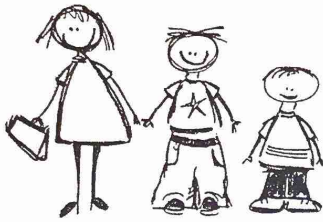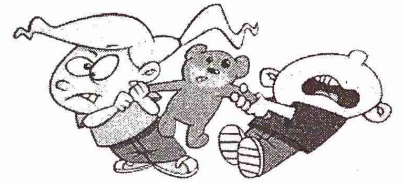Name: _____ Hour: _____ Date: _____

# Lesson 6.1: Day 1: How many children are in your family?

*siblings*

Count up the number of children in your family (including yourself). Be sure to include all your stepbrothers/stepsisters and half-brothers/half-sisters.

*Answers will vary.*

*Example:*

Let $X$ = the number of children. Suppose we choose someone from the class at random.

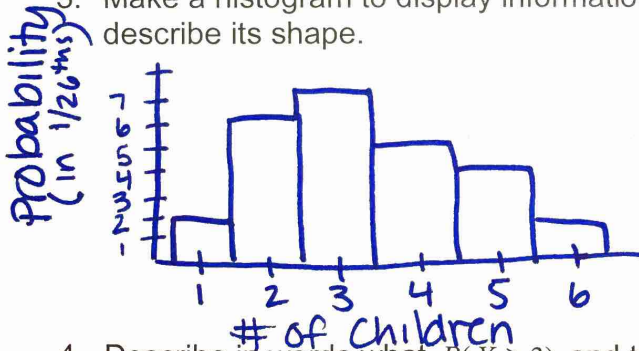| $X$ | 1 | 2 | 3 | 4 | 5 | 6+ |
|---|---|---|---|---|---|---|
| Probability | 2/26 | 6/26 | 7/26 | 5/26 | 4/26 | 2/26 |

1. Is this a valid probability model? Explain.

yes, the probabilities add to 1 and are all between 0 & 1.

2. Is 5.7167 a possible value for $X$? Explain.

No, you can't have a part of a child. → Discrete vs. continuous

3. Make a histogram to display information with $X$ on the horizontal axis, and describe its shape.

Probability (in 1/26 ths)

# of children

Slightly skewed right with a single peak at 3.

4. Describe in words what $P(X \geq 3)$ and then find $P(X \geq 3)$.

Probability that a randomly selected student has 3 or more children in their family is

5. Describe in words what $P(X > 3)$ and then find $P(X > 3)$.

Probability that a randomly selected student has more than 3 children in their family is

6. Find the average of the $X$ values.

$(1 + 2 + 3 + 4 + 5 + 6)/6 = 3.5$

7. Does this value tell us the average number of children in the families of students in this class? If yes, explain. If no, why not? No, 3 should have a larger impact on the mean than 6 since it occurs the most.

$\mu = \sum x_i \cdot p_i$

$1\left(\frac{2}{26}\right) + 2\left(\frac{6}{26}\right) + 3\left(\frac{7}{26}\right) + 4\left(\frac{5}{26}\right) + 5\left(\frac{4}{26}\right) + 6\left(\frac{2}{26}\right) = 3.346$
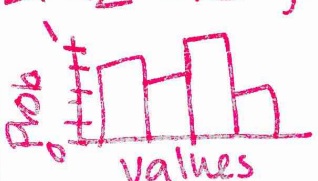
## Lesson 6.1 Day 1– Discrete Random Variables

| Important ideas: | LT#2 Histogram |
|---|---|

LT#1
Discrete random variable takes a fixed set of possible values with gaps in between values
Continuous: can take on any value in an interval


Prob
values

LT #3 mean (Expected Value)
$$\mu = \sum x_i \cdot p_i$$

## Check Your Understanding

Indiana University Bloomington posts the grade distributions for its courses online. Suppose we choose a student at random from a recent semester of this university's Business Statistics course. The student's grade on a 4-point scale (with A = 4) is a random variable X with this probability distribution:

| Value | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Probability | 0.011 | 0.032 | ??? | 0.362 | 0.457 |

1. Write the event "the student got a C" using probability notation. Then find this probability.

$$P(X=2) = 1-(.11+.032+.362+.457)$$
$$= .138$$

2. Explain in words what $P(X \geq 3)$ means. What is this probability?

Probability that a randomly chosen students gets a B or better. $P(X \geq 3) = .819$

3. Make a histogram of the probability distribution. Describe its shape.


Probability
.5 .4 .3 .2 .1
0 1 2 3 4
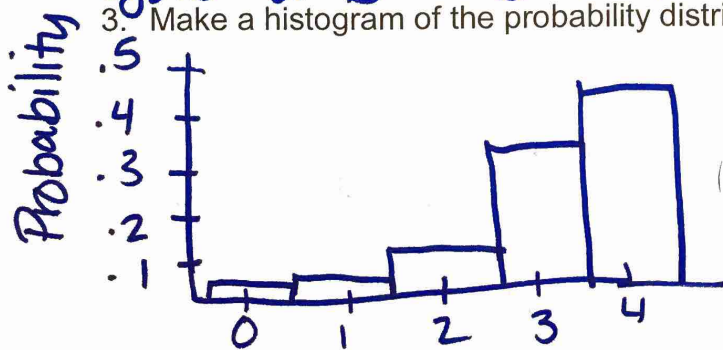
Skewed left with a single peak at 4.

4. Calculate and interpret the expected value of X.

$$0(.011)+1(.032)+2(.138)+3(.362)+4(.457)$$
$$=3.222$$ If many many students are chosen at random the average grade is about 3.222.

TheStatsMedic