LESSON MAKER PRO

Scale Power

Use scale factors to find new areas and volumes.

HIGH SCHOOL · MA.912.GR.4.3

MA.912.GR.4.3 "Extend previous understanding of scale drawings and scale factors to determine how dilations affect the area of two-dimensional figures and the surface area or volume of three-dimensional figures."

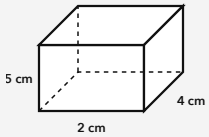
NAME _____ DATE _____

SCALING MEASUREMENTS

If a figure is dilated by scale factor k, its area is multiplied by k^2. Surface area also uses k^2, while volume is multiplied by k^3.

WORKED EXAMPLE

The rectangular prism shown is dilated by a scale factor of 3. Find the volume of the image.



1. Original volume = 2 × 4 × 5 = 40 cm^3.
2. Volume scale factor = 3^3 = 27.
3. Image volume = 40 × 27 = 1,080 cm^3.
4.

Answer: 1,080 cm^3

PRACTICE 4 problems

1 A triangle has area 18 cm^2. It is dilated by a scale factor of 7. Find its image area.

ANSWER _____

2 A solid has volume 27 ft^3. It is dilated by a scale factor of 8. Find its image volume.

ANSWER _____

3 A square has area 11 m^2. Its side lengths are dilated by a scale factor of 9. Find its image area.

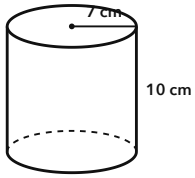
ANSWER _____

4 A model's surface area changes from 14 in^2 to 1,134 in^2. Find the positive scale factor.

ANSWER _____

APPLY IT Show your work

1 The gaming club's 3-D printed trophy is the cylinder shown. A larger trophy is made with scale factor 7. Find its new volume in terms of pi.



ANSWER _____

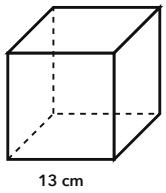
2 A student designs a 32 cm^2 patch for a club hoodie. The print shop enlarges the design by a scale factor of 11/2. What is the new area?

WORK SPACE

ANSWER _____

CHALLENGE One step up

The cube shown has an image surface area of 16,224 cm^2. Find the positive scale factor and the image volume.



WORK SPACE AND ANSWER

Scale Power

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A triangle has area 18 cm^2. It is dilated by a scale factor of 7. Find its image area.	**882 cm^2**
2	A solid has volume 27 ft^3. It is dilated by a scale factor of 8. Find its image volume.	**13,824 ft^3**
3	A square has area 11 m^2. Its side lengths are dilated by a scale factor of 9. Find its image area.	**891 m^2**
4	A model's surface area changes from 14 in^2 to 1,134 in^2. Find the positive scale factor.	**9**

PART 2 · APPLY IT

1. **168,070pi cm^3** The original volume is $pi(7)^2(10) = 490pi$ cm^3. Multiply by $7^3 = 343$ to get 168,070pi cm^3.
2. **968 cm^2** Area is multiplied by $(11/2)^2 = 121/4$. Then $32 \times 121/4 = 968$ cm^2.

CHALLENGE

Scale factor: 4; image volume: 140,608 cm^3

Accept equivalent multiplication setups and answers with correct square or cubic units. For the challenge, the original surface area is 1,014 cm^2, so the area factor is 16 and the scale factor is 4.