AREA AND PERIMETER

DATE OF SOLUTIONS: 15/05/2018
MAXIMUM MARK: 68

SOLUTIONS

GCSE (+ IGCSE) EXAM QUESTION PRACTICE

1. [Edexcel, 2010] Area and Perimeter of 2D Shapes (Inc Circles) **[4 Marks]**

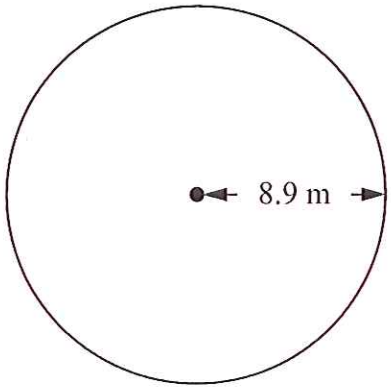


Diagram **NOT** accurately drawn

A circular pond has radius 8.9 m.

(a) Find the area of the pond.
Write down all the figures on your calculator display.
State the units of your answer.

$A = \pi r^2 \quad (r = 8.9)$

$= \pi \times 8.9^2$ M1

248.84555 A1 ..... m^2 A1

(3)

(b) Give the value of your area correct to 2 significant figures.

250 A1

(1)

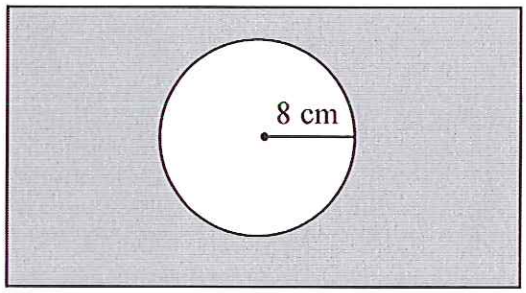


Diagram **NOT** accurately drawn

The diagram shows a circle inside a rectangle.

Work out the area of the shaded region.
Give your answer correct to 3 significant figures.

RECTANGLE

$32 \times 17 = 544$

CIRCLE

$\pi \times 8^2 = 201.06...$

(M) EITHER

SUBTRACT $= 342.93...$

(M1)

343 (A1)

..... cm^2

3. [Edexcel, 2004] Area and Perimeter of 2D Shapes (Inc Circles) **[4 Marks]**

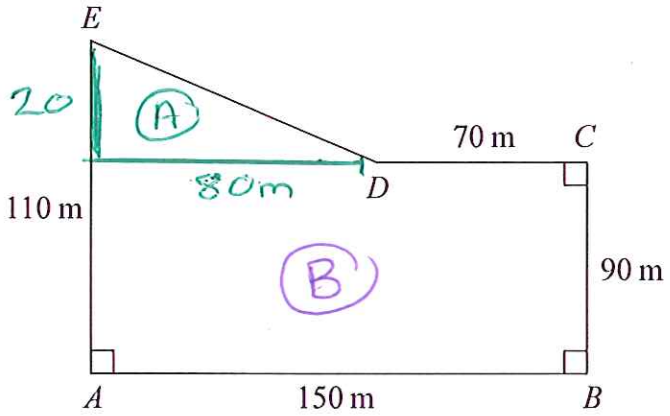


Diagram **NOT** accurately drawn

The shape $ABCDE$ is the plan of a field.
$AB = 150$ m, $BC = 90$ m, $CD = 70$ m and $EA = 110$ m.
The corners at A, B and C are right angles.

Work out the area of the field.

B1 [EITHER]

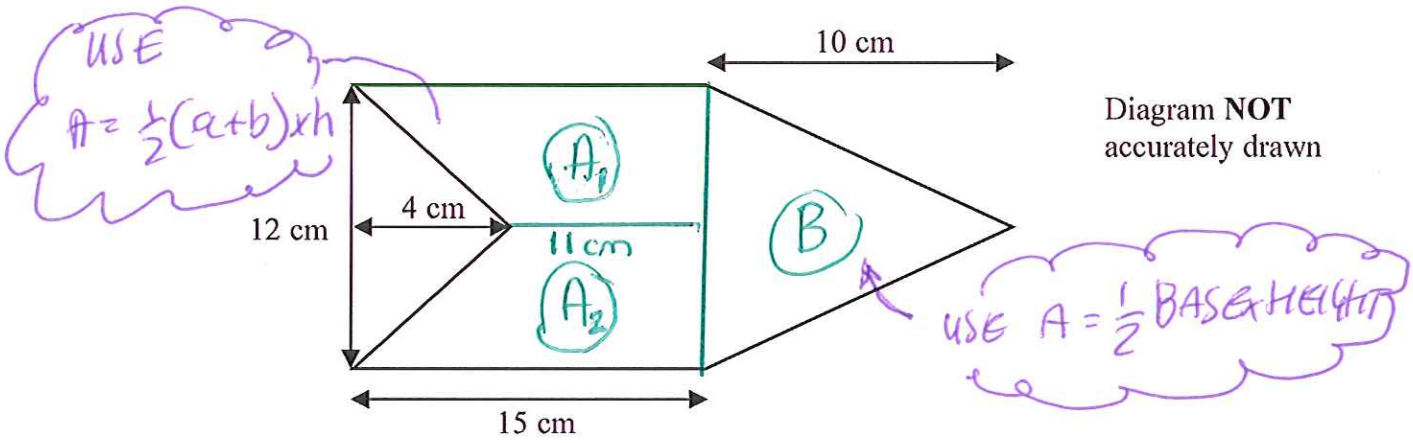
A = $\frac{80 \times 20}{2}$ = 800 A1

B = 150×90 = 13 500 A1

TOTAL = 13 500 + 800

= 14 300 m^2 A1

The diagram shows a shape with one line of symmetry.



Work out the area of the shape.

$A_1 = \frac{1}{2}(15+11)\times 6 = 78$ B1

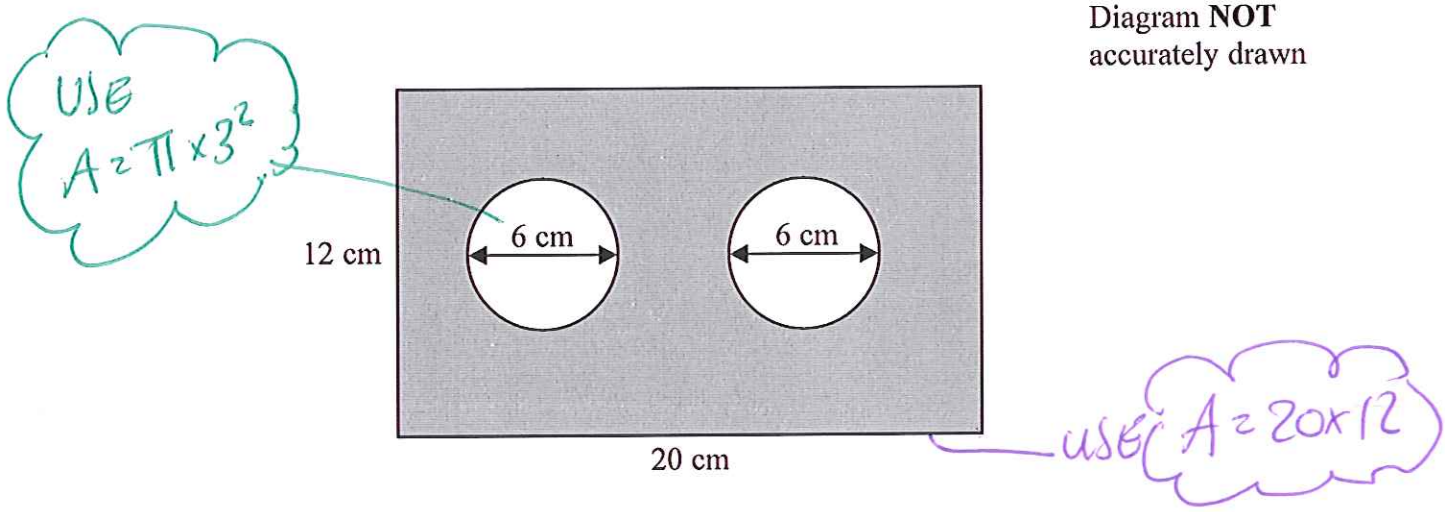
$A_2 = 78$

$B = \frac{1}{2}\times 12\times 10 = 60$ B1

TOTAL = $216\ cm^2$ A1

M1 [ADDING]

5. [Edexcel, 2014] Area and Perimeter of 2D Shapes (Inc Circles) **[4 Marks]**



The diagram shows a metal plate in the shape of a rectangle.
The rectangle has length 20 cm and width 12 cm.
Two identical circles, each of diameter 6 cm, have been cut out of the plate.

Work out the area of the shaded region of the metal plate.
Give your answer correct to the nearest cm^2.

RECTANGLE

$20 \times 12 = 240$ (M1)

CIRCLES

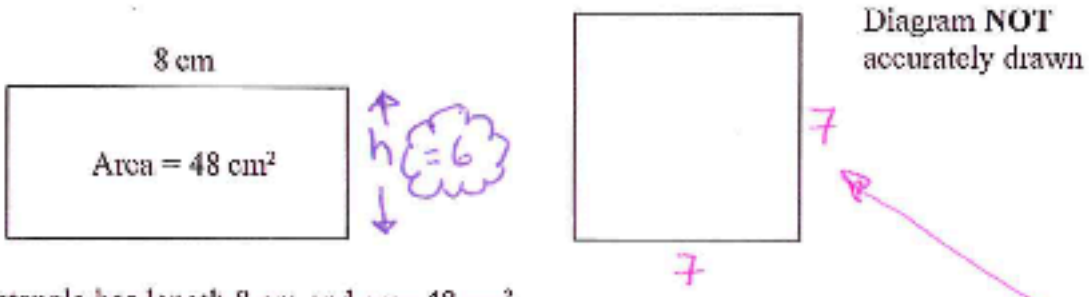
$2 \times \pi \times 3^2 = 56.548...$ (M1)

(M1) [SUBTRACT]

SHADED REGION $= 183.451...$

$= 183 cm^2$ (A1)

Here are a rectangle and a square.



The rectangle has length 8 cm and area 48 cm²
The perimeter of the square is the same as the perimeter of the rectangle.

Calculate the area of the square.

RECTANGLE

$h = \frac{48}{8}$

$= 6$ (M1)

∴ PERIMETER IS

$8+8+6+6 = \underline{\underline{28}}$ (M1)

∴ PERIMETER OF SQUARE

$= 28$

∴ SIDE $= \frac{28}{4}$

$= 7$ (M1)

AREA OF SQUARE IS

$7 \times 7 = \underline{\underline{49\ cm^2}}$

(A1)

The diagram shows a wall.

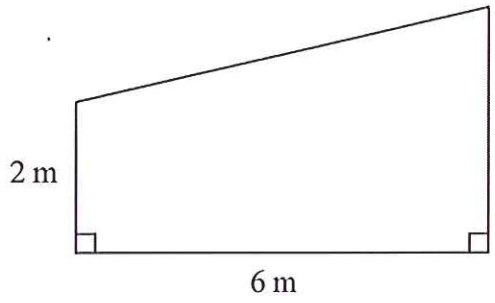


Diagram **NOT** accurately drawn

TRAPEZIUM, USE $A = \frac{1}{2}(a+b)h$

(a) Calculate the area of the wall.

$A = \frac{1}{2}(2+3) \times 6$ (M1)

[OTHER METHODS ARE ACCEPTABLE]

(A1)

15 ..... m^2

(2)

(b) 1 litre of paint covers an area of 20 m^2.
Work out the volume of paint needed to cover the wall.
Give your answer in cm^3.

1 LITRE = 1000 cm^3

FRACTION OF PAINT NEEDED $= \frac{15}{20}$ (M1)

(B1)

SO VOLUME $= \frac{15}{20} \times 1000$

(A1)

750 ..... cm^3

(3)

8. [Edexcel, 2007] Area and Perimeter of 2D Shapes (Inc Circles) **[6 Marks]**

(a) Calculate the area of a circle of radius 2 m.
Give your answer correct to 3 significant figures.

$A = \pi r^2$
$= \pi \times 2^2$ (M1)
$= 12.566...$

12.6 (A1) ..... m^2
(2)

(b) A circular pond has a radius of 2 m.
There is a path of width 1 m around the pond.

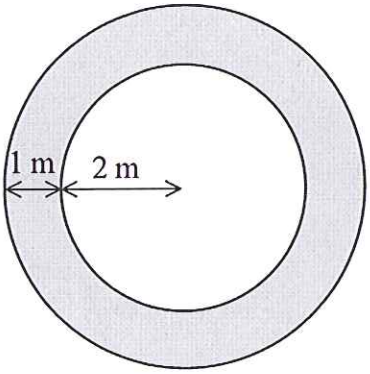


Diagram **NOT** accurately drawn

Calculate the area of the path.
Give your answer correct to 3 significant figures.

$A = \pi \times 3^2$ (M1)
$= 28.274...$

DO NOT USE 12.6!

FINAL AREA $= 28.274 - 12.566$
$= 15.708...$

15.7 (A1) ..... m^2
(2)

(c) Calculate the outer circumference of the path.
Give your answer correct to 3 significant figures.

$C = 2\pi r$ $(r = 3)$
$= 2 \times \pi \times 3$ (M1)
$= 18.849...$

18.8 (A1) ..... m
(2)

(a) Calculate the circumference of a circle of radius 40 m.
Give your answer correct to 3 significant figures.

$C = \pi D$

$= \pi \times 80$ (M1)

$= 251.327...$

251 (A1)

..... m

(2)

(b)

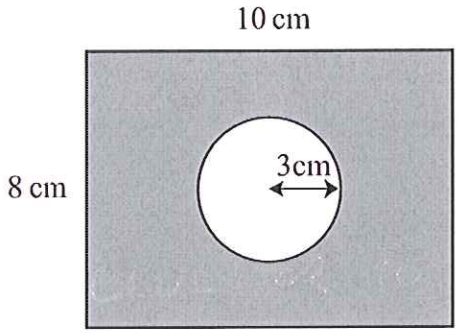


Diagram **NOT** accurately drawn

The diagram shows a circle inside a rectangle.
The rectangle has length 10 cm and width 8 cm.
The radius of the circle is 3 cm.

Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

RECTANGLE:

$8 \times 10 = 80$ (M1)

CIRCLE:

$\pi \times 3^2 = 28.274...$ (M1)

SHADED:-

$80 - 28.274...$

(M1) SUBTRACT

$= 51.7256...$

51.7 (A1)

..... cm^2

(4)

10. [Edexcel, 2012] Area and Perimeter of 2D Shapes (Inc Circles) **[4 Marks]**

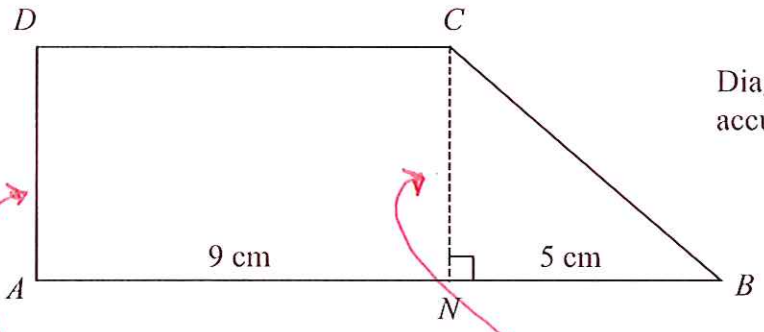
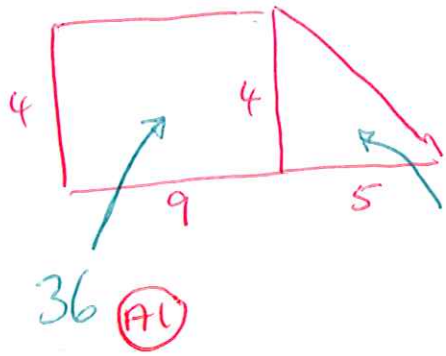


Diagram **NOT** accurately drawn

The shape *ABCD* is made from a rectangle *ANCD* and the right-angled triangle *NBC*.
ANB is a straight line.
AN = 9 cm.
NB = 5 cm.
The area of rectangle *ANCD* is 36 cm²

[AD = 4] B1

Work out the area of shape *ABCD*.



$\frac{4 \times 5}{2} = 10$ A1

36 A1

TOTAL = 36 + 10
= 46

46 A1 cm²

11. [Edexcel, 2013] Area and Perimeter of 2D Shapes (Inc Circles) **[4 Marks]**

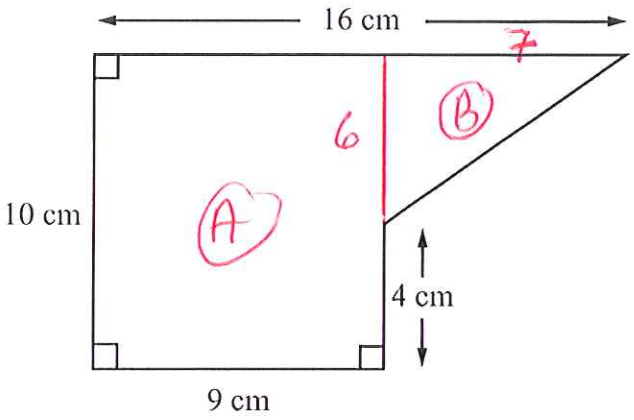


Diagram **NOT** accurately drawn

The diagram shows a shape.

Work out the area of the shape.

A = 9 x 10 = 90

B = $\frac{6 \times 7}{2}$ = 21

TOTAL 111 cm²

111 cm²

A square hole is cut from a circular piece of card.

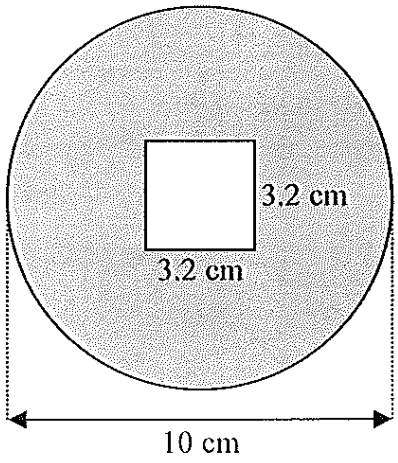


Diagram **NOT** accurately drawn

AREA OF SQUARE = 3.2×3.2

$= 10.24$

The square has sides of length 3.2 cm.
The diameter of the circular piece of card is 10 cm.

Work out the area of the shaded region.
Give your answer correct to 3 significant figures.

AREA OF CIRCLE = πr^2 $(r = 5)$

$= \pi \times 5^2$

$= 78.5398\ldots$

AREA OF SHADED REGION

$= 78.5398 - 10.24$

$= 68.2998$

68.3 ..... cm^2

(a) Calculate the circumference of a circle of radius 30 cm.
Give your answer correct to 3 significant figures.

$C = 2\pi r \quad (r = 30)$

$= 2 \times \pi \times 30$ M1

$= 188.495...$

188 A1 ..... cm

(2)

(b) The diagram shows a circle with radius 2.1 cm inside a square.
The circle touches the sides of the square.

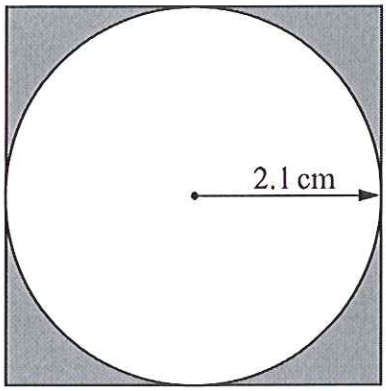


Diagram **NOT** accurately drawn

Work out the shaded area.
Give your answer correct to 3 significant figures.

SQUARE $= 4.2 \times 4.2$

$= 17.64$ B1

CIRCLE $= \pi r^2 \quad (r = 2.1)$

$= 13.854...$ B1

SHADED $= 17.64 - 13.854...$ M1

$= 3.7855...$

3.79 A1 ..... cm^2

(4)

14. [Edexcel, 2016] Area and Perimeter of 2D Shapes (Inc Circles) **[3 Marks]**

The diagram shows a circle inside a rectangle.

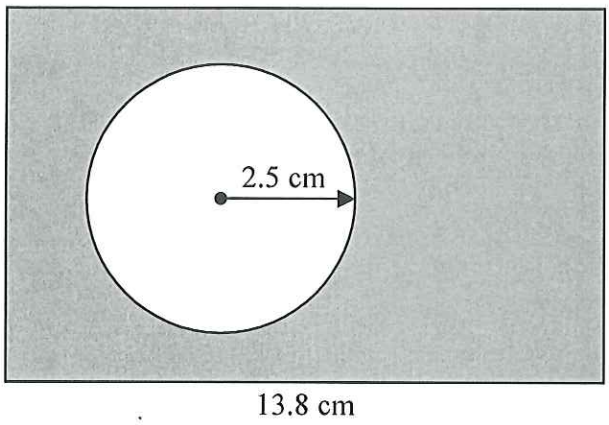


Diagram **NOT** accurately drawn

Work out the area of the shaded region.
Give your answer correct to 3 significant figures.

RECTANGLE

$13.8 \times 7.6 = 104.88$

CIRCLE

$\pi \times 2.5^2 = 19.6349...$

(M1) [EITHER]

SHADED REGION

$104.88 - 19.6349...$ (M1)

85.2 (A1) cm^2

The diagram shows the path of an athlete on a running track.

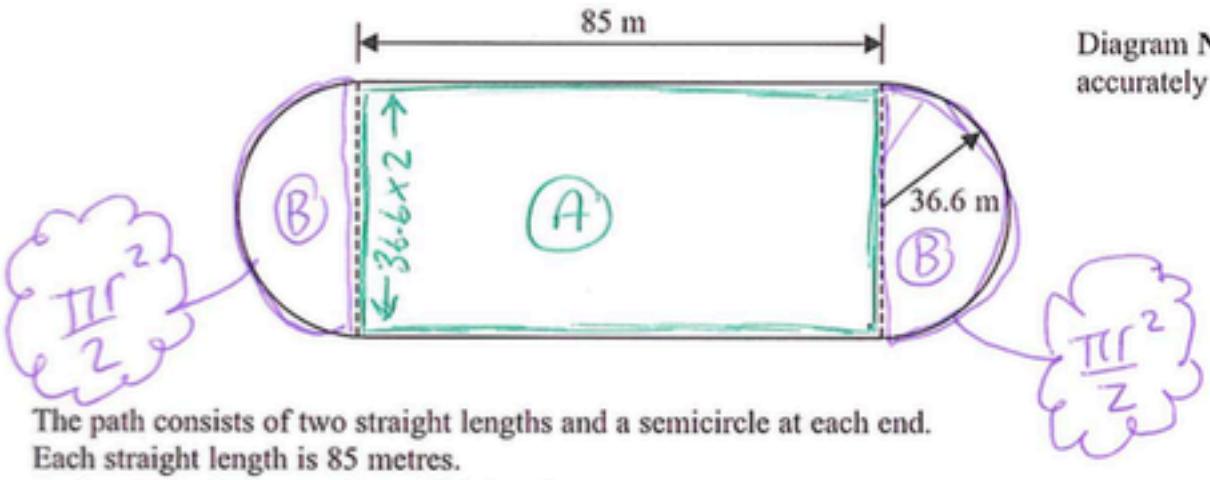


Diagram **NOT** accurately drawn

The path consists of two straight lengths and a semicircle at each end.
Each straight length is 85 metres.
Each semicircle has a radius of 36.6 metres.

Calculate the area enclosed by the path.
Give your answer correct to 3 significant figures.

A $85 \times 73.2 = \underline{\underline{6222}}$ M1

B $\pi \times 36.6^2 = \underline{\underline{4208.35}}$ M1

TOTAL

$6222 + 4208.35 = 10430.35\ldots$ M1

$= \underline{\underline{10400}}\ m^2$ A1

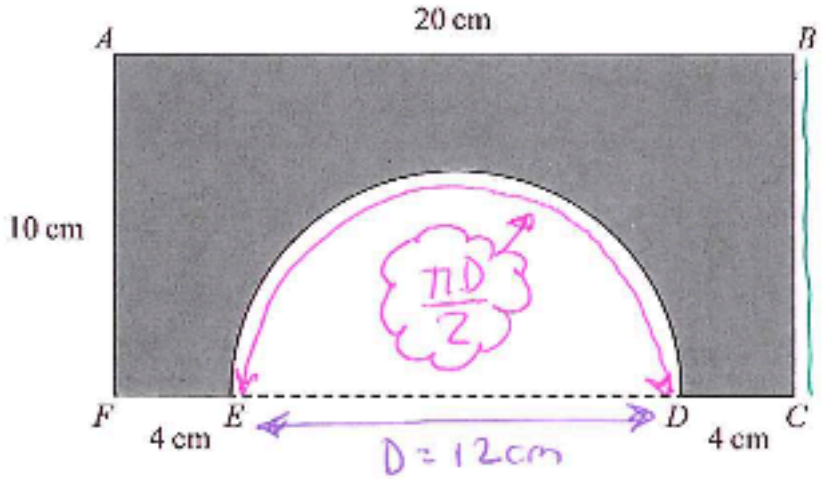


Diagram **NOT** accurately drawn

The shaded shape is made by cutting a semicircle from a rectangular piece of card, $ABCF$, as shown in the diagram.

$FEDC$ is a straight line.
The centre of the semicircle lies on ED.
$AF = BC = 10$ cm, $AB = 20$ cm, $FE = DC = 4$ cm.

Work out the perimeter of the shaded shape.
Give your answer correct to 3 significant figures.

DIAMETER OF SEMI-CIRCLE IS

$20 - (4+4) = 12$ cm

LENGTH OF SEMI-CIRCLE ARC

$\frac{\pi \times 12}{2} = 18.849...$ (B1)

WHOLE PERIMETER

$10 + 20 + 10 + 4 + 4 + 18.849...$ (M1)

$= 66.849$

DON'T FORGET THIS ONE!

66.8 (A1) cm

Disclaimer

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There is no warranty that these solutions will meet Your requirements or provide the results which You want, or that they are complete, or that they are error-free. If You find anything confusing within these solutions then it is Your responsibility to seek clarification from Your teacher, tutor or mentor.

Please report any errors or omissions that You find*. These solutions will be updated to correct errors that are discovered. It is recommended that You always check that You have the most up-to-date version of these solutions.

The methods used in these solutions, where relevant, are methods which have been successfully used with students. The method shown for a particular question is not always the only method and there is no claim that the method that is used is necessarily the most efficient or 'best' method. From time to time, a solution to a question might be updated to show a different method if it is judged that it is a good idea to do so.

Sometimes a method used in these solutions might be unfamiliar to You. If You are able to use a different method to obtain the correct answer then You should consider to keep using your existing method and not change to the method that is used here. However, the choice of method is always up to You and it is often useful if You know more than one method to solve a particular type of problem.

Within these solutions there is an indication of where marks **might** be awarded for each question. B marks, M marks and A marks have been used in a similar, but **not identical**, way that an exam board uses these marks within their mark schemes. This slight difference in the use of these marking symbols has been done for simplicity and convenience. Sometimes B marks, M marks and A marks have been interchanged, when compared to an examiners' mark scheme and sometimes the marks have been awarded for different aspects of a solution when compared to an examiners' mark scheme.

B1 – This is an unconditional accuracy mark (the specific number, word or phrase must be seen. This type of mark cannot be given as a result of 'follow through').

M1 – This is a method mark. Method marks have been shown in places where they might be awarded for the method that is shown. If You use a different method to get a correct answer, then the same number of method marks would be awarded but it is not practical to show all possible methods, and the way in which marks might be awarded for their use, within these particular solutions. When appropriate, You should seek clarity and download the relevant examiner mark scheme from the exam board's web site.

A1 – These are accuracy marks. Accuracy marks are typically awarded after method marks. If the correct answer is obtained, then You should normally (but not always) expect to be awarded all of the method marks (provided that You have shown a method) and all of the accuracy marks.

Note that some questions contain the words 'show that', 'show your working out', or similar. These questions require working out to be shown. Failure to show sufficient working out is likely to result in no marks being awarded, even if the final answer is correct.

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