

Section 10.1/10.2

Determine whether the scenario involves independent or dependent events. Then find the probability.

- 1) There are seven nickels and seven dimes in your pocket. You randomly pick a coin out of your pocket and place it on a counter. Then you randomly pick another coin. The first coin is a nickel and the second coin is a dime.
- 2) There are eight nickels and five dimes in your pocket. You randomly pick a coin out of your pocket and then return it to your pocket. Then you randomly pick another coin. Both times the coin is a nickel.
- 3) A box of chocolates contains six milk chocolates and eight dark chocolates. You randomly pick a chocolate and eat it. Then you randomly pick another piece. Both pieces are milk chocolate.
- 4) A basket contains six apples and seven peaches. You randomly select a piece of fruit and then return it to the basket. Then you randomly select another piece of fruit. The first piece of fruit is an apple and the second piece is a peach.

Determine if the scenario involves mutually exclusive events. Then find the probability.

- 5) A spinner has an equal chance of landing on each of its seven numbered regions. After spinning, it lands in region one or five.
- 6) A basket contains five apples and seven peaches. One of the apples and three of the peaches are rotten. You randomly pick a piece of fruit. It is fresh or it is an apple.
- 7) A box of chocolates contains five milk chocolates and five dark chocolates. Four of the milk chocolates and one of the dark chocolates have peanuts inside. You randomly select and eat a chocolate. It is a milk chocolate or has no peanuts inside.
- 8) There are eleven shirts in your closet, three blue, four green, and four red. You randomly select one to wear. It is blue or green.

State whether each situation is a permutation or a combination. (Hint: Look for key words)

Then solve

- 9) How many ways can 9 runners be arranged on a 4-person relay team?
- 10) How many different 4-person lab groups could be formed in a class of 20?
- 11) How many ways can a 3-man basketball team be formed in a class of 20?
- 12) How many ways can 6 desks be arranged in a row?
- 13) How many ways can you arrange the letters AEIOU?
- 14) A team of 8 basketball players needs to choose a captain and co-captain?

Find the probability of each event.

- 15) A class has nine girls and five boys. If the teacher randomly picks nine students, what is the probability that he will pick all girls?
- 16) There are sixteen songs on your playlist. With random shuffle and no repetition, you listen to two songs. What is the probability that you listened to your favorite song first and your least favorite song second?
- 17) A gambler places a bet on a horse race. To win, she must pick the top three finishers in any order. Eight horses of equal ability are entered in the race. Assuming the horses finish in a random order, what is the probability that the gambler will win her bet?
- 18) A child is drawing a rainbow using a box of seventeen different colored crayons, which include the seven required colors. After drawing the red, orange, yellow, and green arcs in the proper order, he forgets the last three colors. From the remaining thirteen crayons, he chooses three at random to finish drawing the rainbow. What is the probability that he correctly finishes the ROYGBIV rainbow?

- 19) A card is randomly drawn from a standard 52-card deck.
- The card is a king
 - The card is a face card
 - The card is not a face card
- 20) A ball is randomly drawn from a jar that contains five red balls, two white balls, and one yellow ball.
- A red ball is drawn
 - The ball drawn is not yellow
 - A black ball is drawn
- 21) Nicole is carrying nine pages of math homework and two pages of English homework. A gust of wind blows the pages out of her hands and she is only able to recover nine random pages. What is the probability that she recovers all of her math homework?
- 22) A gardener has seven identical-looking tulip bulbs, of which each will produce a different color tulip. Four of the colors are unknown, however one will become white, one will become yellow, and one will become pink. She plants them arbitrarily in a row. When the flowers start to bloom, what is the probability that the yellow one is first in the row, the white one is second, and the pink one is at the end of the row?
- 23) Aliyah is carrying six pages of math homework and four pages of English homework. A gust of wind blows the pages out of her hands and she is only able to recover six random pages. What is the probability that she recovers all of her math homework?
- 24) There are nine songs on your playlist. Four of them are country and five are pop. With random shuffle and no repetition, you listen to four songs. What is the probability that you listened to all country songs?

25) A letter is chosen at random from the words EXTRATERRESTRIAL.

- a) The letter T is chosen
- b) The letter chosen is a vowel
- c) The letter chosen is a consonant

26) In the 6/49 lottery game, a player selects six numbers from 1 to 49. What is the probability of picking the six winning numbers?

27) A monkey is trained to arrange wooden blocks in a straight line. He is then given 11 blocks showing the letters A, B, B, I, I, L, O, P, R, T, Y. What is the probability that the monkey will arrange the blocks to spell the word PROBABILITY?

28) On "The Price is Right" there is a game in which a bag is filled with 3 strike chips and 5 numbers. Let's say that the numbers in the bag are 0, 1, 3, 6, and 9.

a) What is the probability of selecting a strike chip or the number 1?

b) What is the probability of selecting 3 strikes in a row?

29) In a certain Precalculus class, there are 12 juniors and 15 seniors. Of the 12 juniors, 8 are male, and of the 15 seniors, 6 are male. Find the probability that a randomly selected student is:

- a) A junior or female
- b) A senior or male

30) 20. The faculty of the math department at Joliet Junior College is composed of 4 females and 9 males. Of the 4 females, 2 are under the age of 40, and 3 of the males are under the age of 40. Find the probability that a randomly selected faculty member is male or over the age of 40.

Section 10.1/10.2

Determine whether the scenario involves independent or dependent events. Then find the probability.

- 1) There are seven nickels and seven dimes in your pocket. You randomly pick a coin out of your pocket and place it on a counter. Then you randomly pick another coin. The first coin is a nickel and the second coin is a dime. *Dependent*

$$\frac{7}{14} \cdot \frac{7}{13} = \frac{7}{26} = 26.9\%$$

or $\frac{7P_1 \cdot 7P_1}{14P_2}$

- 2) There are eight nickels and five dimes in your pocket. You randomly pick a coin out of your pocket and then return it to your pocket. Then you randomly pick another coin. Both times the coin is a nickel. *independent*

$$\frac{8}{13} \cdot \frac{8}{13} = \frac{64}{169} \approx 37.9\%$$

- 3) A box of chocolates contains six milk chocolates and eight dark chocolates. You randomly pick a chocolate and eat it. Then you randomly pick another piece. Both pieces are milk chocolate. *Dependent*

$$\frac{6}{14} \cdot \frac{5}{13} = \frac{15}{91} \approx 16.5\%$$

- 4) A basket contains six apples and seven peaches. You randomly select a piece of fruit and then return it to the basket. Then you randomly select another piece of fruit. The first piece of fruit is an apple and the second piece is a peach. *independent*

$$\frac{6}{13} \cdot \frac{7}{13} = \frac{42}{169} \approx 24.9\%$$

Determine if the scenario involves mutually exclusive events. Then find the probability.

- 5) A spinner has an equal chance of landing on each of its seven numbered regions. After spinning, it lands in region one or five. *mutually exclusive*

$$\frac{2}{7} \approx 28.6\%$$

- 6) A basket contains five apples and seven peaches. One of the apples and three of the peaches are rotten. You randomly pick a piece of fruit. It is fresh or it is an apple. *Not exc.*

$$\frac{5}{12} + \frac{8}{12} - \frac{4}{12} = \frac{9}{12} = 75\%$$

- 7) A box of chocolates contains five milk chocolates and five dark chocolates. Four of the milk chocolates and one of the dark chocolates have peanuts inside. You randomly select and eat a chocolate. It is a milk chocolate or has no peanuts inside. *Not exc.*

$$\frac{5}{10} + \frac{5}{10} - \frac{1}{10} = \frac{9}{10} = 90\%$$

- 8) There are eleven shirts in your closet, three blue, four green, and four red. You randomly select one to wear. It is blue or green. *Mutually ex.*

$$\frac{3}{11} + \frac{4}{11} = \frac{7}{11} \approx 63.6\%$$

State whether each situation is a permutation or a combination. (Hint: Look for key words)
Then solve

- 9) How many ways can 9 runners be arranged on a 4-person relay team?

$$\boxed{P} \quad 9P_4 = \boxed{3024}$$

- 10) How many different 4-person lab groups could be formed in a class of 20?

$$\boxed{C} \quad 20C_4 = \boxed{4845}$$

- 11) How many ways can a 3-man basketball team be formed in a class of 20?

$$\boxed{C} \quad 20C_3 = \boxed{1140}$$

- 12) How many ways can 6 desks be arranged in a row?

$$\boxed{P} \quad 6P_6 = 720$$

- 13) How many ways can you arrange the letters AEIOU?

$$\boxed{P} \quad 5P_5 = \boxed{120}$$

- 14) A team of 8 basketball players needs to choose a captain and co-captain?

$$\boxed{P} \quad 8P_2 = \boxed{56}$$

Find the probability of each event.

- 15) A class has nine girls and five boys. If the teacher randomly picks nine students, what is the probability that he will pick all girls?

$$\frac{P(E)}{P(S)} = \frac{{}^9C_9}{{}^{14}C_9} = \frac{1}{2002} \approx \boxed{.05\%}$$

- 16) There are sixteen songs on your playlist. With random shuffle and no repetition, you listen to two songs. What is the probability that you listened to your favorite song first and your least favorite song second?

$$\frac{{}^1C_1}{{}^{16}C_1} \cdot \frac{{}^1C_1}{{}^{15}C_1} = \frac{1}{240} = \boxed{.42\%}$$

- 17) A gambler places a bet on a horse race. To win, she must pick the top three finishers in any order. Eight horses of equal ability are entered in the race. Assuming the horses finish in a random order, what is the probability that the gambler will win her bet?

$$\frac{{}^3C_3}{{}^8C_3} = \frac{1}{56} \approx \boxed{1.79\%}$$

- 18) A child is drawing a rainbow using a box of seventeen different colored crayons, which include the seven required colors. After drawing the red, orange, yellow, and green arcs in the proper order, he forgets the last three colors. From the remaining thirteen crayons, he chooses three at random to finish drawing the rainbow. What is the probability that he correctly finishes the ROYGBIV rainbow?

$$\frac{1}{{}^{13}P_3} = \frac{1}{1716} \approx \boxed{0.058\%}$$

19) A card is randomly drawn from a standard 52-card deck.

a) The card is a king $\frac{1}{13}$

b) The card is a face card $\frac{3}{13}$

c) The card is not a face card $\frac{10}{13}$

20) A ball is randomly drawn from a jar that contains five red balls, two white balls, and one yellow ball.

a) A red ball is drawn $\frac{5}{8}$

b) The ball drawn is not yellow $\frac{7}{8}$

c) A black ball is drawn

$$\frac{0}{8}$$

21) Nicole is carrying nine pages of math homework and two pages of English homework. A gust of wind blows the pages out of her hands and she is only able to recover nine random pages. What is the probability that she recovers all of her math homework?

$$\frac{\binom{9}{9} \binom{2}{0}}{\binom{11}{9}} = \frac{1}{55} \approx 1.82\%$$

22) A gardener has seven identical-looking tulip bulbs, of which each will produce a different color tulip. Four of the colors are unknown, however one will become white, one will become yellow, and one will become pink. She plants them arbitrarily in a row. When the flowers start to bloom, what is the probability that the yellow one is first in the row, the white one is second, and the pink one is at the end of the row?

$$\frac{1}{7P_3} = \frac{1}{210} \approx 0.48\%$$

23) Aliyah is carrying six pages of math homework and four pages of English homework. A gust of wind blows the pages out of her hands and she is only able to recover six random pages. What is the probability that she recovers all of her math homework?

$$\frac{\binom{6}{6} \binom{4}{0}}{\binom{10}{6}} = \frac{1}{210} \approx 0.48\%$$

24) There are nine songs on your playlist. Four of them are country and five are pop. With random shuffle and no repetition, you listen to four songs. What is the probability that you listened to all country songs?

$$\frac{\binom{4}{4} \binom{5}{0}}{\binom{9}{4}} = \frac{1}{126} \approx 0.79\%$$

25) A letter is chosen at random from the words EXTRATERRESTRIAL.

- a) The letter T is chosen $\frac{3}{16}$
 b) The letter chosen is a vowel $\frac{6}{16} = \frac{3}{8}$
 c) The letter chosen is a consonant $\frac{5}{8}$

26) In the 6/49 lottery game, a player selects six numbers from 1 to 49. What is the probability of picking the six winning numbers? (order doesn't matter)

$$\frac{1}{\binom{49}{6}} = \frac{1}{13,983,816}$$

$$7.15 \times 10^{-8}$$

or 7.2×10^{-8}

27) A monkey is trained to arrange wooden blocks in a straight line. He is then given 11 blocks showing the letters A, B, B, I, I, L, O, P, R, T, Y. What is the probability that the monkey will arrange the blocks to spell the word PROBABILITY?

Because there are two I's and two B's there are 4 ways to spell

$$\frac{4}{11!} = \frac{4}{39,916,800}$$

$$1.0 \times 10^{-7}$$

28) On "The Price is Right" there is a game in which a bag is filled with 3 strike chips and 5 numbers. Let's say that the numbers in the bag are 0, 1, 3, 6, and 9.

a) What is the probability of selecting a strike chip or the number 1?

b) What is the probability of selecting 3 strikes in a row?

a) $\frac{3}{8} + \frac{1}{8} = \frac{4}{8} = 50\%$

b) $\frac{3}{8} \cdot \frac{2}{8} \cdot \frac{1}{8} = \frac{6}{512} \approx 0.117$

$$1.2\%$$

29) In a certain Precalculus class, there are 12 juniors and 15 seniors. Of the 12 juniors, 8 are male, and of the 15 seniors, 6 are male. Find the probability that a randomly selected student is:

a) A junior or female

b) A senior or male

a) $\frac{12}{27} + \frac{13}{27} - \frac{4}{27} = \frac{21}{27} \approx 0.7$

b) $\frac{15}{27} + \frac{14}{27} - \frac{6}{27} = \frac{23}{27} = .8518$

$$77.8\%$$

$$85.2\%$$

30) The faculty of the math department at Joliet Junior College is composed of 4 females and 9 males. Of the 4 females, 2 are under the age of 40, and 3 of the males are under the age of 40. Find the probability that a randomly selected faculty member is male or over the age of 40.

$$\frac{9}{13} + \frac{8}{13} - \frac{6}{13} = \frac{11}{13}$$

$$\approx 0.846$$

$$84.6\%$$