

Scale Power Lab

Track how size changes area, surface area, and volume.

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 _____

DILATION MULTIPLIERS

When a figure is dilated by scale factor k , its area and surface area are multiplied by k^2 . Its volume is multiplied by k^3 . For a reduction, use the fraction as k before squaring or cubing it.

WORKED EXAMPLE

A mosaic has an area of 13 square units. It is enlarged by a scale factor of 6. Find its new area.

1. Area multiplier = $6^2 = 36$.
2. New area = 13×36 .
3. New area = 468 square units.

Answer: 468 square units

PRACTICE 6 problems

- 1** A shape has an area of 12 square centimeters. It is enlarged by a scale factor of 4. What is the new area?

ANSWER _____

- 2** A figure with an area of 28 square meters is reduced by a scale factor of $\frac{1}{2}$. What is the new area?

ANSWER _____

- 3** A cube has a surface area of 54 square inches. It is enlarged by a scale factor of 3. What is the new surface area?

ANSWER _____

- 4** A solid has a volume of 32 cubic centimeters. It is reduced by a scale factor of $\frac{1}{4}$. What is the new volume?

ANSWER _____

- 5** A rectangular prism has a volume of 40 cubic units. It is enlarged by a scale factor of 2. What is the new volume?

ANSWER _____

- 6** A dilated solid has a volume of 1024 cubic feet. The scale factor was 4. What was the original volume?

ANSWER _____

APPLY IT Show your work

- 1** The gaming club has a logo with an area of 15 square inches for its website. For a projector screen, the logo is enlarged by a scale factor of 3. What area will the projected logo cover?

WORK SPACE

ANSWER _____

- 2** A robotics club prints a small prototype container with a volume of 24 cubic centimeters. A display version is made using a scale factor of $\frac{1}{2}$. What is the volume of the display version?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A storage case has a surface area of 70 square units and a volume of 125 cubic units. It is enlarged by a scale factor of 2. Find the new surface area and volume. Explain why the two measurements use different multipliers.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A shape has an area of 12 square centimeters. It is enlarged by a scale factor of 4. What is the new area?	192 square centimeters
2	A figure with an area of 28 square meters is reduced by a scale factor of $\frac{1}{2}$. What is the new area?	7 square meters
3	A cube has a surface area of 54 square inches. It is enlarged by a scale factor of 3. What is the new surface area?	486 square inches
4	A solid has a volume of 32 cubic centimeters. It is reduced by a scale factor of $\frac{1}{4}$. What is the new volume?	$\frac{1}{2}$ cubic centimeter
5	A rectangular prism has a volume of 40 cubic units. It is enlarged by a scale factor of 2. What is the new volume?	320 cubic units
6	A dilated solid has a volume of 1024 cubic feet. The scale factor was 4. What was the original volume?	16 cubic feet

PART 2 • APPLY IT

- 135 square inches** The area multiplier is 3^2 , or 9. Multiply 15 by 9 to get 135 square inches.
- 3 cubic centimeters** The volume multiplier is $(\frac{1}{2})^3$, or $\frac{1}{8}$. Multiply 24 by $\frac{1}{8}$ to get 3 cubic centimeters.

CHALLENGE

Surface area = 280 square units; volume = 1000 cubic units. Surface area uses $2^2 = 4$, while volume uses $2^3 = 8$.

Accept equivalent fractional or decimal forms where appropriate. Students should square the scale factor for area or surface area and cube it for volume.