Lesson 33 iUB : (UNIT 6 PROBABILITY) Compound Events Day

Mutually Exclusive

Events that cannot occur at the same time are M.Ex. $P(A \text{ or } B) = P(A) + P(B)$

P(Jack or Queen)

= P(Jack) + P(Queen)

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

Mutually Exclusive

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

NOT Mutually Exclusive

Events that can occur at the same time.

NOT Mut. Ex.

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

$P(A \cap B)$

Ex P(Jack or Red)

= P(J) + P(Red) − P(Red Jacks)

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

Independent Events

$P(A \cap B) = P(A) \cdot P(B)$

P(A and B) multiplication

Probability with Overlap Unit 4 West #4

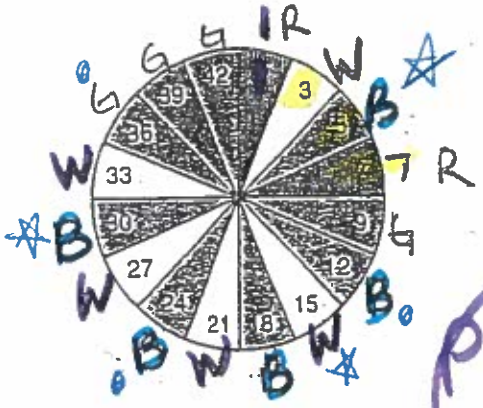
4.1.2 COMPOUND EVENTS

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

Name _____ Date: _____

Use the spinner at right. Find each probability.

19. *P*(blue or white) m.E.
20. *P*(blue or prime) NOT mut.ex
21. *P*(multiple of 5 or multiple of 4) m.E.
22. *P*(odd or blue)
23. *P*(even or green)
24. *P*(green or blue or white)
25. *P*(multiple of 10 or green or red)



Prime: 2, 3, 5, 7, 11, 13, 17, ...

Even: 2, 4, 6, 8, 10

Odd: 1, 3, 5, 7, 9, ...

19. $\frac{5}{16} + \frac{5}{16} = \frac{10}{16} = \frac{5}{8}$

20. $\frac{5}{16} + \frac{3}{16} - \frac{1}{16} = \frac{7}{16}$
P(B) + P(Prime) − P(Blue prime)

21. $\frac{3}{16} + \frac{3}{16} = \frac{6}{16} = \frac{3}{8}$

22. P(odd and blue) = $\frac{1}{16}$
not mut.ex. → P(odd or blue) = $\frac{10}{16} + \frac{5}{16} - \frac{1}{16} = \frac{14}{16} = \frac{7}{8}$

5 vowels 21 consonant

A single card is drawn from a set of alphabet cards marked A to Z. Tell whether or not the events are mutually exclusive. Find each probability.

1. *P*(K or P) NO → IS M.Ex $\frac{1}{26} + \frac{1}{26} = \frac{2}{26} = \frac{1}{13}$
2. *P*(a letter before E or a letter after W) NO → mut. ex. $\frac{4}{26} + \frac{3}{26} = \frac{7}{26}$
3. *P*(a vowel or a letter before M) yes → NOT mut. ex.
4. *P*(a consonant or a letter after S) yes → NOT mut. ex.
5. *P*(a vowel or a consonant) no → IS mut. ex. P(vowel) + P(cons) = 1
6. *P*(C or a letter after J) no → IS mut. excl.

A B C D E F G H I J K L M

(3) P(vowel) + P(letter before m) − P(vowel and before m)

$$\frac{5}{26} + \frac{12}{26} - \frac{3}{26} = \frac{14}{26} = \frac{7}{13}$$

Name _____ Block _____ Date _____

Practice: Lesson 33 W.B. Probability of Multiple Events

Classify each pair of events as *dependent* or *independent*.

1. A member of the junior class and a second member of the same class are randomly selected. dependent
2. A member of the junior class and a member of another class are randomly chosen. independent
3. An odd-numbered problem is assigned for homework, and an even-numbered problem is picked for a test. independent
4. The sum and the product of two rolls of a number cube dependent

Find each probability.

5. A natural number from 1 to 10 is randomly chosen.

   a. *P*(even or 7) 3/5
   $P(E)+P(7)=\frac{5}{10}+\frac{1}{10}=\frac{6}{10}=3/5$
   7 is NOT even it is mut.ex.

   b. *P*(even or odd) _____
   $P(odd)+P(\#<3)-P(\text{odd \# less than 3})$
   $=\frac{7}{10}$

   c. *P*(multiple of 2 or multiple of 3) $\frac{5}{10}+\frac{3}{10}-\frac{1}{10}$
   2,4,6,8,10 3,6,9
   P(mult.2)+P(mult.3) − P(what's incommon)
   NOT mut. excl.

   d. *P*(odd or less than 3) _____
   (1,3,5,7,9) (1,2)
   $\frac{5}{10}+\frac{2}{10}-\frac{1}{10}=\frac{6}{10}$
   NOT mut. excl.
   $=\frac{3}{5}$ 60%

6. A standard number cube is tossed.

   a. *P*(even or 3) _____

   b. *P*(less than 2 or even) _____

   c. *P*(prime or 4) _____

   d. *P*(2 or greater than 6) _____

7. Only 93% of the airplane parts Salome is examining pass inspection. What is the probability that all of the next five parts pass inspection? _____

8. There is a 50% chance of thunderstorms the next three days. What is the probability that there will be thunderstorms each of the next three days?

   _____

***Q* and *R* are independent events. Find *P*(*Q* and *R*).** multiply

9. $P(Q)=\frac{1}{8}, P(R)=\frac{2}{5}$
   $\left(\frac{1}{8}\right)\left(\frac{2}{5}\right)=\frac{2}{40}=\frac{1}{20}$

10. $P(Q)=0.8, P(R)=0.2$
    $(.8)(.2)=.16$

11. $P(Q)=\frac{1}{4}, P(R)=\frac{1}{5}$
    _____

***M* and *N* are mutually exclusive events. Find *P*(*M* or *N*).** $=P(M)+P(N)$

12. $P(M)=\frac{3}{4}, P(N)=\frac{1}{6}$
    $\frac{3}{4}+\frac{1}{6}=$ _____

13. $P(M)=10\%, P(N)=45\%$
    $10\%+45\%=55\%$

14. $P(M)=\frac{1}{5}, P(N)=18\%$
    _____

Warm-ups

Suppose you roll a die twice. What is the probability you will get the following results?

1. $P(4, \text{then } 5)$ $P(4) \cdot P(5)$ $\frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$ 2. $P(3, \text{then odd})$ _____ 3. $P(\text{even, then odd})$ _____

A sewing basket holds 3 balls of red yarn, 2 balls of blue yarn and 5 balls of green yarn.

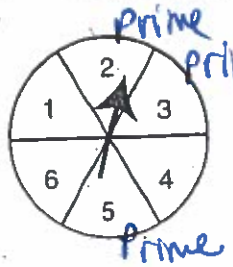
4. Suppose you choose each ball at random and then replace it. Find each probability.

a. $P(\text{blue, then red})$ $P(B) \cdot P(R)$ $\frac{2}{10} \cdot \frac{3}{10} = \frac{6}{100} = \frac{3}{50}$ b. $P(\text{green, then green})$ _____

5. Suppose you choose each ball at random and do not replace it. Find each probability.

a. $P(\text{green, then red})$ $\frac{5}{10} \cdot \frac{3}{9} = \frac{1}{2} \cdot \frac{1}{3} = \frac{1}{6}$ Dependent b. $P(\text{green, then blue})$ _____

You spin the spinner at the below. Find each probability.



6. spinning a 3 or an even number $P(3) + P(\text{even}) = \frac{1}{6} + \frac{3}{6} = \frac{4}{6} = \frac{2}{3}$

7. spinning a prime number $\frac{3}{6} = \frac{1}{2}$

8. spinning a number greater than 1 $\frac{5}{6}$

9. spinning a number less than 4 $\frac{3}{6} = \frac{1}{2}$

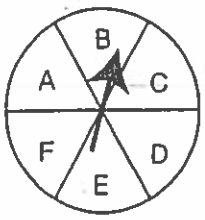
A card is drawn at random from a standard deck of playing cards. For each event, Find the probability.

10. $P(\text{a diamond or a spade})$ _____ 11. $P(\text{black and a 3})$ $\frac{2}{52} = \frac{1}{26}$

12. $P(\text{red and a number card})$ _____ 13. $P(\text{face card or an ace})$ $P(F) + P(\text{Ace})$ $= \frac{12}{52} + \frac{4}{52} = \frac{16}{52} = \frac{4}{13}$

14. $P(\text{red, club, or a face card})$ _____ 15. $P(\text{black and a face card})$ $\frac{6}{52} = \frac{3}{26}$

Both spinners at the right are spun. Find each probability.



17. $P(\text{A, 1})$ _____ 18. $P(\text{B, 2})$ _____

19. $P(\text{a consonant, an even number})$ _____ 20. $P(\text{a vowel, 3})$ _____