Name_____ Date_____ Scan

Algebra 1B-2: Final Exam Review

1) You have a bag of skittles in front of you that you just purchased at the newly finished Village Store. There are a total of 60 skittles in the bag, and the colors are red, orange, yellow, purple, and green.
   a) Just knowing this information, how many orange skittles would you expect to be in the bag? Why?

$\frac{60 \text{ total}}{5 \text{ colors}} = 12$ orange Most likely the colors would be even.

   b) Do you really think that the number of skittles in a bag is divided up evenly? Why or why not?

No → not likely that this would occur.

   c) After opening up the bag and pouring the skittles onto your table, you find that you have the following number of skittles:

Color	Red	Orange	Yellow	Purple	Green
Number	12	10	15	13	10

Based off of this table, what is the *theoretical probability* that you will choose a green skittle out of the bag at random?

$\frac{10}{60} = \frac{1}{6}$ [redacted] [redacted] $= .16\overline{6} = 16.7\%$

P(yellow or purple)?

$15 + 13 = 28$

$\frac{28 \div 4}{60 \div 4} = \frac{7}{15}$ 46.7%

P(orange, yellow, red, or purple)?

$10 + 15 + 12 + 13 = 50$

$\frac{50}{60} = \frac{5}{6}$ 83.3%

P(blue)?

$\frac{0}{60} = 0$ 0%

d) After some good probability calculations, you decide to up the ante. You choose one skittle out of the bag and then after you replace it, you choose another skittle. Find the probability of the following:

P(red and green) $\frac{10}{60} = \frac{1}{6}$

$\frac{12 \div 12}{60 \div 12} = \frac{1}{5}$

$P(\text{red and green}) = \frac{1}{5} \cdot \frac{1}{6} = \frac{1}{30}$ 3.3%

P(purple and yellow)

$\frac{13}{60}$ $\frac{15}{60} = \frac{1}{4}$

$P(\text{purple and yellow}) = \frac{13}{60} \cdot \frac{1}{4} = \frac{13}{240}$ 5.4%

P(orange and brown)

$\frac{10}{60} = \frac{1}{6}$ $\frac{0}{60} = 0$ $\frac{1}{6}(0) = 0$ 0%

P(red or green and yellow) $\frac{15 \div 15}{60 \div 15} = \frac{1}{4}$

$\frac{12+10}{60} = \frac{22 \div 2}{60 \div 2} = \frac{11}{30}$

$P(\text{red or green and yellow}) = \frac{11}{30} \cdot \frac{1}{4} = \frac{11}{120}$ 9.2%

e) By this time, you're starting to get a little tired doing so many math calculations, but something in your head tells you to keep going! So to compromise, you decide that you're going to eat some skittles too.

Find the probability of choosing a yellow skittle then a green skittle if you eat the yellow skittle after you choose it.

$\frac{15 \div 15}{60 \div 15} = \frac{1}{4}$ $\frac{10}{59}$

$P(\text{yellow then green}) = \frac{1}{4} \cdot \frac{10}{59} = \frac{10 \div 2}{236 \div 2} = \frac{5}{118}$ 4.2%

Now imagine you never ate that yellow skittle above and you still had all 60 skittles left in the bag. Find the probability of choosing a purple skittle, eating it, then choosing another purple skittle.

$\frac{13}{60}$ $\frac{12}{59}$ 4.4%

$P(\text{purple + purple}) = \frac{13}{60} \cdot \frac{12}{59} = \frac{156 \div 4}{3540 \div 4} = \frac{39}{885}$

2) You conduct an experiment at your school. You want to know once and for all who the most popular sports team in New England is: the Boston Red Sox, the New England Patriots, the Boston Bruins, or the Boston Celtics. You ask 400 of your classmates to pick one out those four teams as their absolute favorite.

a) What is the *theoretical probability* that a person will like the Boston Celtics the most?

$\frac{1}{4} = 25\%$

b) After you conduct your experiment, you get the following results:

Favorite Team	Red Sox	Patriots	Bruins	Celtics	Don't Care About Sports
Number of People	60	140	80	100	20

c) Based off of your experiment, what is the *experimental probability* that someone will like the Patriots the most?

$\frac{140}{400} = \frac{14 \div 2}{40 \div 2} = \frac{7}{20}$ 35%

d) Again, based off of your experiment, what is the *experimental probability* that someone doesn't even care about sports?

$\frac{20}{400} = \frac{2 \div 2}{40 \div 2} = \frac{1}{20}$ 5%

e) How would you describe the differences between *experimental probability* and *theoretical probability?*

- Experimental probability is the chances that something will occur based off some sort of experiment (like a poll or survey).
- Theoretical probability is the chances that something will occur based on the number of outcomes divided by the total # of outcomes.

3) Give an example of some event that could be an example of a *permutation*. Why is it a permutation?

- The # of ways 6 teams can finish their season (1st place, 2nd place, etc.)
- Order matters.

4) Now, give an example of something that is a *combination*. Again, why is it a combination?

- The # of ways you can order a 3-course meal from a selection of apps, entrees, and desserts.
- The order in which you order your food does not matter.

5) A team of 3 students is to be formed out of 6 students. In how many ways can the teams be formed?

a. Permutation or combination?

b. Figure out how many teams can be formed.

$$6C_3 = \frac{6P_3}{3P_3} = \frac{6 \cdot 5 \cdot 4}{3 \cdot 2 \cdot 1} = \frac{120}{6} = 20 \text{ ways}$$

6) Find the number of permutations of the letters {S, O, R, R, Y}.

$$5P_5 = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$$

7) How many different 3-letter permutations can be formed using the letters in the word 'SCARED'?

$6P_3 = 6 \cdot 5 \cdot 4 = 120$

8) You have to create a secret password for your 2018-2019 Google Account here at GHS. Here are the rules for your password:

-The first character must begin with a digit (0-9) → 10

-The next three characters must have a vowel (not including y) → 5

-The last character must be a digit (0-9) → 10

If you can repeat any digit or vowel, how many passwords are available?

$10 \cdot 5 \cdot 5 \cdot 5 \cdot 10 = 12{,}500$

If you cannot repeat any digit or vowel, how many passwords are available?

$10 \cdot 5 \cdot 4 \cdot 3 \cdot 9 = 5{,}400$

9) You decide to have a 3-course meal at your favorite restaurant, Canoe in Center Harbor. The appetizer choices are: Caesar salad, chicken wings, clam chowder, calamari, nachos, and fried pickles. The entrees include steak, lobster mac and cheese, roasted chicken, salmon, and sushi. The desserts include peanut butter pie, apple pie, chocolate cake, tiramisu, and gelato. How many different meals could you order at Canoe?

Apps: 6 total
Entrees: 5 total
Desserts: 5 total

$\underset{\text{Apps}}{6} \cdot \underset{\text{Entrees}}{5} \cdot \underset{\text{Desserts}}{5} = 150$