

1) Find the probability of the following scenarios.

1. A dice cube has 6 sides that are numbered 1 to 6. If the cube is thrown once, what is the probability of rolling at least a 4?

$$P(x \geq 4) = P(4, 5, 6) = \frac{3}{6} = \boxed{\frac{1}{2}}$$

2. If one letter is chosen at random from the word MATHEMATICS, what is the probability the letter chosen will be an "T"?

There are 2 t's and a total of 11 letters so $\boxed{\frac{2}{11}}$

3. A card is chosen out of a normal deck of cards. What is the probability that the card is a heart?
A deck of cards has 4 suits (spade, club, heart, diamond). There are 13 of each suit. $\frac{13}{52} = \boxed{\frac{1}{4}}$

4. A bag containing 15 red marbles, 12 green marbles, 6 yellow marbles, 11 blue marbles, and 9 purple marbles. What is the probability of pulling out a yellow marble?

Total # of marbles: $15 + 12 + 6 + 11 + 9 = 53$ $\boxed{\frac{6}{53}}$

Suppose that you select a person at random from your school. Are these pairs of events mutually exclusive (ME) or overlapping(O)?

5. has ridden a roller coaster; has ridden a Ferris wheel ME

6. has brown hair; has brown eyes ME

7. is left-handed; is right-handed ME

8. owns a classical music CD; owns a jazz music CD ME

9. is a senior; is a junior ME

10. has shoulder-length hair; is male ME

Circle Mutually Exclusive or Overlapping for the following scenarios. Then find the probability.

11. What is the probability of rolling a die and landing on a 2 or a 5? $\frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \boxed{\frac{1}{3}}$ ME

12. What is the probability of rolling a die and landing on an even number or a number less than three? Even: 2, 4, 6 $\frac{3}{6} + \frac{2}{6} - \frac{1}{6} = \frac{4}{6} = \boxed{\frac{2}{3}}$ ME

Subtract overlap of 2 $\times < 3$: 1, 2

13. A card is drawn from a standard deck of 52 cards. What is the probability the card will be a red or an ace? Red $\frac{26}{52} + \frac{4}{52} - \frac{2}{52} = \frac{28}{52} = \boxed{\frac{7}{13}}$ ME

Subtract overlap of 2 red aces

14. What is the probability of pulling out a card from a standard deck that is a queen or a diamond? 4 Queens 13 diamonds $\frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \frac{16}{52} = \boxed{\frac{4}{13}}$ ME

15. What is the probability of rolling a die and getting a 5 or an even number? No Overlap ME

16. Find the probability of pulling out a card from a standard deck that is red or a spade. No overlap (spades are never red) $\frac{1}{6} + \frac{3}{6} = \frac{4}{6} = \boxed{\frac{2}{3}}$ ME

$$\frac{26}{52} + \frac{13}{52} = \frac{39}{52} = \boxed{\frac{3}{4}}$$

Use the fundamental counting principle to answer the following questions.

17. You go to the local café for lunch and have a choice of 3 drinks, 3 sandwiches, 2 sides, and 4 desserts. If you get one of each category, how many different lunches could be made?

$$3 \cdot 3 \cdot 2 \cdot 4 = \boxed{72}$$

18. You toss a nickel 5 times. How many different outcomes are there?

There are 2 sides of a coin. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = \boxed{32}$

19. How many outfits are possible with a choice of 6 shirts, 5 pairs of pants, and 4 pairs of shoes?

$$6 \cdot 5 \cdot 4 = \boxed{120}$$

20. You are having dessert. You have a choice between chocolate cake, vanilla cake, apple pie, peach pie, and cherry pie to eat. To drink you have a choice between juice, milk, and coffee.

How many combinations of one drink and one dessert are possible?

5 Desserts, 3 drinks $5 \cdot 3 = \boxed{15}$

21. You are ordering a pizza, and want one type of meat and one type of vegetable on it. How many different types of pizza are possible if there are 6 choices for meat and 10 choices for vegetables?

$$6 \cdot 10 = \boxed{60}$$

22. A group of senior citizens have won free vacation packages. The vacation to Bermuda is chosen by 25% of them, 60% choose Alaska, and 15% choose Costa Rica. What is the probability that one randomly chosen senior citizen chooses to vacation in Bermuda or Costa Rica?

Hint: $P(A \cup B) = P(A) + P(B)$ Keep your answer as a percent.

$P(\text{Bermuda}) + P(\text{Costa Rica}) = 25\% + 15\% = \boxed{40\%}$ Add

Use the general addition rule to compute the probability that if you roll two six-sided dice, fill in 2

23. you get odd sum or a sum greater than 10.

$P(\text{odd}) + P(\# > 10) - P(\text{both})$

$$\frac{18}{36} + \frac{3}{36} - \frac{2}{36} = \frac{19}{36}$$

24. you get even sum or a sum of 11.

$P(\text{even}) + P(11) - P(\text{both})$

$$\frac{18}{36} + \frac{2}{36} - \frac{0}{36} = \frac{20}{36} = \frac{5}{9}$$

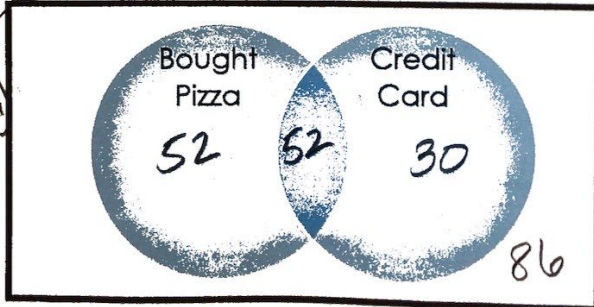
+	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

25. Of the 220 people who came into the Italian deli on Friday, 104 bought pizza and 82 used a credit card. Half of the people who bought pizza used a credit card. What is the probability that a customer bought pizza or used a credit card?

$$P(\text{Bought Pizza}) + P(\text{credit card}) - P(\text{both})$$

$$\frac{104}{220} + \frac{82}{220} - \frac{52}{220}$$

$$= \frac{134}{220} = \frac{67}{110}$$



$$\frac{104}{2} = 52$$

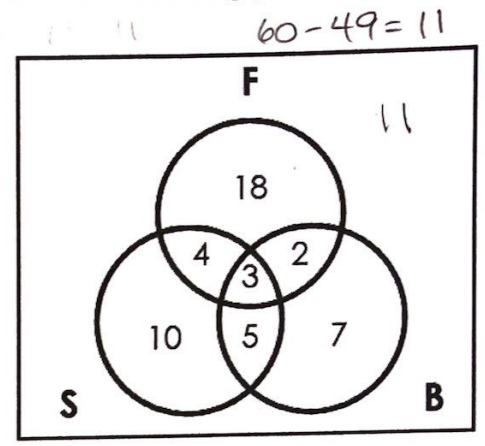
$$82 - 52 = 30$$

$$52 + 52 + 30 = 134$$

$$220 - 134 = 86$$

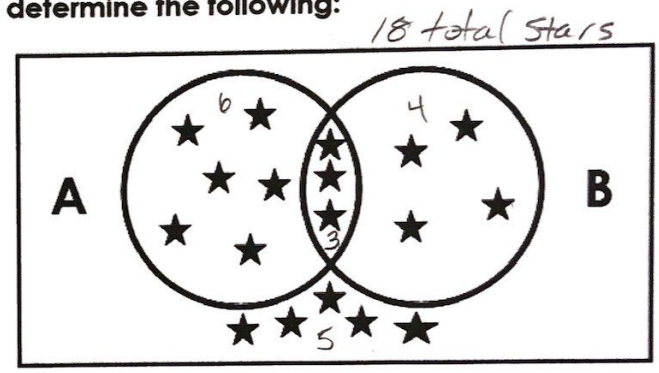
A group of 60 students were asked if they played field hockey (F), basketball (B) or soccer (S). The diagram below displays the results. Use the information given to find the following probabilities.

$\frac{8}{60} = \frac{2}{15}$ 26. $P(B \cap S) = \frac{3+5}{60}$
 $\frac{39}{60} = \frac{13}{20}$ 27. $P(F \cup B) = \frac{18+4+2+3+5+7}{60}$
 $\frac{33}{60} = \frac{11}{20}$ 28. $P(F)' = \frac{11+10+5+7}{60}$
 $\frac{49}{60}$ 29. $P(F \cup B \cup S) = \frac{18+4+3+2+10+5+7}{60}$
 $\frac{11}{60}$ 30. $P(F \cup B \cup S)'$



Given the Venn Diagram below with set A and set B determine the following:

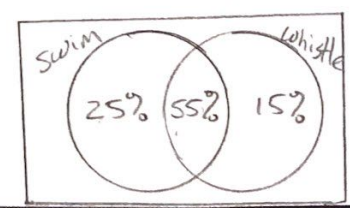
$\frac{3}{18} = \frac{1}{6}$ 31. $P(A \cap B)$
 $\frac{13}{18}$ 32. $P(A \cup B)$
 $\frac{12}{18} = \frac{2}{3}$ 33. $P(\bar{A} \cup B)$ Count all stars not in A and count all stars in B
 $\frac{6}{18} = \frac{1}{3}$ 34. $P(A \cap \bar{B})$ Count stars shared by all of A and all stars not in B



35. Suppose 80% of people can swim. Suppose 70% of people can whistle. Suppose 55% of people can do both. What percentage of people can swim or whistle? Keep your answer as a percent.

$P(\text{swim} \cup \text{whistle})$
 $P(\text{swim}) + P(\text{whistle}) - P(\text{both})$
 $= 80\% + 70\% - 55\% = 95\%$

Add \rightarrow $80\% - 55\% = 25\%$
 $70\% - 55\% = 15\%$



36. At Pope, 60% of the students carry a backpack or a wallet. 40% carry a backpack, and 30% carry a wallet. If a student is selected at random, find the probability that the student carries both a backpack and a wallet. Keep your answer as a percent.

$P(\text{backpack} \cup \text{wallet}) = P(bp) + P(w) - P(\text{both})$
 $60\% = 40\% + 30\% - P(\text{both})$
 $60\% = 70\% - P(\text{both})$
 $-70\% \quad -70\%$
 $-10\% = -P(\text{both})$
 $10\% = P(\text{both})$

