Name: _____

GCSE (1 – 9)

Area and Circumference of Circles

Instructions

- Use **black** ink or ball-point pen.
- Answer all Questions.
- Answer the Questions in the spaces provided
– *there may be more space than you need.*
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

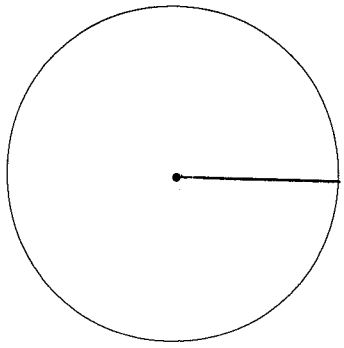
Information

- The marks for each Question are shown in brackets
– *use this as a guide as to how much time to spend on each Question.*

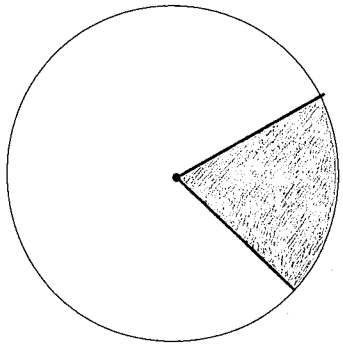
Advice

- Read each Question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every Question.
- Check your answers if you have time at the end

1 (a) On the diagram below, draw a radius of the circle.

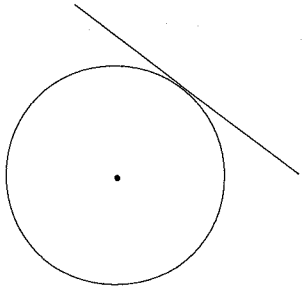


(b) On the diagram below, draw a sector of the circle.
Shade the sector.



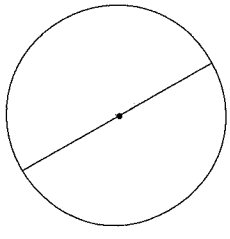
(Total for question 1 is 2 marks)

2 (a) Write down the mathematical name for the straight line touching the circle.



tangent

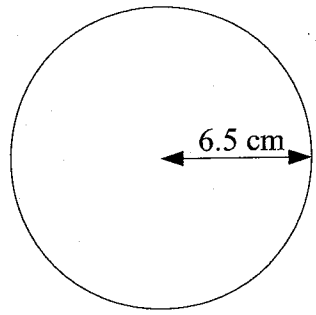
(b) Write down the mathematical name for the straight line shown in the diagram.



diameter

(Total for question 2 is 2 marks)

3 A circle has a radius of 6.5 cm.
Work out the circumference of the circle.
Give your answer correct to 2 decimal places.



Circumference $= 2\pi r$
$= 2\pi(6.5)$
$= 13\pi$
$= 40.84$ cm

40.84 cm

(Total for question 3 is 3 marks)

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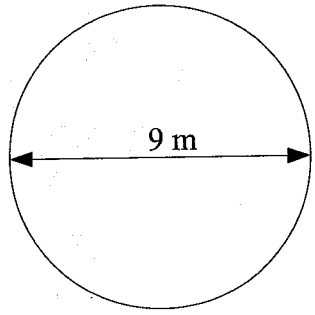
4 A circle has a diameter of 9 m. Radius = 4.5
Work out the area of the circle.
Give your answer correct to 1 decimal place.



Area $= \pi r^2$
$= \pi(4.5)^2$
$= \frac{81}{4}\pi$
$= 63.6\ m^2$

63.6 m^2

(Total for question 4 is 3 marks)

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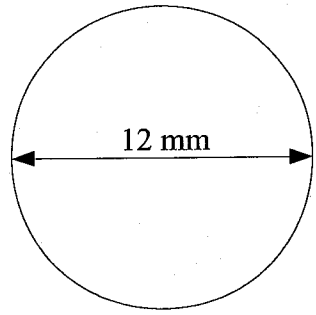
5 A circle has a diameter of 12 mm.
Work out the circumference of the circle.
Give your answer in terms of π



Circumference $= \pi d$
$= \pi(12)$
$= 12\pi$

12π mm

(Total for question 5 is 3 marks)

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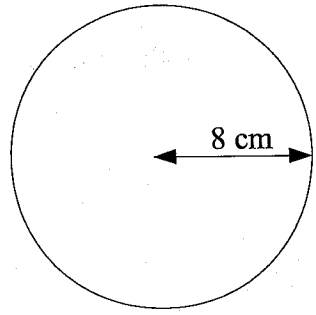
6 A circle has a radius of 8 cm.
Work out the area of the circle.
Give your answer in terms of π



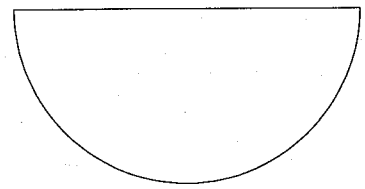
Area $= \pi r^2$
$= \pi(8)^2$
$= 64\pi$

64π cm^2

(Total for question 6 is 3 marks)

7 A semi-circle has an area of 50 m^2.

Find the perimeter of the semi-circle.
Give your answer correct to one decimal place.



Area of semi circle $= \frac{\pi r^2}{2}$

$\frac{\pi r^2}{2} = 50$

$\pi r^2 = 100$

$r^2 = \frac{100}{\pi}$

$r = \sqrt{\frac{100}{\pi}}$

$= 5.64189...$

diameter $= 5.64189 \times 2$
$= 11.28379...$

circumference (whole circle) $= \pi d$
$= \pi (11.28)$
$= 35.449...$

$\frac{35.449}{2} = 17.72...$

$11.28 + 17.72 = 29.0$

29.0 ..... m

(Total for question 7 is 4 marks)

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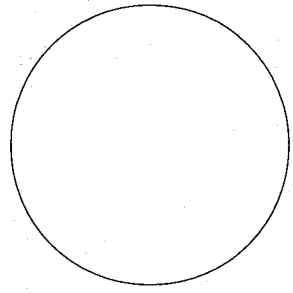
8 A circular field has a diameter of 32 metres.
A farmer wants to build a fence around the edge of the field.

Each metre of fence will cost £15.95

Work out the total cost of the fence.



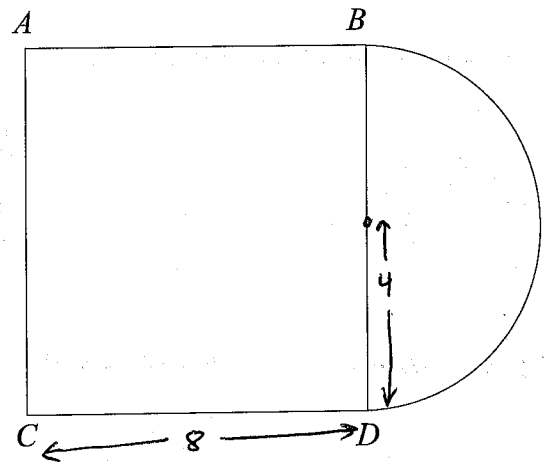
Circumference $= \pi d$
$= \pi (32)$
$= 32\pi$ m

$32\pi \times 15.95 = £1603.47$

£ 1603.47

(Total for question 8 is 3 marks)

9



An area is formed by a square, *ABCD*, and a semi circle.
BD is the diameter of the semi circle.

The radius of the semi circle is 4m. diameter = 8m

The area is going to be covered completely with lawn seed.

A box of lawn seed covers 25 m².

How many boxes of lawn seed will be needed?
You must show your working.

Area of square = 8×8

$= 64 m^2$

Area of semi-circle = $\frac{\pi r^2}{2}$

$= \frac{\pi (4)^2}{2}$

$= 8\pi$

$= 25.1 m^2$

$64 + 25.1 = 89.1 m^2$

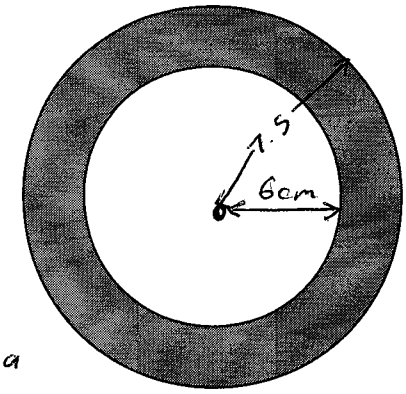
$75 m^2 = 3$ boxes

$100 m^2 = 4$ boxes

4

(Total for question 9 is 5 marks)

10 The diagram shows a shaded ring formed by cutting a smaller circle out of a larger circle.



The radius of the smaller circle is 6 cm.
The diameter of the larger circle is 15 cm.

$r = 7.5$

Find the area of the shaded ring.

Shaded Area = Large Area − Small Area

$= \pi (7.5)^2 - \pi (6)^2$

$= \frac{81}{4}\pi$ or $63.6\ cm^2$

$\frac{81}{4}\pi$ ..... cm^2

(Total for question 10 is 3 marks)

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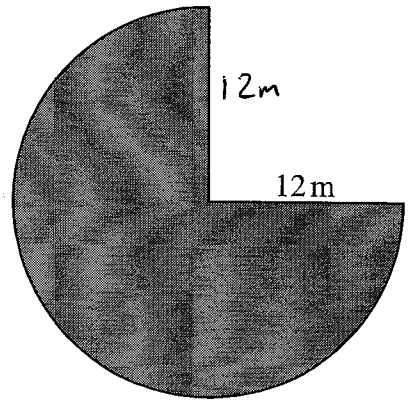
11 The diagram shows three quarters of a circle with a radius of 12 metres.



Find the perimeter of the shape.

Circumference (whole circle) $= 2\pi r$

$= 2\pi(12)$

$= 24\pi$

$\frac{3}{4} \times 24\pi = 18\pi$

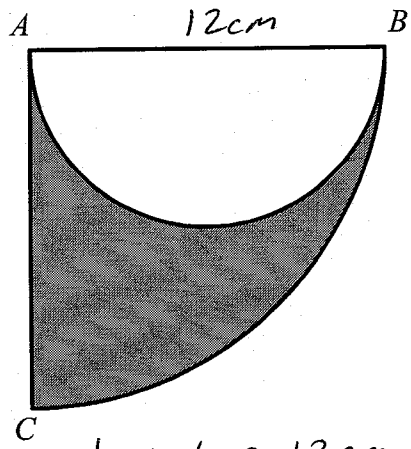
perimeter $= 18\pi + 12 + 12$

$= 80.55\ m$ (2dp)

80.55 ..... m

(Total for question 11 is 3 marks)

12 The diagram shows a semi circle inside a sector of a circle, ABC.



AB is the diameter of the semi circle.
Angle $BAC = 90°$
$AB = 12$ cm

Find the area of the shaded region.

Radius of semi-circle = 6cm

Area of semi circle $= \frac{\pi r^2}{2}$

$= \frac{\pi (6)^2}{2}$

$= 18\pi$

Radius of $\frac{1}{4}$ circle = 12cm

Area of $\frac{1}{4}$ circle $= \frac{\pi r^2}{4}$

$= \frac{\pi (12)^2}{4}$

$= 36\pi$

Shaded Area $= 36\pi - 18\pi$

$= 18\pi$ or 56.5cm^2

18π ..... cm²

(Total for question 12 is 3 marks)

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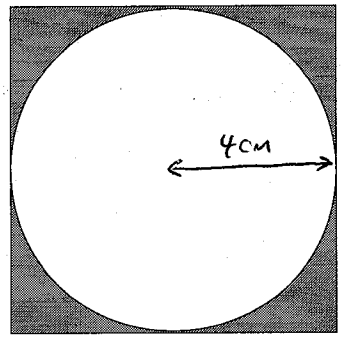
13 A circle is enclosed by a square as shown in the diagram.



Each side of the square measures 8cm.

Find the area of the shaded region.

Give your answer correct to 1 decimal place.

Area of square $= 8 \times 8 = 64\text{cm}^2$

Area of circle $= \pi (4)^2$

$= 16\pi$

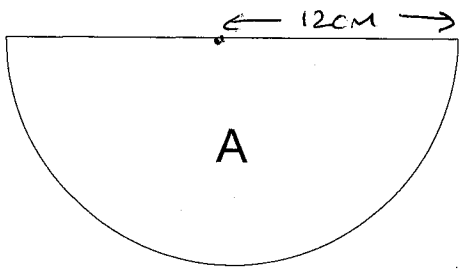
Shaded Area $= 64 - 16\pi$

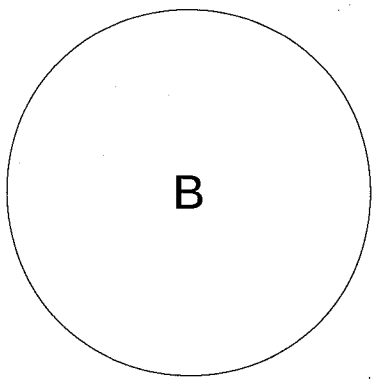
$\approx 13.7\text{cm}^2$

13.7 ..... cm²

(Total for question 13 is 3 marks)

14





Shape **A** is a semi-circle which has a radius of 12 cm.
Shape **B** is a circle.

The area of shape **A** is 8 times the area of shape **B**.

Show that the radius of shape **B** is 3 cm.

Area of semi-circle $= \frac{\pi r^2}{2}$

$= \frac{\pi (12)^2}{2}$

$= 72\pi$

Area of B $= \frac{72\pi}{8}$

$= 9\pi$

B

Area of circle $= \pi r^2$

$\pi r^2 = 9\pi$

$r^2 = 9$

$r = 3$

(Total for question 14 is 3 marks)