GRADE 7 ACCELERATED · UNIT 5 · LESSON 1

Scale Drawings

MA.7.GR.1.5

I can find the scale factor between two figures, and use a scale to find a real length from a drawing or a drawing length from the real one.

Warm-Up

1. Find the value: $3 + 2 \times (-4)$
2. Find the value: $\sqrt{81}$
3. Write 2.5×10^3 as a number.
4. On a map, 3 cm stands for 12 km. What does 1 cm stand for?

Warm-Up

1. Find the value: $3 + 2 \times (-4)$ **−5**
2. Find the value: $\sqrt{81}$ **9**
3. Write 2.5×10^3 as a number. **2,500**
4. On a map, 3 cm stands for 12 km. What does 1 cm stand for?

   4 km

Vocabulary

scale drawing

a drawing of a real thing with every length multiplied by the same number: a map, a floor plan, a model

scale factor

the number every length is multiplied by, written k: from 4 cm to 6 cm, $k = 1.5$

corresponding sides

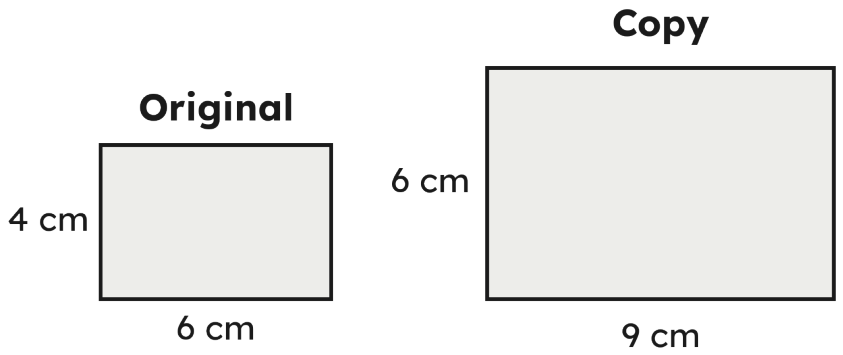
the side of the copy that matches a side of the original: the 6 cm side matches the 4 cm side

scale

a scale factor with units on it: $1\text{ in} : 20\text{ mi}$ means every inch on the map is 20 miles

Notes

I. A scale copy: every side times the same number



$$k = \frac{\text{copy}}{\text{original}} = \frac{9}{6} = 1.5 \qquad \frac{6}{4} = 1.5 \qquad \text{every side} \times 1.5$$

Every angle is still 90°: k multiplies lengths, not angles.

Notes

II. Find k: copy divided by original — and k can be less than 1

$$10 \text{ cm} \rightarrow 4 \text{ cm}: \quad k = \frac{4}{10} = 0.4 \quad \text{(not 2.5)}$$

k = copy ÷ original. Less than 1 shrinks, more than 1 enlarges, 1 is the same size.

Notes

III. Use k both ways

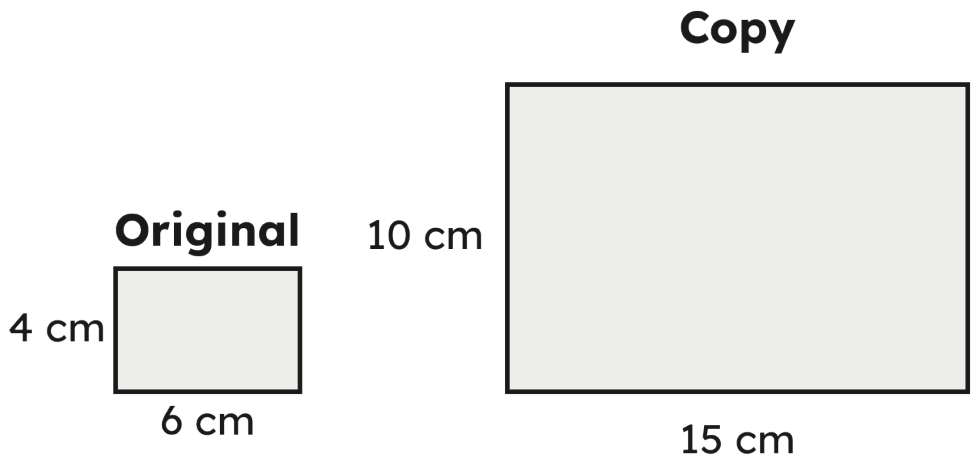
$$\text{copy} = \text{original} \times k \qquad \text{original} = \text{copy} \div k$$

$$1 \text{ in} : 20 \text{ mi} \quad 3.5 \text{ in} \times 20 = 70 \text{ mi} \quad 90 \text{ mi} \div 20 = 4.5 \text{ in}$$

To the copy, multiply by k. Back to the original, divide by k.

Example 1

A 6 cm by 4 cm rectangle is copied at 15 cm by 10 cm.



Find the scale factor.

Example 1

$$k = \frac{15}{6} = 2.5$$

$$\frac{10}{4} = 2.5$$

Answer: k = 2.5

Your Turn

An 8 cm by 10 cm rectangle is copied at 12 cm by 15 cm.

Find the scale factor.

Your Turn

An 8 cm by 10 cm rectangle is copied at 12 cm by 15 cm.

Find the scale factor.

$$k = \frac{12}{8} = 1.5$$

$$\frac{15}{10} = 1.5$$ — the same k

Answer: k = 1.5

Example 2

A map's scale is $1\text{ in} : 25\text{ mi}$.

Two towns are 2.6 in apart on the map.

How far apart are the towns?

Example 2

$$2.6 \times 25 = 65$$

Answer: 65 mi

Your Turn

A map's scale is $1\text{ cm} : 15\text{ km}$.

Two towns are 4.2 cm apart on the map.

How far apart are the towns?

Your Turn

A map's scale is $1\,\text{cm} : 15\,\text{km}$.

Two towns are 4.2 cm apart on the map.

How far apart are the towns?

$$4.2 \times 15 = 63$$

Answer: 63 km

Whiteboards · Question 1 of 9

A 2 cm side becomes 6 cm in the copy.

What is the scale factor?

Answer it.

Whiteboards · Question 1 of 9

A 2 cm side becomes 6 cm in the copy.

What is the scale factor?

$$k = \frac{6}{2} = 3$$

Answer: k = 3

Whiteboards · Question 2 of 9

An 8 cm side becomes 4 cm in the copy.

What is the scale factor?

Answer it.

Whiteboards · Question 2 of 9

An 8 cm side becomes 4 cm in the copy.

What is the scale factor?

$$k = \frac{4}{8} = \frac{1}{2}$$

Answer: k = ½

Whiteboards · Question 3 of 9

A 12 cm side becomes 9 cm in the copy.

What is the scale factor?

Answer it.

Whiteboards · Question 3 of 9

A 12 cm side becomes 9 cm in the copy.

What is the scale factor?

$$k = \frac{9}{12} = \frac{3}{4}$$

Answer: k = ¾

Whiteboards · Question 4 of 9

A side of 5 cm becomes 2 cm in the copy.

What is the scale factor?

A. 2.5

B. 0.4

C. 1

D. 3

Answer it.

Whiteboards · Question 4 of 9

A side of 5 cm becomes 2 cm in the copy.

What is the scale factor?

$$k = \frac{2}{5} = 0.4$$

Answer: B — 0.4

Whiteboards · Question 5 of 9

The scale factor is 3.5. A side of the original is 6 cm.

How long is that side in the copy?

Answer it.

Whiteboards · Question 5 of 9

The scale factor is 3.5. A side of the original is 6 cm.

How long is that side in the copy?

$$6 \times 3.5 = 21$$

Answer: 21 cm

Whiteboards · Question 6 of 9

A drawing has a 40° angle. The real figure is a scale copy at $k = 2.5$.

What is the angle in the real figure?

A. 40°

B. 42.5°

C. 16°

D. 100°

Answer it.

Whiteboards · Question 6 of 9

A drawing has a 40° angle. The real figure is a scale copy at $k = 2.5$.

What is the angle in the real figure?

Lengths are multiplied by k. Angles are not.

40°

Answer: A — 40°

Whiteboards · Question 7 of 9

A triangle has sides 6, 8 and 10. Another has sides 9, 12 and 15; a third has sides 9, 12 and 14.

Which one is a scale copy of the first?

Answer it.

Whiteboards · Question 7 of 9

A triangle has sides 6, 8 and 10. Another has sides 9, 12 and 15; a third has sides 9, 12 and 14.

Which one is a scale copy of the first?

$\frac{9}{6} = \frac{12}{8} = \frac{15}{10} = 1.5$: the second is a copy

$\frac{14}{10} = 1.4 \neq 1.5$: the third is not

Answer: The 9-12-15 triangle (k = 1.5); the 9-12-14 one is not a copy

Whiteboards · Question 8 of 9

Dev, who is 13, draws a 15-ft wall as 3 in long.

How long is a 20-ft wall on his drawing?

Answer it.

Whiteboards · Question 8 of 9

Dev, who is 13, draws a 15-ft wall as 3 in long.

How long is a 20-ft wall on his drawing?

$15 \div 3 = 5$: every inch is 5 ft

$20 \div 5 = 4$

Answer: 4 in

Whiteboards · Question 9 of 9

Priya says the scale factor from a 6 cm side to its 3 cm copy is 2.

Is she right? Explain.

Write your answer in sentences.

Whiteboards · Question 9 of 9

Priya says the scale factor from a 6 cm side to its 3 cm copy is 2.

Is she right? Explain.

$k = \frac{3}{6} = \frac{1}{2}$. No: the copy is smaller, so k is under 1.

Answer: No. k = 3 ÷ 6 = ½: the copy is smaller, so k is under 1.

Independent Set

1. A 5 cm side becomes 15 cm in the copy. Find the scale factor.
2. A 15 cm side becomes 6 cm in the copy. Find the scale factor.
3. A 3 cm by 5 cm rectangle is copied at 7.5 cm by 12.5 cm. Find the scale factor.
4. The scale factor is 1.5 and a side of the original is 8 cm. How long is that side in the copy?
5. A map's scale is $1\text{ in} : 25\text{ mi}$. Two cities are 2.8 in apart on the map. How far apart are they?
6. On the same map, a road is 150 mi long. How long is it on the map?

IXL

1. Open IXL and start today's skills.
2. Work on paper where the question needs work. The answer box does not show it.
3. Every skill listed is required, to a SmartScore of 67. Due by the Unit 5 test.

Today's skills — all required

Scale drawings: find the scale factor, missing side, or missing angle — WEA