

### HW 3 - COMPOUND PROBABILITY HW

Name \_\_\_\_\_

Determine if the following events are dependent or independent:

- throwing a 4 with one die and a 6 with another I
- picking an ace from a deck of cards, keeping it, and then picking a jack. D
- Flipping a tail with a coin and rolling a 4 with a die I
- drawing a spade and drawing a heart from the same deck without replacing the first card. D
- picking two black marbles from a bag, after replacing the marble after the first pick I
- flipping tails with a coin and then flipping it heads I
- Two letters are chosen, without replacement, at random from the English alphabet. If Y is considered to be a consonant, find the probability that
  - both are vowels **A E I O U**
  - both are consonants

$$\frac{5}{26} \cdot \frac{4}{25}$$

$$\frac{21}{26} \cdot \frac{20}{25}$$

8. A bag contains 4 white, 2 blue, and 6 red marbles. A marble is drawn from the bag, replaced, and another marble is drawn. Find the following:

a) P(both are red)

$$\frac{6}{12} \cdot \frac{6}{12} = \frac{36}{144} = \frac{1}{4}$$

b) P(red, then white)

$$\frac{6}{12} \cdot \frac{4}{12} = \frac{24}{144} = \frac{1}{6}$$

c) P(a red and a white)

$$\frac{6}{12} \cdot \frac{4}{12} \cdot \frac{2!}{0!} = \frac{48}{144} = \frac{1}{3}$$

d) P(at least one blue)

$$1 - P(\text{no blues}) = 1 - \left(\frac{10}{12} \cdot \frac{10}{12}\right) = 1 - \frac{100}{144} = \frac{11}{36}$$

Now you are drawing three marbles without replacement:

e) P(2 blues and a red)

$$\frac{2}{12} \cdot \frac{1}{11} \cdot \frac{6}{10} \cdot \frac{3!}{2!}$$

f) P(at least one red)

$$1 - P(\text{no red}) = 1 - \left(\frac{6}{12} \cdot \frac{5}{11} \cdot \frac{4}{10}\right)$$

9. Messy Mike has a sock drawer containing 3 blue socks, 5 white socks, and 2 black socks. He gets dressed in the dark because school starts way too early, so he never looks to see which socks he's pulled from the drawer. Find the following:

a) P(both blue)

$$\frac{3}{10} \cdot \frac{2}{9} = \frac{6}{90} = \frac{1}{15}$$

b) P(both white)

$$\frac{5}{10} \cdot \frac{4}{9} = \frac{20}{90} = \frac{2}{9}$$

c) P(blue and black)

$$\frac{3}{10} \cdot \frac{2}{9} \cdot \frac{2!}{0!} = \frac{12}{90} = \frac{2}{15}$$

d) P(no black)

$$\frac{8}{10} \cdot \frac{7}{9} = \frac{56}{90} = \frac{28}{45}$$

e) P(both socks match)

\* 2 blue OR 2 white OR 2 black

$$\frac{3}{10} \cdot \frac{2}{9} + \frac{5}{10} \cdot \frac{4}{9} + \frac{2}{10} \cdot \frac{1}{9}$$

$$\frac{14}{45}$$

f) P(both socks do not match)

\*  $1 - P(\text{socks match})$

$$1 - \frac{14}{45}$$

$$\frac{31}{45}$$

10. Fifteen airmen are in the line crew. They must take care of the coffee mess and line shack cleanup. They put slips numbered 1 through 15 in a hat and decide that anyone who draws a number divisible by 5 will be assigned the coffee mess and anyone who draws a number divisible by 4 will be assigned cleanup. The first person draws a 4, the second a 3, and the third draws an 11. What is the probability that the fourth person to draw will be assigned

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  
 a) the coffee mess?  $\div$  by 5  
 b) the cleanup?

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

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

11. Anthony's class consists of 19 girls and 15 boys. If 5 students are to be selected at random, determine the probability that they are all girls.

$$\frac{19}{34} \cdot \frac{18}{33} \cdot \frac{17}{32} \cdot \frac{16}{31} \cdot \frac{15}{30} = \frac{1395360}{33390720} = \frac{57}{1364}$$

12. Anthony's church group consists of 10 girls and 9 boys. If 5 of the students are to be selected at random, determine the probability that 3 boys and 2 girls are selected.

$$\frac{9}{19} \cdot \frac{8}{18} \cdot \frac{7}{17} \cdot \frac{10}{16} \cdot \frac{9}{15} \cdot \frac{5!}{3!2!} = \frac{5443200}{16744320} = \frac{105}{323}$$

13. Anthony just got paid and now his wallet contains 11 bills of the following denominations: four \$5 bills, five \$10 bills, one \$20 bill, and one \$50 bill. If Anthony selects five bills at random, find the probability that he selects two \$5 bills and 3 \$10 bills.

$$\frac{4}{11} \cdot \frac{3}{10} \cdot \frac{5}{9} \cdot \frac{4}{8} \cdot \frac{3}{7} \cdot \frac{5!}{2!3!}$$

14. Anthony plays cards with his Meemaw every Wednesday afternoon. If Meemaw draws three cards randomly from a standard deck of cards, find the probability that they are two hearts and a spade.

$$\frac{13}{52} \cdot \frac{12}{51} \cdot \frac{13}{50} \cdot \frac{3!}{2!} = \frac{12168}{265200} = \frac{39}{850}$$

15. Of 35 people attending Anthony's NHS meeting, 28 are seniors. If 4 people at the meeting are selected at random, find the probability that the group includes 3 seniors.

$$\frac{28}{35} \cdot \frac{27}{34} \cdot \frac{26}{33} \cdot \frac{7}{32} \cdot \frac{4!}{3!} = \frac{3302208}{7539840} = \frac{819}{1870}$$

16. Back to Anthony and his money again. Now his wallet contains 9 bills of the following denominations: three \$5 bills, four \$10 bills, and two \$20 bills. In case you're wondering, he spent the \$50 on his girlfriend's birthday present. If Anthony selects three bills at random, find the probability that he selects at least one \$5 bill.

$$1 - P(\text{no } \$5 \text{ bills}) = 1 - \left(\frac{6}{9} \cdot \frac{5}{8} \cdot \frac{4}{7}\right)$$

$$1 - \frac{5}{21} = \frac{16}{21}$$

17. Meemaw is drawing cards again. If she draws five cards at random from a standard deck, find the probability that the cards drawn include 2 face cards and 3 red number cards.

$$\frac{12}{52} \cdot \frac{11}{51} \cdot \frac{18}{50} \cdot \frac{17}{49} \cdot \frac{16}{48} \cdot \frac{5!}{2!3!} = \frac{77552640}{3742502400} = \frac{66}{3185}$$