LESSON MAKER PRO

# Surface Switch

*Track what changes when one dimension grows.*

**GRADE 7 · 7.MG.1.e**

**7.MG.1.e** "Describe how the surface area of a rectangular prism is affected when one measured attribute is multiplied by a factor of 12 or 2, including those in contextual situations."

NAME _____ DATE _____

## CHANGE ONE DIMENSION

Surface area of a rectangular prism is SA = 2(lw + lh + wh). When one dimension is multiplied, recalculate the surface area because only the face pairs that use that dimension change.

### WORKED EXAMPLE

A prism is 3 cm by 4 cm by 5 cm. Double its height. Find the original and new surface areas.

1. Original SA = 2(3 x 4 + 3 x 5 + 4 x 5)
2. Original SA = 2(12 + 15 + 20) = 94 cm^2
3. New height = 10 cm
4. New SA = 2(3 x 4 + 3 x 10 + 4 x 10) = 164 cm^2

**Answer: Original: 94 cm^2. New: 164 cm^2, an increase of 70 cm^2.**

## PRACTICE 5 problems

**1** A prism is 1 cm by 6 cm by 10 cm. Double the 1 cm dimension. Find the original and new surface areas.

**ANSWER** _____

**2** A prism is 2 cm by 7 cm by 11 cm. Multiply the 2 cm dimension by 12. Find the new surface area.

**ANSWER** _____

**3** A prism is 8 cm by 12 cm by 13 cm. Double the 12 cm dimension. How much does the surface area increase?

**ANSWER** _____

**4** A prism is 9 cm by 14 cm by 16 cm. Multiply the 9 cm dimension by 12. Find the new surface area.

**ANSWER** _____

**5** A prism is 15 cm by 17 cm by 18 cm. Double the 18 cm dimension. Find the original and new surface areas.

**ANSWER** _____

## APPLY IT Show your work

**1** A gaming display box is 11 cm long, 12 cm wide, and 14 cm high. A larger box has double the length. What is the surface area of the larger box, and how much greater is it than the original?

WORK SPACE

**ANSWER** _____

**2** A photo-card storage box is 1 cm high, 16 cm wide, and 20 cm long. A stacked version has 12 times the height. What is the surface area of the stacked box, and how much greater is it than the original?

WORK SPACE

**ANSWER** _____

## CHALLENGE One step up

**CHALLENGE**

A prism is 6 cm by 10 cm by x cm. Doubling x increases its surface area by 192 cm^2. Find x, the original surface area, and the new surface area. Explain using an equation.

_____

_____

**ANSWER KEY**

# Surface Switch

**GRADE 7 · 7.MG.1.e**

## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | A prism is 1 cm by 6 cm by 10 cm. Double the 1 cm dimension. Find the original and new surface areas. | **Original: 152 cm^2. New: 184 cm^2.** |
| 2 | A prism is 2 cm by 7 cm by 11 cm. Multiply the 2 cm dimension by 12. Find the new surface area. | **1,018 cm^2** |
| 3 | A prism is 8 cm by 12 cm by 13 cm. Double the 12 cm dimension. How much does the surface area increase? | **504 cm^2** |
| 4 | A prism is 9 cm by 14 cm by 16 cm. Multiply the 9 cm dimension by 12. Find the new surface area. | **6,928 cm^2** |
| 5 | A prism is 15 cm by 17 cm by 18 cm. Double the 18 cm dimension. Find the original and new surface areas. | **Original: 1,662 cm^2. New: 2,814 cm^2.** |

## PART 2 · APPLY IT

1. **Larger box: 1,480 cm^2. Increase: 572 cm^2.** Original SA is 908 cm^2. Use dimensions 22 cm, 12 cm, and 14 cm for the larger box.
2. **Stacked box: 1,504 cm^2. Increase: 792 cm^2.** Original SA is 712 cm^2. The stacked box has dimensions 12 cm, 16 cm, and 20 cm.

## CHALLENGE

**32x = 192, so x = 6 cm. Original SA = 312 cm^2. New SA = 504 cm^2.**

Accept equivalent correct calculations and labels for original, new, and increase. For the challenge, accept an explanation that the increase is 2(6x + 10x), or 32x.