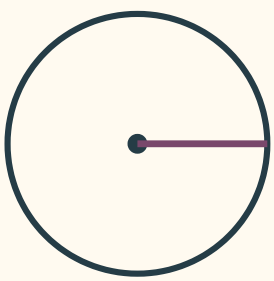
MATHS FIELD GUIDE · GRADE 7

Circle measurements come from a fixed radius

OPENING PROBLEM

Find both circumference and area.



r = 4 cm

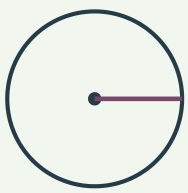
02 Read a circle from its radius
03 Rules and worked cases
04 One turn of a wheel
05 Distinguish the radius, chord and arc
06 Check your reasoning

ILLUSTRATED PROBLEM SHEET

Read a circle from its radius

Circumference is the distance around. Area measures the region inside.

1

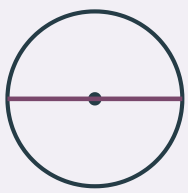


r = 4 cm

Find both circumference and area.

C = 8π cm and A = 16π cm². Notice the different units.

2



d = 10 cm

What error follows from treating diameter as radius?

Actual area is 25π cm². Using 10 as radius gives 100π, four times too large.

3

Radius	r	2r
Boundary	2πr	4πr
Area	πr²	4πr²

Which quantity doubles, and which quadruples?

Boundary scales with one length. Area scales in two directions.

4

Outer radius 5
↓
Inner radius 3
↓
Area = (25 − 9)π

How much area does a circular ring cover?

16π square units. Subtract the disks' areas, not their radii before squaring.

Radius 1
circumference 2π, area π.

Radius 2
circumference 4π, area 4π.

CHAPTER PROBLEM

What happens to a disk's area if its radius triples? Explain.

It becomes nine times as large because area depends on the square of the radius.

MATHS REFERENCE · GRADE 7

Circle measurements come from a fixed radius

A circle is the set of points in a plane at a fixed distance from a centre. That distance is its radius. A diameter joins two circle points through the centre and has length twice the radius.

The circumference is the length of the boundary. The disk enclosed by the circle has an area.

Four cases to recognise

Situation	What to do and why
Diameter 12 cm	Radius 6 cm, circumference 12π cm, area 36π cm².
Semicircular arc of radius 5 cm	Half the full circumference gives 5π cm.
Perimeter of that semicircle	Include the straight diameter: 5π + 10 cm.
Circumference 18π cm	Diameter 18 cm, radius 9 cm, area 81π cm².

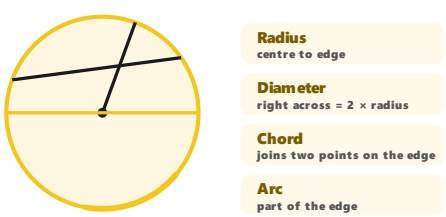
Read the model

Build the idea

Measure the circumference and diameter of several circles. Their ratio is the same constant, π.

A circle of radius r has diameter 2r, so the boundary length is π × 2r = 2πr.

Parts of a circle



Why it works

Cut a disk into many thin sectors and rearrange them alternately. The shape approaches a rectangle with height r and base half the circumference.

Its area is therefore (πr) × r = πr². This explains the connection between boundary length and enclosed area.

radius Distance from centre to circle.
diameter A chord passing through the centre.
circumference Boundary length.
π Circumference divided by diameter.



For radius 8 cm, find the quarter arc.

A quarter of 16π cm is 4π cm.

WORKED INVESTIGATION

One turn of a wheel

A wheel has diameter 70 cm. One complete turn without slipping moves it forward by one circumference. Use π ≈ 22/7 for an estimate.

Look at this part	What it tells you
Radius	35 cm
Distance per turn	about 220 cm
Ten turns	about 22 m

Work it through

The circle encloses approximately (22/7) × 35² = 3,850 cm². Area answers how much surface lies inside; it uses square units.

Catch the mistake

Inserting 70 for r in 2πr doubles the predicted travel. Mark the centre and decide if a labelled segment crosses the entire wheel.

Compare the cases

Follow an example

For radius 5 cm, circumference is 10π cm, about 31.42 cm. Area is 25π cm², about 78.54 cm².

One measures the edge; the other measures the enclosed surface. Their units and formulas differ.

What changes? What stays true?

Doubling the radius doubles circumference but multiplies area by four. Length and area scale differently.

π is exact as a symbol. A decimal such as 3.14 is an approximation. State a rounding instruction when giving decimal results.

Change one condition

Double the diameter. Travel per turn doubles, while the area inside the rim becomes four times as large.



For radius 6 cm, find the sector area.

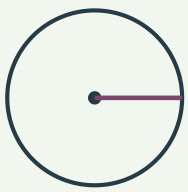
120/360 is one third. A third of 36π is 12π cm².

ILLUSTRATED PROBLEM SHEET

Distinguish the radius, chord and arc

The radius goes from the centre to the boundary. A chord has both ends on the boundary.

1

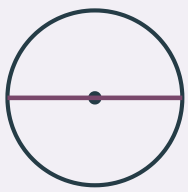


r = 5

What is the diameter?

Two radii laid end to end through the centre give 10.

2

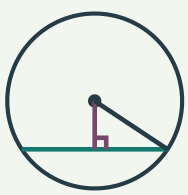


d = 12

Which chord is longest?

A diameter. Its length is twice the radius, here 12.

3

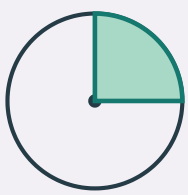


OM ⊥ AB

A radius is 13 and its centre is 5 from a chord. Find the chord length.

The perpendicular halves the chord. Half-length = $\sqrt{(169 - 25)} = 12$. Full length = 24.

4



90°

Which part is one quarter of the circumference?

The curved arc between the two radii. The filled sector is one quarter of the disk area.

Two distinct points on the circle
a chord joins them.

Three noncollinear points
exactly one circumcircle.

CHAPTER PROBLEM

A circular pond has diameter 10 m. Find its circumference and area in terms of π.

Radius is 5 m. Circumference is $\pi \times 10 = 10\pi$ m. Area is $\pi \times 5^2 = 25\pi$ m².

QUESTION BANK · FOLD OR COVER THE RIGHT COLUMN

Check your reasoning

Try the problem	Solution and reasoning
01 A wheel has diameter 0.7 m and rolls ten turns without slipping. How far does it go?	Ten circumferences give 7π metres, close to 22 metres.
02 Do three distinct points always determine one circle?	Only if they are noncollinear. Their chord bisectors then meet at the unique centre.
03 A second wheel has radius 14 cm. Estimate its travel in five complete turns.	Each turn covers about 2 × (22/7) × 14 = 88 cm. Five turns cover about 440 cm, or 4.4 m.
04 A circular track has radius 14 m. How far in 2.5 laps using π ≈ 22/7?	One lap is about 88 m. Multiply by 2.5 for about 220 m.
05 Two disks have radii 3 and 6. What is their area ratio, smaller to larger?	9π:36π = 1:4.



270°

What if the major sector is shaded?

Use the full 270/360 = 3/4. The smaller 90° angle refers to the unshaded part.

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