GRADE 7 · UNIT 5 · LESSON 5

Scale Factors — Perimeter

MA.7.GR.1.5

I can find a scale factor and use it to find the lengths and the perimeter of the copy.

Warm-Up

1. Sample: 2 of 15 walk. 38 walk in all. Members?
2. 10 faulty in a random sample of 250. Predict for 4,000.
3. Find the median: 3, 8, 10, 14, 15, 20
4. Perimeter of a rectangle 7 cm by 4 cm?

Warm-Up

1. Sample: 2 of 15 walk. 38 walk in all. Members? **285**
2. 10 faulty in a random sample of 250. Predict for 4,000. **160**
3. Find the median: 3, 8, 10, 14, 15, 20 **12**
4. Perimeter of a rectangle 7 cm by 4 cm? **22 cm**

Vocabulary

scale factor

the number every length is multiplied by, from the original to the image — it has no units

scale

a sentence like 1 cm : 4 m, which carries units and is not yet a scale factor

image

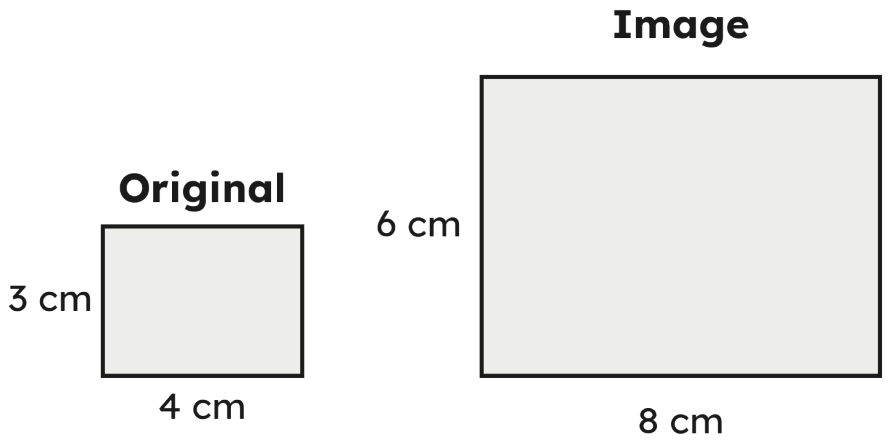
the copy — the figure you get after scaling

corresponding sides

the side of the image that matches a side of the original

Notes

I. The scale factor, and which way it points



$$k = \frac{\text{image}}{\text{original}} = \frac{8}{4} = 2$$

Notes

II. Every length — so the perimeter too

Perimeters, in cm: original $2(4 + 3) = 14$ image $2(8 + 6) = 28$

$$\frac{28}{14} = 2 = k$$

Every length in the figure — side, perimeter, height — is multiplied by k.

Notes

III. A scale is not a scale factor

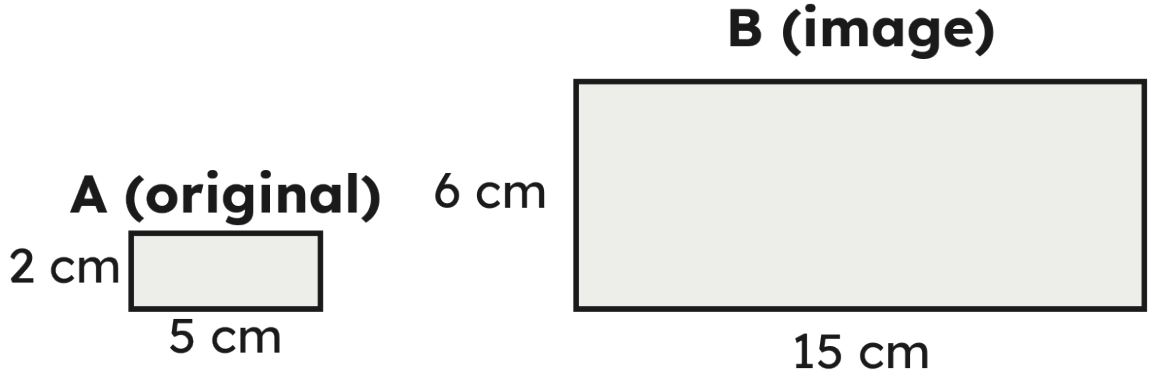
$$1 \text{ cm} : 4 \text{ m} = 1 \text{ cm} : 400 \text{ cm}$$

From the drawing to the real thing, k = 400. From the real thing to the drawing, k = 1/400.

Same unit first. Then divide. Then it is a scale factor.

Example 1

Rectangle B is a scaled copy of rectangle A.



Find the scale factor, then the perimeter of B.

Example 1

$$k = \frac{15}{5} = 3$$

$$2(5 + 2) = 14$$

$$14 \cdot 3 = 42$$

Answer: k = 3, and the perimeter of B is 42 cm

Your Turn

Rectangle D is 7 cm by 2 cm. In a scaled copy E, the 7 cm side is 28 cm.

Find the scale factor, then the perimeter of E.

Your Turn

Rectangle D is 7 cm by 2 cm. In a scaled copy E, the 7 cm side is 28 cm.

Find the scale factor, then the perimeter of E.

Scale factor: $28 \div 7 = 4$

Perimeter of D: $2(7 + 2) = 18$

Perimeter of E: $18 \cdot 4 = 72$

Answer: k = 4; the perimeter of E is 72 cm

Example 2

A photo is 30 cm wide.

A small copy is printed with a scale factor of $\frac{1}{3}$.

How wide is the small copy?

Example 2

$$30 \cdot \frac{1}{3} = 10$$

Answer: 10 cm wide

Your Turn

A shape has a perimeter of 24 cm.

It is redrawn with a scale factor of $\frac{1}{4}$.

Find the perimeter of the copy.

Your Turn

A shape has a perimeter of 24 cm.

It is redrawn with a scale factor of $\frac{1}{4}$.

Find the perimeter of the copy.

$$24 \cdot \frac{1}{4} = 6$$

Answer: 6 cm

Whiteboards · Question 1 of 9

A triangle's shortest side is 6 cm. In the scaled copy the matching side is 21 cm.

Find the scale factor.

Answer it.

Whiteboards · Question 1 of 9

A triangle's shortest side is 6 cm. In the scaled copy the matching side is 21 cm.

Find the scale factor.

Scale factor = copy ÷ original

$21 \div 6 = 3.5$

Answer: 3.5

Whiteboards · Question 2 of 9

The original triangle has sides 6 cm, 8 cm and 10 cm. The scale factor is 3.5.

Find the perimeter of the copy.

Answer it.

Whiteboards · Question 2 of 9

The original triangle has sides 6 cm, 8 cm and 10 cm. The scale factor is 3.5.

Find the perimeter of the copy.

Perimeter of the original: $6 + 8 + 10 = 24$

Perimeter of the copy: $24 \cdot 3.5 = 84$

Answer: 84 cm

Whiteboards · Question 3 of 9

A trail map says 1 cm : 60 m.

Which is the scale factor from the map to the real trail?

A. 60

B. $\frac{1}{6{,}000}$

C. 1 cm : 60 m

D. 6,000

Answer it.

Whiteboards · Question 3 of 9

A trail map says 1 cm : 60 m.

Which is the scale factor from the map to the real trail?

Same units first: 60 m = 6,000 cm

1 cm : 6,000 cm, so the scale factor is 6,000.

Answer: D — 6,000

Whiteboards · Question 4 of 9

A shape has a perimeter of 45 cm.

It is redrawn with a scale factor of $\frac{1}{5}$.

Find the new perimeter.

Answer it.

Whiteboards · Question 4 of 9

A shape has a perimeter of 45 cm.

It is redrawn with a scale factor of $\frac{1}{5}$.

Find the new perimeter.

$$45 \cdot \frac{1}{5} = 9$$

Answer: 9 cm

Whiteboards · Question 5 of 9

The original perimeter is 18 cm. The copy's perimeter is 45 cm.

Find the scale factor.

Answer it.

Whiteboards · Question 5 of 9

The original perimeter is 18 cm. The copy's perimeter is 45 cm.

Find the scale factor.

Scale factor = copy ÷ original

45 ÷ 18 = 2.5

Answer: 2.5

Whiteboards · Question 6 of 9

A rectangle 7 cm by 3 cm is scaled by k = 5.

Which statement is true?

A. The perimeter grows by 20 cm, 5 for each side.

B. The perimeter is multiplied by 5.

C. The perimeter is multiplied by 5 only if it is a square.

D. The perimeter is multiplied by 25.

Answer it.

Whiteboards · Question 6 of 9

A rectangle 7 cm by 3 cm is scaled by k = 5.

Which statement is true?

Original: $7 + 3 + 7 + 3 = 20$

Copy: $35 + 15 + 35 + 15 = 100$

$100 \div 20 = 5$

Answer: B — multiplied by 5

Whiteboards · Question 7 of 9

Over 4 lessons, a class drew a shape with perimeter 26 cm and redrew it with a scale factor of 3.

Find the perimeter of the new shape.

Answer it.

Whiteboards · Question 7 of 9

Over 4 lessons, a class drew a shape with perimeter 26 cm and redrew it with a scale factor of 3.

Find the perimeter of the new shape.

$$26 \cdot 3 = 78$$

Answer: 78 cm

Whiteboards · Question 8 of 9

A poster is 45 cm wide. A small print of it is 18 cm wide.

Find the scale factor from the poster to the print.

Answer it.

Whiteboards · Question 8 of 9

A poster is 45 cm wide. A small print of it is 18 cm wide.

Find the scale factor from the poster to the print.

Scale factor = copy ÷ original

$18 \div 45 = 0.4$

Answer: 0.4

Whiteboards · Question 9 of 9

Every side of a figure is multiplied by 3.

Explain why the perimeter is also multiplied by 3, without using an example.

Write your answer in sentences.

Whiteboards · Question 9 of 9

Every side of a figure is multiplied by 3.

Explain why the perimeter is also multiplied by 3, without using an example.

Perimeter = side + side + side + …

Every side is 3 times as long, so the sum is 3 times as long.

Answer: The perimeter is the sum of the sides, and every side is multiplied by 3.

Independent Practice

1. A side of 5 cm becomes 20 cm in the copy. Find the scale factor.

2. That figure's perimeter was 19 cm. Find the perimeter of the copy.

3. A shape with perimeter 36 cm is redrawn with a scale factor of 1/3. Find the new perimeter.

4. Across 4 drawings, a 9 cm by 5 cm rectangle was scaled by 2.5. Find the perimeter of the copy.

5. A plan says 1 cm : 5 m. Write the scale factor from the plan to the real thing, and say why it is not 5.

6. A perimeter of 32 cm becomes 8 cm. Find the scale factor and say whether the copy is bigger or smaller.

Before You Go

A scale factor runs from the original to the image.

Perimeter scales by k, because it is made of lengths.

Tomorrow: what the same k does to area — and it is not k.

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 60. Due by the Unit 5 test.

Today's skills — all required

Perimeter and area: changes in scale (ZC6)