

# Depth of Knowledge


*Big Ideas Math* uses Norman Webb's Depth of Knowledge to help teachers meet all levels of complexity while using the program. From *Explorations* and *Lessons* to *Exercises* and assessments, students encounter varying Depth of Knowledge levels, reaching higher cognitive demand and promoting student discourse.

## Explorations

**Determining Proportional Relationships**

Work with a partner.

a. You can paint 50 square feet of a surface every 40 minutes. How long does it take you to paint the mural shown? Explain how you found your answer.



**Level 2**

**Finding Distances on a Number Line**

Work with a partner.

a. Find the distance between 3 and  $-2$  on a number line.

b. The distance between 3 and 0 is the absolute value of 3, because  $|3 - 0| = |3| = 3$ . How can you use absolute values to find the distance between 3 and  $-2$ ? Justify your answer.

c. Choose any two rational numbers. Use your method in part (b) to find the distance between the numbers. Use a number line to check your answer.

**Levels 1 and 3**

## Lessons

19. **DIG DEEPER!** A car drives east along a road at a constant speed of 40 miles per hour. At 4:00 P.M., a truck is 264 miles away, driving west along the same road at a constant speed. The vehicles pass each other at 7:00 P.M. What is the speed of the truck?

**Level 3**

**Try It** Solve the equation. Check your solution.

1.  $p - 5 = -2$       2.  $w + 13.2 = 10.4$       3.  $x - \frac{5}{6} = -\frac{1}{6}$

**Level 1**

## Practice

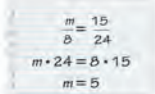
36. **DIG DEEPER!** The *girth* of a package is the distance around the perimeter of a face that does not include the length as a side. A postal service says that a rectangular package can have a maximum combined length and girth of 108 inches.

a. Write an inequality that represents the allowable dimensions for the package.

b. Find three different sets of allowable dimensions reasonable for the package. Find the volume.

**Level 3**

28. **YOU BE THE TEACHER** Your friend solves the proportion  $\frac{m}{8} = \frac{15}{24}$ . Is your friend correct? Explain your reasoning.



**Level 2**

## Assessment

10. A manufacturer wants to double the volume of the graham cracker box. The manufacturer will either double the height or double the width.

a. What is the volume of the new graham cracker box?

b. Which option uses less cardboard? Justify your answer.

c. A graham cracker takes up about 1.5 cubic inches of space. Write an inequality that represents the number of graham crackers that can fit in the new box.

**Level 3**

14. You are helping to remodel a bathroom. The probability that a randomly selected tile is cracked is 40%. For every 10 boards, there is 1 that is warped. Design and use a simulation to estimate the experimental probability that the next tile you select is cracked and the next board you select is *not* warped.

**Level 3**