LESSON MAKER PRO

Scale It Up

Find lengths, areas, and volumes of similar figures.

HIGH SCHOOL · GDA.GM.C

GDA.GM.C "When an object is the image of a known object under a similarity transformation, a length, area, or volume on the image can be computed by using proportional relationships."

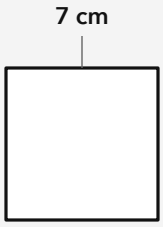
NAME _____ DATE _____

THE BIG IDEA

A similarity transformation multiplies every length by the same scale factor, k. Areas multiply by k^2, and volumes multiply by k^3.

WORKED EXAMPLE

The square shown is enlarged to a similar square whose corresponding side is 21 cm. What is the image's area?

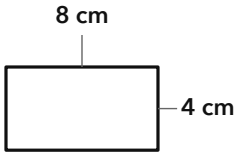


1. Find the scale factor: k = 21/7 = 3.
2. Find the area of the square shown: $7^2 = 49$ cm^2.
3. Scale the area: $49 \times 3^2 = 441$ cm^2.

Answer: 441 cm^2

PRACTICE 6 problems

1 The rectangle shown has a similar image. The image side corresponding to the 8 cm side is 12 cm. How long is the image side corresponding to the 4 cm side?

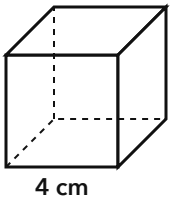


ANSWER _____

2 A design has an area of 30 cm^2. A similar image has a linear scale factor of 2. What is the image's area?

ANSWER _____

3 A similar image of the cube shown has a corresponding edge of 8 cm. What is the image's volume?

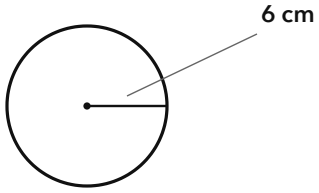


ANSWER _____

4 A garden plan has an area of 96 m^2. A similar image has a linear scale factor of 1/2. What is the image's area?

ANSWER _____

5 A similar image of the circle shown has a diameter of 18 cm. What is the ratio of the image's area to the area of the circle shown?



ANSWER _____

6 A sculpture has a volume of 54 cm^3. A similar image has a linear scale factor of 2/3. What is the image's volume?

ANSWER _____

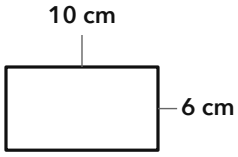
APPLY IT Show your work

1 A student 3D-prints a phone stand using 80 cm^3 of material. A similar, larger stand has a linear scale factor of 3/2. How much material will the larger stand use?

WORK SPACE

ANSWER _____

2 An art club uses the poster sketch shown to make a similar poster. The poster side corresponding to the sketch's 10 cm side is 50 cm long. What is the poster's area?



ANSWER _____

CHALLENGE One step up

A stage prop is resized so that the image's surface area is 25/36 of the original's. The original has a volume of 216 dm^3. Find the image's volume and explain how you found the linear scale factor.

WORK SPACE AND ANSWER

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	The rectangle shown has a similar image. The image side corresponding to the 8 cm side is 12 cm. How long is the image side corresponding to the 4 cm side?	**6 cm**
2	A design has an area of 30 cm^2. A similar image has a linear scale factor of 2. What is the image's area?	**120 cm^2**
3	A similar image of the cube shown has a corresponding edge of 8 cm. What is the image's volume?	**512 cm^3**
4	A garden plan has an area of 96 m^2. A similar image has a linear scale factor of 1/2. What is the image's area?	**24 m^2**
5	A similar image of the circle shown has a diameter of 18 cm. What is the ratio of the image's area to the area of the circle shown?	**9/4**
6	A sculpture has a volume of 54 cm^3. A similar image has a linear scale factor of 2/3. What is the image's volume?	**16 cm^3**

PART 2 · APPLY IT

1. **270 cm^3** Volume scales by the cube of the linear scale factor: $80 \times (3/2)^3 = 270$ cm^3.
2. **1,500 cm^2** The scale factor is 50/10 = 5. The sketch's area is $10 \times 6 = 60$ cm^2, so the poster's area is $60 \times 5^2 = 1{,}500$ cm^2.

CHALLENGE

The linear scale factor is 5/6 because $(5/6)^2 = 25/36$. The image's volume is $216 \times (5/6)^3 = 125$ dm^3.

Accept equivalent forms of 9/4, such as 2.25, for problem 5. In the challenge, the explanation must use the square root of the area ratio to find the linear scale factor before cubing it for volume.