LESSON MAKER PRO

Scale It Up

Find image lengths, areas, and volumes.

HIGH SCHOOL · A2S.GM.A

A2S.GM.A "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."

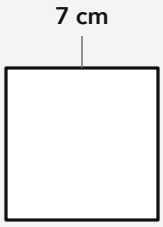
NAME _____ DATE _____

THE SCALE FACTOR RULE

When every length is multiplied by a scale factor k, corresponding lengths multiply by k, areas by k^2, and volumes by k^3. To work backward from an image measure, divide by the matching factor.

WORKED EXAMPLE

The square shown is enlarged by a scale factor of 3. What is the area of the image?

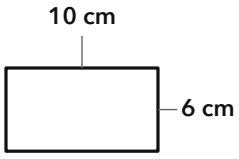


1. Original area: $7 \times 7 = 49$ cm^2.
2. Area factor: $3^2 = 9$.
3. Image area: $49 \times 9 = 441$ cm^2.

Answer: 441 cm^2

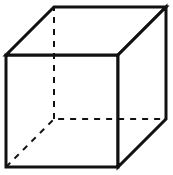
PRACTICE 6 problems

1 The rectangle shown is enlarged by a scale factor of 2. Find the area of the image.



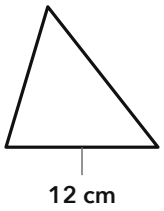
ANSWER _____

2 The cube shown is enlarged by a scale factor of 5/2. Find the volume of the image.



ANSWER _____

3 The triangle shown is reduced by a scale factor of 1/2. Find the image side corresponding to the labeled side.



ANSWER _____

4 A shape has an area of 80 cm^2. Its image has a length scale factor of 5/4. Find the image area.

ANSWER _____

5 A solid has a volume of 216 cm^3. Its image has a length scale factor of 1/2. Find the image volume.

ANSWER _____

6 An image has an area of 64 m^2. The length scale factor from the original to the image is 2. Find the original area.

ANSWER _____

APPLY IT Show your work

1 You enlarge a square sticker design with a side length of 8 cm by a scale factor of 5/4. What area will the new sticker cover?

WORK SPACE

ANSWER _____

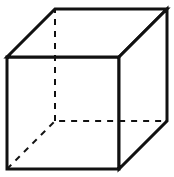
2 A 3D-printed game prop has a volume of 24 cm^3. You print a larger version with every length doubled. What is the larger prop's volume?

WORK SPACE

ANSWER _____

CHALLENGE One step up

The cube shown is enlarged until its image has a surface area of 150 cm^2. What is the image's volume? Explain how you found the length scale factor.



WORK SPACE AND ANSWER

Scale It Up

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	The rectangle shown is enlarged by a scale factor of 2. Find the area of the image.	**240 cm^2**
2	The cube shown is enlarged by a scale factor of 5/2. Find the volume of the image.	**1,000 cm^3**
3	The triangle shown is reduced by a scale factor of 1/2. Find the image side corresponding to the labeled side.	**6 cm**
4	A shape has an area of 80 cm^2. Its image has a length scale factor of 5/4. Find the image area.	**125 cm^2**
5	A solid has a volume of 216 cm^3. Its image has a length scale factor of 1/2. Find the image volume.	**27 cm^3**
6	An image has an area of 64 m^2. The length scale factor from the original to the image is 2. Find the original area.	**16 m^2**

PART 2 · APPLY IT

1. **100 cm^2** The new side length is 8 × 5/4 = 10 cm, so its area is 10 × 10 = 100 cm^2.
2. **192 cm^3** Doubling every length multiplies volume by $2^3 = 8$. The larger volume is 24 × 8 = 192 cm^3.

CHALLENGE

125 cm^3. The original surface area is $6 \times 4^2 = 96$ cm^2. The area factor is 150/96 = 25/16, so the length scale factor is 5/4. The image side is 4 × 5/4 = 5 cm, giving a volume of $5^3 = 125$ cm^3.

Accept equivalent exact forms and solutions that apply the appropriate power of the length scale factor. For the challenge, students may find the image side length from its surface area instead.