Section B [48 marks]

Answer **four** questions in this section.

Each question in this section carries 12 marks.

8 Ahmed throws a ball to John.
The ball travels 10 metres at an average speed of x metres per second.

(a) Write an expression, in terms of x, for the time taken, in seconds, for the ball to travel from Ahmed to John. [1]

(b) John then throws the ball to Pierre.
The ball travels 15 metres.
The ball's average speed is 0.5 metres per second greater than the ball's average speed from Ahmed to John.

Write an expression, in terms of x, for the time taken, in seconds, for the ball to travel from John to Pierre. [1]

(c) The time taken between John catching the ball and then throwing it to Pierre is 2 seconds.
The total time taken for the ball to travel from Ahmed to Pierre is 7 seconds.

Write down an equation in x, and show that it simplifies to

$$2x^2 - 9x - 2 = 0.$$ [3]

(d) Solve the equation $2x^2 - 9x - 2 = 0$, giving each answer correct to 2 decimal places. [4]

(e) **(i)** Find the average speed, in metres per second, of the ball as it travels from John to Pierre. [1]

(ii) How much longer does it take for the ball to travel from John to Pierre than from Ahmed to John?
Give your answer in seconds. [2]

Section B [48 marks]

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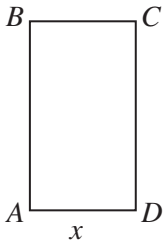
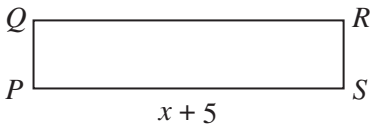
7





ABCD and *PQRS* are rectangles.
Each rectangle has an area of $13\,\text{cm}^2$.
$AD = x$ centimetres and $PS = (x + 5)$ centimetres.

(a) Find, in terms of x, an expression for

(i) AB, [1]

(ii) PQ. [1]

(b) Given that AB is 3 cm greater than PQ, form an equation in x and show that it simplifies to

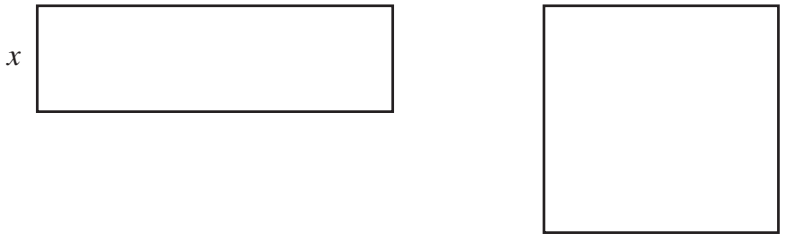
$$3x^2 + 15x - 65 = 0.$$ [3]

(c) Solve the equation $3x^2 + 15x - 65 = 0$, giving each answer correct to 2 decimal places. [4]

(d) **(i)** Show that the perimeter of *ABCD* is 14.9 cm, correct to 3 significant figures. [1]

(ii) Find the difference between the perimeters of the two rectangles. [2]

10



A piece of wire, 28 cm in length, is cut into two parts.
One part is used to make a rectangle and the other a square.

The length of the rectangle is three times its width.
The width of the rectangle is x centimetres.

(a) (i) Write down an expression, in terms of x, for the length of the rectangle.

Answer ..... cm [1]

(ii) Find, and simplify, an expression, in terms of x, for the length of a side of the square.

Answer ..... cm [2]

(b) It is given that the area of the rectangle is equal to the area of the square.

(i) Form an equation in x and show that it reduces to $x^2 - 28x + 49 = 0$.

[2]

(ii) Solve the equation $x^2 - 28x + 49 = 0$, giving each solution correct to 3 significant figures.

Do not write in this margin

Answer $x =$ ..... or ..... [4]

(iii) Which solution represents the width of the rectangle?
Give a reason for your answer.

Answer The width of the rectangle is .....cm because .....

..... [2]

(iv) Calculate the area of the square.

Answer .....cm^2 [1]

Section B [48 marks]

Answer **four** questions in this section.

Each question in this section carries 12 marks.

7 **(a)** $x = \sqrt{a^2 + b^2}$

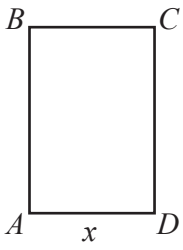
(i) Calculate x when $a = -0.73$ and $b = 1.84$.

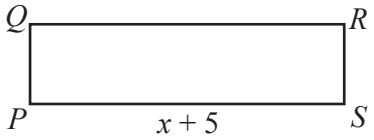
Answer ..... [1]

(ii) Express b in terms of x and a.

Answer $b =$ ..... [2]

(b)





$ABCD$ and $PQRS$ are rectangles.
$AD = x$ cm and $PS = (x + 5)$ cm.
Each rectangle has an area of 17 cm^2.

(i) Write down an expression for PQ in terms of x.

Answer $PQ =$ ..... cm [1]

(ii) AB is 3 cm longer than PQ.

Form an equation in x and show that it simplifies to $3x^2 + 15x - 85 = 0$.

[3]

(iii) Solve the equation $3x^2 + 15x - 85 = 0$.
Give your solutions correct to 3 significant figures.

Answer $x =$ ..... or ..... [3]

(iv) Find the perimeter of the rectangle $PQRS$.

Answer ..... cm [2]

5 **(a)** Express as a single fraction in its simplest form $\frac{4}{x-2} - \frac{5}{x+1}$.

Answer ..... [2]

(b) Solve $2x(x + 1) = 3(4 - x)$.

Answer $x =$ ..... or ..... [3]

(c) Anil and Yasmin buy some pens and notebooks from the same shop.

Anil buys 3 pens and 2 notebooks for \$4.80 .
Yasmin buys 5 pens and 4 notebooks for \$9.00 .

(i) Form a pair of simultaneous equations to represent this information.

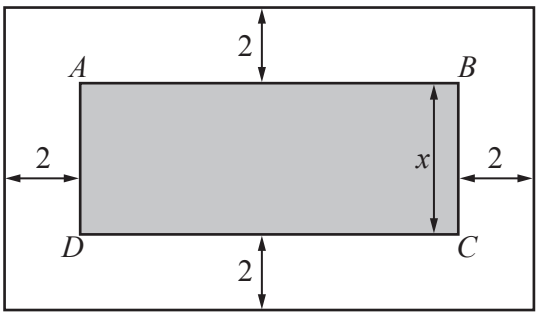
[1]

(ii) Solve the simultaneous equations to find the cost of a pen and the cost of a notebook.

Answer Cost of pen = \$ .....

Cost of notebook = \$ .....[3]

10 A rectangular picture, $ABCD$, is placed inside a rectangular frame.



The length, AB, of the picture is three times its height, x cm.
The width of the frame is 2 cm.

(a) The total area of the picture and the frame is 476 cm^2.

Form an equation in x and show that it simplifies to $3x^2 + 16x - 460 = 0$.

[4]

(b) Solve the equation $3x^2 + 16x - 460 = 0$.

Answer $x =$ ..... or ..... [3]

(c) Find the height and length of the **frame**.

Answer Height = ... cm

Length = ... cm [2]

(d) The frame is made from wood.
The wood is 5 mm thick.
The mass of 1 cm^3 of the wood is 0.7 g.

Calculate the mass of wood used in the frame.

Answer ..... g [3]

9 **(a)** On Monday, Ravi goes on a 20 km run.

(i) His average speed for the first 12 km is x km/h.

Write down an expression, in terms of x, for the time taken for the first 12 km.
Give your answer in minutes.

Answer ..... minutes [1]

(ii) His average speed for the final 8 km of the run is 1.5 km/h slower than for the first 12 km.

Write an expression, in terms of x, for the time taken for the final 8 km of the run.
Give your answer in minutes.

Answer ..... minutes [1]

(iii) Ravi takes 110 minutes to complete the full 20 km.

Form an equation in x and show that it simplifies to $22x^2 - 273x + 216 = 0$.

[4]

(iv) Solve the equation $22x^2 - 273x + 216 = 0$.
Show your working and give each answer correct to 2 decimal places.

Answer $x =$ ..... or $x =$ ..... [3]

(b) On Friday, Ravi ran the whole 20 km at the same average speed that he ran the final 8 km on Monday.

Calculate the time Ravi took to run 20 km on Friday.
Give your answer in hours and minutes, correct to the nearest minute.

Answer ..... hours ..... minutes [3]

[Turn over