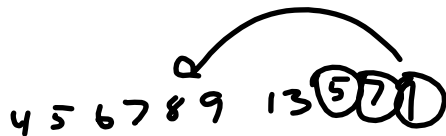Applied Topics in Math
Chapter 12 Review

Each of the numbers 0-9 is written on a sheet of paper and the sheets are placed in a box. If <u>one</u> sheet of paper is selected at random, determine the probability that the number selected is
[3 pts. each]

1. even.   _____

2. Less than 4.   _____

$4\ 5\ 6\ 7\ 8\ 9\ 13\ \textcircled{5}\ \textcircled{7}\ \textcircled{1}$

3. Greater than 3 or odd. $\dfrac{6}{10} + \dfrac{5}{10} - \dfrac{3}{10}$ $\dfrac{8}{10} = \dfrac{4}{5}$

4. Odd and more than 4.   _____

$0\ 5$

If <u>two</u> of the same ten sheets of paper are now selected, <u>without replacement</u>, determine the probability that
[3 pts. each]

1 $\dfrac{2}{9}$

5. Both numbers are even. $\dfrac{5}{10} \cdot \dfrac{4}{9}$ _____

6. Both numbers are greater than 5.   _____

7. Both numbers are multiples of 2. $\dfrac{5}{5}\dfrac{5}{10} \cdot \dfrac{4}{9}$ _____

$\dfrac{25}{90} = \dfrac{5}{18}$

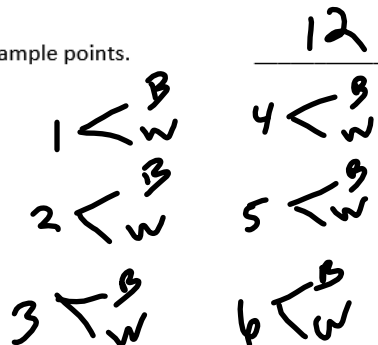8. The first number is even and the second number is odd.

$\dfrac{5}{10} \cdot \dfrac{5}{9}$

For #9–13, one die is rolled and one colored chip – black or white – is selected at random.

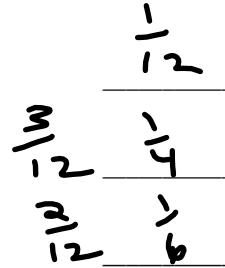9. Use the counting principle to determine the number of sample points. 12

$6 \cdot 2$

$1 <^{B}_{W}$ $4 <^{B}_{W}$

10. <u>Construct a tree diagram</u> to illustrate the sample space:

$2 <^{B}_{W}$ $5 <^{B}_{W}$

$3 <^{B}_{W}$ $6 <^{B}_{W}$

Use your tree diagram to determine the probability of obtaining

11. the number 3 and the color black.

$$\frac{1}{12}$$

12. an even number and the color white.

$$\frac{3}{12} \quad \frac{1}{4}$$

13. a number less than 3 and the color white.

$$\frac{3}{12} \quad \frac{1}{6}$$

$$\frac{2}{6} \cdot \frac{1}{2} = \frac{3}{12}$$

14. A serial number is to consist of eight digits. Determine the **number of serial numbers possible** if the first two numbers cannot be 0 (and repetition is allowed).

$$81,000,000$$

$$\underline{9} \; \underline{9} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10}$$

15. The odds against the Eagles winning the basketball game are 7:5. What is the **probability that the Eagles win** the game against Masuk?

$$\text{odds against} \quad \frac{f}{s} = \frac{7}{5} \qquad \text{prob} \quad \frac{s}{T} = \frac{5}{12}$$

16. You get to select one card at random from a standard deck of 52 cards. If you pick a king, you win $7. If you pick a queen, you lose $4. If you pick a jack, you lose $2. **Determine the expected value.**

$$.077$$

$$\frac{4}{52}(7) + \frac{4}{52}(-4) + \frac{4}{52}(-2) + \frac{40}{52}(0)$$

17. In how many ways can the letters of the word "VILLANOVA" be arranged?

$$45,360$$

$$\frac{9!}{\dfrac{2! \cdot 2! \cdot 2!}{8}}$$

$$L = 2!$$
$$V = 2!$$
$$A = 2!$$

THS offered ham sandwiches and pizza for lunch one day. The number of boys and girls who ate either a ham sandwich or pizza were recorded below.

	Ham Sandwich	Pizza	Total
Boys	40	62	102
Girls	28	88	116
Total	68	150	218

If <u>one</u> of these students is selected at random, **determine the probability** that

$$\frac{102}{218} = \frac{51}{109}$$

18. the student is a boy.

19. the student ate pizza, given that <u>it is a boy</u>.

$$\frac{62}{102} \quad \frac{31}{51}$$

20. the student ate a ham sandwich, given <u>that it is a girl</u>.

$$\frac{28}{116} \quad \frac{14}{58} = \frac{7}{29}$$

21. the student is a boy, given that they ate pizza for lunch.

$$\frac{62}{150} \quad \frac{31}{75}$$

22. At the bakery, a box of cookies is made by selecting four cookies from the six types of cookie – chocolate chip, oatmeal raisin, sugar, peanut butter, butterscotch, and chocolate. In **how many ways** can a box of cookies be arranged?

$$_6C_4 \qquad \underline{15}$$

23. While visiting NYC, the Lairds want to attend 3 shows out of 10 shows they would like to see. In **how many ways** can they do so?

$$_{10}C_3 \qquad \underline{\hspace{2cm}}$$

Five hundred raffle tickets are sold for $3 each. One prize of $450 is to be awarded.
SHOW WORK!

a) Jason purchases one ticket. Determine his <u>expected value</u>.

$$\frac{1}{500}(447) + \frac{499}{500}(-3)$$

$$\$-2.10$$

$$+\frac{1}{500}(97)+$$

1. Use your expected value to answer whether or not it is to your advantage to play this game (yes or no).

NO

b) Determine the <u>fair price</u> of a ticket for the raffle.

.90

$$-2.10 + 3 = .90$$