LESSON MAKER PRO

Scale Factor Effects

Track what changes when similar figures grow or shrink.

HIGH SCHOOL · GDA.GM.C.19

GDA.GM.C.19 "Derive and apply the relationships between the lengths, perimeters, areas, and volumes of similar figures in relation to their scale factor."

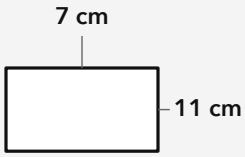
NAME _____ DATE _____

THE BIG IDEA

A scale factor tells you how corresponding lengths change. Perimeters change by the same factor, areas change by its square, and volumes change by its cube.

WORKED EXAMPLE

A rectangle similar to the one shown has a scale factor of 3. Find the new rectangle's perimeter and area.

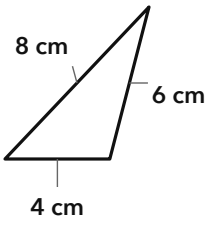


1. Original perimeter: $2(7 + 11) = 36$ cm.
2. New perimeter: $36 \times 3 = 108$ cm.
3. Original area: $7 \times 11 = 77$ cm^2.
4. New area: $77 \times 3^2 = 693$ cm^2.

Answer: Perimeter: 108 cm; area: 693 cm^2.

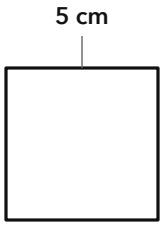
PRACTICE 6 problems

1 A triangle similar to the one shown has a scale factor of 2. What is its perimeter?



ANSWER _____

2 A square similar to the one shown has a scale factor of 4. What is its area?

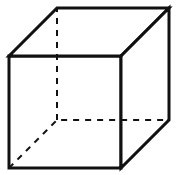


ANSWER _____

3 A design has an area of 80 cm^2. A similar copy has a scale factor of 1/2. What is the copy's area?

ANSWER _____

4 A cube similar to the one shown has a scale factor of 1/2. What is its volume?



ANSWER _____

5 Two similar figures have perimeters of 24 cm and 96 cm. The smaller figure has an area of 15 cm^2. What is the larger figure's area?

ANSWER _____

6 Two similar solids have volumes of 64 cm^3 and 512 cm^3. A height on the smaller solid is 10 cm. What is the corresponding height on the larger solid?

ANSWER _____

APPLY IT Show your work

1 A school club is making a larger version of a 12 ft by 8 ft banner for an event. The banners will be similar, and the new banner will be 18 ft long. How much fabric will the new banner need?

WORK SPACE

ANSWER _____

2 For a tabletop game, you 3D-print a larger version of a figurine that uses 8 cm^3 of material. Every length on the new figurine is 5/2 times the corresponding length on the first. How much material does the new figurine use?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Two similar right prisms have corresponding face areas of 9 cm^2 and 144 cm^2. The larger prism has a volume of 320 cm^3 and a base perimeter of 60 cm. Find the smaller prism's volume and base perimeter. Explain how the face areas give you the scale factor.

WORK SPACE AND ANSWER

ANSWER KEY

Scale Factor Effects

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A triangle similar to the one shown has a scale factor of 2. What is its perimeter?	**36 cm**
2	A square similar to the one shown has a scale factor of 4. What is its area?	**400 cm^2**
3	A design has an area of 80 cm^2. A similar copy has a scale factor of 1/2. What is the copy's area?	**20 cm^2**
4	A cube similar to the one shown has a scale factor of 1/2. What is its volume?	**27 cm^3**
5	Two similar figures have perimeters of 24 cm and 96 cm. The smaller figure has an area of 15 cm^2. What is the larger figure's area?	**240 cm^2**
6	Two similar solids have volumes of 64 cm^3 and 512 cm^3. A height on the smaller solid is 10 cm. What is the corresponding height on the larger solid?	**20 cm**

PART 2 · APPLY IT

1. **216 ft^2** The length scale factor is 18/12 = 3/2, so the new width is 8 × 3/2 = 12 ft. The area is 18 × 12 = 216 ft^2.
2. **125 cm^3** Volume changes by the cube of the scale factor: 8 × $(5/2)^3$ = 8 × 125/8 = 125 cm^3.

CHALLENGE

The face-area ratio is 144/9 = 16, so the length scale factor from smaller to larger is 4. The smaller volume is 320/4^3 = 5 cm^3, and its base perimeter is 60/4 = 15 cm.

Accept equivalent calculations that use the correct length, area, or volume scale factor. Require units in final answers.