

HW SOL 7.2

March 5, 2018 1:51 PM

Name: _____ **Math 10 Enriched HW 7.2 Mutually exclusive events:**

1. What does it mean when two events are mutually exclusive?

• they can't happen AT THE SAME TIME

2. Indicate if the following events are mutually exclusive? Explain why:

i) Event A: Being a Canadian & Event B: Being an American

• you can have DUAL CITIZENSHIP

ii) Event A: Canucks winning the Stanley Cup and Event B: Canucks losing in a playoff series in the same year

• MUTUALLY EXCLUSIVE, To win THE STANLEY CUP, you need to win THE PLAY OFF SERIES.

iii) Rolling a dice once and Event A: getting a 4 & Event B: getting an Odd number

• M.E.

iv) Picking a number from 0 to 10, Event A: getting a prime number and Event B: Getting an even number

• NOT M.E. '2' IS BOTH EVEN & PRIME

v) Picking an integer: Event A: a number that is even & Event B: a number that is odd

• M.E.

vi) Picking an integer: Event A: a number that is positive & Event B: a number that is negative

• NOT M.E.

vii) Picking an integer: Event A: a number that is not positive & Event B: a number that is not negative

• NOT M.E. → '0' IS NEITHER POSITIVE OR NEGATIVE.

3. Find the complement of each event:

i) Failing a science test

• NOT FAILING A SCIENCE TEST

ii) Flipping a coin 3 times and getting at least 2 heads

• GETTING LESS THAN 2 HEADS.

iii) Rolling a dice and getting an even number

• GETTING AN ODD NUMBER

iv) Rolling two dice and getting both odd numbers

• GETTING AT LEAST ONE EVEN NUMBER.

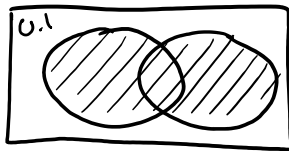
v) Rolling two dice, getting a sum greater than 8 or rolling two even numbers

4. If $P(A) = 0.254$, then what is the value of $P(\bar{A}) = ?$

$$= 1 - 0.254$$

$$= \underline{\hspace{2cm}}$$

5. Given $P(A) = 0.7$, $P(B) = 0.45$, and $P(\overline{A \text{ or } B}) = .10$, determine $P(A \text{ and } B)$



$$P(A \text{ and } B) = 0.9 = P(A) + P(B) - P(A \text{ and } B)$$

$$0.9 = 0.7 + 0.45 - x$$

$$x = 0.7 + 0.45 - 0.9$$

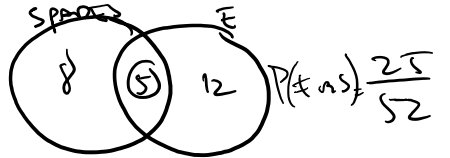
$$x = 0.25$$

6. A card is drawn at random, what is the probability that the card is an even number or a spade?

$$P(S) = \frac{13}{52} = \frac{1}{4}$$

$$P(E) = \frac{20}{52} = \frac{5}{13}$$

$$P(E \text{ and } S) = \frac{5}{52} = \frac{1}{13}$$



7. A card is drawn at random, what is the probability that the card is a heart or a spade?

① $P(H \text{ or } S) = P(H) + P(S) - P(H \text{ and } S)$ OR

② $P(H) \times P(\overline{S}) + P(\overline{H}) \times P(S) + P(H) \times P(S)$

8. Indicate when we should be using which of the two formulas?

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

vs

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

↑
A ∩ B NOT M.E.

↑
A ∩ B AND M.E.

9. Kyle Korver has a 56% of making a 3point shot and his teammate LeBron James has a 45% of making a 3point shot. What is the probability that at least one of them will make a 3 point shot?

$$P(K) + P(J) - P(K \text{ and } J) \quad \left\{ \begin{array}{l} K \cdot \overline{J} + \overline{K} \cdot J + K \cdot J \\ (0.56)(0.55) + (0.44)(0.45) + (0.56 \times 0.45) \end{array} \right.$$

10. Two dice are rolled, event "A" is that the sum is greater or equal to 7, event "B" is that one of the numbers is a "4". Find $P(A \text{ or } B)$

$$P(A) = \frac{21}{36}$$

$$P(A \text{ or } B) = \frac{21}{36} + \frac{11}{36} - \frac{4}{36}$$

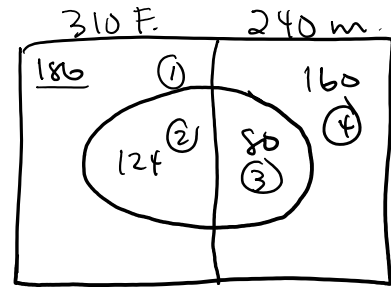
$$P(B) = \frac{11}{36}$$

$$= \frac{28}{36} = \frac{7}{9}$$

$$P(A \text{ and } B) = \frac{4}{36} = \frac{1}{9}$$

11. In a graduating class of 240 males and 310 females, $\frac{1}{3}$ of the males and $\frac{2}{5}$ of the females graduated with "honours" distinction. A student is selected randomly for an internship. Find the probability that:
- a) The student is female or graduated with honours

$$\frac{(1) + (2) + (3)}{(1) + (2) + (3) + (4)}$$



- b) The student is male or did not graduate with honours

$$\frac{(1) + (3) + (4)}{(1) + (2) + (3) + (4)}$$

12. In the NBA, the Golden State Warriors have a 60% chance of winning the championship in 2017 and the Cleveland Cavaliers have a 25% chance of winning. What is the probability that either one of these team wins the championship?

13. The results of a recent exam had fifteen percent of students earning at least a "B", sixty-five percent with at least a "C-", and forty-five percent with less than a "C". What percent of the students received a "C" or a "C+"?

14. In a TV survey, 40% of viewers watch sports, 50% watch the news, and 30% watch neither. What is the probability that a randomly selected viewer watches both?

15. A drug was invented to increase the life expectancy of seniors at age 80. 70% of seniors taking the drug live at least 85, 30% at least 88, 10% at least 90 and 0.5% over 93. What is the probability that a senior taking this drug will live between i) 88 and 90 ii) 90 and 93?

16. The Venn diagram on the right indicates the number of students taking each subject course "A" Arts, "B" Biology, and "C" Calculus. Use the diagram to find the number of students in each region:

a) "A and B" 12

e) "B or C"
 $13 + 12 + 6 + 7 + 15 + 31$

b) "A or B"
 $13 + 20 + 28$

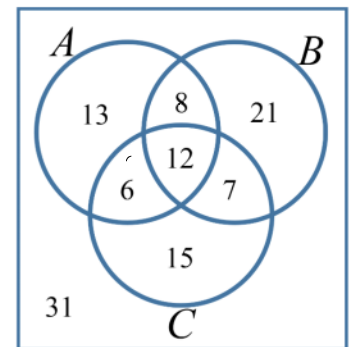
f) " A^c and C"
 $7 + 15$

c) "B and C" (19)

g) " B^c or C^c "

d) "B or C"

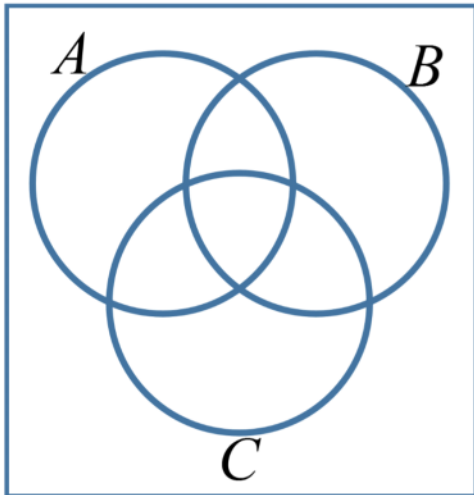
h) " A or B or C "



i) " A^c or B^c or C^c "

• EVERYTHING EXCEPT THE MIDDLE 12

17. If $P(A) = \frac{1}{3}$, $P(B) = \frac{1}{4}$, $P(C) = \frac{2}{5}$, and all 3 events are independent, fill in the percentage for each of the region of the Venn diagram. Then answer the following questions:



i) "A and B and C"

$$\frac{1}{3} \times \frac{1}{4} \times \frac{2}{5}$$

ii) "A and B"

$$\frac{1}{3} \times \frac{1}{4}$$

iii) "A and C"

$$\frac{1}{3} \times \frac{2}{5}$$

iv) "A and B^c and C"

v) "B or C"

$$\frac{1}{4} + \frac{2}{5} - \frac{1}{4} \left(\frac{2}{5} \right)$$

vi) "(A or B or C)^c"

18. A traffic light runs repeatedly through the following cycles; green for 30 seconds, then yellow for 3 seconds, and then red for 30 seconds. Leah picks a random three second time interval to watch the light. What is the probability that the color changes while she is watching? AMC 12

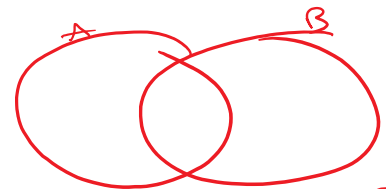
19. A five letter word is to be created using only letters from A to J. Repeats are allowed. What is the probability that the word contains at least one "A" and one "B"?

① All 5 letter words: A to J. 10^5

② words with no A's $\Rightarrow 9^5$

③ words with no B's $\Rightarrow 9^5$

④ words with no A's/B's $\Rightarrow 8^5$



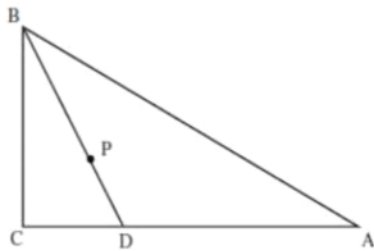
$$P(x) = \frac{9^5 + 9^5 - 8^5}{10^5}$$

20. Nine teams play each other once in a tournament and each game can only end with a win or loss, and no ties. What is the probability that no team in the tournament wins all their games and no team loses all their games?

① $9C_2 = \frac{9 \times 8}{1 \times 2} = 36 \text{ Games}$

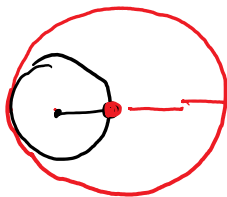
A

21. Triangle ABC is a right triangle with $\angle ACB$ as the right angle, $\angle ABC = 60^\circ$, and $AB = 10$. Let "P" be randomly chosen inside triangle ABC, and extend BP to meet AC at point "D". What is the probability that $BD > 5\sqrt{2}$? Amc 12 2002



22. If $P(A) = x$, $P(B) = y$, and $P(C) = z$, derive a formula for $P(A \text{ or } B \text{ or } C)$ in terms of "x", "y", and "z".

23. A frog makes 3 jumps, each exactly 1 meter long. The directions of the jumps are chosen randomly and independently. What is the probability that the frog's final position is no more than 1 meter from its starting position? Amc 12 2010



$$\frac{\pi(1)^2}{\pi(2)^2} = \frac{1}{4} //$$

$$\frac{\pi R^2}{\pi R_2^2} = \frac{\pi(1)^2}{\pi(2)^2}$$

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