

GCSE Maths: Scale drawings and maps (Higher): answers

GCSE Maths - Loci, Bearings and Vectors - Higher - Lesson 22.1

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch22-constructions-loci-bearings-vectors/higher/scale-drawings-and-maps/

Exercise 22A Scale and ratio Non-calculator

1 Write each scale as a ratio in the form 1 : n .

(a) 1 cm represents 5 m

Answer: 1 : 500

(b) 1 cm represents 20 m

Answer: 1 : 2000

(c) 1 cm represents 500 m

Answer: 1 : 50 000

(d) 1 cm represents 2 km

Answer: 1 : 200 000

2 The scale of a map is shown. Work out the real distance for each map distance.

(a) Scale 1 : 1000. Map distance 3 cm. Give your answer in metres.

Answer: 30 m

(b) Scale 1 : 5000. Map distance 8 cm. Give your answer in metres.

Answer: 400 m

(c) Scale 1 : 25 000. Map distance 6 cm. Give your answer in kilometres.

Answer: 1.5 km

(d) Scale 1 : 200 000. Map distance 2.5 cm. Give your answer in kilometres.

Answer: 5 km

(e) Scale 1 : 50 000. Map distance 12 cm. Give your answer in kilometres.

Answer: 6 km

(f) Scale 1 : 200. Drawing length 9 cm. Give your answer in metres.

Answer: 18 m

3 A map has a scale of 1 : 50 000. Two towns are 7.2 cm apart on the map. How far apart are the towns in real life? Give your answer in km.

Answer: 3.600000000000000088817841970012523233890533447265625 km

4 Work out the length on the map or drawing for each real length.

- (a) Scale 1 : 1000. Real length 50 m.

Answer: 5 cm

- (b) Scale 1 : 50 000. Real length 2 km.

Answer: 4 cm

- (c) Scale 1 : 250 000. Real length 15 km.

Answer: 6 cm

- (d) Scale 1 : 2000. Real length 360 m.

Answer: 18 cm

- (e) Scale 1 : 25 000. Real length 4.5 km.

Answer: 18 cm

- (f) Scale 1 : 20. Real length 1.8 m.

Answer: 9.0000000000000002220446049250313080847263336181640625 cm

5 Work out the scale of each map as a ratio in the form 1 : n .

- (a) 4 cm on the map represents 2 km.

Answer: 1 : 50 000

- (b) 5 cm on the map represents 250 m.

Answer: 1 : 5000

- (c) 2 cm on the map represents 8 km.

Answer: 1 : 400 000

- (d) 3 cm on the plan represents 6 m.

Answer: 1 : 200

6 A toy car is a model of a real car. The scale of the model is 1 : 24. The model is 17.5 cm long. Work out the length of the real car. Give your answer in metres.

Answer: 4.2 m

7 A wall is 5.6 m long. It is drawn on a plan with a scale of 1 : 50. How long is the wall on the plan?

Answer: 11.199999999999999289457264239899814128875732421875 cm

8 The scale of a map is 1 cm to 250 m.

- (a) Write the scale as a ratio in the form 1 : n .

Answer: 1 : 25 000

- (b) Two lakes are 7.4 cm apart on the map. How far apart are they in real life? Give your answer in km.

Answer: 1.850000000000000088817841970012523233890533447265625 km

9 Sam says: "A scale of 1 : 2000 means that 1 cm on the map is 2000 m in real life." Is Sam right? Explain your answer.

Answer: No. 1 cm is 2000 cm = 20 m.

- 10** Map A has a scale of 1 : 25 000. Map B shows the same area with a scale of 1 : 50 000. Which map shows more detail? Give a reason using the distance that 1 cm represents on each map.

Answer: Map A. 1 cm is 250 m on map A but 500 m on map B.

- 11** A walker follows a path that measures 8.4 cm on a map with a scale of 1 : 25 000. She walks at 3 km/h. How many minutes does the walk take?

Answer: 42 minutes

- 12 Show that** on a map with a scale of 1 : 50 000, a distance of 2 cm on the map is 1 km in real life.

Answer: $2 \times 50\,000 = 100\,000\text{ cm} = 1\text{ km}$

- 13** The scale of a map is 1 : 25 000. A forest has an area of 8 cm^2 on the map. Work out the real area of the forest in km^2 .

Answer: 0.5 km^2

- 14** A plan of a field has a scale of 1 : 2000. The field has an area of 15 cm^2 on the plan. Work out the real area of the field in m^2 .

Answer: 6000 m^2

- 15** The scale of a map is 1 : 20 000. A square park has sides of 3 cm on the map. **Show that** the real area of the park is 0.36 km^2 .

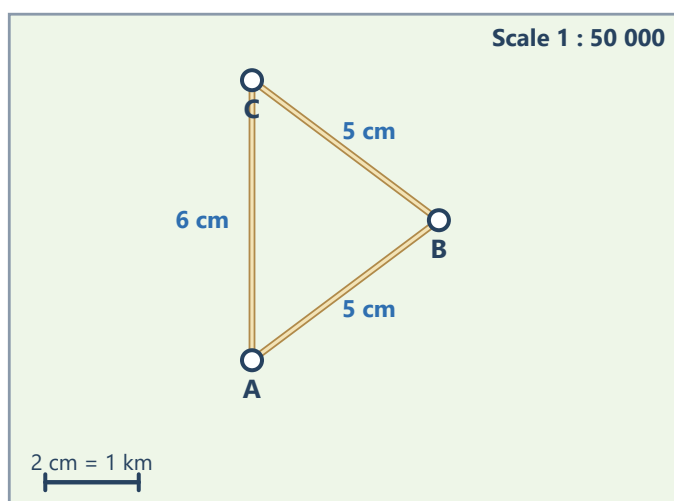
Answer: side 0.6 km, area 0.36 km^2

- 16 Challenge.** On a map, 6 cm represents 9 km. A road measures 14.2 cm on the same map. Work out the real length of the road.

Answer: 21.3 km

Exercise 22B Maps and scale drawings in context Calculator allowed

- 1** The map shows three villages A, B and C joined by roads. The scale is 1 : 50 000.



- (a)** Work out the real length of the road from A to B.

Answer: 2.5 km

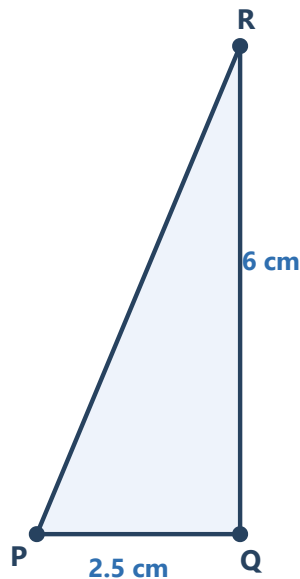
- (b) Work out the real length of the road from A to C.

Answer: 3 km

- (c) Pat drives from A to C by way of B. How much further is this than driving straight from A to C?

Answer: 2 km

- 2 A ladder is 6.5 m long. Its foot is 2.5 m from a vertical wall on flat ground. Make a scale drawing of the right-angled triangle using a scale of 1 cm to 1 m (the triangle in the picture is drawn to this scale). Measure the angle between the ladder and the ground. Give your answer to the nearest degree.



Answer: 67° (accept 66° to 68°)

- 3 The shadow of a flagpole on level ground is 8 m long. The angle of elevation of the Sun is 35°. Use a scale drawing with 1 cm to 1 m to find the height of the flagpole to the nearest metre.

Answer: 6 m (accept 5 m to 6 m)

- 4 A drawing of a footbridge has a scale of 1 : 200. The real bridge is 36 m long. How long is the bridge on the drawing?

Answer: 18 cm

- 5 The scale of a map is 1 : 50 000. Write the scale in the form "1 cm represents ___ km".

Answer: 0.5 km

- 6 A map has a scale of 1 cm to 5 km.

- (a) Write the scale as a ratio in the form 1 : n .

Answer: 1 : 500 000

- (b) The distance between two cities on the map is 7.4 cm. Work out the real distance.

Answer: 37.0000000000000017763568394002504646778106689453125 km

- 7 On a map with a scale of 1 : 25 000, a school is 4.8 cm east and 3.6 cm north of a railway station. Work out the real distance from the station to the school in a straight line. Give your answer in km.

Answer: 1.5 km

- 8** A cyclist rides along a route that is 15.6 cm long on a map with a scale of 1 : 50 000. She cycles at 12 km/h. How long does the ride take? Give your answer in minutes.

Answer: 39 minutes

- 9** A model of a tower is built to a scale of 1 : 300. The model is 18 cm tall. A window on the model is 0.5 cm tall. Work out the real height of (a) the tower, (b) the window. Give both answers in metres.

Answer: (a) 54 m, (b) 1.5 m

- 10** A map has a scale of 1 : 10 000. A rectangular field measures 3.2 cm by 2.5 cm on the map. Work out the real area of the field in hectares. (1 hectare = 10 000 m².)

Answer: 8 hectares

- 11 Challenge.** A model boat is made to a scale of 1 : 20. The model holds 250 cm³ of water. Work out the volume of the real boat in m³. (1 m³ = 1 000 000 cm³.)

Answer: 2 m³