AREA AND CIRCUMFERENCE OF A CIRCLE

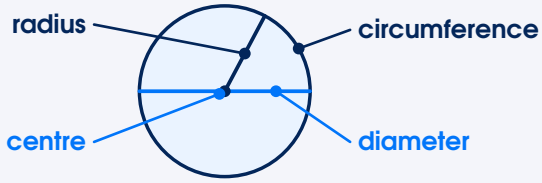
BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

KEY IDEA

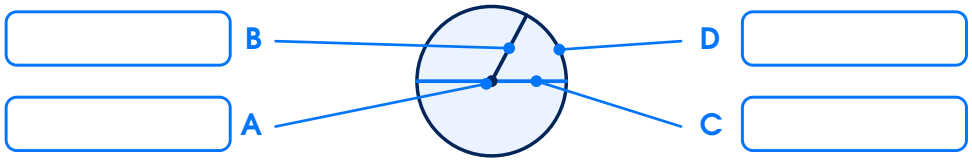
The centre is the point in the middle.
The radius goes from the centre to the edge.
The diameter goes across, through the centre.
The circumference is the distance all the way around.

diameter = 2 × radius



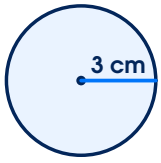
1 Label the parts of the circle. Use the words in the box.

centre | radius | diameter | circumference

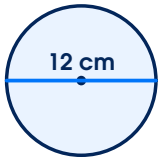


2 Find the missing length for each circle.

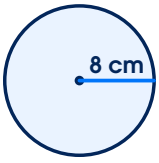
The diameter is double the radius. The radius is half the diameter.

a) 

× 2
d = ____ cm

b) 

÷ 2
r = ____ cm

c) 

× 2
d = ____ cm

3 Square each number.



$3^2 = 3 \times 3 = 9$

Squaring means a number times itself.

n	2	4	7	10
n^2				

4 Circumference = π × diameter. Use the π button on your calculator. Give each answer to 1 decimal place.

Example: press [3] [×] [π] [=] to get 9.424777... → 9.4 cm



a) 4 cm → × π → ____ cm

b) 7 cm → × π → ____ cm

diameter circumference

AREA AND CIRCUMFERENCE OF A CIRCLE

SUPPORT

NAME _____ CLASS _____ DATE _____

KEY IDEA

Circumference

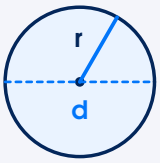
$C = \pi \times d$

the distance around (cm)

Area

$A = \pi \times r^2$

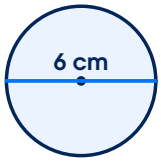
the space inside (cm^2)



r^2 means r × r. Round answers to 1 decimal place.

1 Work out the circumference of each circle. Use $C = \pi \times d$.

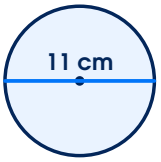
a)



C = π × ☐

C = ☐ cm

b)



C = π × ☐

C = ☐ cm

2 Work out the circumference of each circle. Find the diameter first.

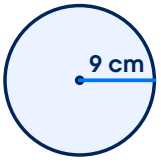
a)



d = ☐ cm

C = π × ☐ = ☐ cm

b)



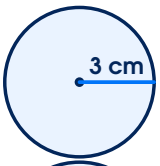
d = ☐ cm

C = π × ☐ = ☐ cm

3 Work out the area of each circle. Use $A = \pi \times r^2$.

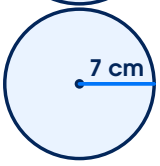
Square the radius, then multiply by π. Round to 1 d.p.

a)



$A = \pi \times 3^2 = \pi \times$ ☐ = ☐ cm^2

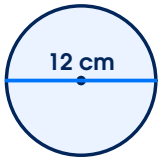
b)



$A = \pi \times 7^2 = \pi \times$ ☐ = ☐ cm^2

4 Work out the area of each circle. Halve the diameter to find the radius first.

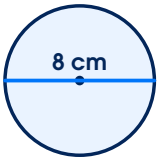
a)



r = ☐ cm

$A = \pi \times$ ☐^{2} = ☐ cm^2

b)



r = ☐ cm

$A = \pi \times$ ☐^{2} = ☐ cm^2

AREA AND CIRCUMFERENCE OF A CIRCLE

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

$C = \pi d = 2\pi r$ $A = \pi r^2$

In terms of π: leave π in the answer, e.g. $A = \pi \times 5^2 = 25\pi$ cm².

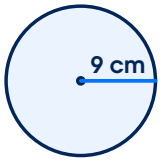
FLUENCY

1 Complete the table. Give the circumference and area to 1 decimal place.

RADIUS	DIAMETER	CIRCUMFERENCE	AREA
	2.5 cm		
7 cm			
	20 cm		

2 Work out each answer. Give your answers in terms of π.

a)



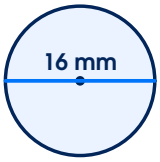
Circumference = _____

b)



Area = _____

c)



Area = _____

REASONING

3 This semicircle has a diameter of 18 cm. Give your answers to 1 decimal place.

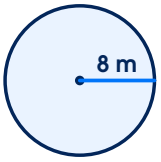


a) Area of the semicircle _____ cm²

b) Perimeter of the semicircle _____ cm

The perimeter includes the straight edge.

4 Tom and Sam each make a mistake with this circle, which has a radius of 8 m.



Tom: **Circumference = π × 8 = 25.1 m**

Sam: **Area = π × 8 × 2 = 50.3 m²**

a) Explain each mistake. .....

.....

b) Correct circumference _____ m Correct area _____ m²

AREA AND CIRCUMFERENCE OF A CIRCLE

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

REASONING

1 Is each statement always, sometimes or never true? Circle your answer.

Give an example or a reason for each answer.

a) Doubling the radius of a circle doubles its area. ALWAYS SOMETIMES NEVER

b) Doubling the radius doubles the circumference. ALWAYS SOMETIMES NEVER

c) A circle's area is greater than its circumference. ALWAYS SOMETIMES NEVER

d) A semicircle's perimeter is half of a circle's. ALWAYS SOMETIMES NEVER

.....

PROBLEM SOLVING

2 Work backwards. Give each answer to 1 decimal place.

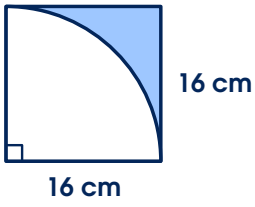
a) A circular pond has a circumference of 50 m. Find its radius.

..... r = ____ m

b) A circle has an area of 300 cm². Find its radius.

..... r = ____ cm

3 Work out the area of the shaded region. Give your answer to 1 decimal place.



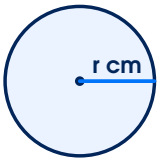
The white shape is a quarter of a circle with its centre at a corner of the square.

.....

Shaded area ____ cm²

★ CHALLENGE FOR ALL

4 For this circle, the number of cm² in the area is exactly 3 times the number of cm in the circumference.



a) Find the value of r. ____

b) Explain why your answer does not depend on the value of π.

.....

AREA AND CIRCUMFERENCE OF A CIRCLE – ANSWERS

ANSWERS

BUILDING BLOCKS

1 A centre · B radius · C diameter · D circumference
2 a) 6 cm b) 6 cm c) 16 cm
3 4 · 16 · 49 · 100
4 a) $4 \times \pi = 12.566... \rightarrow 12.6$ cm b) $7 \times \pi = 21.991... \rightarrow 22.0$ cm

SUPPORT

1 a) $\pi \times 6 = 18.8$ cm b) $\pi \times 11 = 34.6$ cm
2 a) d = 8 cm, C = 25.1 cm b) d = 18 cm, C = 56.5 cm
3 a) $\pi \times 3^2 = \pi \times 9 = 28.3$ cm² b) $\pi \times 7^2 = \pi \times 49 = 153.9$ cm²
4 a) r = 6 cm, $A = \pi \times 6^2 = 113.1$ cm² b) r = 4 cm, $A = \pi \times 4^2 = 50.3$ cm²

CORE

1 r 1.25 cm, C 7.9 cm, A 4.9 cm² · d 14 cm, C 44.0 cm, A 153.9 cm² · r 10 cm, C 62.8 cm, A 314.2 cm²
2 a) 18π cm b) 100π m² c) 64π mm²
3 a) $\pi \times 9^2 \div 2 = 127.2$ cm² b) $\pi \times 18 \div 2 + 18 = 46.3$ cm
4 a) Tom used the radius instead of the diameter ($C = \pi \times 16$ or $2 \times \pi \times 8$). Sam multiplied by 2 instead of squaring ($8^2 = 64$). b) 50.3 m · 201.1 m²

GREATER DEPTH

1 a) never (the area is multiplied by 4) b) always ($C = 2\pi r$) c) sometimes (only when $r > 2$; equal when $r = 2$) d) never (you must add the diameter as well)
2 a) $d = 50 \div \pi = 15.92...$, r = 8.0 m b) $r^2 = 300 \div \pi = 95.49...$, r = 9.8 cm
3 $16^2 - \frac{1}{4} \times \pi \times 16^2 = 256 - 64\pi = 54.9$ cm²
4 a) $\pi r^2 = 3 \times 2\pi r \rightarrow r = 6$ cm b) both sides contain π, so dividing by π (and by r) leaves r = 6.