LESSON MAKER PRO

Stretch or Shrink

Check how dilation changes segment length.

HIGH SCHOOL · GDA.GM.F.26.b

GDA.GM.F.26.b "Verify that the dilation of a line segment is longer or shorter in the ratio given by the scale factor."

NAME _____ DATE _____

LENGTH RATIO

A dilation multiplies a segment's length by its scale factor, k. To verify the dilation, divide the image length by the original length. A scale factor greater than 1 makes the segment longer, while a scale factor between 0 and 1 makes it shorter.

WORKED EXAMPLE

The figure shows a segment and its dilated image. The scale factor is 3/2. Find the image length and verify the ratio.

Original 10 cm

Image ? cm

1. Multiply the original length by the scale factor: 10 × 3/2 = 15 cm.
2. Divide the image length by the original length: 15/10 = 3/2.

Answer: The image is 15 cm long. The ratio is 3/2, so the dilation is verified.

PRACTICE 6 problems

1 Use the figure. If the scale factor is 2, what is the image length?

Original 6 cm

Image ? cm

ANSWER _____

2 Use the figure. If the scale factor is 1/4, what is the image length?

Original 24 mm

Image ? mm

ANSWER _____

3 Use the figure. Find the scale factor and state whether the image is longer or shorter.

Original 9 in.

Image 27 in.

ANSWER _____

4 Use the figure. Find the scale factor and state whether the image is longer or shorter.

Original 20 cm

Image 5 cm

ANSWER _____

5 A 14 ft segment is dilated by a scale factor of 1/2. Find the image length.

ANSWER _____

6 Use the figure. Find the scale factor and state whether the image is longer or shorter.

Original 16 m

Image 20 m

ANSWER _____

APPLY IT Show your work

1 You enlarge a concert poster design by a scale factor of 4/3. A line in the original design is 18 cm long. How long is the line in the enlarged design? Verify the length ratio.

WORK SPACE

ANSWER _____

2 A 32 cm stripe on a skateboard deck is reduced by a scale factor of 3/4 for a smaller deck. How long is the new stripe? Verify the length ratio.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Use the figure. The original segment is dilated first by 2/3, then by 5/4. Find the final length and the overall scale factor. Verify the overall scale factor using the original and final lengths.

Original	**36 mm**
Final image	**? mm**

WORK SPACE AND ANSWER

ANSWER KEY

Stretch or Shrink

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the figure. If the scale factor is 2, what is the image length?	**12 cm**
2	Use the figure. If the scale factor is 1/4, what is the image length?	**6 mm**
3	Use the figure. Find the scale factor and state whether the image is longer or shorter.	**Scale factor: 3. The image is longer.**
4	Use the figure. Find the scale factor and state whether the image is longer or shorter.	**Scale factor: 1/4. The image is shorter.**
5	A 14 ft segment is dilated by a scale factor of 1/2. Find the image length.	**7 ft**
6	Use the figure. Find the scale factor and state whether the image is longer or shorter.	**Scale factor: 5/4. The image is longer.**

PART 2 · APPLY IT

1. **24 cm; 24/18 = 4/3.** Multiply 18 by 4/3 to get 24 cm. Dividing the image length by the original length confirms the scale factor.
2. **24 cm; 24/32 = 3/4.** Multiply 32 by 3/4 to get 24 cm. Dividing the new length by the original length confirms the scale factor.

CHALLENGE

The final length is 30 mm. The overall scale factor is 5/6, verified by 30/36 = 5/6.

Accept equivalent fractions or decimals for scale factors. In the challenge, the intermediate length is 24 mm.