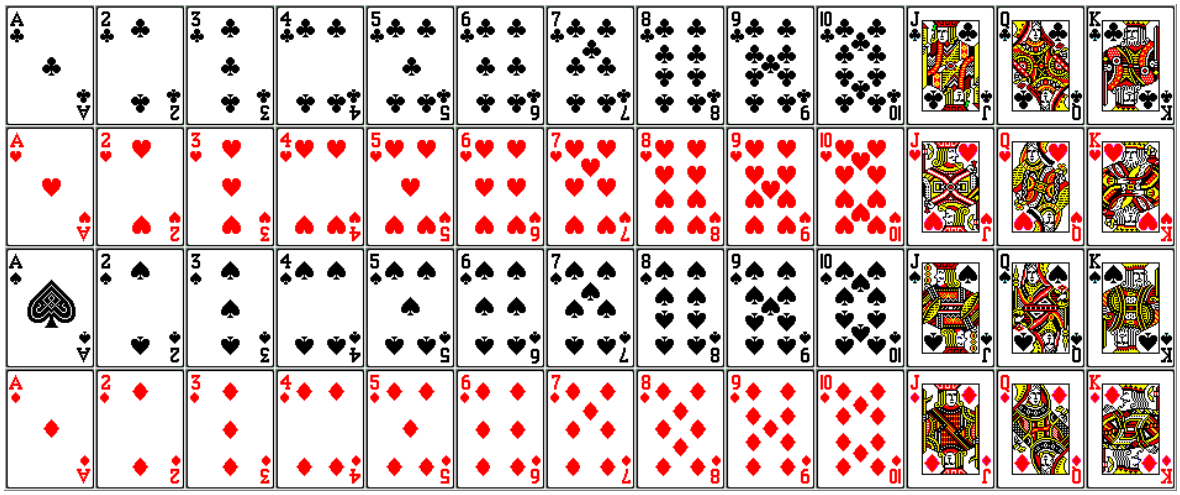
Probability Theory Worksheet 1 Name _____

Solve the problems below using your knowledge of probability. Write fractions in lowest terms.

1. What is the probability of choosing a king from a standard deck of playing cards?
$\frac{4}{52} = \frac{1}{13} = .0769 = 7.7\%$
2. What is the probability of choosing a green marble from a jar containing 5 red, 6 green and 4 blue marbles?
$\frac{6}{15} = \frac{2}{5}$
3. What is the probability of choosing a marble that is not blue in problem 2?
$\frac{11}{15}$
4. What is the probability of getting an odd number when rolling a single 6-sided die?
$\frac{3}{6} = \frac{1}{2} = .5 = 50\%$
5. What is the probability of choosing a jack or a queen from a standard deck of 52 playing cards?
$\frac{8}{52} = \frac{2}{13}$
6. What is the probability of landing on an odd number after spinning a spinner with 7 equal sectors numbered 1 through 7?
$\frac{4}{7}$
7. What is the probability of getting a 7 after rolling a single die numbered 1 to 6?
0
8. What is the probability of choosing a queen, a king or an ace from a standard deck of playing cards?
$\frac{12}{52} = \frac{3}{13}$
9. What is the probability of choosing the letter i from the word probability?
$\frac{2}{11}$
10. What is the sample space for choosing a letter from the word probability?
{P, R, O, B, A, I, L, T, Y}
11. SS of flipping coin: {H, T}
12. SS of rolling die: {1, 2, 3, 4, 5, 6}



Probability of Compound Events Name:_____

Independent Events:

A compound event involves two or more simple events occurring together.

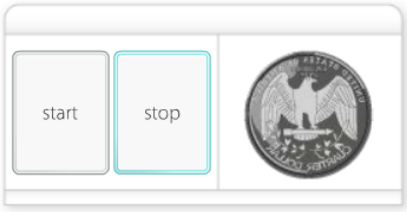
Examples: rolling two dice, flipping four coins or scoring three baskets in a row. All of these probabilities involve more than one event.

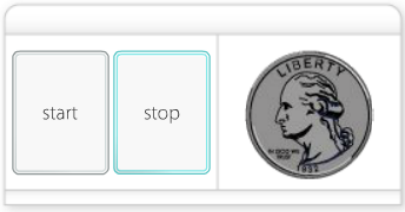
$$Probability\ of\ a\ simple\ event = \frac{favorable\ outcomes}{total\ possible\ outcomes}$$

When the probabilities of compound events do not influence each other, they are known as independent events

- Probability of independent events A and B occurring:
  $P(A \text{ and } B) = P(A) \cdot P(B)$

The probability of event A occurring has no effect on the probability of event B occurring. For example, if two coins are flipped, the side the first coin lands on has no effect on the side that the second coin lands on. The probability that one coin lands on heads is $\frac{1}{2}$. The probability that both coins land on heads, then, is $\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$.





$P\{2 \text{ heads}\} = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$

$P\{2 \text{ Tails}\} = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$

$P\{\text{one head}\} = P(\text{Head})\,P(\text{Tail}) + P(\text{Tail})\,P(\text{Head})$

$= \frac{1}{4} + \frac{1}{4}$

$= 1/2$

Flip 2 coins

P{getting 1 head} =

Example 1:

The spinner shown below is divided into 8 equal sections.

Constance spins the arrow on this spinner four times. What is the probability that the arrow lands on an even number all four times?

A 0.0625 B 0.125 C 0.25 D 0.5

$= \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$

$= \frac{1}{16}$

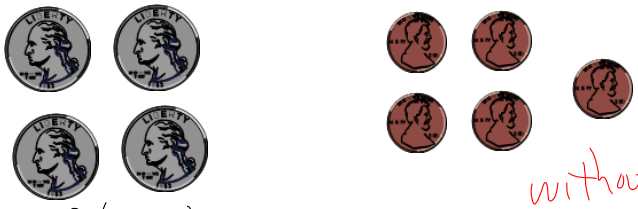
Dependent Events:

When the probabilities of compound events will influence each other, these are known as ___dependent___ ___events___. That is because the outcome of one event depends on the outcome of another event.

- Probability of dependent events A and B occurring:
  $P(A \text{ then } B) = P(A) \cdot P(B \text{ after } A \text{ occurs})$

probability of event A occurring has an effect on the probability of event curring.

or example, suppose you have 5 quarters and 5 pennies in your wallet. You select two coins from the wallet without looking. If the first coin is not replaced, then the total number of coins in your wallet decreases from 10 to 9 after the first coin is selected. This has an effect on the probability of choosing the second coin.



without replacement

$P(1Q) = \frac{5Q}{10\text{ coins}} = \frac{1}{2}$

$P(2Q) = \frac{1}{2} \cdot \frac{4}{9} = \frac{4}{18} = \frac{2}{9}$

$P(1Q \text{ then } 1P) = \frac{5}{10} \cdot \frac{5}{9} = \frac{25}{90}$

Example 2:

A bag contains the following letter tiles: 6 vowels and 10 consonants. Amanda selects three letter tiles from the bag without looking. She does not replace the letter tiles back in the bag. What is the probability that she selects all consonants?

A $\frac{1}{2}$ B $\frac{5}{8}$ C $\frac{3}{14}$ D $\frac{125}{512}$

$P(\text{all consonants}) = \frac{10}{16} \cdot \frac{9}{15} \cdot \frac{8}{14}$

$10/16 * 9/15 * 8/14$

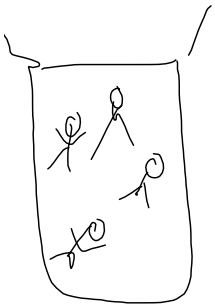
$\frac{C}{D} * \frac{D}{D}$

Example 3:

From a group of 3 girls and 6 boys, two will be chosen to attend a conference. What percent chance is there that the first person chosen is a boy and the second person chosen is a girl?

A 22% B 25% C 33% D 50%

$= \frac{6}{9} \cdot \frac{3}{8}$



http://www.mrmaisonet.com/index.php?/Probability-Quizzes/Probability-Of-Compound-Events.html

Read each problem. Circle the letter of the best answer.

1. There is a 10% chance it will rain on Saturday and a 30% chance it will rain on Sunday. What percent chance is there that it will rain on both Saturday and Sunday?

A 3%

B 15%

C 20%

D 40%

indep

(.1)(.3) = .03

2. In a shipment of alarm clocks, the probability that one alarm clock is defective is 0.04. Charlie selects three alarm clocks at random. If he puts each clock back with the rest of the shipment before selecting the next one, what is the probability that all three alarm clocks would be defective?

A 0.000064

B 0.00012

C 0.064

D 0.12

= (.04)(.04)(.04)

= 6.4E-5

= 6.4×10^{-5}

= .000064

3. Stefan rolls a 1–6 number cube and flips a coin. What is the probability he rolls a number less than 5 and the coin lands on tails?

A $8\frac{1}{3}\%$

B $33\frac{1}{3}\%$

C $41\frac{2}{3}\%$

D $66\frac{2}{3}\%$

$\frac{4}{6} \cdot \frac{1}{2}$

$= \frac{4}{12}$

$= \frac{1}{3}$

$= .33333$

$=$

4. A cafeteria has 5 turkey sandwiches, 6 cheese sandwiches, and 4 tuna sandwiches. There are two students in line and each will take a sandwich. What is the probability that the first student takes a cheese sandwich and the next student takes a turkey sandwich?

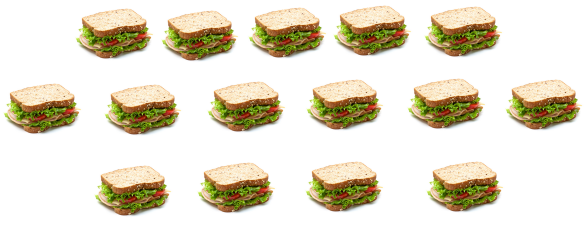
A $\frac{1}{7}$

B $\frac{1}{14}$

C $\frac{2}{15}$

D $\frac{2}{21}$

$\frac{6}{15} \cdot \frac{5}{14}$



5. Natasha has a bag of gift bows. The table below shows the colors of bows in the bag.

BAG OF GIFT BOWS

Color	Number
White	6
Gold	5
Red	4
Blue	7
Green	2
Pink	1

If Natasha picks bows at random, what percent chance is there that the first two gifts she wraps will have a white bow?

A 0.8%

B 5%

C 5.76%

D 24%

$\frac{6}{24} \cdot \frac{5}{24}$

7. Wade is playing darts. Each dart throw scores a certain number of points, depending on where on the dartboard it lands, as shown below. A throw that misses the dartboard completely is worth 0 points.

The table shows the probability of scoring 8, 5, 3, 2, or 0 points on any given throw.

DART SCORE PROBABILITIES

Score	Probability
8	0.1
5	0.2
3	0.3
2	0.3
0	0.1

If Wade throws two darts, what is the probability his total score will be exactly 10 points?

A 0.3

B 0.1

C 0.03

D 0.07

$P(5,5) \rightarrow (.2)(.2)$

$P(8,2) \rightarrow (.1)(.3)$

$P(2,8) \rightarrow (.3)(.1)$

$+$

6. A builder has 8 lots available for sale.

- 6 lots are greater than one acre.
- 2 lots are less than one acre.

What is the probability that the next three lots sold will be greater than one acre?

A $\frac{3}{4}$

B $\frac{15}{28}$

C $\frac{27}{64}$

Open ended:

There are 3 black marbles and 4 red marbles in a bag. Trevor will take out 2 marbles without looking.

A What is the probability that both marbles will be black? Show your work.

Answer: _____

B Explain how you found your answer to **part A.**

C Suppose that Trevor takes out 1 marble, replaces it in the bag, then takes out another marble. What is the probability that both marbles will be black in this situation? Show your work.

Answer: _____

D Explain how you found your answer to **part C.**