HEADLINES – "DISTRICT 12 REAPING BEING HELD TODAY"

May the odds be ever in your favor…will they be today????

In the book The Hunger Games, 24 contestants compete for the title of Hunger Games Champion. The contestants are from age 12 to age 18. In their country of Panem there are 12 districts. One boy and one girl from each district are chosen to attend the Hunger Games. They are called tributes.

Below is a summary of the tributes.

DISTRICT											
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
BOY	BOY	BOY	BOY	BOY	BOY	BOY	BOY	BOY	BOY	BOY	BOY
GIRL	GIRL	GIRL	GIRL	GIRL	GIRL	GIRL	GIRL	GIRL	GIRL	GIRL	GIRL

Use the table above to answer the following questions. Write probabilities as simplified fractions.
For #1-10, you choose one of the 24 contestants at random.

1.	P(boy) [What is the probability you will choose a boy?]	
2.	P(a person from district 12)	
3.	P(a girl from district 11)	
4.	P(a person not from district 2)	
5.	P(either a boy or a girl)	
6.	P(a person from district 13)	
7.	P(a person from a prime numbered district)	
8.	P(a boy from a composite numbered district)	
9.	P(a girl from district 4, 5, or 6)	
10.	P(a person from a district that is a multiple of 3)	

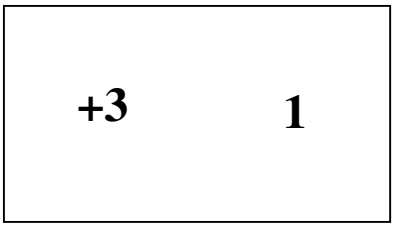
11.	Assume each contestant has an equal chance of winning. What is the probability the girl from district 12 will win?	
12.	If the Hunger Games were played 96 times, how many times would expect a boy from district 6 to win?	
13.	The final four contestants are the boys and girls from districts 3 and 4. Use a tree diagram to list all the possible orders the next two contestants may be eliminated.	

+1 0	+1 1	+1 0
+1 1	+1 0	+1 1
+1 0	+1 1	+2 0
+2 0	+2 0	+2 1
+2 0	+2 1	+2 0
+2 1	+3 0	+3 0

+3 0	+3 1	+3 0
+3 1	+4 0	+4 1
+4 0	+4 1	+5 0
+5 0	+5 0	+5 1
+6 0	+6 0	+6 0
+6 1		

The Hunger Games Reaping Simulation

You received a piece of paper when you walked in to class today.



The **first number** (+1 to +6) represents how many years you are going to add to your current age for today's lesson.

My current age: _____ + my first number _____ = my age for this project _____

Members of my family: _____ (current members living in your house, including yourself)

The **second number** represents whether you received tesserae or not. In the Hunger Games, tesserae represents additional food resources for families in need.

0 = you are not starving and you did not receive tesserae
1 = you are starving and your family has received tesserae each year since you were 12

Directions for determining your entries into the reaping

PART 1: AGE
Age 12 = 1, Age 13 = 2, Age 14 = 3, Age 15 = 4, Age 16 = 5, Age 17 = 6, Age 18 = 7

PART 2: TESSERAE

You must add 1 extra entry for every family member (including yourself) that received tesserae. These extra entries are cumulative.

For example, if you are 14 years old, your baseline number of entries would be 3 (for age). Added to this number would be your tesserae. For example, if you have 5 members in your family, the entries for tesserae at age 14 would be 5x3=15.

Portions of this first project taken from: Hunger Games: What Are the Chances?, Sarah B. Bush and Karen S. Karp**,** *Mathematics Teaching in the Middle School*, Vol. 17, No. 7 (March 2012), pp. 426-435

1.	On the basis of your age and your tesserae status, determine the number of entries you will have in the reaping lottery this year. Show all work here:
2.	Place your entries in the boy drawing or girl drawing using the small pieces of paper. Then write your number of entries in the correct column on the board.
3.	Given the grand total number of entries in our district (class) and for your gender, what is the probability that your name will be selected? Express your answer as both a fraction and a percentage round to the nearest hundredth (ex. 5.82%). **Calculator**
4.	Suppose you were a student in another class period. Would your chances (or probability) of being selected for the Hunger Games be the same? Why, or why not?
5.	Write an algebraic equation representing a person's total number of entries, E, for a given year if you did not receive tesserae. Define your variables and write your equation below.
6.	Write an algebraic equation representing a person's total number of entries, E, for a given year if you did receive tesserae each year, starting at age 12, for all family members. Define your variables and write your equation below.

7.	Katniss had 20 entries in the reaping, Peeta 5, Gale 42, and Prim 1. If there were 4,144 boy entries and 4,060 girl entries in District 12, what is the probability that each name would be drawn for the Hunger Games? (percentage, round to the nearest hundredth) **Calculator**
8.	What is the probability that both Peeta and Prim are drawn at the reaping? To determine to probability of both of these two events happening, you multiply each individual probability together. Show your expression and answer below. **Calculator**
9.	How many entries would you have if you were 18 years old, had 9 family members, and received tesserae for each of them every year since you were 12?
10.	Suppose you were in a math class of 24 students and each student randomly draws the name of a contestant from the Hunger Games. If your contestant wins the Hunger Games, you win a prize. Is this a fair game? Why or why not? Can you determine the probability of your contestant winning the Hunger Games? If so, write it as a fraction.
11.	How many orders are possible for the first, second, and third person eliminated?
12.	During the Hunger Games in the book, 24 contestants compete until one person is declared the winner. How many orders are possible in which the contestants could have been eliminated (assuming 1 contestant eliminated at a time)? **Calculator**
13.	Suppose as the Hunger Games tributes arrive at the capitol they each greet every other contestant one time. How many total greetings would there be? Use drawings or lists to help organize your thoughts. Show all your work.

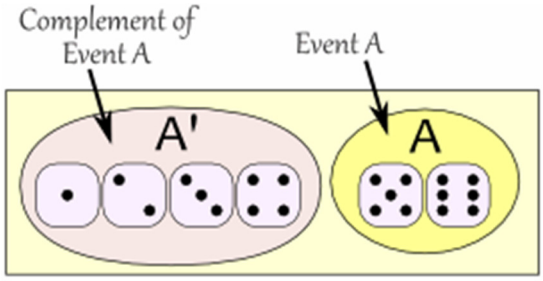
Determine something has a probability of…

0%		**50%**	
10%		**75%**	
25%		**100%**	

Probability	the chance that some event will happen
Outcome	one possible result of a probability event For example, 4 is an outcome when a die is rolled.
Event	a specific outcome or type of outcome
Sample space	the set of all possible outcomes For example, rolling a die the sample space is {1, 2, 3, 4, 5, 6}
Theoretical Probability	the ratio of the number of ways an event can occur to the number of possible outcomes (You are solving it mathematically.)
Experimental Probability	an estimated probability based on the relative frequency of positive outcomes occurring during an experiment (You are conducting an experiment.)
Random	outcomes occur at random if each outcome is equally likely to occur
Simple	A simple experiment consists of one action.
Composite	A composite experiment consists of more than one action.

The probability of an event is the ratio of the number of ways the event can occur to the number of possible outcomes.

$$P(event) = \frac{\text{number of ways an event can occur}}{\text{number of possible outcomes}}$$



The probability of rolling a 5 or 6 above is $\frac{2}{6}$. $P(A) = \frac{2}{6}$

The **complement** of an event is all the outcomes that are not the event. It is represented with the prime symbol. $P(A') = \frac{4}{6}$ because rolling a 1, 2, 3, or 4 is the complement of rolling a 5 or a 6.

$$P(A) + P(A') = 1 \textbf{ always.}$$

HUNGER GAMES COMPETITION

The chart below shows how many tributes were left at the end of each day of the 74th Annual Hunger Games.

	Tributes remaining		Tributes remaining		Tributes remaining
Start	24	**Day 6**	10	**Day 12**	5
End of Day 1	13	**Day 7**	10	**Day 13**	5
Day 2	12	**Day 8**	8	**Day 14**	4
Day 3	12	**Day 9**	6	**Day 15**	3
Day 4	12	**Day 10**	6	**Day 16**	3
Day 5	10	**Day 11**	6	**Day 17**	2

Assume that all of the contestants have equal abilities to win the Hunger Games. Use the table above to answer the following questions.

	Name	**Fraction**	**Percent (nearest whole percent)**
1.	Before the Hunger Games begin what is the probability that Katniss will win?		
2.	Before the Hunger Games begin what is the probability that Katniss won't win?		
3.	After day one, what is the probability that Katniss will win?		
4.	After day one, what is the probability that Katniss won't win?		
5.	At the end of day 5 what is the probability that Katniss will win?		
6.	At the end of day 8 what is the probability that Katniss will win?		
7.	At the end of day 14 what is the probability that Katniss will win?		
8.	At the end of day 16 what is the probability that Katniss will win?		
9.	At the end of day 16 what is the probability that Katniss won't win?		
10.	***Why does Katniss' probability become greater as she gets farther into the Hunger Games?***		