GRADE 7 · UNIT 5 · LESSON 8

Dimensions and Perimeters

MA.7.GR.1.5

I can use a scale like 1 in. : 4 ft to find real lengths and perimeters, and turn it into a scale factor.

Warm-Up

1. A 9 by 5 rectangle is scaled by 2. New perimeter?
2. A 30 cm^2 shape is scaled by 4. New area?
3. Find the mean: 4, 7, 9, 12, 13
4. How many centimeters are in 9 meters?

Warm-Up

1. A 9 by 5 rectangle is scaled by 2. New perimeter? **56 units**
2. A 30 cm^2 shape is scaled by 4. New area? **480 cm^2**
3. Find the mean: 4, 7, 9, 12, 13 **9**
4. How many centimeters are in 9 meters? **900 cm**

Vocabulary

scale

1 in. : 4 ft — one length on the drawing stands for another in the real thing

scale factor

the same relationship as a bare number, after both lengths are in one unit

Notes

I. A scale is a sentence

1 in. : 4 ft — one inch on the plan stands for four feet in the room.

Plan to real: multiply the plan's number by 4. Real to plan: divide by 4.

A 5 in. side on the plan: $5 \cdot 4 = 20$, so the room's side is 20 ft.

Notes

II. Perimeter goes the same way

A room is 5 in. by 3 in. on a plan at 1 in. : 4 ft.

$$2(5 + 3) = 16 \qquad 16 \cdot 4 = 64$$

The plan's perimeter is 16 in.; 1 in. stands for 4 ft, so the real perimeter is 64 ft.

One conversion at the end, not one per side.

Notes

III. From a scale to a scale factor

$$1 \text{ cm} : 2 \text{ m} = 1 \text{ cm} : 200 \text{ cm}$$

From the plan to the real thing, k = 200.

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

Example 1

A floor plan uses the scale 1 in. : 10 ft.

On the plan a classroom is 4 in. by 3 in.

Find the classroom's real dimensions and its real perimeter.

Example 1

$4 \cdot 10 = 40$ $\quad$ $3 \cdot 10 = 30$

$2(4 + 3) = 14$

$14 \cdot 10 = 140$

Answer: 40 ft by 30 ft; perimeter 140 ft

Your Turn

A floor plan uses the scale 1 in. : 3 ft. On the plan a room is 6 in. by 5 in.

Find the room's real dimensions and its real perimeter.

Your Turn

A floor plan uses the scale 1 in. : 3 ft. On the plan a room is 6 in. by 5 in.

Find the room's real dimensions and its real perimeter.

Each side: $6 \cdot 3 = 18$ and $5 \cdot 3 = 15$

Plan perimeter: $2(6 + 5) = 22$

$22 \cdot 3 = 66$

Answer: 18 ft by 15 ft; perimeter 66 ft

Example 2

A plan uses the scale 1 cm : 8 m.

Write it as a scale factor from the plan to the real thing.

Example 2

$$8\ \text{m} = 800\ \text{cm}$$

$$k = \frac{800}{1} = 800$$

Answer: k = 800

Your Turn

A plan uses the scale 1 cm : 5 m.

Write it as a scale factor from the plan to the real thing.

Your Turn

A plan uses the scale 1 cm : 5 m.

Write it as a scale factor from the plan to the real thing.

Same units first: 5 m = 500 cm

1 cm : 500 cm, so $k = 500$

Answer: $k = 500$

Whiteboards · Question 1 of 9

A plan uses the scale 1 in. : 6 ft. A wall is 7 in. on the plan.

How long is the real wall?

Answer it.

Whiteboards · Question 1 of 9

A plan uses the scale 1 in. : 6 ft. A wall is 7 in. on the plan.

How long is the real wall?

1 in. on the plan is 6 ft.

$7 \cdot 6 = 42$

Answer: 42 ft

Whiteboards · Question 2 of 9

Same plan, 1 in. : 6 ft. The plan's perimeter is 20 in.

Find the real perimeter.

Answer it.

Whiteboards · Question 2 of 9

Same plan, 1 in. : 6 ft. The plan's perimeter is 20 in.

Find the real perimeter.

$$20 \cdot 6 = 120$$

Answer: 120 ft

Whiteboards · Question 3 of 9

A plan uses the scale 1 cm : 3 m.

Which is the scale factor from the plan to the real thing?

A. 3

B. 300

C. 1 cm : 3 m

D. $\frac{1}{300}$

Answer it.

Whiteboards · Question 3 of 9

A plan uses the scale 1 cm : 3 m.

Which is the scale factor from the plan to the real thing?

Same units first: 3 m = 300 cm

1 cm : 300 cm, so the scale factor is 300.

Answer: B — 300

Whiteboards · Question 4 of 9

A plan uses the scale 1 in. : 8 ft. A real wall is 96 ft long.

How long is the wall on the plan?

Answer it.

Whiteboards · Question 4 of 9

A plan uses the scale 1 in. : 8 ft. A real wall is 96 ft long.

How long is the wall on the plan?

Real to plan: divide.

$96 \div 8 = 12$

Answer: 12 in.

Whiteboards · Question 5 of 9

A plan uses the scale 1 cm : 4 m.

Write the scale factor from the plan to the real thing.

Answer it.

Whiteboards · Question 5 of 9

A plan uses the scale 1 cm : 4 m.

Write the scale factor from the plan to the real thing.

Same units first: 4 m = 400 cm

1 cm : 400 cm, so the scale factor is 400.

Answer: 400

Whiteboards · Question 6 of 9

A plan's perimeter is 18 cm. The scale is 1 cm : 4 m.

Which finds the real perimeter?

A. $18 \cdot 400 = 7{,}200$, so 7,200 m

B. $18 \div 4 = 4.5$, so 4.5 m

C. $18 \cdot 4 = 72$, so 72 m

D. $18 \cdot 16 = 288$, so 288 m

Answer it.

Whiteboards · Question 6 of 9

A plan's perimeter is 18 cm. The scale is 1 cm : 4 m.

Which finds the real perimeter?

Perimeter is a length, so use the scale once.

$18 \cdot 4 = 72$, so 72 m

Answer: C — 72 m

Whiteboards · Question 7 of 9

Over 3 drafts, a plan's perimeter came out 26 in. at the scale 1 in. : 5 ft.

Find the real perimeter.

Answer it.

Whiteboards · Question 7 of 9

Over 3 drafts, a plan's perimeter came out 26 in. at the scale 1 in. : 5 ft.

Find the real perimeter.

$$26 \cdot 5 = 130$$

Answer: 130 ft

Whiteboards · Question 8 of 9

A garden's fence is 150 ft. A plan uses the scale 1 in. : 5 ft.

How long is the fence on the plan?

Answer it.

Whiteboards · Question 8 of 9

A garden's fence is 150 ft. A plan uses the scale 1 in. : 5 ft.

How long is the fence on the plan?

Real to plan: divide.

$150 \div 5 = 30$

Answer: 30 in.

Whiteboards · Question 9 of 9

A plan says 1 cm : 10 m. A student writes 'the scale factor is 10'.

Explain what is missing.

Write your answer in sentences.

Whiteboards · Question 9 of 9

A plan says 1 cm : 10 m. A student writes 'the scale factor is 10'.

Explain what is missing.

A scale factor compares the same unit.

10 m = 1,000 cm, so 1 cm : 1,000 cm and $k = 1{,}000$

Answer: Same unit first: 10 m = 1,000 cm, so k = 1,000.

Independent Practice

1. A plan uses 1 in. : 5 ft. A wall is 8 in. on the plan. How long is the real wall?

2. On the same plan the perimeter is 24 in. Find the real perimeter.

3. A plan uses 1 cm : 6 m. Write the scale factor from the plan to the real thing.

4. Across 4 revisions, a plan's perimeter is 18 in. and the scale is 1 in. : 7 ft. Find the real perimeter.

5. A real room is 84 ft around. The plan uses 1 in. : 6 ft. Find the plan's perimeter.

6. A student says 1 cm : 25 m gives a scale factor of 25. In one sentence say what is missing, and give the factor.

Before You Go

One inch stands for four feet.

Convert once, at the end.

Next class: the same plan, but the area.

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

Scale drawings: find the scale factor or missing side (XHM)