

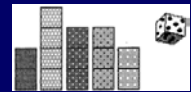
Tower Power

Developed by
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These activities are designed to reinforce and enhance number sense, operations and data analysis concepts.

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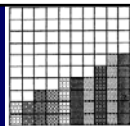
Building Towers



- Students work with a partner to build towers.
- Have the first student roll one number cube.
- Make a tower equal to the number rolled.
- The second student rolls the number cube.
- Make a new tower equal to the number rolled.
- Students take turns rolling the number cube and building towers until there are 10 different towers.

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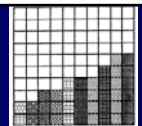
Finding the Range



- Have students arrange the ten towers in ascending order (shortest to tallest).
- Have students graph the towers on a chart.
- Identify the smallest and largest towers.
- Introduce the term **range** - the difference between the largest and smallest values in a set of data.
- The range can be given as an interval (1 to 5.)
- 2, 2, 3, 3, 4, 4, 4, 5, 6, 6 - Range: $6 - 2 = 4$

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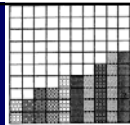
Finding the Mode



- Have students identify the towers that are the same size.
- Next, identify the set of towers that are the same size and occur most often.
- Introduce the term **mode** - the number or numbers that occur most often in a set of data.
- Note- if no number occurs most often, the set of data has no mode.
- The mode is 4. There are three towers that have four cubes each.

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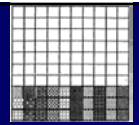
Finding the Median



- Have students identify the fifth and sixth towers.
- Have students count how many towers are before the fifth tower (4) and how many towers are after the sixth tower (4).
- Explain that the fifth and sixth towers are in the middle of the set of ten towers.
- Introduce the term **median** - the middle number.
- For a set of an odd number of data arranged in order, it is the middle number.
- For an even number of data arranged in order, it is the average of the two middle numbers.
- The median is 4.

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Finding the Mean



- Have students rearrange their ten towers so that all ten towers are the same size and have the same number of cubes.
- Remember there must still be ten towers.
- Introduce the term **mean** - the average. The sum of the given numbers divided by the number of numbers used in computing the sum.
- Divide the cubes as evenly as possible between the ten towers.
- "Left over" cubes are the remainder.
- The mean is $3 \text{ r } 9$ or 3.9 .

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Tower Factorials!

- Explain to the students that the tower builders are building four floor towers.
- They can only use four colors to paint the floors.
- The floors can be any arrangement of the four colors.
- There can be no towers with the same color arrangements.
- Find all the tower arrangements.
- Record the results on the Tower Builder worksheet.

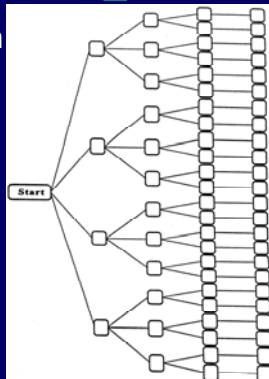
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Tower Factorials! Solution

- This is a permutation.
 - A permutation of a number of objects is an ordered arrangement of those objects-that is, placing the objects in a definite order.
 - The formula for the number of permutations is ${}_n P_x = n!/(n-x)!$
- A tree diagram can be used to show the possible arrangements.

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Tree Diagram





Tower Probability

- Place one yellow and one red color cube in a bag.
- Ask which color students think they will get if they reach into the bag and without looking take out one cube.
- Have students take turns drawing one cube, tallying the color and returning the cube to the bag.
- After everyone has had a turn taking a cube, discuss the results.

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Tower Probability Results

Each cube has an equal chance of being taken from the bag.
The more times they take a cube, the more likely it is that the results will be about the same.

Color of Cube	Number of times color is taken from bag,
Yellow	
Red	

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Tower Probability

- Try another combination such as one red cube and three green cubes.
- Red will be drawn from the bag about 1/4 of the time and green about 3/4 of the time
- Help students to understand that if the numbers are the same, the chances are about the same.
- If the numbers are different, the color with more cubes has a better chance of being drawn from the bag.

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