Year 10 Maths

Unit 2: Ratio and scale

For every 3 circles there are 2 triangles.

This can be written as a **ratio**:
 The ratio of circles to triangles is 3 : 2
 The ratio of triangles to circles is 2 : 3

simplifying ratios...

EXAMPLE:
Simplify the ratio 15 : 20

$15 : 20$
$\div 5 \quad\quad \div 5$
$3 : 4$

5 is a factor of both 15 and 20

EXAMPLE:
Simplify 2.4 : 3 : 4.8

$2.4 : 3 : 4.8$
x 10 $\quad\quad$ x 10
$24 : 30 : 48$
$\div 6 \quad\quad \div 6$
$4 : 5 : 8$

First get rid of the decimals

Keep going if there's still a common factor

EXAMPLE: Simplify
2 hours : 40 minutes

$120 : 40$
$\div 10 \quad\quad \div 10$
$12 : 4$
$\div 3 \quad\quad \div 3$
$3 : 1$

Convert to a common unit (e.g. minutes)

Simplify further if possible

sharing in a ratio...

EXAMPLE: Fran and Elle share 270 lego bricks in the ratio 4 : 5. How many does each get?

$4 : 5$

30 30
30
(circles)

270

Draw a diagram

$270 \div 9 = 30$

Work out the value of each circle
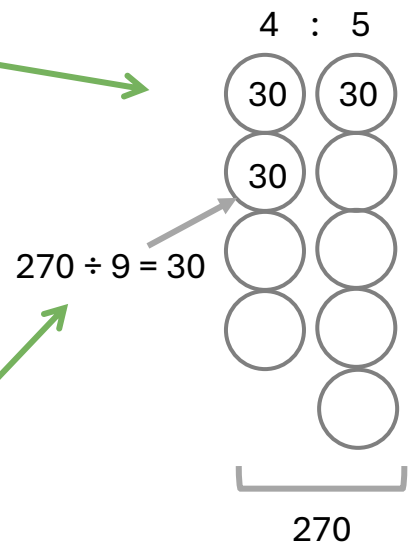
Count the circles

$4 \times 30 = 120$
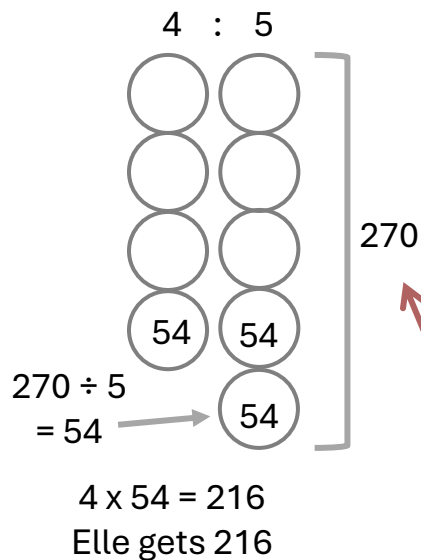$5 \times 30 = 150$

Fran gets 120
Elle gets 150

Answer in context

one part is given...

EXAMPLE:
Fran and Elle share some lego bricks in the ratio 4 : 5.
Elle gets 270. How many does Fran get?

4 : 5

$270 \div 5$
$= 54$

270

4 x 54 = 216
Elle gets 216

a difference is given...

EXAMPLE: Pete and Sam share some sweets in the ratio 1 : 3.
Sam gets **20 more** than Pete. How many do they have in total?

1 : 3

$20 \div 2 = 10$

20

4 x 10 = 40
They have 40

'1:n' means we want a '1' on the left of the ratio

We can get this by dividing by 5

This is in the 'form' we want
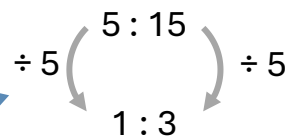
Dividing by 8 gives us '1' on the left side
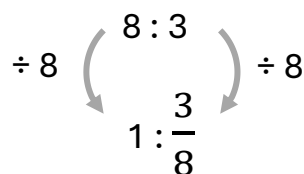
This time the 5 circles are worth 270

We can include a fraction or decimal in the ratio

This time we want the '1' on the right side of the ratio

We can get this by dividing by 15

The 2 circles here represent the '20 more'

the form 1 : n...

EXAMPLE: Write 5 : 15 in the form **1 : n**

$\div 5$ 5 : 15 $\div 5$
1 : 3

EXAMPLE: Write 19 : 3 in the form 1 : n

$\div 8$ 8 : 3 $\div 8$
$1 : \dfrac{3}{8}$

or 1 : 0.375

the form n : 1...

EXAMPLE: Write 5 : 15 in the form **n : 1**

$\div 15$ 5 : 15 $\div 15$
$\dfrac{5}{15} : 1$

$\dfrac{1}{3} : 1$
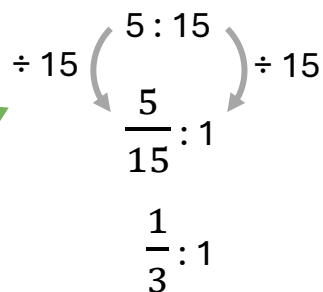
Simplify fractions in the answer when you can
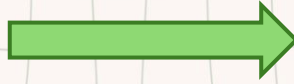
A **map scale** can be written using units
  e.g. 1cm to 10 miles
or as a ratio
  e.g. 1 : 50 000
For this ratio, 1 cm on the map represents 50 000 cm in real life.
(or 1mm represents 50 000 mm, etc.)

EXAMPLE: A map has a scale 1cm : 6km
A road is 15km long. How long does it appear on the map, in cm?

MAP : REAL LIFE
  1cm : 6km
  1cm : 6000m
  1cm : 600 000cm

Scale to the same units

  1 : 600 000
÷ 40   ÷ 40
  0.025 : 15 000

Use the 15km in the question (in metres here)

Road on the map,
  0.025 metres   x 100
  2.5 cm

The question asked for the answer in cm

scale drawings...

EXAMPLE:
The accurate scale diagrams shows two towns, Town A and Town B.
Find the actual distance between the two towns, in kilometres.

Town A

Town B
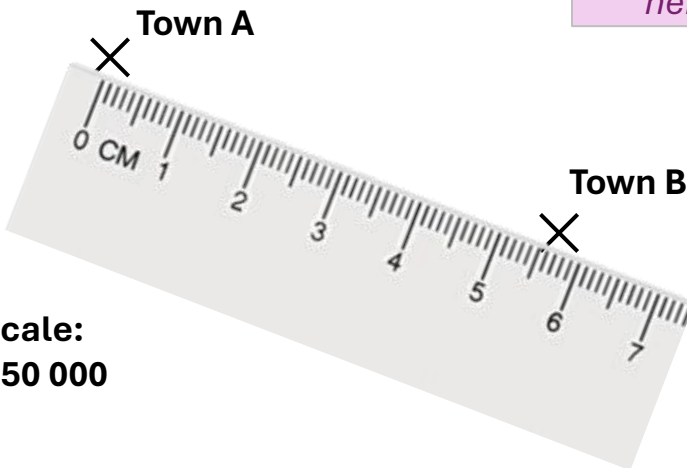
Scale:
1 : 50 000

5.7 cm on diagram → x 50 000 → 285000 cm in real life → ÷100 → 2850 m → ÷1000 → **2.85 km**

Measure the distance accurately with a ruler

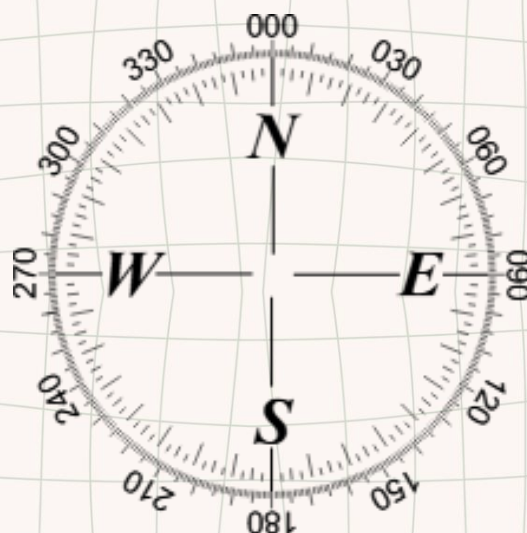*Use the scale from the diagram*

The question asked for the answer in kilometres

A **bearing** is used to represent direction accurately, such as for navigation.

Bearings are measured:
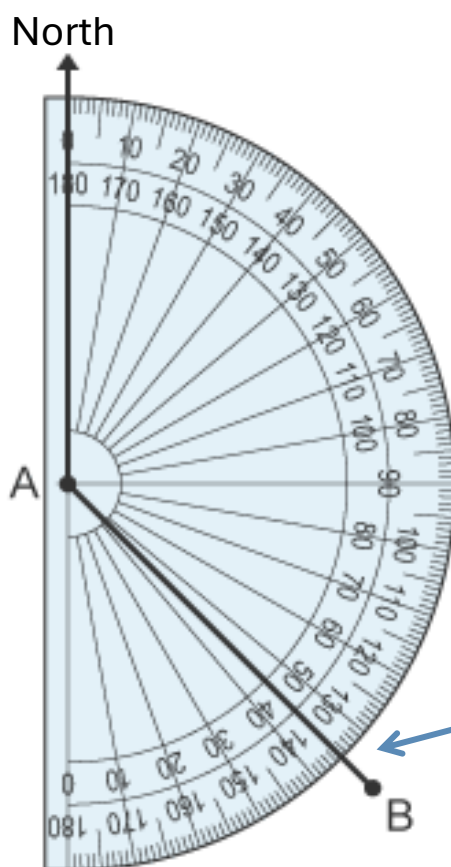- clockwise from north
- in degrees
- using 3 digits (e.g. 042°)

The bearing of **A from B** is the direction to travel to get <u>from B</u> to A.

EXAMPLE:
Measure the bearing of **B from A**.

This means the direction to get <u>from A</u> to B

We're travelling <u>from A,</u> so place the centre of a protractor at A

North

A

B

Measure the angle accurately, clockwise from north

135°

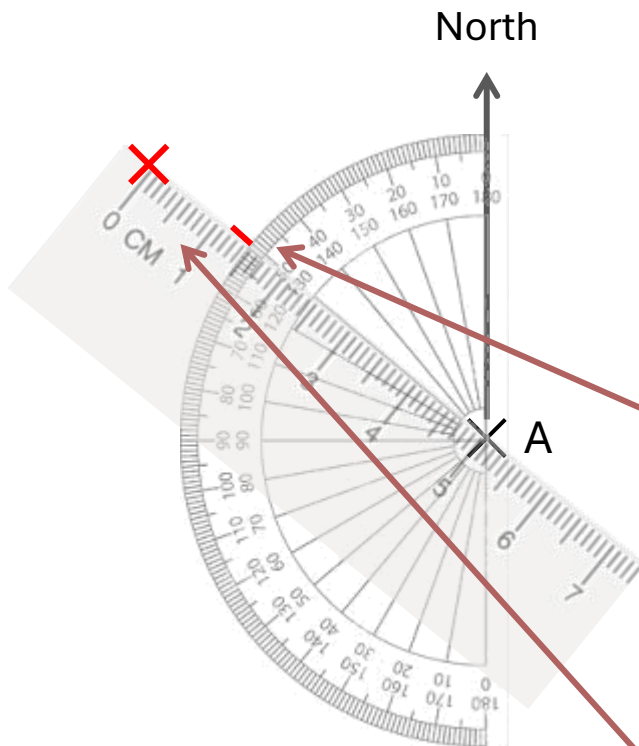Remember to use 3 digits for angles less than 100°

constructing...

EXAMPLE:
Josh is at point A.
He runs 500m on a bearing of 310°.
Plot his finishing position with a cross.

The bearing needs to be clockwise from north

Scale 1 cm : 100 m

360 – 310 = 50°

Calculate the distance using the scale

North

1 cm : 100m
<u>5 cm</u> : 500m

A

Use a protractor to mark the correct angle

Then use a ruler to mark the answer at the correct distance