

4.6

Circles and Semi-Circles

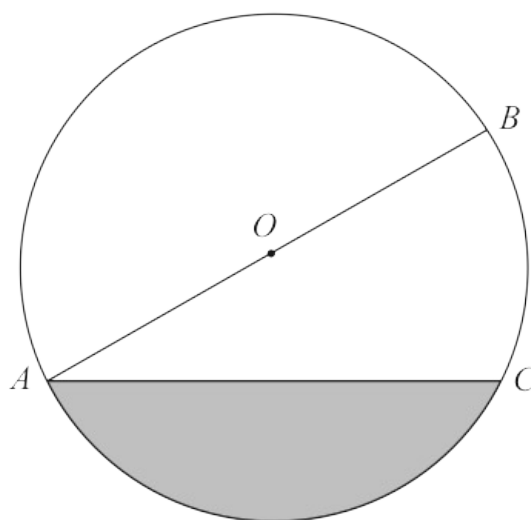
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5



A , B and C are points on a circle, centre O .

(a) Measure the length of AC .

You must include the units with your answer.

.....
(2)

(b) Write down the mathematical name for

(i) the line AB ,

.....

(ii) the line AC ,

.....

(iii) the shaded region.

.....
(3)

(Total for Question 5 is 5 marks)

18 A circle has diameter 18 cm.

Work out the circumference of the circle.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 18 is 2 marks)

20 Here is a field in the shape of a circle.

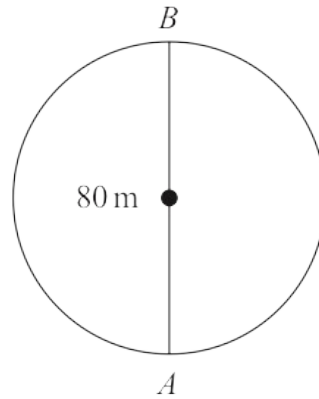


Diagram **NOT**
accurately drawn

The field is crossed by a path AB where AB is a diameter of the circle.
 $AB = 80$ metres.

Anil runs once around the circumference of the circle.
Sachin runs along the path from A to B and then runs back along the path to A .

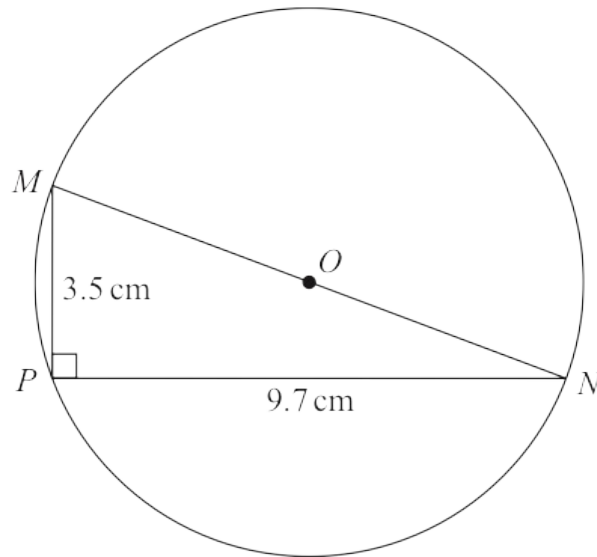
Anil runs further than Sachin.

How much further?
Give your answer in metres, correct to 1 decimal place.

.....m

(Total for Question 20 is 3 marks)

Diagram **NOT**
accurately drawn



M , N and P are points on a circle, centre O .
 MON is a diameter of the circle.

$MP = 3.5$ cm
 $PN = 9.7$ cm

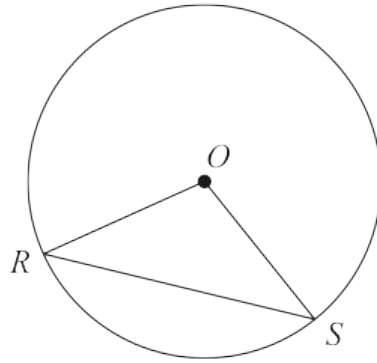
Angle $MPN = 90^\circ$

Work out the circumference of the circle.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 20 is 4 marks)

9 R and S are points on a circle with centre O .



(a) On the diagram above, shade a segment of the circle.

(1)

(b) Write down the mathematical name of the straight line RS .

.....
(1)

In the diagram below, P and Q are points on a circle with centre O .

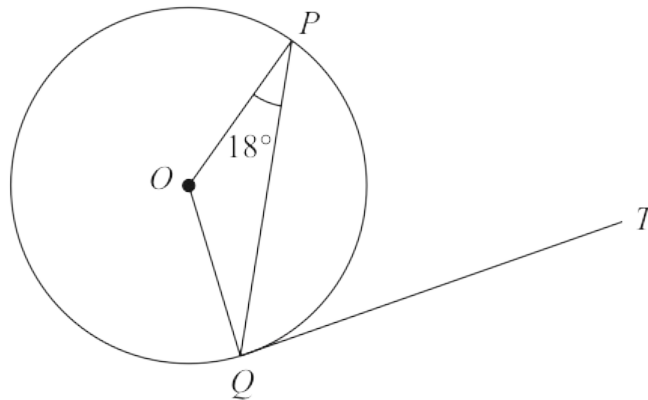


Diagram **NOT** accurately drawn

QT is a tangent to the circle.

Angle $OPQ = 18^\circ$

(c) Work out the size of angle PQT .

Give a reason for each stage of your working.

.....
(3)

- 17 The diagram shows an isosceles triangle ABC and a semicircle with centre O and diameter 12 cm.

The point B lies on the semicircle.

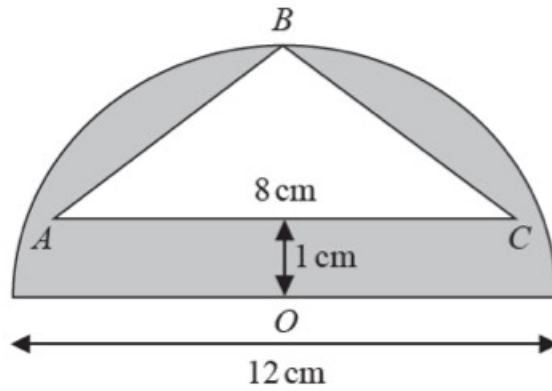


Diagram **NOT** accurately drawn

The line OB is the line of symmetry of the diagram.

AC is 1 cm from the diameter of the semicircle and $AC = 8$ cm.

Work out the area of the shaded region.

Give your answer correct to 3 significant figures.

cm^2

(Total for Question 17 is 4 marks)

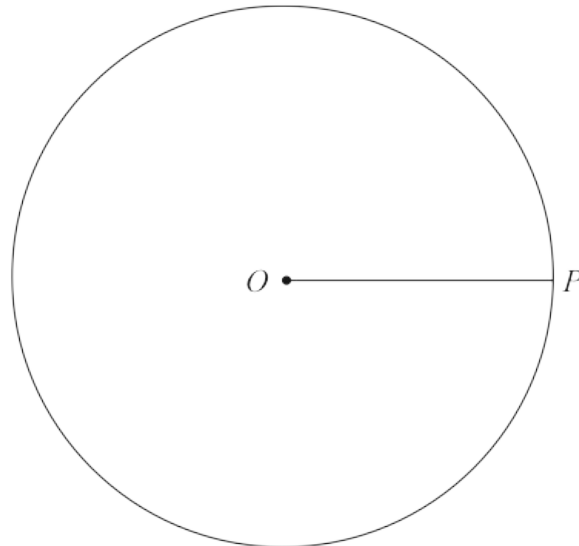
12 A circle has radius 9 cm.

- (a) Work out the circumference of the circle.
Give your answer correct to 1 decimal place.

(2) cm

January 2019 1FR

3 Here is a circle, centre O .



- (a) Measure the radius, OP , of the circle.
Give your answer in centimetres.

(1) cm

The point Q is 2 cm from O .
The angle between OP and OQ is a right angle.

- (b) Mark with a cross (\times) a possible position of the point Q .
Label the point Q .

(2)

25 The shape, shown shaded in the diagram, is the region between two semicircles.

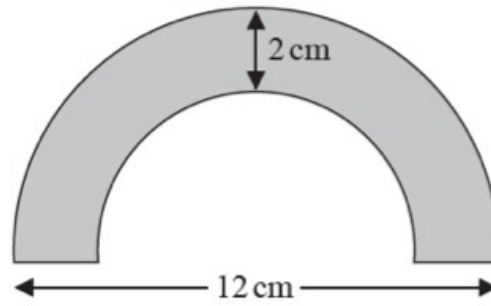


Diagram **NOT**
accurately drawn

The diameter of the outer semicircle is 12 cm.

The shape has constant thickness 2 cm.

Calculate the area of the shape.

Give your answer as a multiple of π .

cm²

(Total for Question 25 is 3 marks)

23 The diagram shows a shape made from a right-angled triangle and a semicircle.

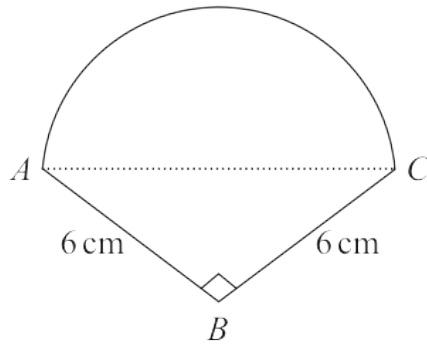


Diagram **NOT** accurately drawn

AC is the diameter of the semicircle.

$BA = BC = 6 \text{ cm}$

Angle $ABC = 90^\circ$

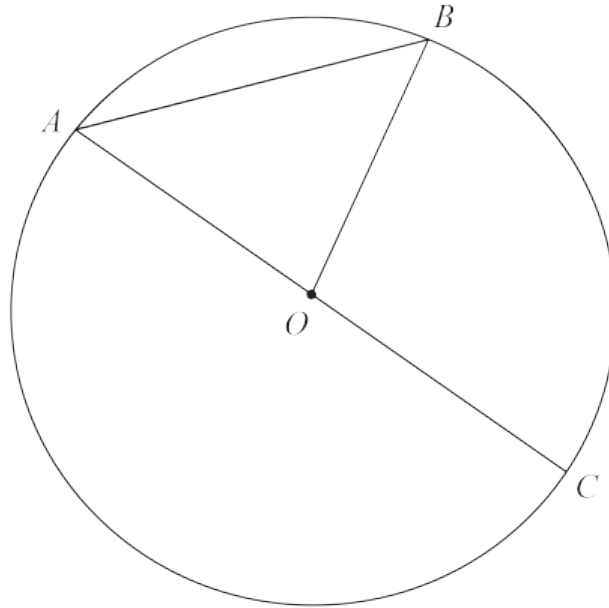
Work out the area of the shape.

Give your answer correct to 1 decimal place.

..... cm^2

(Total for Question 23 is 5 marks)

- 3 A , B and C are points on a circle, centre O .
 AOC is a straight line.



- (a) Write down the mathematical name for the line AC .

.....
(1)

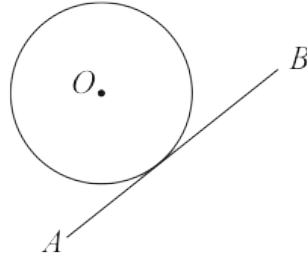
- (b) Write down the mathematical name for the line AB .

.....
(1)

- (c) On the diagram, shade a sector of the circle.

(1)

- 6 (a) The diagram shows a circle with centre O .

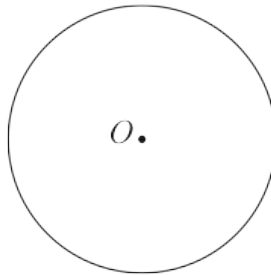


Write down the word from the box that describes the line AB .

sector	segment	tangent	chord	diameter
--------	---------	---------	-------	----------

.....
(1)

- (b) The diagram shows a circle with centre O .



On the diagram, draw a radius of the circle.

(1)

- (c)

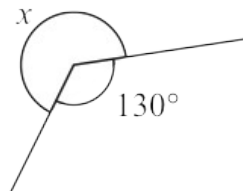


Diagram **NOT** accurately drawn

Work out the size of the angle marked x .

.....
(1)

- 27 The diagram shows a shaded shape $ABCD$ made from a semicircle ABC and a right-angled triangle ACD .

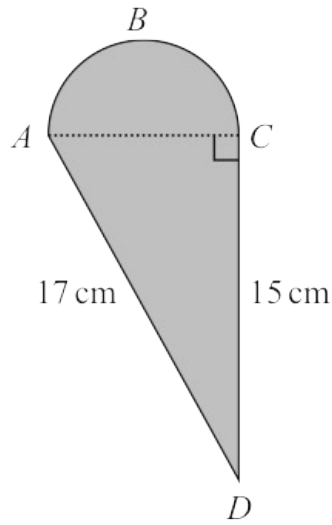


Diagram **NOT** accurately drawn

AC is the diameter of the semicircle ABC .

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

..... cm

(Total for Question 27 is 5 marks)

18 The diagram shows Yuen's garden.

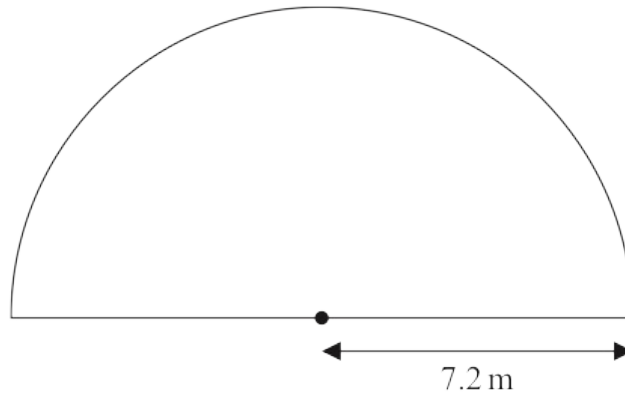


Diagram **NOT**
accurately drawn

The garden is in the shape of a semicircle of radius 7.2 m.

Yuen is going to cover his garden with grass seed.

Yuen has 12 boxes of grass seed.

Each box of grass seed contains enough seed to cover 6 m^2 of the garden.

Has Yuen enough grass seed for his garden?

Show your working clearly.

(Total for Question 18 is 3 marks)

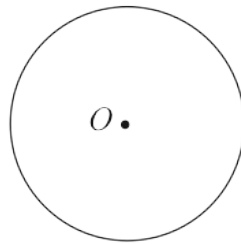
3 The diagram shows a line AB .



(a) At the point A draw an acute angle.
Label your acute angle a .

(1)

The diagram shows a circle with centre O .



(b) Draw a diameter of the circle.

(1)

June 2020 1F

11 A circle has radius 18 cm.

Work out the circumference of the circle.

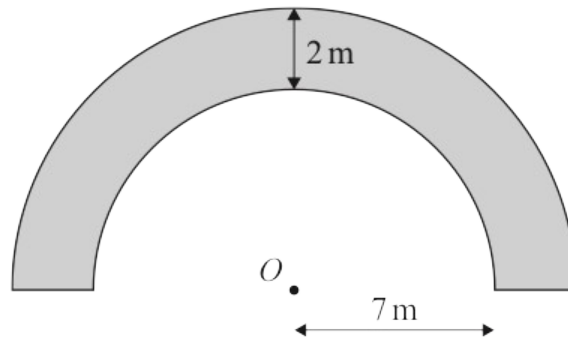
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 11 is 2 marks)

24 The region, shown shaded in the diagram, is a path.

Diagram **NOT**
accurately drawn



The boundary of the path is formed by two semicircles, with the same centre O , and two straight lines.

The inner semicircle has a radius of 7 metres.

The path has a width of 2 metres.

Work out the perimeter of the path.

Give your answer correct to one decimal place.

..... m

(Total for Question 24 is 3 marks)

22 A , B and C are points on a circle with centre O .

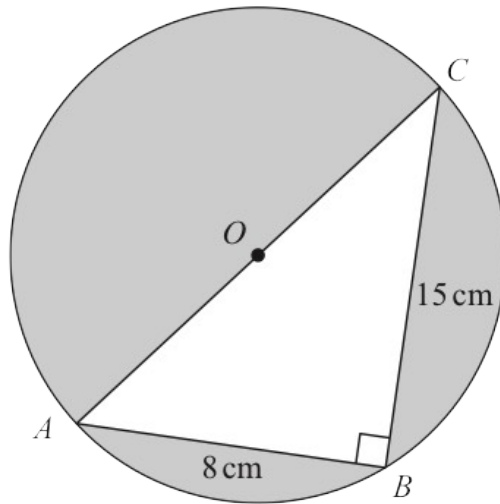


Diagram **NOT** accurately drawn

AOC is a diameter of the circle.

$AB = 8\text{ cm}$ $BC = 15\text{ cm}$

Angle $ABC = 90^\circ$

Work out the total area of the regions shown shaded in the diagram.
Give your answer correct to 3 significant figures.

..... cm²

(Total for Question 22 is 5 marks)

January 2021 1FR

13 A circle has diameter 18 cm.

Work out the area of the circle.

Give your answer correct to 3 significant figures.

..... cm²

(Total for Question 13 is 2 marks)

- 12 The diagram shows a rectangle $ABCD$ and a semicircle with diameter AB where $AB = 12$ cm. The point E lies on DC and also on the semicircle.

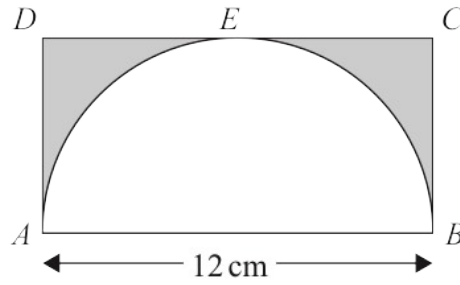


Diagram **NOT** accurately drawn

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

..... cm²

(Total for Question 12 is 3 marks)

11 A circle has radius 7.5 cm

Work out the area of the circle.

Give your answer correct to 3 significant figures.

..... cm²

(Total for Question 11 is 2 marks)

16 The diagram shows the front of a wooden door with a semicircular glass window.

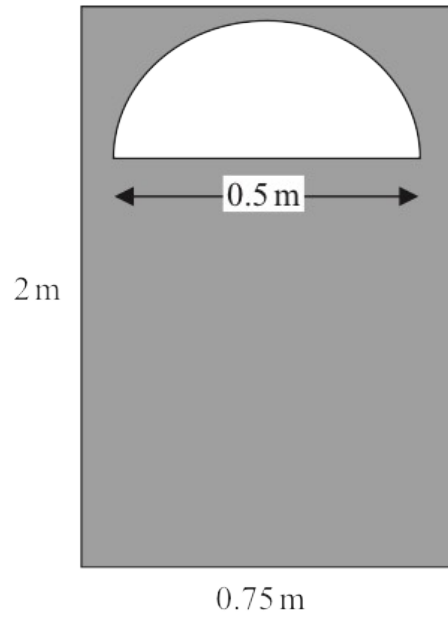


Diagram **NOT** accurately drawn

Julie wants to apply 2 coats of wood varnish to the front of the door, shown shaded in the diagram.

250 millilitres of wood varnish covers 4 m^2 of the wood.

Work out how many millilitres of wood varnish Julie will need.

Give your answer correct to the nearest millilitre.

..... millilitres

(Total for Question 16 is 5 marks)

10 A circle has a **diameter** of 14 cm.

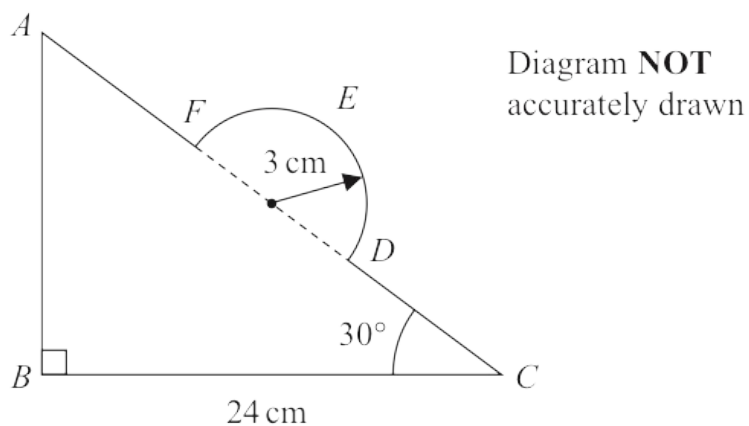
Calculate the area of the circle.

Give your answer correct to 3 significant figures.

..... cm²

(Total for Question 10 is 2 marks)

26 In the diagram, ABC is a right-angled triangle and DEF is a semicircular arc.



In triangle ABC

$$BC = 24 \text{ cm} \qquad \text{angle } ABC = 90^\circ \qquad \text{angle } BCA = 30^\circ$$

The points D and F lie on AC so that DF is the diameter of the semicircular arc DEF
 The radius of the semicircular arc is 3 cm.

Work out the length of $AFEDC$

Give your answer correct to 2 significant figures.

..... cm

(Total for Question 26 is 5 marks)

7 A circle has radius 6.5 cm.

Calculate the circumference of the circle.

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 7 is 2 marks)

22 The diagram shows a shape made from a square $ABCD$ and 4 identical semicircles.

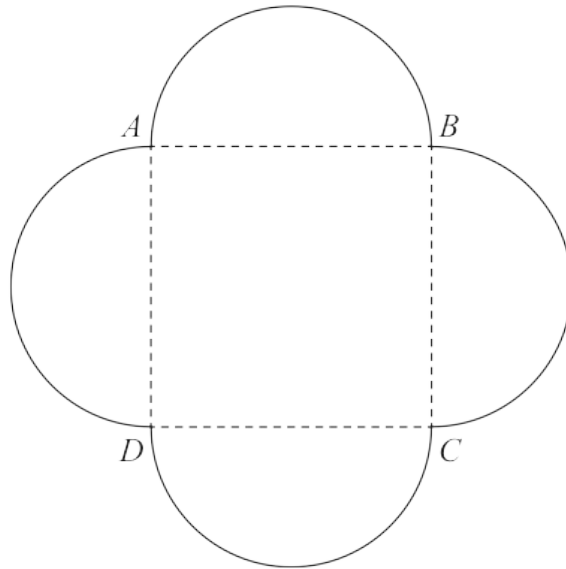


Diagram **NOT** accurately drawn

As shown in the diagram, the semicircles have AB , BC , CD and DA as diameters.

The area of the square is 36 cm^2

Calculate the total area of the shape.

Give your answer correct to one decimal place.

..... cm^2

(Total for Question 22 is 4 marks)

25 R and T are points on a circle, centre O

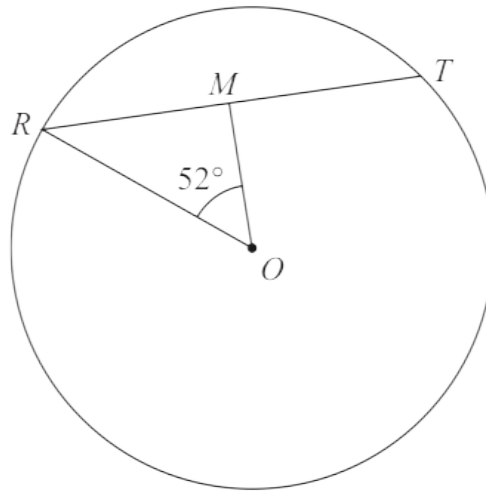


Diagram **NOT** accurately drawn

$RT = 12$ cm

M is the midpoint of RT

Angle $ROM = 52^\circ$

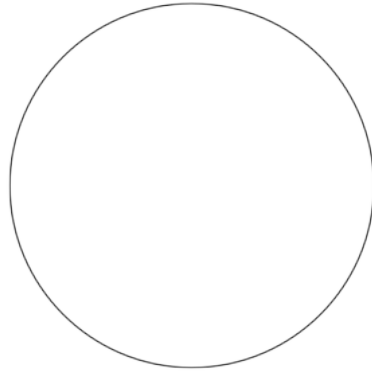
Work out the area of the circle.

Give your answer correct to 3 significant figures.

..... cm²

(Total for Question 25 is 4 marks)

3



(c) On the diagram above, draw a chord of the circle.

(1)

19 The diagram shows a shaded shape made from three identical semicircles, *X*, *Y* and *Z*

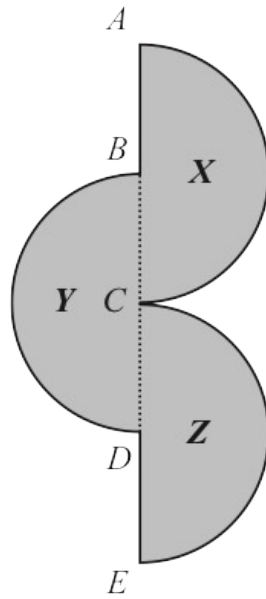


Diagram **NOT** accurately drawn

ABCDE is a straight line.

AC is the diameter of semicircle *X* and *B* is the centre of semicircle *X*

BD is the diameter of semicircle *Y* and *C* is the centre of semicircle *Y*

CE is the diameter of semicircle *Z* and *D* is the centre of semicircle *Z*

$$AC = BD = CE = 20 \text{ cm}$$

Work out the perimeter of the shaded shape.

Give your answer correct to the nearest whole number.

..... cm

(Total for Question 19 is 3 marks)