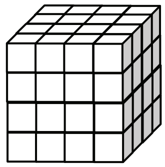
(2) Find an unknown dimension

Activity

Give your student 64 multilink cubes and ask him to build a larger cube from it. If you don't have that many, use 27 or 8 cubes. When he is finished, ask him how he determined how long each side should be. He would have had to find some number for the length of the side such that side x side x side = 64. Tell him that the number 64 is a called a perfect cube. Have him create a table of the perfect cubes for the numbers 1-10.



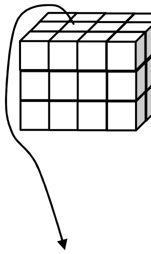
V = 64 units^3
Side = ?
? x ? x ? = 64
4 x 4 x 4 = 64
Side = 4 cm

s	*s*^{3}
1	1
2	8
3	27
4	64
5	125
6	216
7	343
8	512
9	729
10	1000

Ask your student to find the length of the sides of a cube with a volume of 216 cm^3. (Optional: You can show her how to find cube roots using prime factorization. However, at this level the given volumes for cubes will be fairly small so it will be easy to determine the cube roots by just trying some factors.)

V = 216 cm^3
Side = ?
$216 = 2^3 \times 3^3 = 6^3$
Side = 6 cm

Ask your student to build a rectangular prism of volume 36 cubic units, with one side 4 cubes and another 3 cubes. Then discuss how he could determine how long the third side should be without actually using the cubes. The third side is equal to the volume divided by the cubes in one layer, which is the product of the two sides. Point out that when we divide the volume by the product of the two sides, we are actually dividing it by the area of the face formed by those two sides.



V = 36 units^3
2 sides = 4 units and 3 units
3rd side = ?
$? = \frac{36}{4 \times 3} = 3$
3rd side = 3 units

Area
= 4 units x 3 units = 12 units^2

Discussion

Tasks 8-9, pp. 52-53

Task 9: Be sure your student understands that she can divide the volume by the length of any two sides to get the length of the third side, so she can use the same formula for a missing length or width. Tell her that 3 cm x 2 cm is the area of one of the faces (the top or bottom face). So we could also find the height if we had been given just the area of the top or bottom faces

8. **3** x **3** x **3** = 27
   3 cm
9. 4 cm

Practice

Tasks 10-11, p. 53

If your student finds the answers using the division algorithm, have him try solving the problems by simplifying the fractions to see if that is easier.

10. (a) $AB = \frac{576 \text{ cm}^3}{8 \text{ cm} \times 8 \text{ cm}} = \mathbf{9 \text{ cm}}$ (b) $CD = \frac{216 \text{ m}^3}{6 \text{ m} \times 3 \text{ m}} = \mathbf{12 \text{ cm}}$
11. (a) $EF = \frac{264 \text{ cm}^3}{66 \text{ cm}^2} = \mathbf{4 \text{ cm}}$ (b) $CD = \frac{288 \text{ ft}^3}{72 \text{ ft}^2} = \mathbf{4 \text{ ft}}$

$$\frac{\cancel{288}\ \cancel{144}\ \cancel{72}\ 36}{\cancel{72}\ \cancel{36}\ \cancel{18}\ 9} = 4$$

Workbook

Exercise 4, p. 38 (answers p. 60)

With the second method it is often easiest to start with the lowest prime number. If the number we are factoring is even, then we keep using 2 as one of the factors until it is no longer even. Then we can try 3, then 5, then 7, then 11, and so on for succeeding prime numbers. But it is not really necessary to start with 2. If we were doing the prime factorization of 88, we might start with 11.

Tell your student that customarily when we give the prime factorization of a number, we list the lowest prime numbers first.

Practice

Task 4, p. 20

4. (a) 15 = 3 x 5
   (b) 50 = 2 x 5 x 5
   (c) 36 = 2 x 2 x 3 x 3

Discussion

Tasks 5-7, p. 21

5. 72 = 2^3 x 3^2

6. (a) 16
   (b) 4^3 = 4 x 4 x 4 = 64

7. (a) 3^3 = 3 x 3 x 3 = 27
   (b) 7^2 = 7 x 7 = 49
   (c) 3^3 x 7^2 = 3 x 3 x 3 x 7 x 7 = 1323
   (d) 1^7 = 1

Point out that your student has seen exponents before. We use them for units of area and volume. The unit cm^2 means that a measurement in centimeters was multiplied by another measurement in centimeters, and cm^3 means that 3 different measures in centimeters were multiplied together. However, using exponents of 2 or 3 with numbers has nothing to do with area or volume per se. We could feasibly say that the area of something is 2^3 cm^2. This simply means that the area is 8 cm^2 and tells us nothing about the sides or even the shape of the figure. Just because the exponent on the number is 3 does not mean we are measuring volume, it is only the exponent on the centimeters that tells us it is a measurement of an area.

6(b): Even though exponents are being taught in the context of prime factorization, the base does not have to be a prime number.

7(d): Point out that 1 to any power is 1.

Practice

Tasks 8-9, p. 21

8. (a) 2^3 x 5^3
   (b) 3^2 x 5^2 x 7
   (c) 7^2 x 11^2

9. (a) 2^2 x 3 x 5
   (b) 2^3 x 3
   (c) 2^2 x 5^2

Workbook

Exercise 5, pp. 14-15 (answers p. 23)

Unit 12 – Data Analysis

Chapter 1 – Mean, Median and Mode

Objectives

- Find the mean, median, and mode of a set of data.
- Understand how mean, median, and mode differ in the information they provide.

Material

- Graph paper
- Data on high and low temperatures or other data

Vocabulary

- Mean
- Median
- Mode
- Range

Notes

In *Primary Mathematics* 4B students learned to find the median and mode of a set of data. In Unit 11 of *Primary Mathematics* 5B they learned to find the average of a set of data, which is also the mean. In this chapter your student will find the mean, median, and mode of the same set of data and examine what kind of information each of these types of summary data provide.

The **mean** is the same as average and is calculated by dividing the sum of all the values in a set of data by the total number of values.

The **median** is the middle value in a set of data. When there is an odd number of values the median is the value in the middle. When there is an even number of values the median is the average of the two middle values.

The **mode** is the value that occurs most frequently in a set of data. At this level your student will only deal with cases in which there are only one or two modes.

The **range** is a measure of spread rather than central tendency and is the difference between the highest value and the lowest value. Students have found the range of a set of data in earlier levels.

The mean is the most commonly used type of summary data because it is an easy way to even out irregularities in the data. Sometimes the median is preferred to the mean, because it is less sensitive to extreme values since half of the values are above the median and half of the values are below it. Mean and median are usually used to analyze numerical data whereas mode is usually used to look at categorical data. Categorical data deals with categories that are not ordered, such as age group, race, gender, favorite ice cream, etc. Some data can be looked at both numerically and categorically (e.g., the yearly salaries of the employees in a company).

It is up to you how much time you want to spend on this chapter and whether you want your student to collect data and analyze it. The purpose of this chapter is just to introduce the student to the three common measures of central tendency, i.e., measures that represent the “center” of distribution, and how to compute them. The concepts will be covered in more depth in *Primary Mathematics* 6B, including the usefulness of each type of measure and the effect of adding a new data value to each.