

Connect

Title

SI Units – Geometry equations
Calculating area of 2D shapes



Today's Targets

Identify equations for geometry - Area

Select which equations from a given list would be used for a specified engineering product or project

Connect:

$I = 5$
Amps

$R = 1$
Ohm

$V = 5$

The physical and organisational structures and facilities needed for the operation of a society or enterprise.

Equations:

- ☐ missile travel and distance established
- ☐ how far you can fly on one tank of fuel
- ☐ fuel efficiency calculations
- ☐ number of passengers carried
- ☐ weight calculations
- ☐ aerodynamic lift calculations
- ☐ how far you can fly calculations – distance vs fuel
- ☐ friction on the surface of the plane's wings
- ☐ amount of lift per surface area
- ☐ weight of plane
- ☐ weight of missile
- ☐ weight of fuel
- ☐ engineer design.



Monday, 20 July 2026

Today's title: SI Units – Geometry equations - area



Prior Learning

CA1 Engineering disciplines



Today's Targets

Identify equations for calculating area

Select which equations from a given list

Today's Learning:

You must be able to:

Define what an area is.

Calculate the area of rectangles and triangles.

Calculate the area of circles.

You may also be able to:

Calculate the area of compound shapes.

Differentiate between circle and circumference.



Future Learning

CA3

Reading engineering drawings



Literacy

International System (SI)

Geometry

Equation

Area

NCFE Level 1 / 2 Technical Award in Engineering

CA2 - Applied science and mathematics in engineering

2.2.1 SI Units of Measurement - equations

Geometry - Area

Lesson 7

Monday, 20 July 2026

Today's title: 2.2: Engineering equations - area



Your target

- Identify equations for geometry
- Select which equations from a given list which would be used for a specified engineering product or project



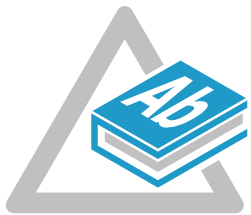
Steps to success

- Apply data to a selected equation to complete a calculation for a specified engineering product or project



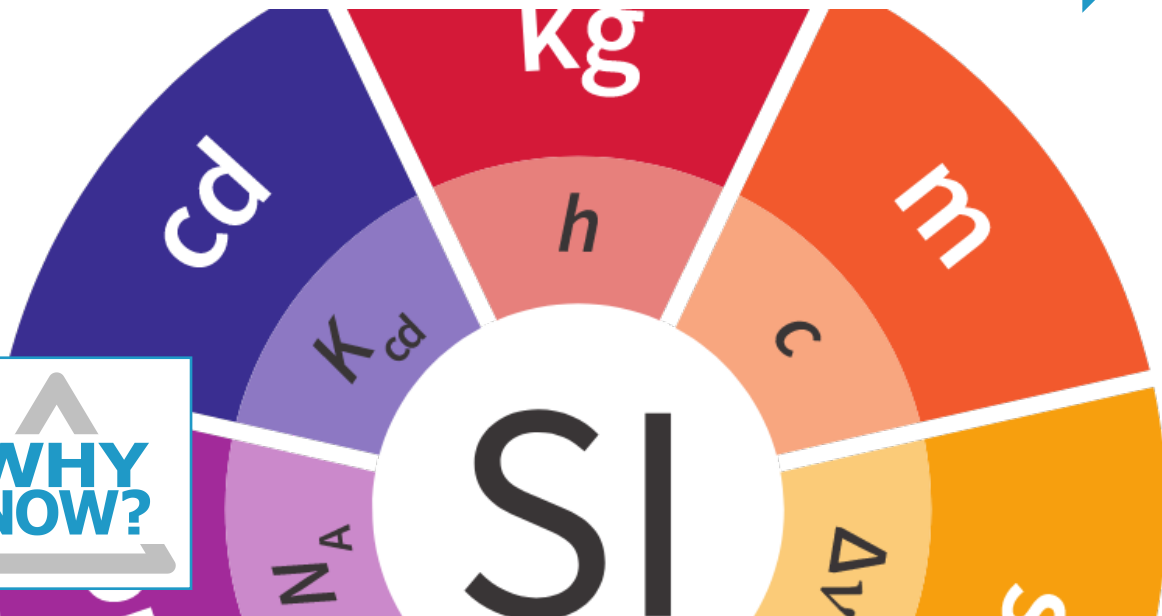
Path to progress

- Justify the selection of the equation
- Assess whether the correct calculation has been used



Key terms

International System (SI)
Equation
Geometry



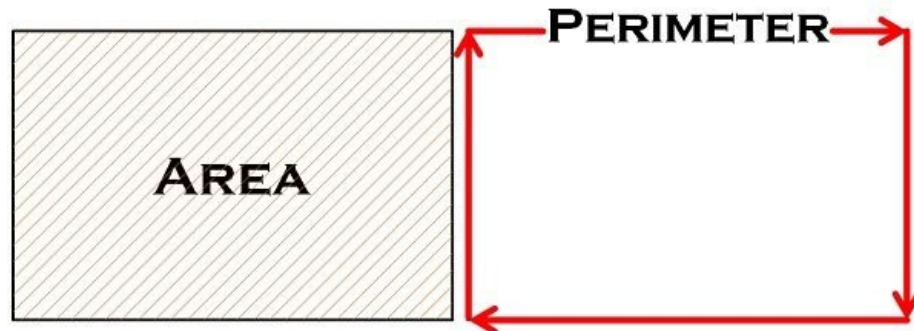
Activate

What is an area?

An area is an amount of surface a two-dimensional shape can cover and is measured in square units.

What is the difference between area and perimeter?

Perimeter is the distance **around the outside of a shape**. For example, if you walk around the edge of a playground, you're measuring its perimeter. Area is the amount of space **inside a shape**.



Activate

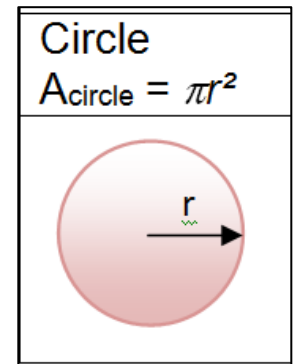
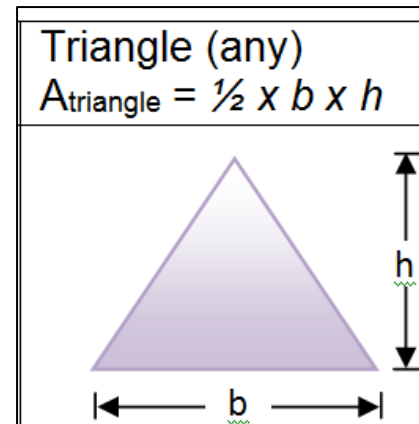
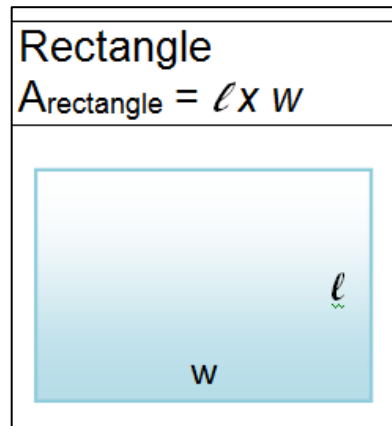
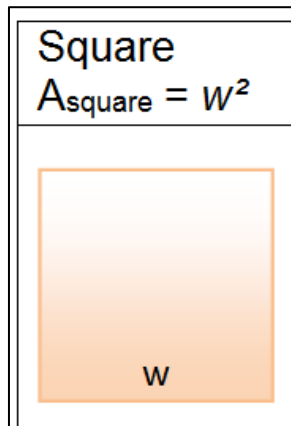
2D Geometry

Area of a square = length of side²

Area of a rectangle = length of side 1 x length of side 2

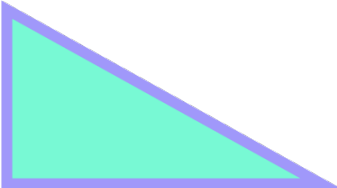
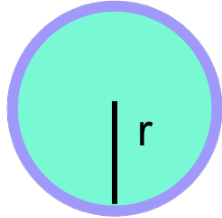
Area of a triangle = (length of base x height of triangle) ÷ 2

Area of a circle $\pi \times \text{radius}^2$



Activate

How to calculate basic shape areas

Rectangle	Triangle	Circle
 width length	 height base	 r

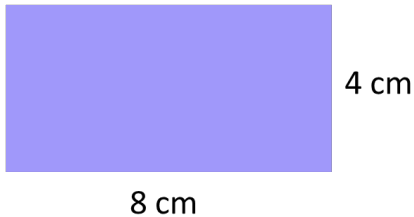
What is the difference between circle and circumference?

The distance around the boundary of a circle is called the circumference.

Activate

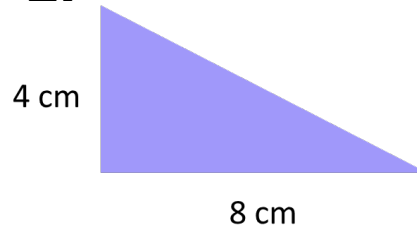
Area calculations 1. Calculate the areas below and display on your mini whiteboards.

1.



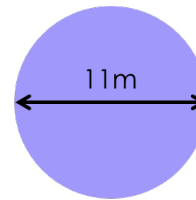
$$A = w \times h$$

2.



$$A = (b \times h) / 2$$

3.



$$A = \pi r^2$$

4.



If the radius of this shape is 8.5cm, calculate its area.

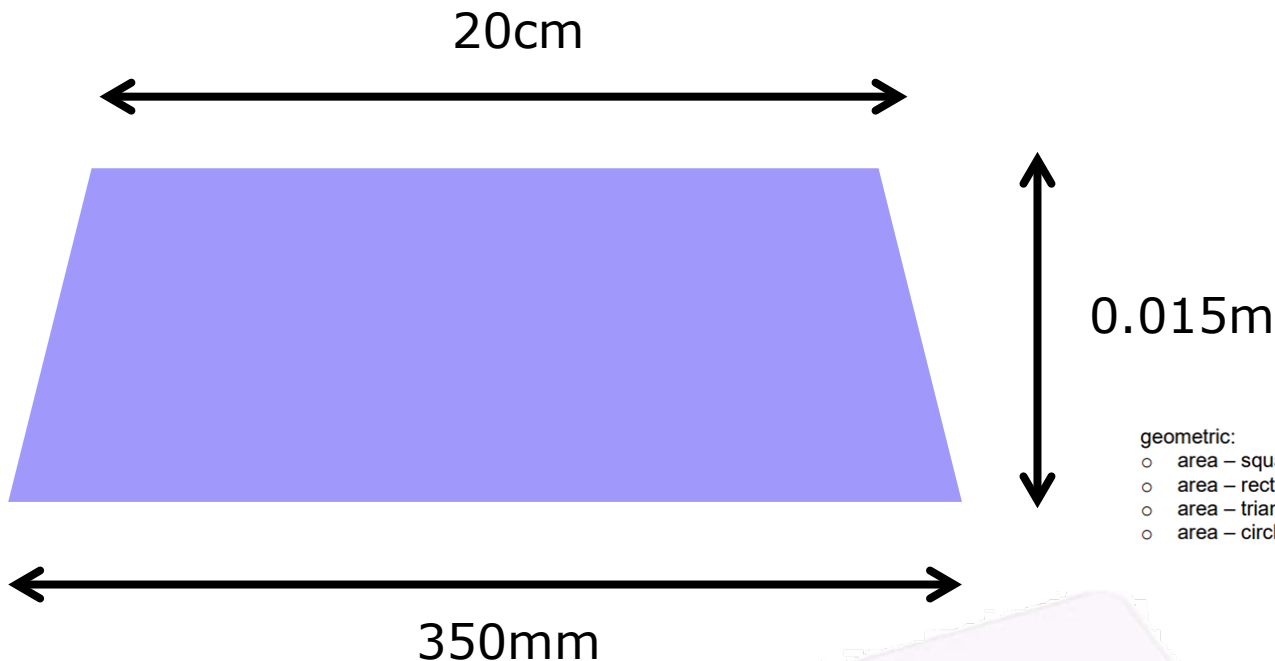
$$\begin{aligned} A &= \pi r^2 \\ r &= 8.5 \\ A &= 3.14 \times 8.5 \\ &= 226.86\text{cm}^2 / 4 \\ &= 56.7 \times 3 \\ &= 170\text{cm}^2 \end{aligned}$$



Monday, 20 July 2026

Activate

Area calculations 2. Calculate the area below in cm and display on your mini whiteboards.



Caution.
Separate into
known
shapes and
mind the
units.

geometric:

- area – square
- area – rectangle
- area – triangle
- area – circle

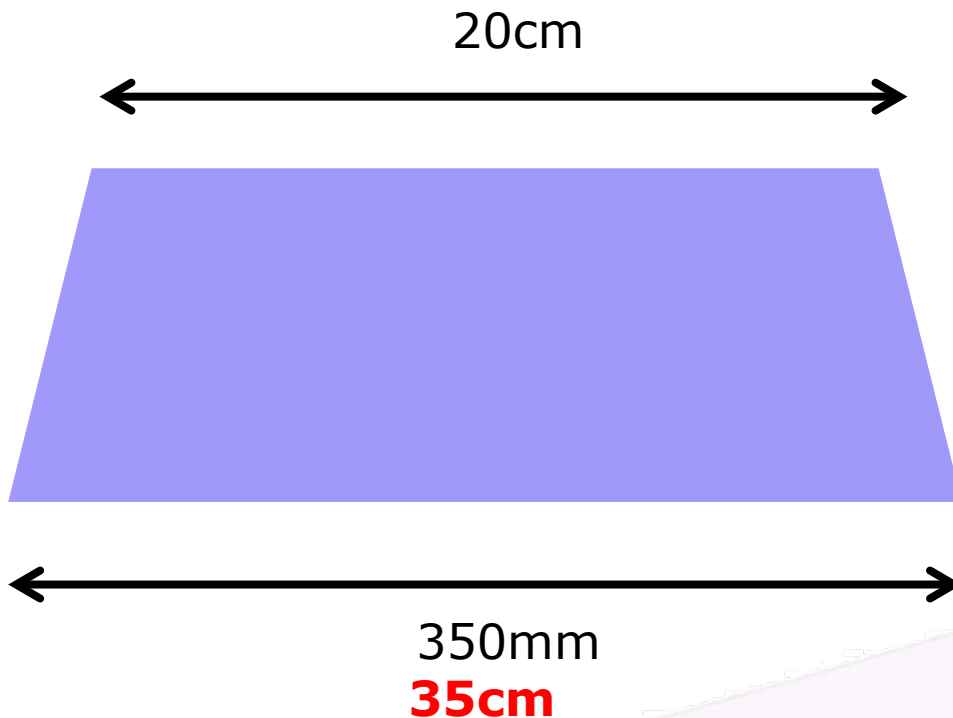
length of side²
length of side 1 x length of side 2
(length of base x height of triangle) ÷ 2
 $\pi \times \text{radius}^2$



Monday, 20 July 2026

Activate

Area calculations 2. - *answer*



Area of rectangle: $35 \times 20 = 700 \text{ cm}^2$
To calculate missing triangles (x2):
 $35 - 20 = 15$
Width of triangle: $15 / 2 = 7.5$
Area triangle $7.5 \times 10 / 2 = 37.5 \text{ cm}^2$
Total area = $700 - 37.5 - 37.5 = 625 \text{ cm}^2$

geometric:

- area – square
- area – rectangle
- area – triangle
- area – circle

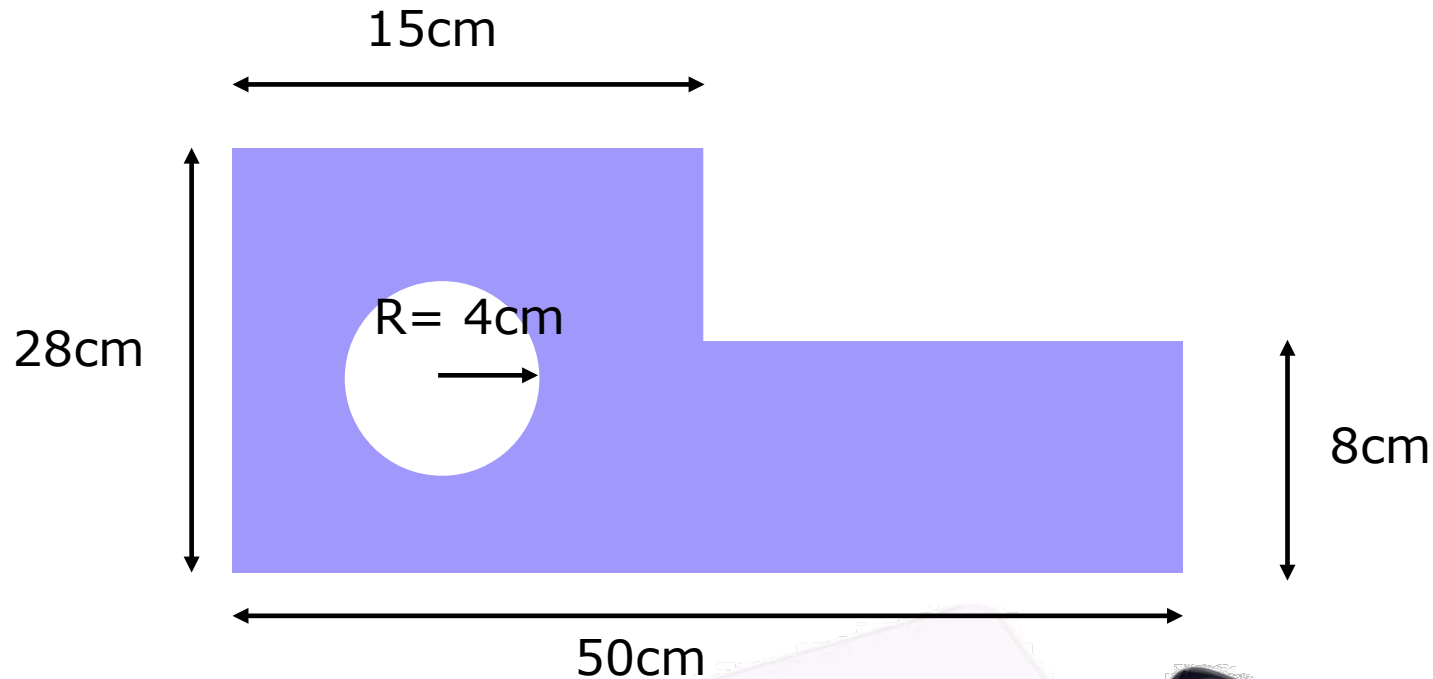
length of side²
length of side 1 x length of side 2
(length of base x height of triangle) ÷ 2
 $\pi \times \text{radius}^2$



Monday, 20 July 2026

Activate

Area calculations 3. Calculate the area below in cm and display on your mini whiteboards.



geometric:

- area – square
- area – rectangle
- area – triangle
- area – circle

length of side²

length of side 1 x length of side 2

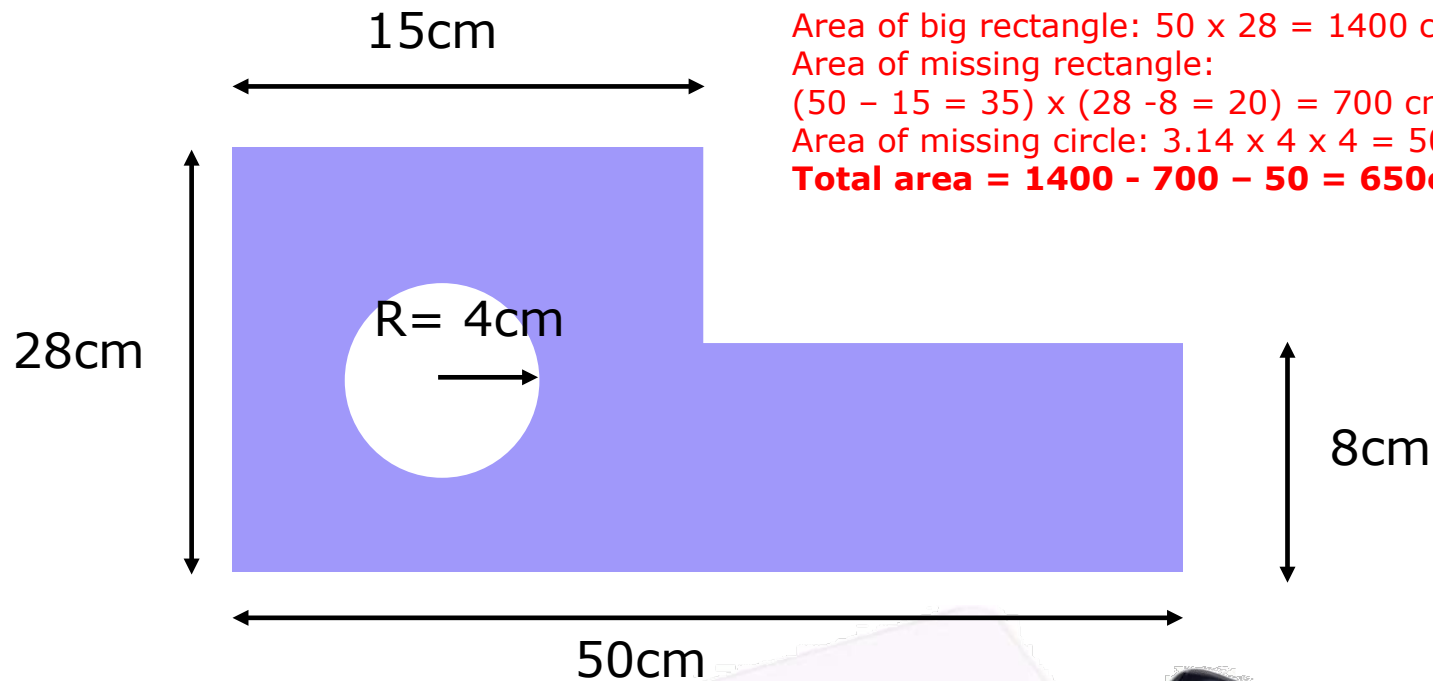
(length of base x height of triangle) ÷ 2

$\pi \times \text{radius}^2$



Activate

Area calculations 3. - *answer*



Area of big rectangle: $50 \times 28 = 1400 \text{ cm}^2$

Area of missing rectangle:

$(50 - 15 = 35) \times (28 - 8 = 20) = 700 \text{ cm}^2$

Area of missing circle: $3.14 \times 4 \times 4 = 50.27 \text{ cm}^2$

Total area = $1400 - 700 - 50 = 650 \text{ cm}^2$

geometric:

- area – square
- area – rectangle
- area – triangle
- area – circle

length of side²

length of side 1 x length of side 2

(length of base x height of triangle) ÷ 2

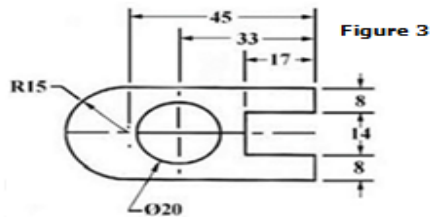
$\pi \times \text{radius}^2$



Demonstrate

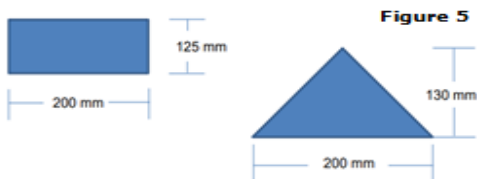
1. Calculate the **length** and **width** of the product shown in figure 3.

Show your working. [4 marks]



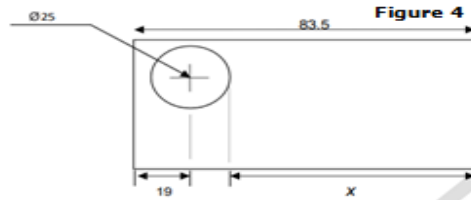
2. You are a sheet metal worker. You have been asked to produce a circular component out of 1cm stainless steel with a radius of 7cm.

Calculate the surface **area** of the component. Give your answer to one decimal place (1dp)



3. Figure 4 shows a component with a hole through it. Calculate the missing dimension x.

Show your working.



4. Figure 5 (bottom left) shows two components to be cut from the same square sheet of material, that has an area of 40 000 mm².

Calculate if both shapes in Figure 5 can be cut from the same square sheet.

Show your working. [3 marks]

**25
minutes!**



Name two SI units of measurement commonly used in mechanical engineering. _____

geometric:

- area – square
- area – rectangle
- area – triangle
- area – circle

length of side²

length of side 1 x length of side 2

(length of base x height of triangle) ÷ 2

$\pi \times \text{radius}^2$

Consolidate

Can you now?

- Define what an area is?
- Calculate the area of rectangles and triangles?
- Calculate the area of circles?
- Calculate the area of compound shapes?
- Differentiate between circle and circumference?

Next lesson...

We will learn about...

...how to look at reading and interpreting engineering drawings accurately; the contents of a title block, the two systems of measurement and the use of scale in an engineering drawing
