

Graphing Technology Lab

Changing Dimensions

TI-84 Plus

You can use TI-84 Plus technology to investigate how changes in dimension affect the surface area and volume of a rectangular prism.

ACTIVITY

Step 1 Open CelSheet under the APPS menu by pressing **APPS** and using the arrows to select **CelSheet** and press **ENTER**.

KEYSTROKES: **ENTER** **ENTER** **F5** 1: File... 3: New... **2nd** **ALPHA** **[S]** **[U]** **[R]** **[F]** **[V]** **[O]** **[L]** **ENTER** **ENTER**

SURF	A	B	C
1	1	2	3
2	1	2	6
3	1	3	6
4	2	3	6
5	3	4	9
6			

Step 2 Insert the values for length in column A, width in column B, and height in column C, shown in the table.

KEYSTROKES: 1 **ENTER** 1 **ENTER** 1 **ENTER** 2 **ENTER**
 3 **ENTER** **▶** **▲** **▲** **▲** **▲** **▲** 2 **ENTER** 2 **ENTER**
 4 **ENTER** 4 **ENTER** 6 **ENTER** **▶** **▲** **▲** **▲** **▲** **▲**
 3 **ENTER** 6 **ENTER** 6 **ENTER** 6 **ENTER** 9 **ENTER**

Step 3 Enter the formula for the surface area = $2\ell w + 2wh + 2\ell h$ in terms of cells A1, B1, and C1 in cell D1.

KEYSTROKES: **▶** **▲** **▲** **▲** **▲** **▲** **STO** **▶** 2 **×** **ALPHA** **[A]** 1 **×**
ALPHA **[B]** 1 **+** 2 **×** **ALPHA** **[B]** 1 **×** **ALPHA** **[C]**
 1 **+** 2 **×** **ALPHA** **[A]** 1 **×** **ALPHA** **[C]** 1 **ENTER**

SURF	A	B	C	D	E
1	1	2	3	22	6
2	1	2	6		
3	1	3	6		
4	2	3	6		
5	3	4	9		
6					

Step 4 Enter the formula for the volume = ℓwh in terms of cells A1, B1, and C1 in cell E1.

KEYSTROKES: **▶** **▲** **STO** **▶** **ALPHA** **[A]** 1 **×** **ALPHA** **[B]** 1 **×** **ALPHA** **[C]** 1

Step 6 With the cursor in cell D1, press **ALPHA** **F3** to copy. Press **ALPHA** **F4** in each of the cells D2 through D5 to paste. Repeat the process for volume in column E. Use **2nd** **[QUIT]** to end the copy/paste process.

Step 7 Add additional values and observe the effect on surface area and volume as one or more of the dimensions changes.

Analyze the Results

1. How does the surface area change when one of the dimensions is doubled? two of the dimensions? all three of the dimensions?
2. How does the volume change when one of the dimensions is doubled? two of the dimensions? all three of the dimensions?
3. How does the surface area change when all three of the dimensions are tripled?
4. How does the volume change when all three of the dimensions are tripled?
5. **MAKE A CONJECTURE** If the dimensions of a prism are all multiplied by a factor of 5, what do you think the ratio of the new surface area to the original surface area will be? the ratio of the new volume to the original volume? Explain.
6. **CHALLENGE** Write an expression for the ratio of the surface areas and the ratio of the volumes if all three of the dimensions of a prism are increased by a scale factor of k . Explain.