

16. *Car Repair* The manager at Arango Automotive has found that the probability that a car brought into the shop requires an oil change is 0.6, the probability that a car brought into the shop requires brake repair is 0.4, and the probability that a car requires both an oil change and brake repair is 0.2. For a car brought into the shop, determine the probability that the car will require an oil change or brake repair.

$$.80 = .60 + .40 - .20$$

Roll a Die In Exercises 17–20, a single die is rolled one time. Determine the probability of rolling

17. a 2 or 5. $\frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$

18. an odd number or a number greater than 4.

$$\frac{3}{6} + \frac{2}{6} - \frac{1}{6} = \frac{4}{6} = \frac{2}{3}$$

19. a number greater than 4 or less than 2.

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

20. a number greater than 3 or less than 5.

$$\frac{3}{6} + \frac{4}{6} - \frac{1}{6} = \frac{6}{6} = 1$$

Select One Card In Exercises 21–26, one card is selected from a deck of playing cards. Determine the probability of selecting

21. an ace or a 2. $\frac{4}{52} + \frac{4}{52} = \frac{8}{52} = \frac{2}{13}$

22. a jack or a club. $\frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \frac{16}{52} = \frac{4}{13}$

23. a picture card or a red card. $\frac{12}{52} + \frac{26}{52} - \frac{6}{52} = \frac{32}{52} = \frac{8}{13}$

24. a club or a red card. $\frac{13}{52} + \frac{26}{52} = \frac{39}{52} = \frac{3}{4}$

25. a card less than 8 or a club. (Note: The ace is considered a low card.) $\frac{28}{52} + \frac{13}{52} - \frac{7}{52} = \frac{34}{52} = \frac{17}{26}$

26. a card greater than 9 or a black card.

$$\frac{16}{52} + \frac{26}{52} - \frac{8}{52} = \frac{34}{52} = \frac{17}{26}$$

Warm up - OR problems

One card is selected from a deck of playing cards.
Determine the probability of selecting

1. a jack or a 3

2. an ace or a heart

3. a picture card of a black card.

Section 12.6 - And Problems

And probability problems requires obtaining a favorable outcome in each of the given events.

For example, suppose that **two** cards are to be selected from a deck of cards and we are interested in the probability of selecting two aces (one ace and then a second ace).

Only if both cards selected are aces would this experiment be considered successful.

$$P(\underline{A \text{ and } B}) = P(A) \cdot P(B)$$

Always assume that event A has occurred when calculation $P(B)$.

$P(\underline{B/A})$ read 'probability of B given A.'

Determine the probability that event A occurs and then event B occurs (in that order).

Example 4

Two cards are to be selected with replacement from a deck of cards. Determine the probability that two queens will be selected.

$$P(Q \text{ and } Q) \\ \frac{4}{52} \cdot \frac{4}{52} = \frac{1}{13} \cdot \frac{1}{13} = \frac{1}{169}$$

Example 5

Two cards are to be selected without replacement from a deck of cards. Determine the probability that two queens are selected.

$$P(Q \text{ and } Q) \\ \frac{4}{52} \cdot \frac{3}{51} = \frac{1}{13} \cdot \frac{1}{17} = \frac{1}{221}$$

Independent events - Example 4 is independent because the card was replaced. Whatever happened on the first event did not effect the second event.

roll a die and flip a coin.

Dependent events - Example 5 is a dependent event because the card was not replaced. Therefore the first card effected what happened on the second event.

Replacement is independent

Without replacement is dependent.

Example 7 Drug Reaction

A new medicine was given to a sample of 25 of Dr. Cleary's patients with flu symptoms. Of the total, 19 patients reacted favorably, 2 reacted unfavorably, and 4 were unaffected. Three of these patients are selected at random. Determine the probability of each of the following.

a) All three reacted favorably. $P(f \text{ and } f \text{ and } f) = \frac{19}{25} \cdot \frac{18}{24} \cdot \frac{17}{23} = \frac{969}{2300}$

b) The first patient reacted favorably, the second patient reacted unfavorably, and the third patient was unaffected.

$$\frac{19}{25} \cdot \frac{2}{24} \cdot \frac{4}{23} = \frac{19}{1725}$$

c) No patient reacted favorably.

$$\frac{6}{25} \cdot \frac{5}{24} \cdot \frac{4}{23} = \frac{1}{115}$$

d) At least one patient reacted favorably. $1 - \frac{1}{115} = \frac{114}{115}$

in class Page 779 #27-38

Homework Page 780 #39-44, 49-52, 57-62