Scale drawing

- Interpreting the scale on a map
- Using the scale on a map to calculate distances
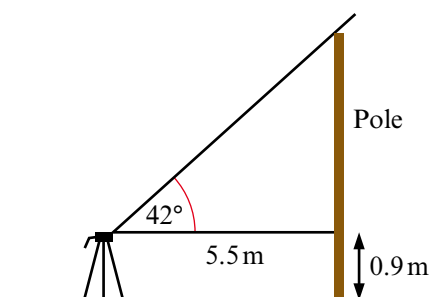
Keywords

You should know

explanation 1a   explanation 1b

1 Paul is finding the height of a telegraph pole. He has a tripod that is 0.9 m high.
   He puts the tripod 5.5 m from the pole and measures the angle of elevation as 42°.

   a Draw an accurate scale diagram using a scale of 2 cm to 1 m.

   b Use your diagram to find the height of the pole.

   c Paul says that 2 cm on his diagram is 100 cm in reality.
      Explain how to write this scale as a ratio.

2 Melanie wanted to find the width of a river.
   The diagram shows what she did.
   From peg 2 she measured the angle
   of 58°.

   a Explain what Melanie has done.

   b Explain what a scale of 1 : 200 means.

   c The distance between peg 1 and peg 2 is 15 m, or 1500 cm.
      What would the distance be on a scale drawing using a scale of 1 : 200?

   d Make an accurate scale drawing to find the width of the river.
      Show any working out.
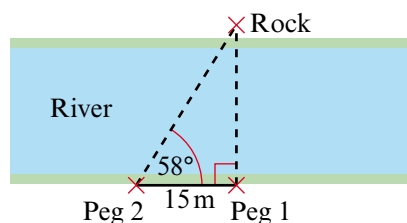
3 The diagram shows the plan of a garden, drawn to a scale of 1 : 400.

   a Explain what a scale of 1 : 400 means.

   b Measure the diameter of the circular pond on the diagram.

   c Explain how to find the actual diameter of the pond.

   d Measure the length of the rectangular lawn on the plan in centimetres.

   e What is the actual length of the lawn?

   f What is the actual width of the lawn?

   g How many square metres of turf should be ordered?

   h A bench 2.4 m long is to be placed near the pond.
   How long would the bench be on the plan?

explanation 2a   explanation 2b   explanation 2c

4 At the 2008 Olympics, Team GB achieved many medals in rowing.
Ami is making a model of a coxless four. The scale is 1 : 60.

   a The length of her model is 21.7 cm. How long is the actual boat?

   b The width of her model is 7.8 mm. What is the actual width of the boat?

   c The depth of the model boat is 6.4 mm. What is the actual depth of the boat?

   d Ami is making the oars. The length of the oars is 3.84 m.
   How long will these be on the model?

**5** Rowena collects model helicopters. Her latest model has a scale of 1 : 40.

a Look at the illustration. What number goes in the boxes?

× ☐

÷ ☐

Model

Not to scale
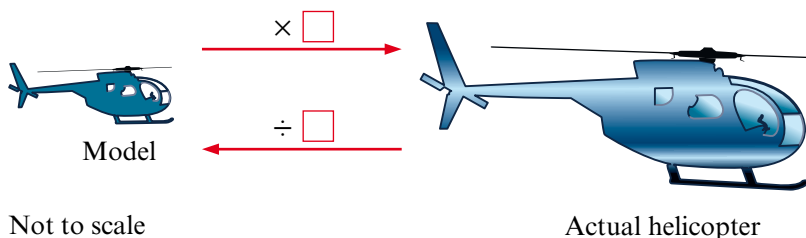
Actual helicopter

b If you measure a length in millimetres on the model, what unit will the actual length be in just after you use the scale factor?

c The length of the model helicopter is 15.8 cm.
What is the actual length of the helicopter?

d The height of the model is 65.5 mm.
What is the height of the actual helicopter?

e The radius of the rotor blade on the actual helicopter is 3.7 m.
What is the radius of the blade on the model?

f The tail rotor blade has an actual diameter of 102 cm.
What diameter is this on the model?

g The distance between the landing feet on the model is 47 mm.
What is the actual distance between the landing feet?

6 The diagram shows a family parking design for a supermarket.
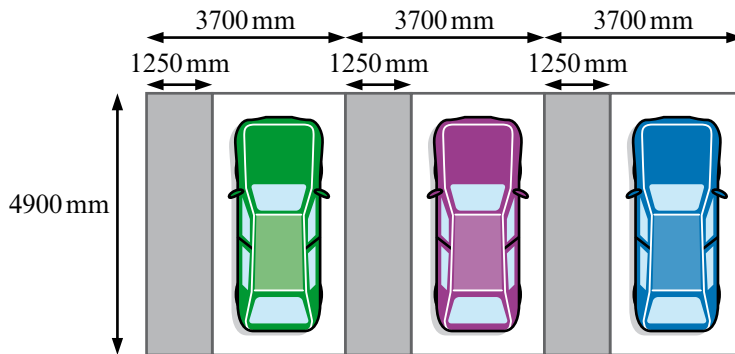
a Use the design to draw a scale diagram using a scale of 1 : 100.

b The width of the road section is 4 m.
How wide would this be, in millimetres, on the scale drawing?

7 The picture shows a scale drawing of a racing car.
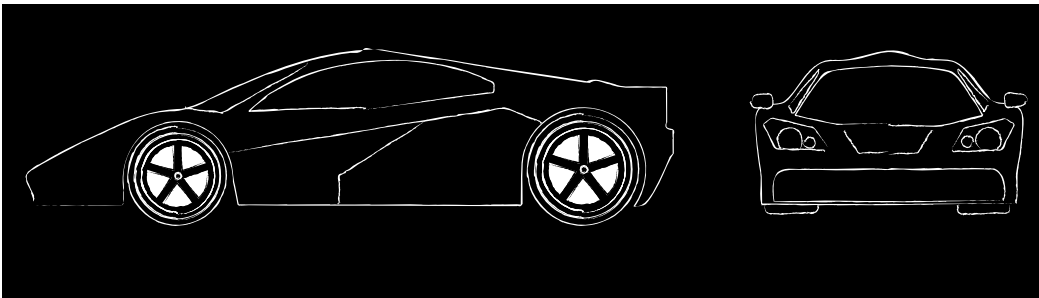
a The length of the racing car on the scale drawing is 85.5 mm and the length of the actual car is 4275 mm. What is the scale of this drawing in ratio form?

b The width of the car on the drawing is 36.4 mm. What is the actual width?

c The actual ground clearance is 120 mm.
What is the ground clearance on the diagram?

d What does 1 cm on the model represent in real life?

e Monica draws the same car using a scale of 1 : 100.
What is the difference between the two drawings?

8 A map of Italy is drawn to a scale of
1 : 2 000 000.

   a The distance between Cortona and
   Roma is 10 cm on the map. What is
   the actual distance in kilometres?

   b The distance between Cortona and
   Pisa is 9 cm on the map. What is this
   in kilometres in real life?

   c The distance between Cortona
   and Milano is 420 km. How many
   centimetres would this be on the map?

   d What actual distance, in kilometres, does
   1 cm on the map represent?

9 A walking map has a scale of 1 : 50 000.

   a The direct distance between Grasmere and Windermere on the map is
   22.7 cm. What is the actual distance between these two places?

   b Lake Coniston is 18 cm long on the map.
   What is the actual length of the lake in kilometres?

   c The distance between Ambleside and Windermere is 6.1 km.
   How far apart are they on the map?

   d What actual distance, in kilometres, does 1 cm on the map represent?

10 A map has a scale of 1 : 500 000.

   a The distance between two service stations
   on the map is 3.1 cm.

   What is the actual distance?

   b The next emergency phone is 17 km away.
   How many millimetres would this be on
   the map?

   c At the next junction, there is a picnic area by the river. This is 6 mm from
   the road on the map. How far will this be in real life?

EMERGENCY
17 km

11 Michael runs along the canal from
the first bridge to the second.
On his map, the distance is 7.5 cm.

The map has a scale of 1 inch to 1 mile
but Michael's ruler only measures in centimetres.

a Michael remembers that 1 inch is about 2.5 cm.
Work out the distance between the two bridges.

b The next bridge is $2\frac{1}{2}$ miles further down the canal.

How far is this on the map in centimetres?

12 Nita has drawn a scale drawing of a space shuttle.

a The length of the shuttle on her drawing is 74 mm.
The actual length is 37 m. What scale has she used?
Write it in the form of a ratio.

b The wing span on her drawing is 46 mm.
What is the actual wing span of the shuttle?

c The height of the shuttle is 17 m.
What measurement is this on her drawing?

d The ground clearance of the wing tip on her drawing is 7.2 mm.
How far above the ground is the actual wing tip?