GCSE Maths – Geometry and Measures

Properties of Circles

Worksheet

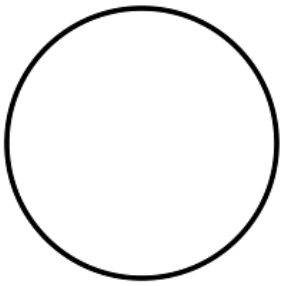
WORKED SOLUTIONS

This worksheet will show you how to work out questions related to properties of circles. Each section contains a worked example, a question with hints and then questions for you to work through on your own.

Section A

Worked Example

Draw a chord on the circle.

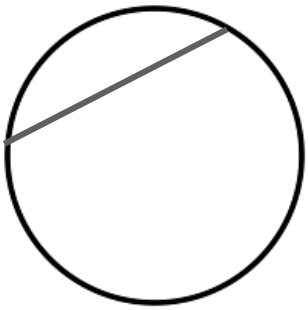


Step 1: Give the meaning of a chord.

A chord is a straight line joining two points on the circumference.

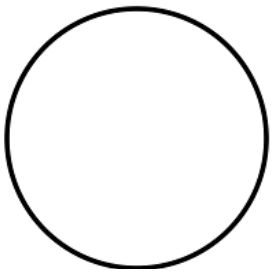
Step 2: Use the definition to accurately draw the chord.

Mark two points of the circumference of the circle.
Join the two points to create a chord.



Guided Example

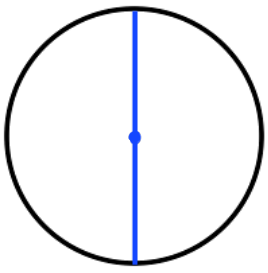
Draw a diameter on this circle



Step 1: Give the meaning of a diameter.

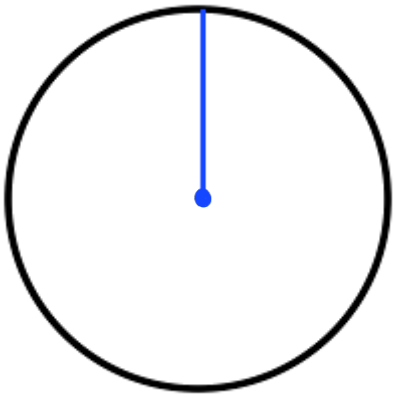
A diameter is a line that joins a point on the circumference with another point on the circumference and passes through the centre.

Step 2: Use the definition to accurately draw the diameter.



Now it's your turn!
If you get stuck, look back at the worked and guided examples.

1. A circle is shown below.



a) Draw a radius on this circle.

b) The radius of a circle is 6.8 cm. What is the length of the diameter?

Diameter is twice the length of the radius.

Diameter : $2 \times 6.8 = 13.6$ cm

c) The diameter of a circle is 28 cm. What is the length of the radius?

Radius : $28 \text{ cm} \div 2 = 14$ cm

d) The diameter of a circle is 3.4 cm. Calculate the circumference of the circle to 1 decimal place.

Circumference $= 2\pi r$ or πd

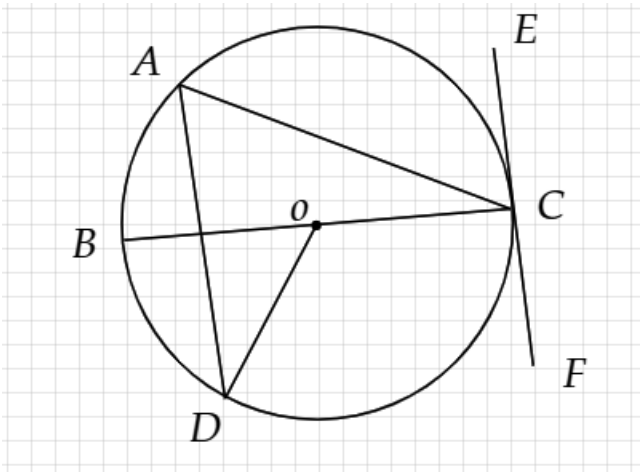
Circumference $= \pi \times d$

$= \pi \times 3.4$

$= 3.4\pi$ ($\pi = 3.14$)

$= 10.7$ cm

2. Consider the following diagram.



Define the following:

a) AC = chord

b) AD = chord

c) OC = radius

d) BC = diameter

e) OD = radius

f) EF = tangent

3. A circle has diameter 10 cm. Taking $\pi = 3$, find the perimeter of the circle.

Perimeter = circumference

Circumference = $\pi \times d$

Perimeter = $\pi \times d$
= 3×10
= 30 cm

The perimeter of the circle is 30 cm.

4. A circle has radius 3.5 cm. Taking $\pi = 3.14$, find the perimeter of the circle.

Perimeter = Circumference

Circumference = $2 \times \pi \times r$

Perimeter = $2 \times \pi \times r$

$= 2 \times 3.14 \times 3.5$

$= 21.98$ cm

The perimeter of the circle is 21.98 cm.

5. A circle has perimeter 12 cm. Taking $\pi = 3$, find the radius of the circle.

Perimeter = Circumference

Circumference = $2 \times \pi \times r$

Perimeter = $2 \times \pi \times r$

$12 = 2 \times 3 \times r$

$12 = 6r$

$r = \frac{12}{6}$

$= 2$ cm

The radius of the circle is 2 cm

6. A circle has perimeter $(3x + 21)$ cm. Taking $\pi = 3$, find the radius of the circle in terms of x.

Perimeter = circumference

Circumference = $2 \times \pi \times r$

Perimeter = $2 \times \pi \times r$

$3x + 21 = 2 \times 3 \times r$

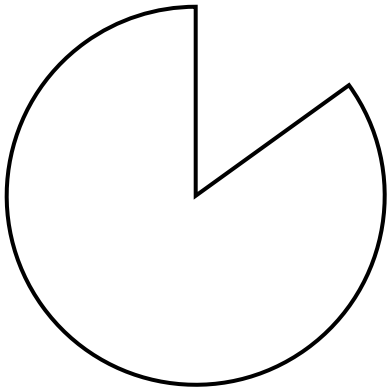
$= 6r$

$\frac{3x + 21}{6} = r$

$\frac{x + 7}{2} = r$

The radius of the circle in terms of x is $\frac{x+7}{2}$ cm

7. A sector of a circle with arc length 3 cm is cut out of the circle. If the radius is 5 cm, find the perimeter of the shape to the nearest centimetre.



Circumference of the circle $= 2 \times \pi \times r$

$= 2 \times \pi \times 5$

$= 10\pi$ → $\pi = 3.1416$

$= 31.416$ cm

Circumference of the shape $= 31.416$ cm $- 3$ cm

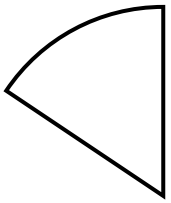
$= 28.416$ cm

Perimeter of the shape $= 28.416$ cm $+ 5$ cm $+ 5$ cm

$= 38.416$ cm

$\approx$ 38 cm

8. The perimeter of a circle is 24 cm. A sector is cut out with arc length 3 cm. What is the perimeter of the sector?



Perimeter $= 2 \times \pi \times r$

$24 = 2 \times \pi \times r$

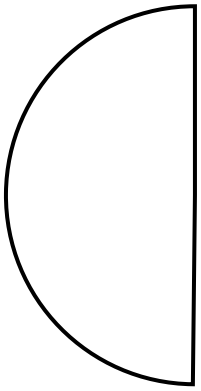
$\frac{24}{2\pi} = r$

$r = \frac{12}{\pi} = 3.82$

Perimeter of the sector $= 2 \times 3.82 + 3$

$= 10.64$ cm

9. The radius of this shape is 3 cm. What is the perimeter of the shape?



Perimeter of the circle $= 2 \times \pi \times r$

$= 2 \times \pi \times 3$

$= 6\pi$

Length of the arc $= \frac{6\pi}{2}$ → because the arc is half a circle

$= 3\pi$

Perimeter of the shape $= 3\pi + 2 \times 3$

$= 3\pi + 6$ → $\pi = 3.1416$

$= 9.425 + 6$

$= 15.425$

$\approx$ 15.4 cm