

12-5 Skills Practice**The Normal Distribution**

Determine whether the data appear to be *positively skewed*, *negatively skewed*, or *normally distributed*.

1.

Miles Run	Track Team Members
0–4	3
5–9	4
10–14	7
15–19	5
20–23	2

2.

Speeches Given	Political Candidates
0–5	1
6–11	2
12–17	3
18–23	8
24–29	8

3. **PATIENTS** The frequency table to the right shows the average number of days patients spent on the surgical ward of a hospital last year.

Days	Number of Patients
0–3	5
4–7	18
8–11	11
12–15	9
16+	6

a. What percentage of the patients stayed between 4 and 7 days?

b. Does the data appear to be *positively skewed*, *negatively skewed*, or *normally distributed*? Explain.

4. **DELIVERY** The time it takes a bicycle courier to deliver a parcel to his farthest customer is normally distributed with a mean of 40 minutes and a standard deviation of 4 minutes.

a. About what percent of the courier's trips to this customer take between 36 and 44 minutes?

b. About what percent of the courier's trips to this customer take between 40 and 48 minutes?

c. About what percent of the courier's trips to this customer take less than 32 minutes?

5. **TESTING** The average time it takes sophomores to complete a math test is normally distributed with a mean of 63.3 minutes and a standard deviation of 12.3 minutes.

a. About what percent of the sophomores take more than 75.6 minutes to complete the test?

b. About what percent of the sophomores take between 51 and 63.3 minutes?

c. About what percent of the sophomores take less than 63.3 minutes to complete the test?

12-5 Practice

The Normal Distribution

Determine whether the data appear to be *positively skewed*, *negatively skewed*, or *normally distributed*.

1.

Time Spent at a Museum Exhibit	
Minutes	Frequency
0–25	27
26–50	46
51–75	89
75–100	57
100+	24

2.

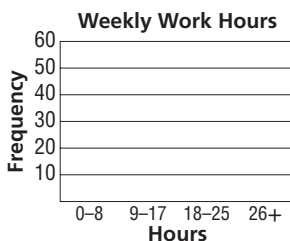
Average Age of High School Principals	
Age in Years	Number
31–35	3
36–40	8
41–45	15
46–50	32
51–55	40
56–60	38
60+	4

3. **STUDENTS** The frequency table to the right shows the number of hours worked per week by 100 high school students.

Hours	Number of Students
0–8	30
9–17	45
18–25	20
26+	5

a. What percentage of the students worked between 9 and 17 days?

b. Do the data appear to be *positively skewed*, *negatively skewed*, or *normally distributed*? Explain.



4. **TESTING** The scores on a test administered to prospective employees are normally distributed with a mean of 100 and a standard deviation of 15.

a. About what percent of the scores are between 70 and 130?

b. About what percent of the scores are between 85 and 130?

c. About what percent of the scores are over 115?

d. About what percent of the scores are lower than 85 or higher than 115?

e. If 80 people take the test, how many would you expect to score higher than 130?

f. If 75 people take the test, how many would you expect to score lower than 85?

5. **TEMPERATURE** The daily July surface temperature of a lake at a resort has a mean of 82° and a standard deviation of 4.2° . If you prefer to swim when the temperature is at least 77.8° , about what percent of the days does the temperature meet your preference?

12-6 Skills Practice**Hypothesis Testing**

Find a 95% confidence interval for each of the following.

1. $\bar{x} = 21$, $s = 3$, and $n = 10,000$

2. $\bar{x} = 50$, $s = 2.5$, and $n = 50$

3. $\bar{x} = 120$, $s = 9$, and $n = 144$

4. $\bar{x} = 10.5$, $s = 7.9$, and $n = 100$

5. $\bar{x} = 200$, $s = 18$, and $n = 120$

6. $\bar{x} = 21$, $s = 4$, and $n = 50$

7. $\bar{x} = 58$, $s = 3.5$, and $n = 7$

8. $\bar{x} = 84$, $s = 5$, and $n = 100$

9. $\bar{x} = 115.1$, $s = 12.8$, and $n = 200$

10. $\bar{x} = 48$, $s = 7.5$, and $n = 150$

Test each null hypothesis. Write *accept* or *reject*.

11. $H_0 = 72$, $H_1 < 72$, $n = 50$, $\bar{x} = 71.3$, and $\sigma = 2$

12. $H_0 = 45$, $H_1 < 45$, $n = 50$, $\bar{x} = 40$, and $\sigma = 7$

13. $H_0 = 11.7$, $H_1 > 11.7$, $n = 100$, $\bar{x} = 12$ and $\sigma = 1.5$

14. $H_0 = 151.3$, $H_1 < 151.3$, $n = 150$, $\bar{x} = 150$, and $\sigma = 4$

15. $H_0 = 40$, $H_1 > 40$, $n = 5$, $\bar{x} = 42$, and $\sigma = 2$

16. $H_0 = 100.5$, $H_1 < 100.5$, $n = 256$, $\bar{x} = 100$, and $\sigma = 4$

17. $H_0 = 26$, $H_1 > 26$, $n = 2000$, $\bar{x} = 28$, and $\sigma = 4.5$

18. $H_0 = 68.7$, $H_1 > 68.7$, $n = 196$, $\bar{x} = 70.7$, and $\sigma = 14$

19. $H_0 = 7$, $H_1 > 7$, $n = 100$, $\bar{x} = 7.2$, and $\sigma = 1$

20. $H_0 = 55.63$, $H_1 < 55.63$, $n = 100$, $\bar{x} = 55$, and $\sigma = 3.2$

12-6 Practice**Hypothesis Testing**

Find a 95% confidence interval for each of the following.

1. $\bar{x} = 56$, $s = 2$, and $n = 50$

2. $\bar{x} = 99$, $s = 22$, and $n = 121$

3. $\bar{x} = 34$, $s = 4$, and $n = 200$

4. $\bar{x} = 12$, $s = 4.5$, and $n = 100$

5. $\bar{x} = 37$, $s = 2.5$, and $n = 50$

6. $\bar{x} = 78$, $s = 2$, and $n = 225$

7. $\bar{x} = 36$, $s = 6$, and $n = 36$

8. $\bar{x} = 121$, $s = 2.5$, and $n = 100$

Test each null hypothesis. Write *accept* or *reject*.

9. $H_0 = 200.1$, $H_1 < 200.1$, $n = 200$, $\bar{x} = 50$, and $\sigma = 2$

10. $H_0 = 75.6$, $H_1 < 75.6$, $n = 100$, $\bar{x} = 77$, and $\sigma = 7$

11. $H_0 = 89.3$, $H_1 < 89.3$, $n = 100$, $\bar{x} = 89$ and $\sigma = 1.5$

12. $H_0 = 75$, $H_1 < 75$, $n = 150$, $\bar{x} = 74.2$, and $\sigma = 2.5$

13. $H_0 = 121$, $H_1 < 121$, $n = 64$, $\bar{x} = 120$, and $\sigma = 2$

14. $H_0 = 198.5$, $H_1 > 198.5$, $n = 100$, $\bar{x} = 200$, and $\sigma = 7.5$

15. $H_0 = 38.5$, $H_1 > 38.5$, $n = 50$, $\bar{x} = 40$, and $\sigma = 4.5$

16. $H_0 = 112.5$, $H_1 < 112.5$, $n = 100$, $\bar{x} = 110.5$, and $\sigma = 10$

17. **RUNNING** Josh and his sister Megan run together each morning and do not use a stopwatch to keep track of their time. Josh thinks they usually run the mile under 7 minutes, while Megan thinks it takes them longer. They borrow a stopwatch and time themselves each day for 20 days. Their mean time to run one mile is 7.4 minutes with a standard deviation of 0.2 minutes. Test Megan's hypothesis.

18. **QUALITY CONTROL** Kim is a quality tester for a tropical fruit company. The company claims that their canned pineapple stays fresh for at least 16 hours after opening. Kim tests 15 different cans to see if they actually stay fresh for at least 16 hours. Use the data below to conduct a hypothesis test.

Number of Hours Each Can Stays Fresh				
12	14	7	12	10
12	12	13	16	9
5	11	19	18	6

12-7 Skills Practice***Binomial Distributions***

1. **COINS** Find each probability if a coin is tossed 4 times.

a. $P(4 \text{ heads})$

b. $P(0 \text{ heads})$

c. $P(\text{exactly } 3 \text{ heads})$

d. $P(\text{exactly } 2 \text{ heads})$

e. $P(\text{exactly } 1 \text{ head})$

f. $P(\text{at least } 3 \text{ heads})$

2. **DICE** Find each probability if a die is rolled 3 times.

a. $P(\text{exactly one } 2)$

b. $P(\text{exactly two } 2\text{s})$

c. $P(\text{exactly three } 2\text{s})$

d. $P(\text{at most one } 2)$

3. **FIREWORKS** A town that presents a fireworks display during its July 4 celebration found the probability that a family with two or more children will watch the fireworks is $\frac{3}{5}$. If 5 of these families are selected at random, find each probability.

a. $P(\text{exactly } 3 \text{ families watch the fireworks})$

b. $P(\text{exactly } 2 \text{ families watch the fireworks})$

c. $P(\text{exactly } 5 \text{ families watch the fireworks})$

d. $P(\text{no families watch the fireworks})$

e. $P(\text{at least } 4 \text{ families watch the fireworks})$

f. $P(\text{at most } 1 \text{ family watches the fireworks})$

4. **TESTS** One section of a standardized English language test has 10 true/false questions. Find each probability when a student guesses at all ten questions.

a. $P(\text{exactly } 8 \text{ correct})$

b. $P(\text{exactly } 2 \text{ correct})$

c. $P(\text{exactly half correct})$

d. $P(\text{all } 10 \text{ correct})$

e. $P(0 \text{ correct})$

f. $P(\text{at least } 8 \text{ correct})$

12-7 Practice***Binomial Distributions***

1. **COINS** Find each probability if a coin is tossed 6 times.
 - a. $P(\text{exactly 3 tails})$
 - b. $P(\text{exactly 5 tails})$
 - c. $P(0 \text{ tails})$
 - d. $P(\text{at least 4 heads})$
 - e. $P(\text{at least 4 tails})$
 - f. $P(\text{at most 2 tails})$

2. **FREE THROWS** The probability of Chris making a free throw is $\frac{2}{3}$. If she shoots 5 times, find each probability.
 - a. $P(\text{all missed})$
 - b. $P(\text{all made})$
 - c. $P(\text{exactly 2 made})$
 - d. $P(\text{exactly 1 missed})$
 - e. $P(\text{at least 3 made})$
 - f. $P(\text{at most 2 made})$

3. **BOARD GAME** When Tarin and Sam play a certain board game, the probability that Tarin will win a game is $\frac{3}{4}$. If they play 5 games, find each probability.
 - a. $P(\text{Sam wins only once})$
 - b. $P(\text{Tarin wins exactly twice})$
 - c. $P(\text{Sam wins exactly 3 games})$
 - d. $P(\text{Sam wins at least 1 game})$
 - e. $P(\text{Tarin wins at least 3 games})$
 - f. $P(\text{Tarin wins at most 2 games})$

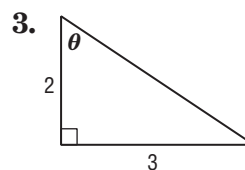
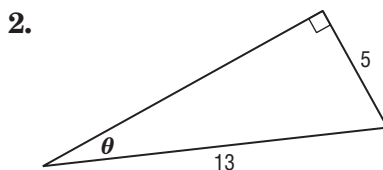
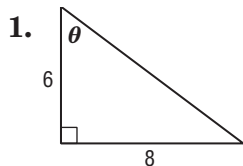
4. **SAFETY** In August 2001, the American Automobile Association reported that 73% of Americans use seat belts. In a random selection of 10 Americans in 2001, what is the probability that exactly half of them use seat belts?

5. **HEALTH** In 2001, the American Heart Association reported that 50 percent of the Americans who receive heart transplants are ages 50–64 and 20 percent are ages 35–49.
 - a. In a randomly selected group of 10 heart transplant recipients, what is the probability that at least 8 of them are ages 50–64?
 - b. In a randomly selected group of 5 heart transplant recipients, what is the probability that 2 of them are ages 35–49?

13-1 Skills Practice

Trigonometric Functions in Right Triangles

Find the values of the six trigonometric functions for angle θ .

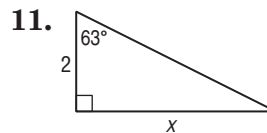
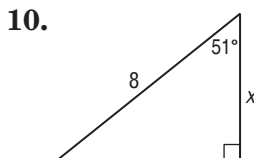
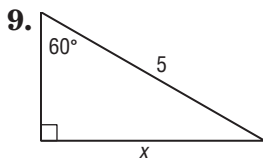
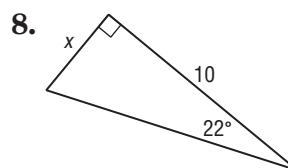
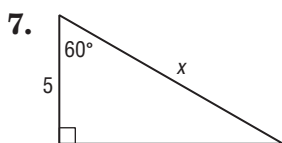
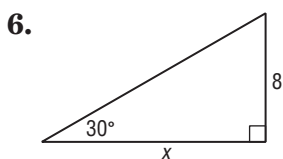


In a right triangle, $\angle A$ is acute.

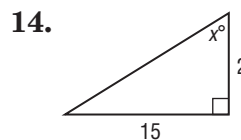
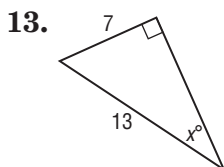
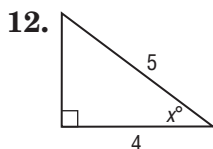
4. If $\tan A = 3$, what is $\sin A$?

5. If $\sin A = \frac{1}{16}$, what is $\cos A$?

Use a trigonometric function to find the value of x . Round to the nearest tenth.



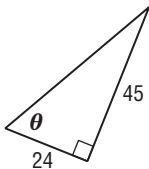
Find the value of x . Round to the nearest tenth.



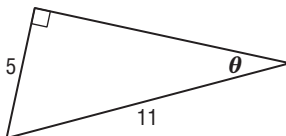
13-1 Practice**Trigonometric Functions in Right Triangles**

Find the values of the six trigonometric functions for angle θ .

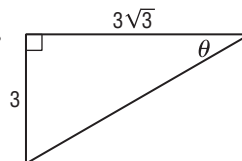
1.



2.



3.

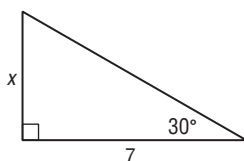


In a right triangle, $\angle A$ and $\angle B$ are acute.

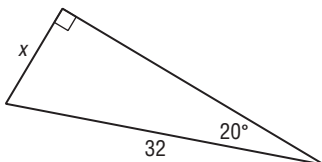
4. If $\tan B = 2$, what is $\cos B$? 5. If $\tan A = \frac{11}{17}$, what is $\sin A$? 6. If $\sin B = \frac{8}{15}$, what is $\cos B$?

Use a trigonometric function to find each value of x . Round to the nearest tenth if necessary.

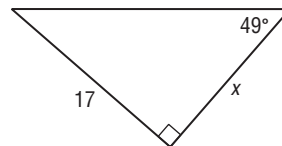
7.



8.

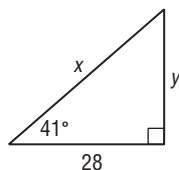


9.

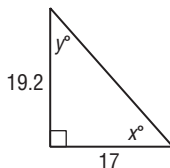


Use trigonometric functions to find the values of x and y . Round to the nearest tenth if necessary.

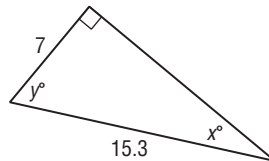
10.



11.



12.

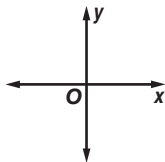


13. **SURVEYING** John stands 150 meters from a water tower and sights the top at an angle of elevation of 36° . How tall is the tower? Round to the nearest meter.

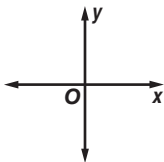
13-2 Skills Practice**Angles and Angle Measure**

Draw an angle with the given measure in standard position.

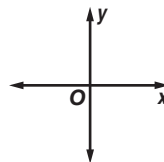
1. 185°



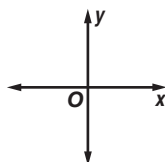
2. 810°



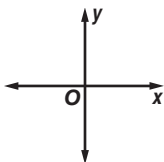
3. 390°



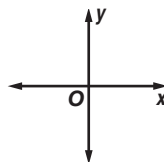
4. 495°



5. -50°



6. -420°



Find an angle with a positive measure and an angle with a negative measure that are coterminal with each angle.

7. 45°

8. 60°

9. 370°

10. -90°

11. $\frac{2\pi}{3}$

12. $\frac{5\pi}{2}$

13. $\frac{\pi}{6}$

14. $-\frac{3\pi}{4}$

Rewrite each degree measure in radians and each radian measure in degrees.

15. 130°

16. 720°

17. 210°

18. 90°

19. -30°

20. -270°

21. $\frac{\pi}{3}$

22. $\frac{5\pi}{6}$

23. $\frac{2\pi}{3}$

24. $\frac{5\pi}{4}$

25. $-\frac{3\pi}{4}$

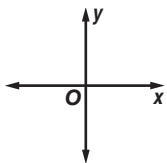
26. $-\frac{7\pi}{6}$

13-2 Practice

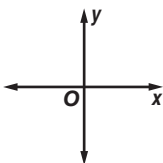
Angles and Angle Measure

Draw an angle with the given measure in standard position.

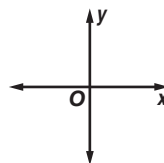
1. 210°



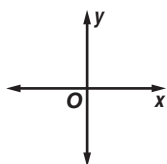
2. 305°



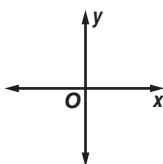
3. 580°



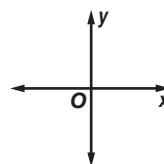
4. 135°



5. -450°



6. -560°



Find an angle with a positive measure and an angle with a negative measure that are coterminal with each angle.

7. 65°

8. 80°

9. 110°

10. $\frac{2\pi}{5}$

11. $\frac{5\pi}{6}$

12. $-\frac{3\pi}{2}$

Rewrite each degree measure in radians and each radian measure in degrees.

13. 18°

14. 6°

15. -72°

16. -820°

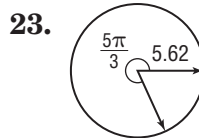
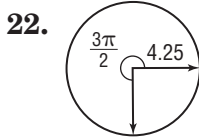
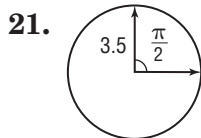
17. 4π

18. $\frac{5\pi}{2}$

19. $-\frac{9\pi}{2}$

20. $-\frac{7\pi}{12}$

Find the length of each arc. Round to the nearest tenth.



24. **TIME** Find both the degree and radian measures of the angle through which the hour hand on a clock rotates from 5 A.M. to 10 P.M.

25. **ROTATION** A truck with 16-inch radius wheels is driven at 77 feet per second (52.5 miles per hour). Find the measure of the angle through which a point on the outside of the wheel travels each second. Round to the nearest degree and nearest radian.