## Math Lesson 5: How Do We Survey the Reef To Estimate Coral Coverage?

**Hawaii DOE Content Standards:**

Math standard: [Data Analysis, Statistics, and Probability]-Pose questions and collect, organize, and represent data to answer those questions; Interpret data using methods of exploratory data analysis

**Performance indicator:**

After completing this lesson, students will use the calculator to generate random placement coordinates on the reef.

**Vocabulary:**

Coordinate pairs, fractions, percents

**Time:**

One class period

**Materials:**

TI-84 calculators, View Screen

## Activity

In this lesson we will review fractions in relation to percentages, and practice estimating the percentage of coral coverage of reef transect sites. Our goal is to collect data from a randomly selected sample of transect sites, examine that data and reach conclusions regarding the amount of coverage of the reef for two major species of coral - *Porites compressa* and *Montipora capitata*.

**Random placement of metric squares**

To determine where we will place the metric squares on the reef, we will use the transect line with a predetermined starting point at one end. Using the random number generator on the calculator, we will generate pairs of numbers. The first number in the pair will tell us how many meters to proceed along the transect line from the starting point. The second number in the pair will tell us how many meters to proceed **above** (a positive number) or **below** (a negative number) the transect line at the [point at which we have stopped. Let the first numbers in the pair range from 0 to 25. Let the second numbers range from –5 to +5. Store the first numbers in List 1, the second numbers in List 2. Generate as many pairs as metric squares you are going to place. The first entry in List 1 will be paired with the first entry in List 2, etc.

Example: MATH/PRB/5/randInt. On screen: randInt(0,25,10)-->L5. This assumes there are 10 metric squares to be placed. Then randInt(-5,5,10)-->6. Your lists may looks like this:

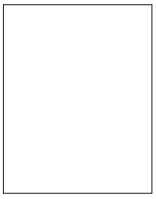
| L5 | L6 |
|---|---|
| 11 | 0 |
| 23 | 5 |
| 2 | -5 |
| 18 | -1 |
| 18 | 4 |

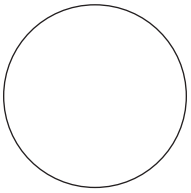
The first pair (11,0) would indicate that you move 11 meters along the transect line, but no distance above or below. The second pair (23,5) indicates you place the metric square by moving 23 meters from the start along the transect line, and 5 meters above the line; (2,-5) indicates you place the metric square by moving 2 meters from the start along the transect line, and 5 meters below the line.

## Practice problems:

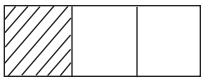
1. Copy the figures below, then divide and shade the shapes to represent the given fraction.

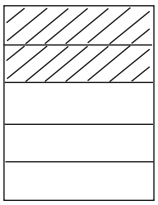
a) $^1/_3$ 

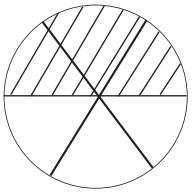
b) $^2/_5$ 

c) $^3/_6$ 

**[Accept reasonable answers. Possible answers are shown below.]**

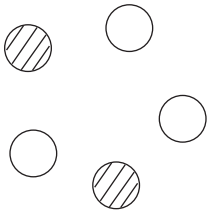
a) 

b) 

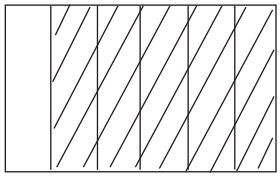
c) 

2. Describe each picture by writing a sentence that includes a fraction. For example, in part (a), you could write, "$^2/_5$ of the circles are filled in." Write a different sentence for part (a) and then do parts (b) and (c).

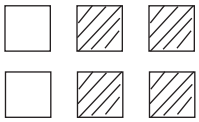
**[Accept reasonable answers. Possible answers are given below.]**

a) 

**[3/5 of the circles are not shaded.]**

b) 

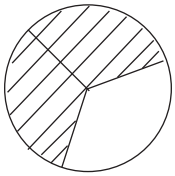
**[5/6 of the rectangle is shaded.]**

c) 

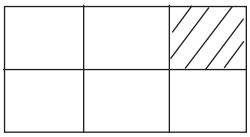
**[4/6 of the squares are filled in.]**

3. Represent each picture with a fraction.

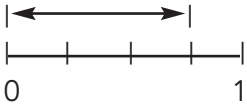
a) **[2/3]**



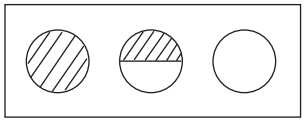
b) **[1/6]**



c) **[3/4]**




4. Al says that the fraction 1/2 represents the picture at right. Jake disagrees and think it is 1-1/2. Martha says, "You're both right." Who is right? Explain your reasoning.

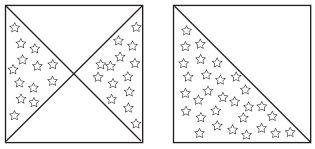


**[Answers may vary depending on perspective.**
**Make sure your class is exposed to all three answers.**
- **Al is right because 1/2 of the total picture is shaded.**
- **Jake is right because 1-1/2 circles are shaded.**
- **Martha is right because she understands both perspectives.**

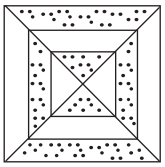
**Accept all three answers if students provide the correct explanations.]**

5. Tanisha and Jorel each shaded a square to show one half.

a) Tanisha's square is the one on the right, and Jorel's is on the left. Jorel said Tanisha did not show one-half correctly. Who is correct? Explain your reasoning.
**[Both showed one-half correctly.]**



b) Wendy said she had a better way to divide a square in half, shown at right. Does Wendy's shaded area represent one-half of the square? Explain.
**[Yes. For every shaded piece, there is a corresponding unshaded piece.]**



c) Harvey said, "Mine shows one-half too." (His square is shown at right.) Is Harvey correct? Explain. **[Yes; drop an altitude in the triangle to show that each part of the triangle is half of a rectangle. See diagram below.]**