GRADE 7 · UNIT 5 · LESSON 7

Scale Drawings

MA.7.GR.1.5

I can check that a scaled copy fits its grid and lands on the gridlines, and find the copy's sides, perimeter and area.

Warm-Up

1. A 40 cm^2 shape is scaled by k = 3. New area?
2. Perimeter 18 m, scaled by k = 2. New perimeter?
3. Find the mean: 3, 8, 10, 15, 19
4. What is $\frac{2}{3}$ of 12?

Warm-Up

1. A 40 cm^2 shape is scaled by k = 3. New area? **360 cm^2**
2. Perimeter 18 m, scaled by k = 2. New perimeter? **36 m**
3. Find the mean: 3, 8, 10, 15, 19 **11**
4. What is $\frac{2}{3}$ of 12? **8**

Vocabulary

scaled copy

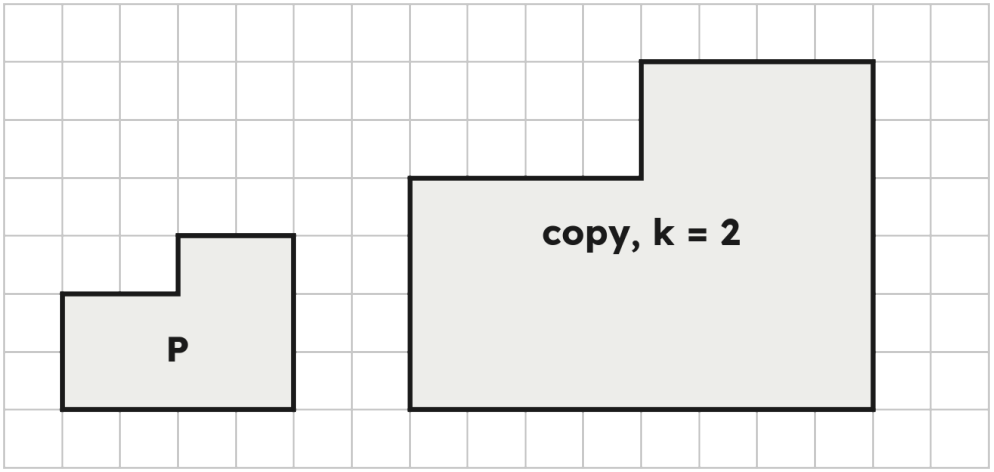
same shape, every length multiplied by the same k

gridline

the lines of the grid — a good scale factor lands the copy's corners on them

Notes

I. Draw it one side at a time



each square is 1 unit

Multiply every side by k, in order, and the corners land on gridlines.

Notes

II. Choose a factor that fits

A 6 by 4 figure on a 20 by 15 grid: k = 3 fits (18 by 12); k = 4 does not (24 by 16).

Every side times k must be a whole number of squares, or the corners miss the lines.

$\frac{1}{2}$ works on even sides; $\frac{1}{3}$ needs sides that are multiples of 3.

Notes

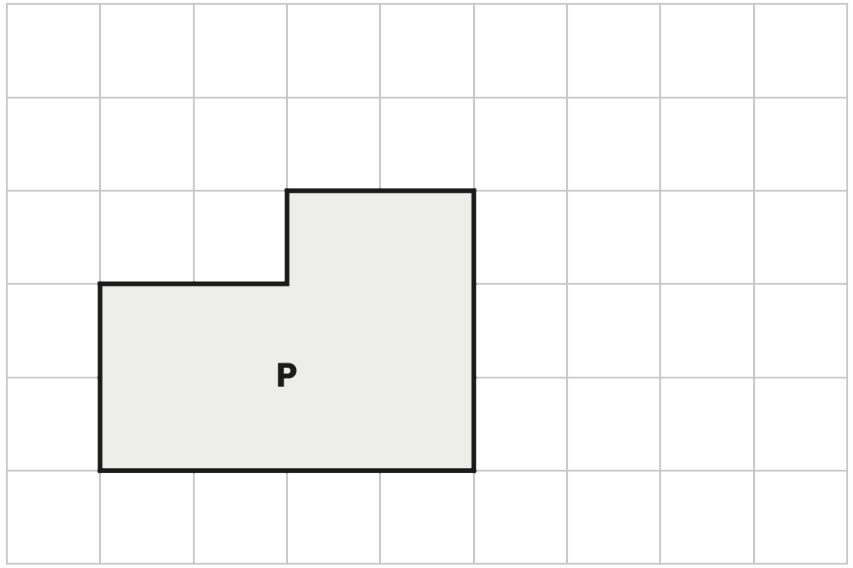
III. Same shape means the angles do not move

Lengths change by k. Angles do not change at all.

A square scaled by 5 is still a square. A right angle is still 90°.

Example 1

This shape has sides of 4, 3, 2, 1, 2 and 2 units. Draw a copy with k = 3.



each square is 1 unit

What are the copy's side lengths, and what is its perimeter?

Example 1

$4, 3, 2, 1, 2, 2$ become $12, 9, 6, 3, 6, 6$

$P = 14 \cdot 3 = 42$

$A = 10 \cdot 3^2 = 90$

Answer: 12, 9, 6, 3, 6, 6 — perimeter 42 units

Your Turn

An L-shape has sides of 5, 2, 2, 1, 3 and 3 units, in order.

It is copied with a scale factor of 4.

What are the copy's side lengths, and what is its perimeter?

Your Turn

An L-shape has sides of 5, 2, 2, 1, 3 and 3 units, in order.

It is copied with a scale factor of 4.

What are the copy's side lengths, and what is its perimeter?

Each side times 4: 20, 8, 8, 4, 12, 12

Perimeter: $16 \cdot 4 = 64$

Answer: 20, 8, 8, 4, 12, 12 — perimeter 64 units

Example 2

A 12 by 8 rectangle will not fit on a small grid.

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

What are the copy's dimensions?

Example 2

$12 \cdot \frac{1}{4} = 3$ $\quad$ $8 \cdot \frac{1}{4} = 2$

$12 \cdot \frac{1}{3} = 4$ $\quad$ $8 \cdot \frac{1}{3} = 2\frac{2}{3}$

Answer: 3 by 2

Your Turn

An 18 by 14 rectangle is redrawn with a scale factor of $\frac{1}{2}$.

What are the copy's dimensions?

Your Turn

An 18 by 14 rectangle is redrawn with a scale factor of $\frac{1}{2}$.

What are the copy's dimensions?

$$18 \cdot \frac{1}{2} = 9$$

$$14 \cdot \frac{1}{2} = 7$$

Answer: 9 by 7

Whiteboards · Question 1 of 9

A 5 by 3 rectangle is drawn with a scale factor of 2.

What is the copy's longer side?

Answer it.

Whiteboards · Question 1 of 9

A 5 by 3 rectangle is drawn with a scale factor of 2.

What is the copy's longer side?

$$5 \cdot 2 = 10$$

Answer: 10 units

Whiteboards · Question 2 of 9

Same copy: the 5 by 3 rectangle, scaled by 2.

Find the copy's perimeter.

Answer it.

Whiteboards · Question 2 of 9

Same copy: the 5 by 3 rectangle, scaled by 2.

Find the copy's perimeter.

Copy: $5 \cdot 2 = 10$ by $3 \cdot 2 = 6$

Perimeter: $10 + 6 + 10 + 6 = 32$

Answer: 32 units

Whiteboards · Question 3 of 9

A 10 by 4 rectangle is to be drawn on a grid 45 squares by 30.

Which scale factor will NOT fit?

A. $k = \frac{1}{2}$

B. $k = 4$

C. $k = 5$

D. $k = 2$

Answer it.

Whiteboards · Question 3 of 9

A 10 by 4 rectangle is to be drawn on a grid 45 squares by 30.

Which scale factor will NOT fit?

With k = 5: $10 \cdot 5 = 50$ and $4 \cdot 5 = 20$

50 is more than 45, so it does not fit.

Answer: C — k = 5

Whiteboards · Question 4 of 9

An 8 by 6 rectangle is redrawn with a scale factor of $\frac{1}{2}$.

Find the area of the copy.

Answer it.

Whiteboards · Question 4 of 9

An 8 by 6 rectangle is redrawn with a scale factor of $\frac{1}{2}$.

Find the area of the copy.

Copy: $8 \cdot \frac{1}{2} = 4$ by $6 \cdot \frac{1}{2} = 3$

Area: $4 \cdot 3 = 12$

Answer: 12 square units

Whiteboards · Question 5 of 9

A grid is 20 squares wide and 12 tall. A 7 by 3 rectangle is copied with a scale factor of 3.

Does the copy fit? If not, by how many squares does it run over?

Answer it.

Whiteboards · Question 5 of 9

A grid is 20 squares wide and 12 tall. A 7 by 3 rectangle is copied with a scale factor of 3.

Does the copy fit? If not, by how many squares does it run over?

Across: $7 \cdot 3 = 21$, and 21 is more than 20

Down: $3 \cdot 3 = 9$, and 9 fits in 12

$21 - 20 = 1$

Answer: No — 21 across runs 1 square past the 20

Whiteboards · Question 6 of 9

A 9 by 5 rectangle is redrawn on a grid with a scale factor of $\frac{1}{3}$.

What goes wrong?

A. 5 ÷ 3 is not whole.

B. 9 becomes 27 — too big.

C. Nothing — 3 by 5/3 is fine.

D. You can't scale down.

Answer it.

Whiteboards · Question 6 of 9

A 9 by 5 rectangle is redrawn on a grid with a scale factor of $\frac{1}{3}$.

What goes wrong?

$9 \div 3 = 3$, a whole number of squares.

$5 \div 3$ is not a whole number of squares.

Answer: A — the 5 does not divide by 3

Whiteboards · Question 7 of 9

Over 3 attempts, a class drew a figure with perimeter 17 units and scaled it by 4.

Find the new perimeter.

Answer it.

Whiteboards · Question 7 of 9

Over 3 attempts, a class drew a figure with perimeter 17 units and scaled it by 4.

Find the new perimeter.

$$17 \cdot 4 = 68$$

Answer: 68 units

Whiteboards · Question 8 of 9

A figure has an area of 99 square units.

It is redrawn with a scale factor of $\frac{1}{3}$.

Find the area of the copy.

Answer it.

Whiteboards · Question 8 of 9

A figure has an area of 99 square units.

It is redrawn with a scale factor of $\frac{1}{3}$.

Find the area of the copy.

$$k \cdot k = \frac{1}{3} \cdot \frac{1}{3} = \frac{1}{9}$$

$$99 \cdot \frac{1}{9} = 11$$

Answer: 11 square units

Whiteboards · Question 9 of 9

A 14 by 6 rectangle redrawn with a factor of $\frac{1}{4}$ misses the gridlines.

What does that tell you about the factor?

Write your answer in sentences.

Whiteboards · Question 9 of 9

A 14 by 6 rectangle redrawn with a factor of $\frac{1}{4}$ misses the gridlines.

What does that tell you about the factor?

$14 \div 4 = 3.5$ $6 \div 4 = 1.5$

Answer: A quarter does not give whole squares here.

Independent Practice

1. A 4 by 7 rectangle is scaled by 3. What are the copy's dimensions?

2. Find the perimeter of that copy.

3. A 16 by 10 rectangle is redrawn with a scale factor of 1/2. Find the area of the copy.

4. Over 2 lessons, a figure with perimeter 15 units was scaled by 4. Find the new perimeter.

5. A grid is 22 squares wide and 14 tall. A 5 by 4 rectangle is copied with a scale factor of 4. Does the copy fit? If not, by how many squares does it run over?

6. A 7 by 4 figure is to be scaled by 1/2. Say why its corners will not all land on gridlines, and give a factor whose corners do.

Before You Go

Same shape, new size.

Check the fit and the gridlines before you draw.

Next: a scale with units on it, and what to do with it.

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 scaled length (9VH)