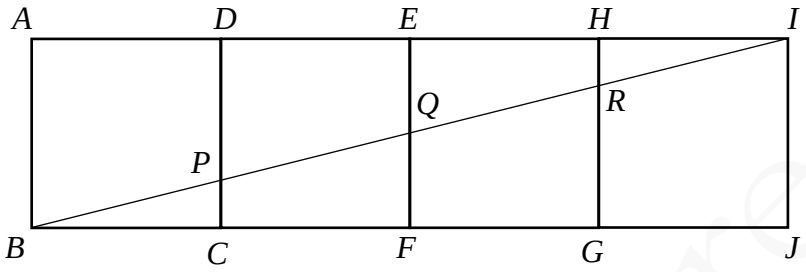
21. In the figure, *ABCD*, *CDEF*, *EFGH* and *GHIJ* are squares. *BI* cuts *CD*, *EF* and *GH* at *P*, *Q* and *R* respectively. Find the ratio of the area of quadrilateral *DEQP* to the area of quadrilateral *RGJI*.

A. 2 : 3
B. 3 : 4
C. 5 : 7
D. 9 : 16

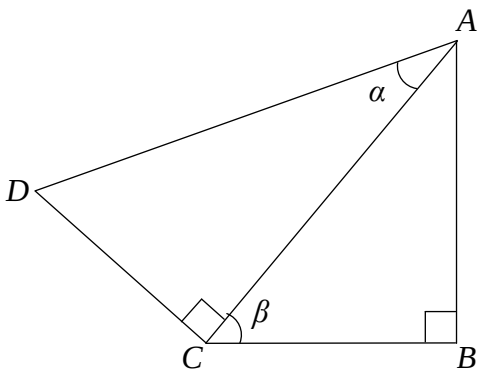


22. If the sum of the interior angles of a regular *n*-sided polygon is 9 times the sum of the exterior angles of the polygon, which of the following is true?

A. The value of *n* is 18.
B. Each interior angle of the polygon is 160^{o}.
C. The number of folds of rotational symmetry is 18.
D. Each exterior angle of the polygon is 18^{o}.

23. In the figure, $\frac{AB}{AD}$ =

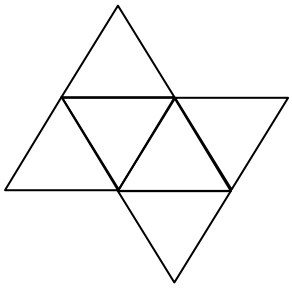
A. tan α sin β
B. tan α cos β
C. sin α cos β
D. cos α sin β



24. The coordinates of the points *A* and *B* are (7, –2) and (–9, 6) respectively. If *C* is a point lying on the straight ling $2x + y = 0$ such that *AC* = *BC*, the *y*-coordinate of *C* is

A. –2.
B. –1.
C. 1.
D. 2.

25. The figure below consists of six identical equilateral triangles. The number of axes of reflectional symmetry of the figure is



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

26. The equation of the circle C is $3x^2 + 3y^2 + 18x - 24y + 56 = 0$. Which of the following are true?

I. The origin lies outside C.
II. The coordinates of the centre of C are $(-3, 4)$.
III. The radius of C is 13.

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

27. If the straight lines $5x - 2y - 4 = 0$ and $hx + ky - 8 = 0$ are perpendicular to each other and intersect at a point on the x-axis, then k =

A. 2.
B. 5.
C. 10.
D. 25

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28. A bag contains n blue marbles and 30 red marbles. If a marble is randomly drawn from the bag, then the probability of drawing a blue marble is $\frac{1}{n+2}$. Find the value of n.

A. 5

B. 6

C. 25

D. 35

29. A box contains of 1 red card, 2 green cards and 7 blue cards. In a lucky draw, a card is randomly drawn from the box and a certain number of tokens will be awarded according to the following table:

Colour of the card drawn	Red	Green	Blue
Number of tokens awarded	80	60	10

Find the expected number of tokens awarded in the lucky draw.

A. 10

B. 27

C. 50

D. 69

30. If the mean and the mode of the numbers 5, 9, 6, 4, 5, 8, 7, x, y and z are 7 and 9 respectively, then the median of these numbers is

A. 6.5.

B. 7.

C. 7.5.

D. 8.

Section B

31. The L.C.M. of $4x^3y^2z$, $6xy^3$ and $8x^2yz^3$ is

A. $2xy$.

B. $2xyz$.

C. $24x^3y^3z^3$.

D. $24x^6y^6z^4$.

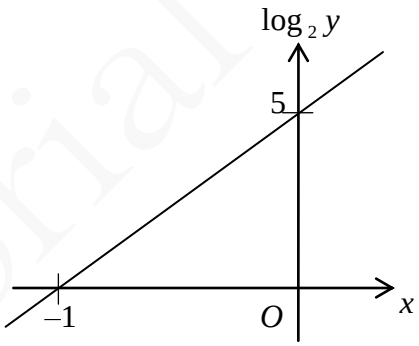
32. The graph in the figure shows the linear relation between $\log_2 y$ and x. If $y = ab^x$, then b =

A. $\frac{1}{2}$

B. 2

C. 25

D. 32



33. $ED0000CB00000_{16}$ =

A. $237 \times 16^{11} + 203 \times 16^5$.

B. $254 \times 16^{11} + 220 \times 16^5$.

C. $237 \times 16^{12} + 203 \times 16^6$.

D. $254 \times 16^{12} + 203 \times 16^6$.

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34. If β is a real number, then $\dfrac{\beta^2+9}{\beta-3i} =$

A. $\beta-3i$.

B. $\beta+3i$.

C. $3+\beta i$.

D. $3-\beta i$.

35. Consider the following system of inequalities:

$$\begin{cases} 3x-2y \le 5 \\ 4x+y \ge 3 \\ 6x+7y \le 65 \end{cases}$$

Let R be the region which represents the solution of the above system of inequalities. If (x, y) is a point lying in R, then the greatest value of $3x-4y+18$ is

A. 8.

B. 13.

C. 25.

D. 32.

36. Let a_n be the nth term of a geometric sequence. If $a_5 = 24$ and $a_9 = 96$, which of the following must be true?

I. The common ratio of the sequence is more than 1.

II. Some of the terms of the sequence are irrational numbers.

III. The sum of the first 99 terms of the sequence is greater than 1.9×10^{15}.

A. I only

B. II only

C. I and III only

D. II and III only

37. For $0^o \le \theta \le 360^o$, how many roots does the equation $4\cos^2 \theta + 7\cos \theta + 3 = 0$ have?

A. 2

B. 3

C. 4

D. 5

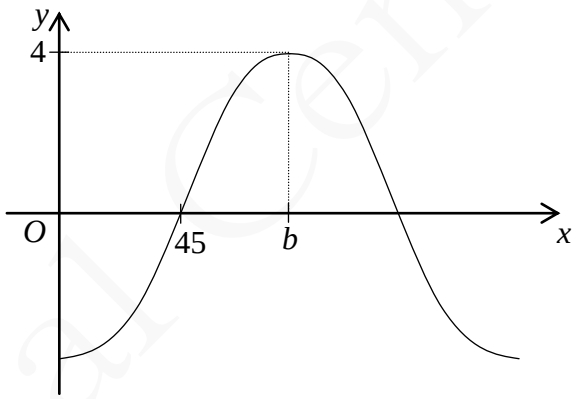
38. Let a and b be constants. If the figure shows the graph of $y = a \sin 3(x^o + \theta)$ for $\theta > 0^o$, then

A. $a = -4$ and $b = 75$.

B. $a = -4$ and $b = 90$.

C. $a = 4$ and $b = 75$.

D. $a = 4$ and $b = 90$.



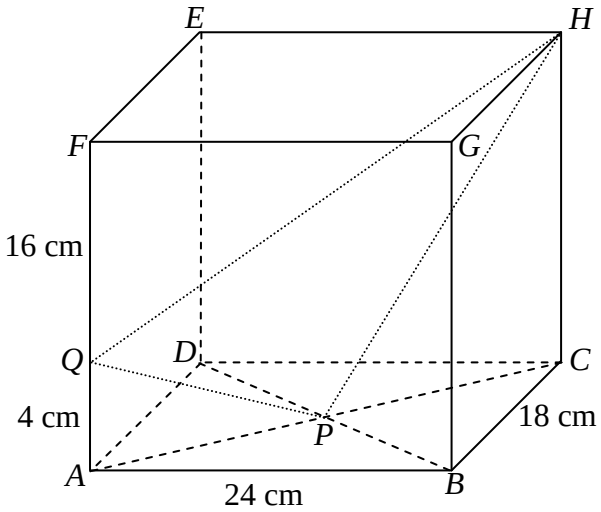
39. In the figure, $ABCDEFGH$ is a rectangular block. AC and BD intersect at P. Q is a point lying on AF such that $AQ = 4$ cm and $QF = 16$ cm. Find $\sin \angle PHQ$.

A. $\frac{36}{85}$

B. $\frac{77}{85}$

C. $\frac{29}{5\sqrt{241}}$

D. $\frac{181}{17\sqrt{241}}$



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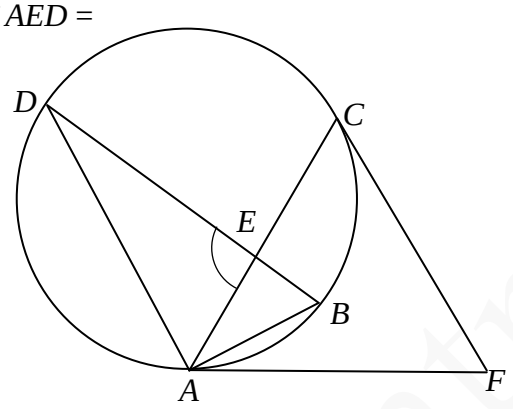
40. In the figure, *BD* is a diameter of the circle *ABCD*. *FA* and *FC* are tangents to the circle. *AC* and *BD* intersect at *E*. If *AC* = *AD* and $\angle AFC = 66^o$, then $\angle AED$ =



A. 57^o.
B. 66^o.
C. 81^o.
D. 90^o.

41. The straight line $x + 2y + 7 = 0$ and the circle $x^2 + y^2 - 8x + 6y - 5 = 0$ intersect at *A* and *B*. Find the *x*-coordinate of the mid-point of *AB*.

A. 13
B. 3
C. –5
D. –17

42. There are 6 red balls, 7 green balls and 8 blue balls in a bag. If 4 balls are randomly drawn from the bag, find the probability that at least 1 green ball is drawn.

A. $\frac{44}{57}$
B. $\frac{364}{855}$
C. $\frac{712}{855}$
D. $\frac{335}{336}$

43. There are 15 S6 students and 18 S5 students in a group. If 8 students are selected from the group to form a committee consisting of at most 3 S5 students, how many different committees can be formed?

A. 888 030
B. 2 450 448
C. 3 338 478
D. 6 368 778

44. The stem-and-leaf diagram below shows the distribution of the scores (in marks) of a group of students in a mathematics test. Peter gets the highest score in the test.

Stem (tens)	Leaf (units)
5	2 3 3
6	0 3 3 5 6 7 9
7	1 2 2 4 5 9
8	0 0 4 8

Which of the following is/are true?

I. The standard deviation of the distribution is greater than 10.

II. The inter-quartile range of the distribution is 14 marks.

III. The standard score of Peter in the test is lower than 2.

A. I only

B. II only

C. I and III only

D. II and III only

45. It is given that T(n) is the nth term of an arithmetic sequence. Let x_1, y_1 and z_1 be the median, the interquartile range and the variance of the group of numbers { T(1), T(2), T(3),…, T(30)} respectively while x_2, y_2 and z_2 be the median, the interquartile range and the variance of the group of numbers { T(31), T(32), T(33),…, T(60)} respectively Which of the following must be true?

I. $x_1 < x_2$

II. $y_1 = y_2$

III. $z_1 = z_2$

A. I only

B. II only

C. I and III only

D. II and III only

END OF PAPER

