Name: _____ Date _____

Topic : Probability Word Problems- Worksheet 1

What is the probability?

1. Jill is playing cards with her friend when she draws a card from a pack of 20 cards numbered from 1 to 20. What is the probability of drawing a number that is square? 4/20 = 1/5
   1, 4, 9, 16

2. Each of the letters in the word SAMSUNG are on separate cards, face down on the table. If you pick a card at random, what is the probability that its letter will be S or U? 3/7

3. A magician showed a magic trick where he picked one card from a standard deck. Determine what the probability is that the card will be a queen card? 4/52 = 1/13

4. A bag contains ten black marbles, twenty white marbles, and five grey marbles. You pick one without looking. What is the probability that the marble will be either white OR black? 30/35 = 6/7
   (35)

5. You ask a friend to think of a number from four to twelve. What is the probability that his number will be 8? 1/9
   4, 5, 6, 7, 8, 9, 10, 11, 12

6. Each of letters in the word are on separate cards, face down on the table. If you pick a card at random, what is the probability that its letter will be L or E?

7. You roll a SIX sided die. What is the probability that the value of the roll will be one? 1/6

8. A bag contains 5 blue sticks, 4 red sticks, and 3 orange sticks and you ask a friend to pick one without looking. What is the probability that the stick will be blue? 5/12
   (12)

9. You think of a number from the first twenty negative integers. What is the probability that the integer chosen will be divisible by 4? -4, -8, -12, -16, -20 5/20 = 1/4

10. When a six sided die is rolled then what is the probability that the number rolled will be five? 1/6

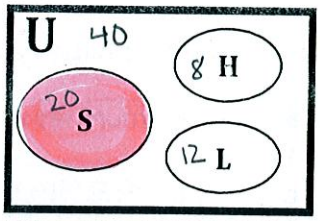
Name _____ Date _____

Intersection & Union of Sets Using U Worksheet 1

1) Steve was cleaning out his workshop and gathered 20 screwdrivers (S), 8 hammers (H), and 12 pliers (L) and organized them into a drawer. Set U is the drawer.

a) $P(S) = \frac{20}{40} = \frac{1}{2}$

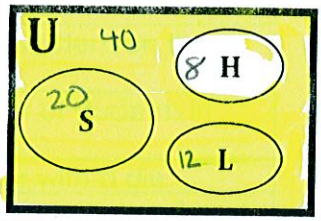
Shade P(S)



b) $P(H)^C = \frac{32}{40} = \frac{4}{5}$

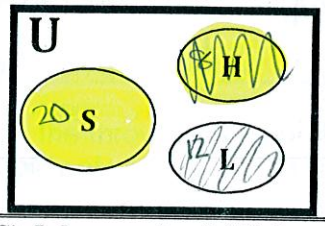
Shade $P(H)^C$

40 - 8 = 32



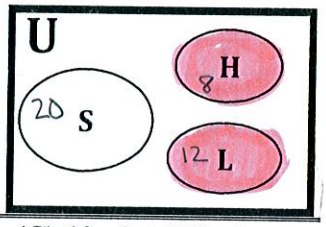
c) $P(S \text{ or } L) = \frac{32}{40} = \frac{4}{5}$

Shade P(S or L)



d) $P(H \text{ or } L) = \frac{20}{40} = \frac{1}{2}$

Shade P(H or L)

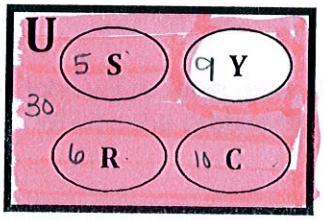


2) In November it snowed (S) 5 days, rained (R) 6, was sunny (Y) 9, and was cloudy (C) 10 . Set U is the days in the month of November.

a) $P(Y)^C = \frac{21}{30} = \frac{7}{10}$

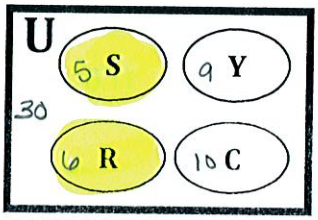
Shade $P(Y)^C$

30 - 9 = 21



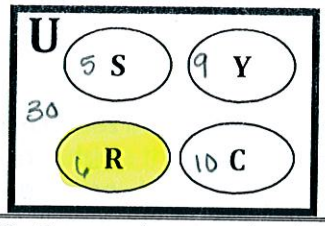
b) $P(S \text{ or } R) = \frac{11}{30}$

Shade P(S or R)



c) $P(R) = \frac{6}{30} = \frac{1}{5}$

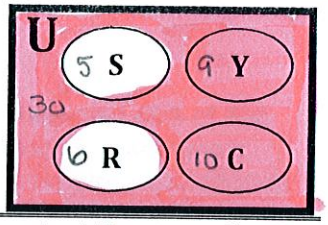
Shade P(R)



d) $P(S \text{ or } R)^C = \frac{19}{30}$

Shade $P(S \text{ or } R)^C$

30 - 11 = 19

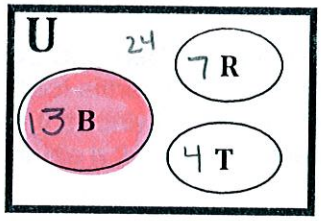


3) There were 13 bicycles (B), 7 recumbent cycles (R) , and 4 tricycles (T) on display at a bike store. Set U is the inventory of the bike store.

a) $P(R \text{ or } T)^C = \frac{13}{24}$

Shade $P(R \text{ or } T)^C$

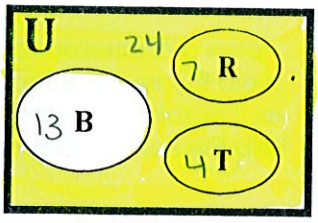
24 - 11 = 13



b) $P(B)^C = \frac{11}{24}$

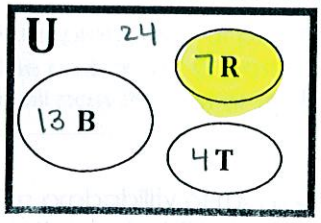
Shade $P(B)^C$

24 - 13 = 11



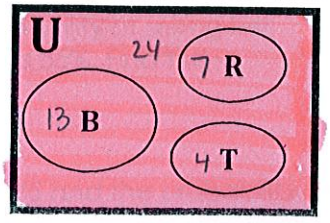
c) $P(R) = \frac{7}{24}$

Shade P(R)



d) P(B or R or T) = $\frac{1}{\ }$

Shade P(B or R or T)



9.2 Mutually Exclusive Events

1a. Non-mutually exclusive
b. Non-mutually exclusive
c. Mutually exclusive
d. Mutually exclusive
e. Non-mutually exclusive
f. Non-mutually exclusive

2.

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

$\frac{8}{36} = \frac{2}{9}$

3. $\frac{3}{6} + \frac{2}{6} - \frac{1}{6} = \frac{4}{6} = \frac{2}{3}$

4a. $0.13 + 0.26 = 0.39$
b. $0.13 + 0.26 + 0.45 + 0.11 = 0.95$
c. $100 - 0.13 = 0.87$

5a.

	WW	WNW	T
HW	53	27	80
HNW	7	13	20
T	60	40	100

$\frac{7}{100} + \frac{27}{100} + \frac{53}{100} = \frac{87}{100}$

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

$\frac{11}{21} = \frac{1}{3} + \frac{2}{7} - 1X$

6. $\frac{11}{21} = \frac{1}{3} + \frac{2}{7} - X$

$X = 2/21$

7. $X = 90 + 60 - 55$

$X = 95\%$

8. $X = \frac{4}{5} + \frac{3}{5} - \frac{2}{5} = \frac{5}{5}$

$X = 100\%$

9. Mutually Exclusive

$\frac{4}{13} + \frac{6}{13} = \frac{10}{13}$

10. N, M, E

$\frac{11}{27} + \frac{15}{27} - \frac{6}{27} = \frac{20}{27}$

11. M, Exclusive

$\frac{4}{52} + \frac{4}{52} - \frac{8}{52} = \frac{2}{13}$

12. $\frac{5}{6} + \frac{9}{10} = \frac{26}{15}$

N, M, E events

$\frac{4}{5} = \frac{26}{15} - X$

$X = \frac{14}{15}$

13.

	1	2	3	4	5	6
1	1-1	1-2	1-3	1-4	1-5	1-6
2	2-1	2-2	2-3	2-4	2-5	2-6
3	3-1	3-2	3-3	3-4	3-5	3-6
4	4-1	4-2	4-3	4-4	4-5	4-6
5	5-1	5-2	5-3	5-4	5-5	5-6
6	6-1	6-2	6-3	6-4	6-5	6-6

$$\frac{6}{36} + \frac{6}{36} - \frac{1}{36} = \frac{11}{36}$$

14. $$\frac{4}{52} + \frac{26}{52} - \frac{2}{52} = \frac{28}{52} = \frac{7}{13}$$

15. $$\frac{26}{52} + \frac{12}{52} - \frac{6}{52} = \frac{32}{52} = \frac{8}{13}$$

16.

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

$$\frac{9}{36} = \frac{1}{4}$$

17. $$\frac{3}{5} + \frac{2}{6} - \frac{1}{5} = \frac{4}{5}$$

18. $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14\}$

a) $$\frac{6}{14} + \frac{3}{14} = \frac{9}{14}$$

b) $2 = \{2, 4, 6, 8, 10, 12, 14\}$

$3 = \{3, 6, 9, 12\}$

or $3 = \{6, 12\}$

$$\frac{7}{14} + \frac{4}{14} - \frac{2}{14} = \frac{9}{14}$$

c) $$\frac{1}{14} + \frac{1}{14} = \frac{2}{14} = \frac{1}{7}$$

d) $$\frac{1}{14} + \frac{7}{14} = \frac{8}{14} = \frac{4}{7}$$

9.3 Hunger Games → Independent Events

1. $\left(\frac{1}{6}\right)\left(\frac{1}{5}\right) = \frac{1}{30}$

2. $\left(\frac{1}{6}\right)\left(\frac{1}{5}\right) = \frac{1}{30}$

3. $\left(\frac{6}{6}\right)\left(\frac{5}{5}\right) = \frac{30}{30} = 1$

4. $\left(\frac{3}{6}\right)\left(\frac{1}{5}\right) = \frac{1}{10}$

5. $\left(\frac{2}{6}\right)\left(\frac{4}{5}\right) = \frac{8}{30} = \frac{4}{15}$

6. $\left(\frac{4}{6}\right)\left(\frac{3}{5}\right) = \frac{6}{15}$

7. $\left(\frac{4}{6}\right)\left(\frac{1}{5}\right) = \frac{4}{30} = \frac{2}{15}$

8. $\left(\frac{5}{6}\right)\left(\frac{4}{5}\right) = \frac{20}{30} = \frac{2}{3}$

9. $\left(\frac{1}{6}\right)\left(\frac{1}{5}\right)\left(\frac{1}{3}\right) = \frac{1}{90}$

13. $\left(\frac{2}{6}\right)\left(\frac{4}{5}\right)\left(\frac{2}{3}\right) = \frac{8}{45}$

10. $\left(\frac{1}{6}\right)\left(\frac{1}{5}\right)\left(\frac{2}{3}\right) = \frac{1}{45}$

14. $\left(\frac{1}{2}\right)\left(\frac{2}{5}\right)\left(\frac{2}{3}\right) = \frac{2}{15}$

11. $\left(\frac{5}{6}\right)\left(\frac{4}{5}\right)\left(\frac{2}{3}\right) = \frac{4}{9}$

15. $\left(\frac{5}{6}\right)\left(\frac{1}{5}\right)\left(\frac{2}{3}\right) = \frac{1}{9}$

12. 1

16. Decrease!

---

1. $\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{4}$

2. $\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{4}$

3. $\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{4}$

★4. $\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{4}$

5. $\left(\frac{3}{5}\right)\left(\frac{2}{7}\right) = \frac{6}{35}$

6. $\left(\frac{2}{5}\right)\left(\frac{2}{7}\right) = \frac{4}{35}$

7. $\left(\frac{2}{5}\right)\left(\frac{1}{7}\right) = \frac{2}{35}$

9. $\frac{1}{5}$

10. $\frac{1}{5}$

11. $\left(\frac{1}{5}\right)\left(\frac{1}{5}\right) = \frac{1}{25}$

12. $\left(\frac{1}{5}\right)\left(\frac{4}{5}\right) = \frac{4}{25}$

13. $\left(\frac{1}{2}\right)\left(\frac{1}{16}\right) = \frac{1}{32}$

14. $\left(\frac{1}{2}\right)\left(\frac{3}{16}\right) = \frac{3}{32}$

15. $\left(\frac{1}{2}\right)\left(\frac{2}{16}\right) = \frac{1}{16}$

17. $\left(\frac{1}{2}\right)\left(\frac{10}{16}\right) = \frac{5}{16}$

★18. $\left(\frac{1}{2}\right)\left(\frac{6}{16}\right) = \frac{3}{16}$

19. $\left(\frac{1}{4}\right)\left(\frac{1}{6}\right) = \frac{1}{24}$

20. $\left(\frac{1}{4}\right)\left(\frac{5}{6}\right) = \frac{5}{24}$

21. $\left(\frac{1}{4}\right)\left(\frac{1}{2}\right) = \frac{1}{8}$

22. $\left(\frac{1}{4}\right)\left(\frac{1}{2}\right) = \frac{1}{8}$

23. $\left(\frac{3}{4}\right)\left(\frac{1}{6}\right) = \frac{1}{8}$

Activity 13-13: **Independent and Dependent Events** Name:

If the outcome of one event affects the outcome of a second event, the events are dependent.

The probability of two dependent events, A and B, is equal to the probability of event A times the probability of event B. However, the probability of event B now depends on event A.

$$P(A, B) = P(A) \bullet P(B)$$

Example **There are 6 black pens and 8 blue pens in a jar. Plutarch takes a pen without looking and then takes another pen without replacing the first, what is the probability he will get 2 black pens?**

$$P(\text{black first}) = \frac{6}{14} \text{ or } \frac{3}{7} \qquad P(\text{black second}) = \frac{5}{13}$$

$$P(\text{black, black}) = \frac{3}{7} \bullet \frac{5}{13} \text{ or } \frac{15}{91}$$

Tell whether each event is independent or dependent.

1.	Haymitch (not good at fashion) selecting a sweater, selecting a shirt	indep.
2.	Madge choosing one card from a deck then choosing a second card without replacing the first	dep.
3.	Gale's wallet contains two $5 bills, two $10 bills, and three $20 bills. Two bills are selected without the first being replaced.	dep.
4.	Alma Coin rolls two dice.	ind.
5.	Annie choosing two cards from a deck so that they make a "pair".	dep.
6.	Beetee selecting a DVD from a storage case and then selecting a second DVD without replacing the first	dep.
7.	There are 20 letter tiles face down on the table. Tim knows that there is one X-tile and one J-tile. Prim picks two tiles. What is the probability that she will pick the X-tile and then the J-tile?	dep.
8.	Squad 451 has 12 CD's in their car. They select one of the CD's while also selecting a beverage to drink at Starbucks.	ind.

86% of Texas' 12th graders missed this TAKS problem.

9. Winners from the math club fund-raiser randomly select a gift-certificate from Box A and from Box B. The boxes are shown below.

BOX A	BOX B
5 dinner certificates	4 CD certificates
4 DVD certificates	3 camera certificates
3 movie certificates	5 amusement certificates
5 T-shirts certificates	5 TV certificates

What is the probability that the first winner will randomly select a DVD certificate and an amusement certificate?

A. $\frac{20}{289}$ B. $\frac{9}{17}$ C. $\frac{9}{289}$ D. $\frac{1}{19}$

(A)

$\left(\frac{4}{17}\right)\left(\frac{5}{17}\right) = \frac{20}{289}$

Created by Lance Mangham, 6th grade teacher, Carroll ISD

25. $\left(\frac{1}{6}\right)\left(\frac{1}{3}\right) = \frac{1}{18}$

26. $\left(\frac{1}{6}\right)\left(\frac{1}{2}\right) = \frac{1}{12}$

27. $\left(\frac{1}{3}\right)\left(\frac{1}{2}\right) = \frac{1}{6}$

28. $\left(\frac{4}{6}\right)\left(\frac{1}{2}\right) = \frac{2}{6} = \frac{1}{3}$

29. $\left(\frac{1}{6}\right)\left(\frac{D}{6}\right) = \frac{1}{36}$

30. $\left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{4}$

31. $\left(\frac{1}{3}\right)\left(\frac{2}{3}\right) = \frac{2}{9}$

32. $\left(\frac{2}{3}\right)\left(\frac{2}{3}\right) = \frac{4}{9}$

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1. FINNICK

1. $\left(\frac{2}{7}\right)\left(\frac{1}{6}\right) = \frac{1}{21}$

2. $\left(\frac{1}{7}\right)\left(\frac{1}{6}\right) = \frac{1}{42}$

3. $\left(\frac{2}{7}\right)\left(\frac{1}{6}\right) = \frac{1}{21}$

4. $\left(\frac{2}{7}\right)\left(\frac{2}{6}\right) = \frac{2}{21}$

5. 0.1.

6. $\left(\frac{2}{7}\right)\left(\frac{5}{6}\right) = \frac{10}{42} = \frac{5}{21}$

7. $\left(\frac{1}{7}\right)\left(\frac{2}{6}\right)\left(\frac{2}{5}\right) = \frac{2}{105}$

8. $\left(\frac{2}{7}\right)\left(\frac{2}{6}\right)\left(\frac{1}{5}\right) = \frac{2}{105}$

9. $\left(\frac{1}{7}\right)\left(\frac{1}{6}\right)\left(\frac{1}{5}\right) = \frac{1}{210}$

10. $\left(\frac{2}{5}\right)\left(\frac{1}{3}\right)\left(\frac{4}{5}\right) = \frac{8}{105}$

11. $\left(\frac{2}{7}\right)\left(\frac{1}{6}\right)(1) = \frac{1}{21}$

12. 0.1.

13. $\left(\frac{1}{7}\right)\left(\frac{2}{6}\right)\left(\frac{2}{5}\right)\left(\frac{1}{4}\right) = \frac{1}{210}$

14. $\left(\frac{2}{7}\right)\left(\frac{2}{6}\right)\left(\frac{1}{5}\right)\left(\frac{1}{4}\right) = \frac{1}{210}$

16. $\left(\frac{1}{7}\right)\left(\frac{1}{6}\right)\left(\frac{1}{5}\right)\left(\frac{2}{4}\right) = \frac{1}{420}$

17. $\left(\frac{1}{7}\right)\left(\frac{2}{6}\right)\left(\frac{2}{5}\right)\left(\frac{1}{4}\right)\left(\frac{1}{3}\right) = \frac{1}{630}$

18. $\left(\frac{1}{7}\right)\left(\frac{1}{6}\right)\left(\frac{1}{5}\right)\left(\frac{2}{4}\right)\left(\frac{1}{3}\right) = \frac{1}{1260}$

19. $P(A \cap B) = 0.30$

20. $P(B) = 0.9$

21. $P(A) = 0.5$

22. $P(A \cap B) = 0.248$

23. $P(B|A) = 1$

24. $P(A) = 0.45$

7.4 Homework: Permutations and Combinations Name: _____

Math 2

Directions: Solve the following permutation problems. Show all work (i.e. what you put into the calculator).

1. In a contest in which there are 8 participants, in how many ways can 5 distinct prizes be awarded?

   A.) 112 B.) 6720 C.) 336 D.) 6720

   $8P_5$

2. A club elects a president, vice-president, and secretary-treasurer. How many sets of officers are possible if there are 15 members and any member can be elected to each position? No person can hold more than one position.

   $15P_3$

   A.) 2730 B.) 32,760 C.) 910 D.) 1365

3. A church has 7 bells in its bell tower. Before each church service 5 bells are rung in sequence. No bell is rung more than once. How many possible sequences are there?

   $7P_5$

   A.) 2520 B.) 42 C.) 84 D.) 21

4. How many arrangements can be made using 2 letters of the word HYPERBOLAS if no letter is to be used more than once?

   $10P_2$

   A.) 1,814,400 B.) 3,628,800 C.) 45 D.) 90

5. A work softball team has 15 players on its roster. There are 9 distinct positions in which these players can be placed. How many lineups can be fielded?

   $15P_9$

   A.) 1,505,667,870 B.) 1,635,890 C.) 1,816,214,400 D.) 214,400

Directions: Solve the following combination problems. Show all work (i.e. what you put into the calculator).

6. From a group of 8 people, 5 will each win $1,000. How many different winning groups are possible? $8C_5$

   A.) 56 B.) 6720 C.) 168 D.) 336

7. Of a classroom filled with 20 students, 2 will be selected to stay after school and correct homework for extra credit. How many combinations are possible? $20C_2$

   A.) 190 B.) 210 C.) 63 D.) 40

8. To win the lottery, one must correctly select 6 numbers from a collection of 50 numbers (one through 50). The order in which the selection is made does not matter. How many different selections are possible? $50C_6$

   A.) 250 B.) 15,890,700 C.) 300 D.) 13,983,816

9. A test is administered with 15 questions. Students are allowed to answer any ten. How many choices of ten questions are there?

   $15C_{10}$

   A.) 150 B.) 250 C.) 3003 D.) 3000

Directions: Decide if the problem is an example of a permutation or combination. Then evaluate each one. Show proper notation, and your work.

10. How many teams of 4 horses would be made if there were 9 horses in the stable?

$_9C_4 = 126$ teams

11. A lock manufacturer uses the numbers 1 - 30 in its combinations. How many different combinations for the lock are there if it uses 3-number combinations?

$_{30}P_3 = 24360$ combinations

12. Mike has nine baseball trophies to arrange on the shelf. How many different ways can they be arranged?

$9! = 362880$ arrangements

13. In math class, there are 24 students. The teacher picks 4 students to help do a demonstration. How many different groups of 4 could she have chosen?

$_{24}C_4 = 10626$ groups

14. In how many ways can 10 people wait in line for concert tickets?

$10! = 3{,}628{,}800$ different line orders

15. The teacher has listed 30 books as book report options. You must read 5. How many different sets of 5 books could you have chosen to read?

$_{30}C_5 = 142506$ different options

16. How many different ways are there to purchase 2 CD's, 3 DVD's and 1 set of headphones if there are 7 CD titles, 5 DVD titles, and 3 types of headphones available?

$\frac{7}{CD} \times \frac{6}{CD} \times \frac{5}{DVD} \times \frac{4}{DVD} \times \frac{3}{DVD} \times \frac{3}{Head}$

$_7C_2 \times {}_5C_3 \times {}_3C_1 = 630$ ways