



Junior Maths Mastery Challenge 2025

Paper F

Student Name: _____

Student No.: _____

DO NOT OPEN THIS BOOKLET UNTIL INSTRUCTED.

Calculators are **not** allowed.

Read the instructions on the **answer sheet** and fill in your **name, school** and **other information**.

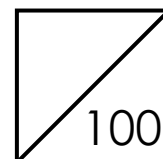
Record your answers in your **answer sheet**.

You have **1 hour 30 minutes** to answer all 25 questions.



Junior Maths Mastery Challenge (2025)

Paper F



Section A (70 marks)

Questions 1 to 10 carry 3 marks each.

1. If we subtract 18 from the sum of $17p$ and $19p$ where p is a whole number greater than 0, which of the following is **not always** a factor of the result?

- (A) 2 (B) 3 (C) 6
(D) 7 (E) 9

2. Find the value of the following.

$$\left(1 - \frac{1}{2}\right) \div \left(1 - \frac{1}{3}\right) \div \left(1 - \frac{1}{4}\right) \div \dots \div \left(1 - \frac{1}{99}\right) \div \left(1 - \frac{1}{100}\right)$$

- (A) $\frac{1}{100}$ (B) $\frac{1}{4}$ (C) 1
(D) 25 (E) 50



3. $1 \div \frac{1}{4}$ can be written as $\frac{1}{\frac{1}{4}}$. Find the value of $\frac{1}{1 + \frac{1}{1 + \frac{1}{2}}}$.

(A) $\frac{2}{3}$

(B) $\frac{3}{5}$

(C) $1\frac{1}{3}$

(D) $1\frac{1}{2}$

(E) $1\frac{2}{3}$

4. Find the value of the following.

$$(3939 \times 5.5 + 39.39 \times 5) \div 55.5$$

(A) 3.939

(B) 39.39

(C) 393.9

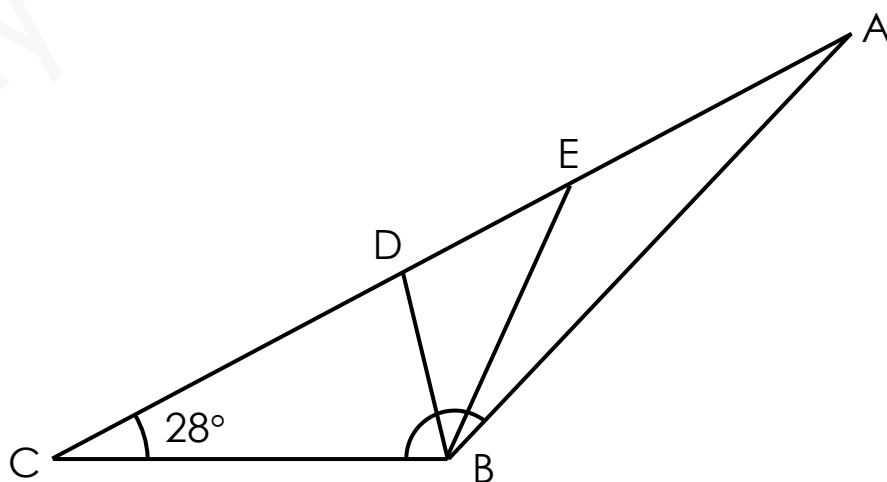
(D) 3939

(E) 39 390

5. There are two pipes, A and B, connected to an empty pool. Pipe A can fill the empty pool completely in 6 h. Pipe B can empty a completely filled pool in 10 h. If both pipes are turned on at the same time, how many hours does it take to fill the pool completely?

- (A) $3\frac{3}{4}$ h (B) 12 h (C) 14 h
(D) 15 h (E) 16 h

6. The figure shows Triangle ABC such that $CD = CB$, $DE = DB$ and $EA = EB$. $\angle ACB = 28^\circ$. The figure is not drawn to scale. Find $\angle ABC$.



- (A) 129° (B) 131° (C) 133°
(D) 135° (E) 137°



7. What is the percentage increase in the area of a square if the length of each side is doubled?

(A) 100% (B) 200% (C) 300%
(D) 400% (E) 500%

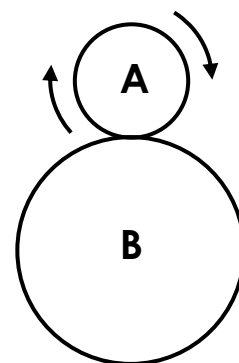
8. The average height of 5 boys and 3 girls is 143 cm. The average height of the boys is 8 cm more than that of the girls. Find the average height of the boys.

(A) 135 cm (B) 138 cm (C) 147 cm
(D) 151 cm (E) None of the above

9. John calculates the difference, sum and product of the date and month of his birth. The ratio of the difference to the sum to the product is 1 : 5 : 30. What is his birthdate?

(A) 2 February (B) 9 March (C) 4 June
(D) 15 October (E) 8 December

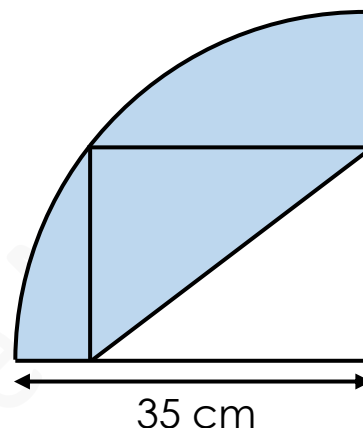
10. Ben rolls a circular disc, A, along the circumference of another circular disc, B. The radius of Disc B is twice the radius of Disc A. How many full turns does Disc A need to make to return to its starting point?



(A) 2 (B) 3 (C) 4
(D) 6 (E) 9

Questions 11 to 20 carry 4 marks each.

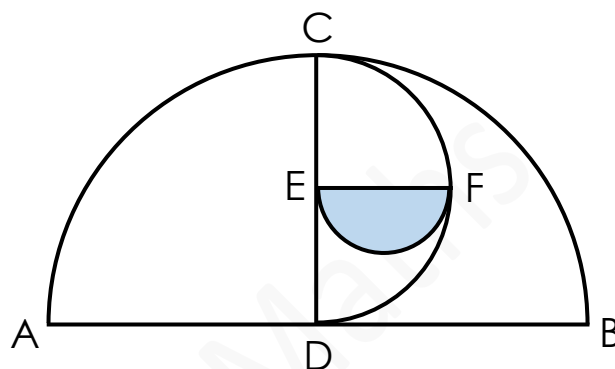
11. The figure shows a rectangle in a quarter circle with a radius of 35 cm. The perimeter of the rectangle is 98 cm. Find the perimeter of the shaded part. Take $\pi = \frac{22}{7}$.



- (A) 111 cm (B) 113 cm (C) 125 cm
(D) 133 cm (E) None of the above
12. The average age of all the teachers and parents in a room is 32 years. The average age of the teachers is 26 years. The average age of the parents is 34 years. What is the possible number of teachers and parents in the room?

- (A) 10 (B) 14 (C) 18
(D) 20 (E) 25

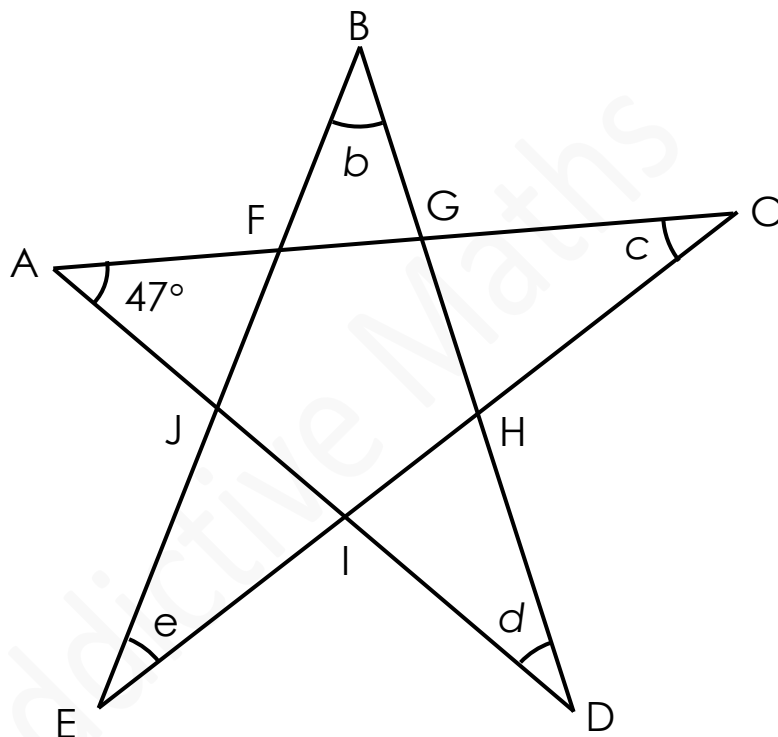
13. The figure shows two semicircles in a large semicircle.
AB, CD and EF are diameters of the semicircles.
The area of the shaded semicircle is 36 cm^2 .
Find the area of the figure.



- (A) 144 cm^2 (B) 288 cm^2 (C) 324 cm^2
(D) 576 cm^2 (E) None of the above
14. A bag contains blue and red beads in the ratio $3 : 5$.
Amy and Betty share the beads in the ratio $1 : 2$.
The number of blue and red beads Amy gets is in the ratio $1 : 3$. What fraction of Betty's beads are blue?

- (A) $\frac{1}{4}$ (B) $\frac{3}{8}$ (C) $\frac{7}{16}$
(D) $\frac{1}{2}$ (E) None of the above

15. In the figure, AC, AD, BE, BD and CE are straight lines. $\angle CAD = 47^\circ$. The figure is not drawn to scale. Find the sum of $\angle b$, $\angle c$, $\angle d$ and $\angle e$.



- (A) 133° (B) 217° (C) 243°
(D) 313° (E) None of the above



16. At first, a tank contains 9 L of salt solution, made up of 95% water and 5% salt. A bottle of salt solution, made up of 75% water and 25% salt, is poured into the tank. The solution in the tank now is made up of 90% water and 10% salt. How many litres of salt solution did the bottle contain?

- (A) 1 L (B) 3 L (C) 6 L
(D) 7 L (E) None of the above



17. Tina made some bookmarks to sell at a school fair from Wednesday to Sunday.

On Wednesday, she sold $\frac{1}{6}$ of the bookmarks.

On Thursday, she sold $\frac{1}{5}$ of the remaining bookmarks.

On Friday, she sold $\frac{1}{4}$ of the remaining bookmarks.

On Saturday, she sold $\frac{1}{3}$ of the remaining bookmarks.

On Sunday, she sold $\frac{1}{2}$ of the remaining bookmarks.

She had 25 bookmarks left in the end. How many bookmarks did she make at first?

(A) 60

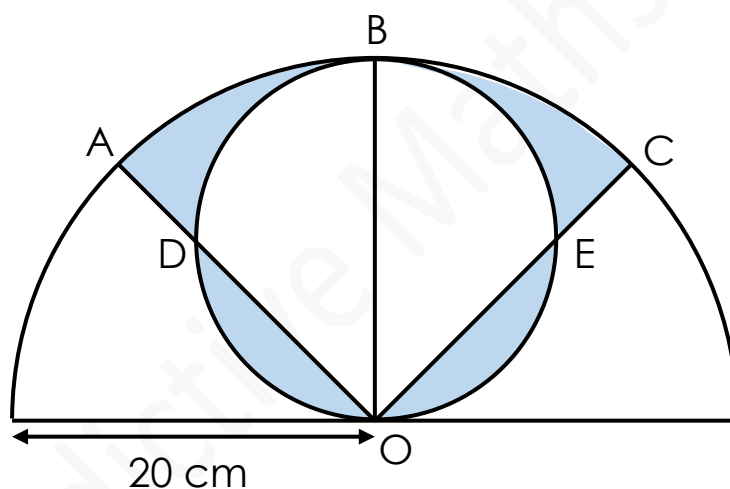
(B) 96

(C) 120

(D) 150

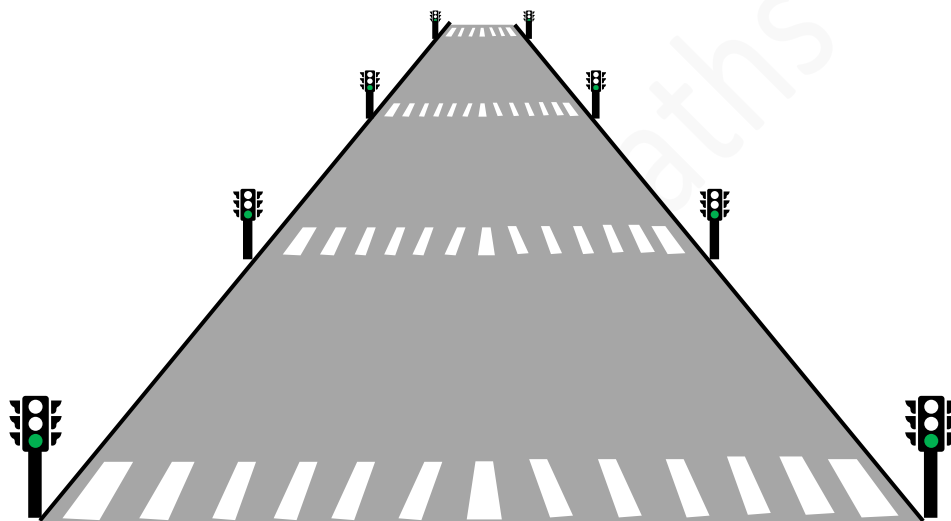
(E) None of the above

18. In the figure, a small circle touches a large semicircle with centre O and radius 20 cm exactly at points O and B . Points A and C are on the semicircle. OA and OC are straight lines cutting through the small circle at points D and E . Points D and E are midpoints of the arcs from O to B . Find the total area of the shaded parts. Take $\pi = 3.14$.



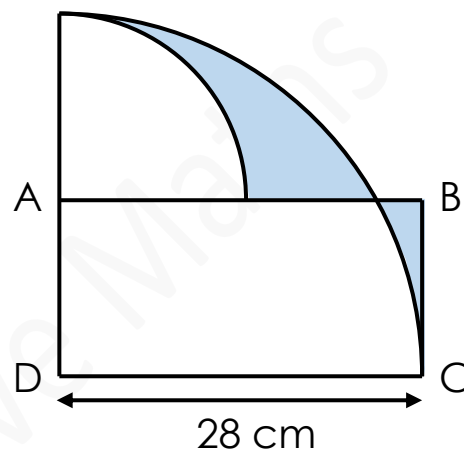
- (A) 114 cm^2 (B) 157 cm^2 (C) 188.4 cm^2
(D) 314 cm^2 (E) None of the above

19. There are four consecutive sets of traffic lights along a street. Each set of lights is green for 1.5 minutes, then amber for 3 seconds and then red for 1 minute. Each set of lights turns red 8 seconds after the previous set turns red. Find the longest duration when all the lights are green.



- (A) 24 s (B) 32 s (C) 58 s
(D) 1 min 6 s (E) 1 min 22 s

20. The figure shows two quarter circles and Rectangle ABCD. The radius of the smaller quarter circle is equal to the breadth of Rectangle ABCD. Find the difference in area between the two shaded parts. Take $\pi = \frac{22}{7}$.



- (A) 56 cm^2 (B) 70 cm^2 (C) 224 cm^2
(D) 238 cm^2 (E) None of the above



Section B (30 marks)

Questions 21 to 25 carry 6 marks each.

21. A box contained some blue and red balls in the ratio $2 : 5$.

Paul added some blue balls to the box. The ratio of the number of blue balls to that of red balls became $3 : 2$.

He then added some red balls to the box. The ratio of the number of blue balls to that of red balls became $2 : 3$.

Given that he added 12 fewer blue balls than red balls to the box, how many balls did the box contain at first?



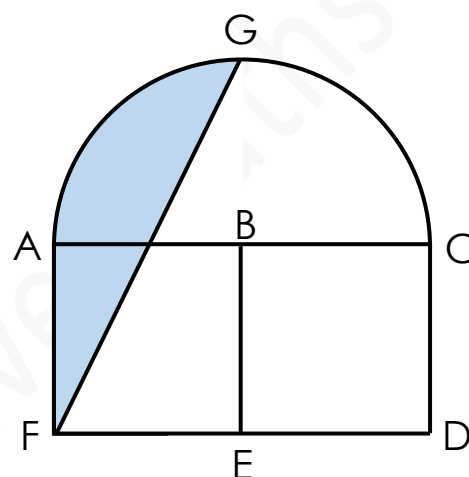
22. Ash and Ben are building a model ship together.

If Ash starts, and builds the model ship for 25 minutes, then Ben takes over, he will complete it in 60 minutes.

If Ben starts, and builds the model ship for 36 minutes, then Ash takes over, he will complete it in 33 minutes.

How many minutes will they take to build the model ship together if they start at the same time? Give your answer correct to 2 decimal places where necessary.

23. The figure shows a semicircle and two squares, ABEF and BCDE. Point B is the midpoint of AC and G is the midpoint of the arc AC. The perimeter of the figure is $42\frac{6}{7}$ cm. Find the area of the shaded part in cm^2 . Give your answer correct to 2 decimal places. Take $\pi = \frac{22}{7}$.



24. The figure shows a rectangular piece of paper of area 256 cm^2 folded along a dotted line AB (Figure 1).

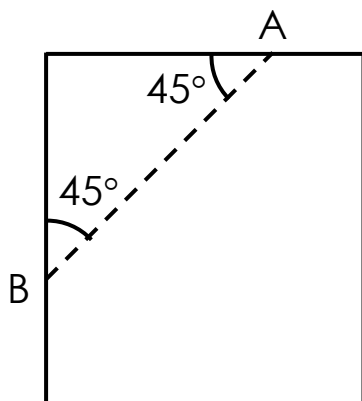


Figure 1

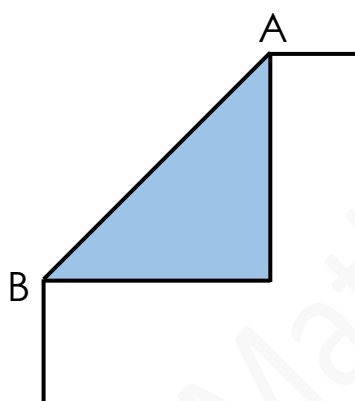


Figure 2

In Figure 2, the ratio of the area of the shaded part to that of the unshaded part is $1 : 2$. Find the length of AB in centimetres.



25. Five guards, P, Q, R, S and T, are assigned to an event for 5 days from Monday to Friday.

- Each day, 3 guards are on duty and 2 guards are on their day off.
- No guards can be on duty for 3 consecutive days.
- No guards can be on their day off for 2 consecutive days.
- Guard Q is on duty for 2 more days than Guard R.
- Guards P and T are on duty on the same day only once.
- Guard P is on duty on Tuesday.

Which guards are on duty on Friday?

END OF PAPER

Seriously Addictive Maths

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