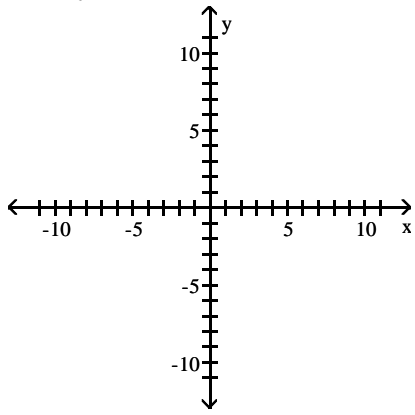
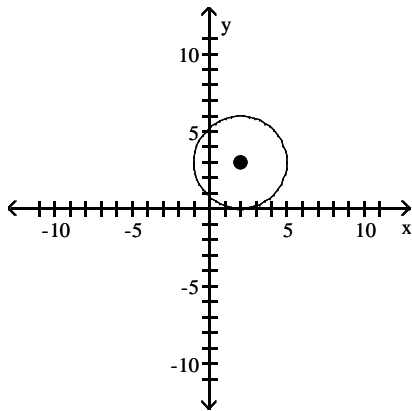


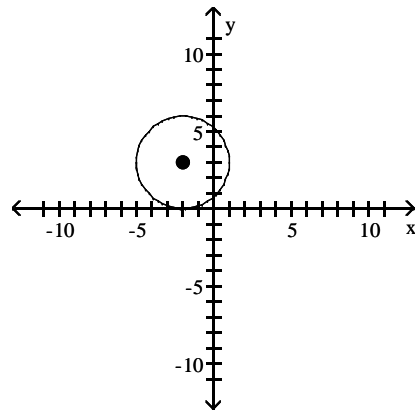
6) $(x + 2)^2 + (y + 3)^2 = 9$



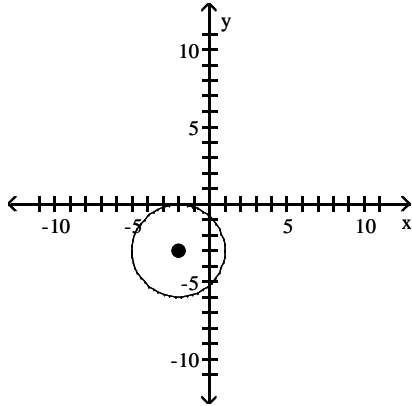
A)



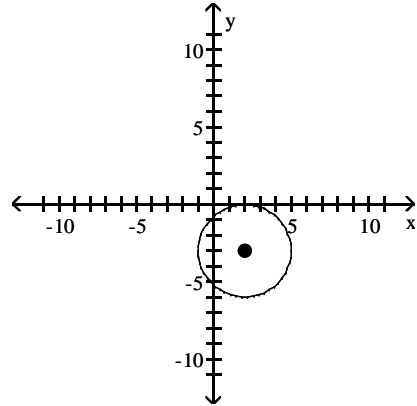
B)



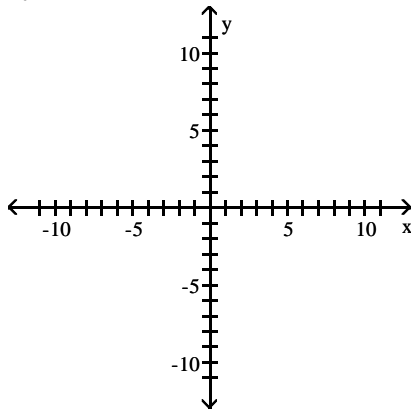
C)



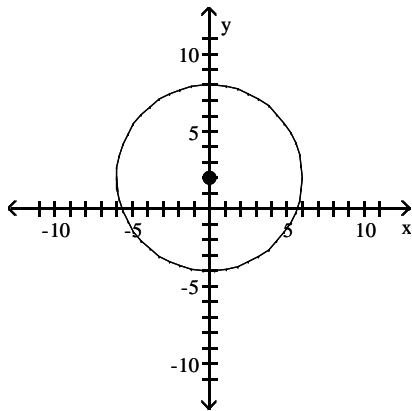
D)



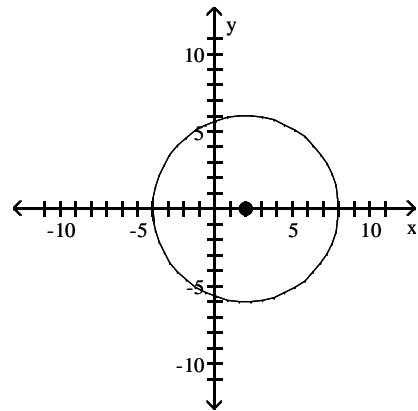
7) $x^2 + (y - 2)^2 = 36$



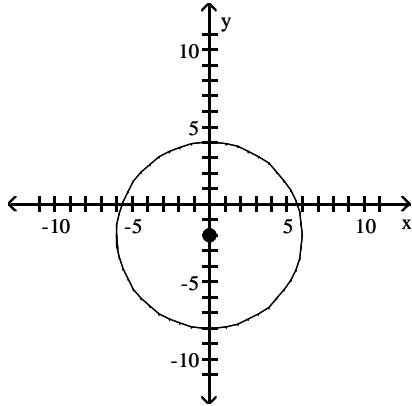
A)



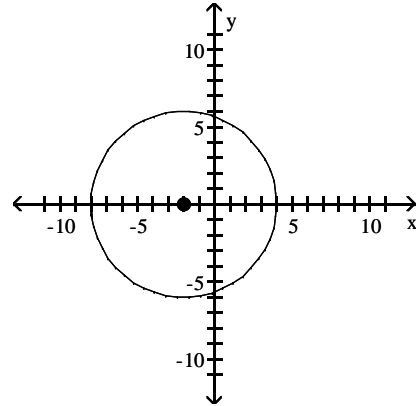
B)



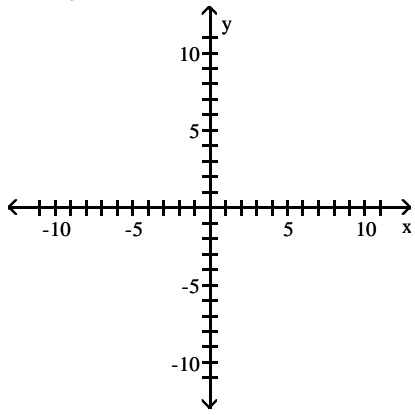
C)



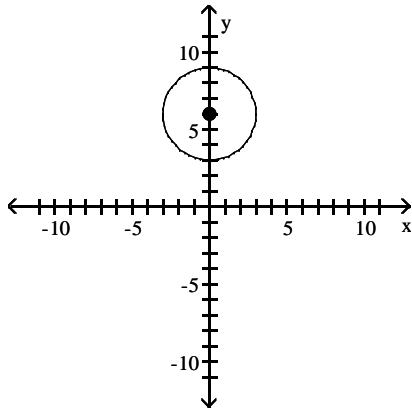
D)



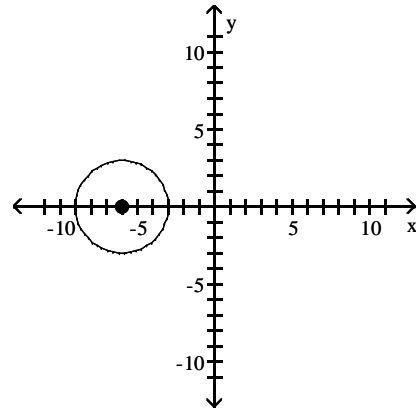
8) $(x - 6)^2 + y^2 = 9$



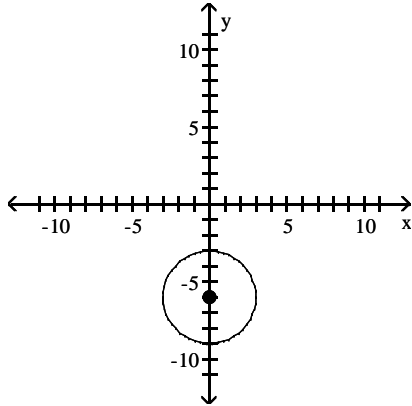
A)



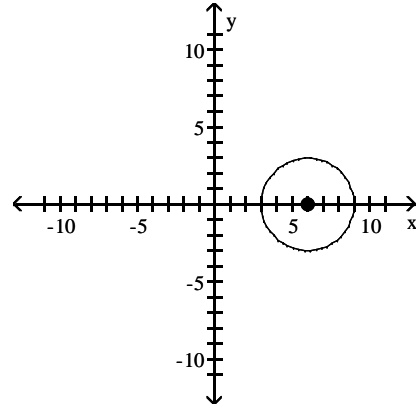
B)



C)



D)

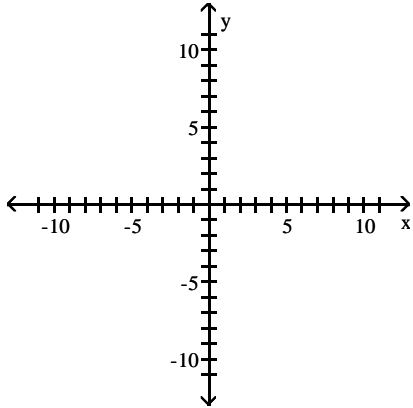


3 Work with the General Form of the Equation of a Circle

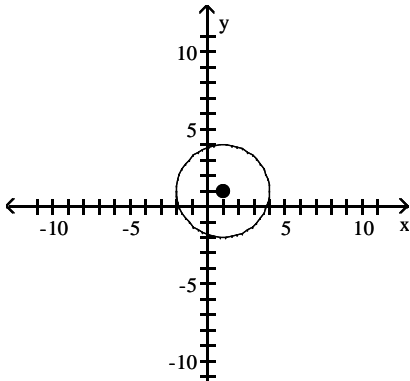
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the center (h, k) and radius r of the circle. Graph the circle.

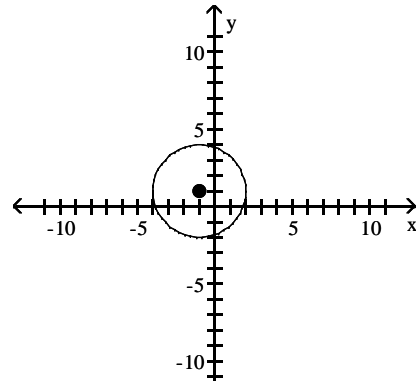
1) $x^2 + y^2 - 2x - 2y - 7 = 0$



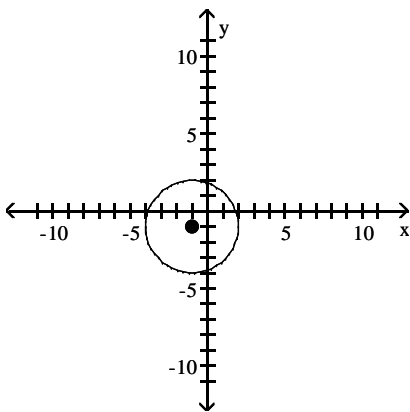
A) $(h, k) = (1, 1); r = 3$



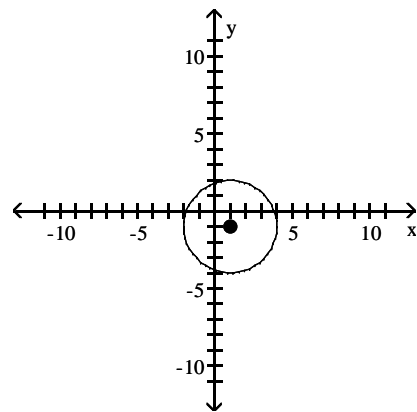
B) $(h, k) = (-1, 1); r = 3$



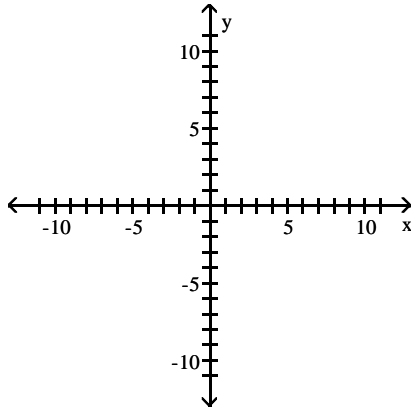
C) $(h, k) = (-1, -1); r = 3$



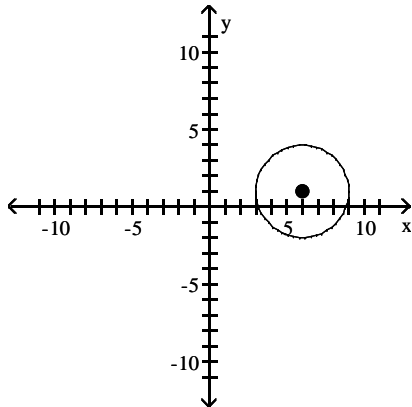
D) $(h, k) = (1, -1); r = 3$



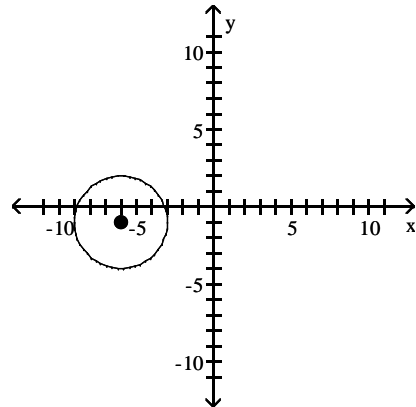
2) $x^2 + y^2 + 12x + 2y + 28 = 0$



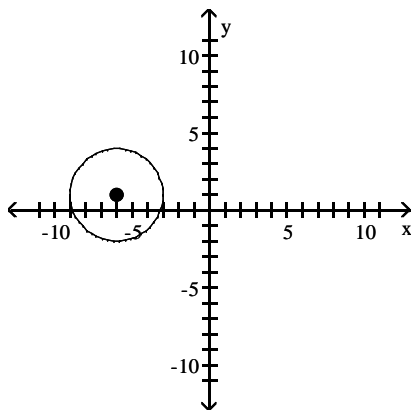
A) $(h, k) = (6, 1); r = 3$



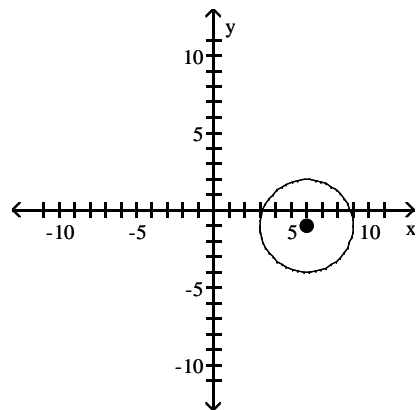
B) $(h, k) = (-6, -1); r = 3$



C) $(h, k) = (-6, 1); r = 3$



D) $(h, k) = (6, -1); r = 3$



Find the center (h, k) and radius r of the circle with the given equation.

3) $x^2 - 16x + 64 + (y + 9)^2 = 36$

- A) $(h, k) = (8, -9); r = 6$
 C) $(h, k) = (-9, 8); r = 6$

- B) $(h, k) = (9, -8); r = 36$
 D) $(h, k) = (-8, 9); r = 36$

4) $x^2 + 8x + 16 + y^2 - 2y + 1 = 36$

- A) $(h, k) = (-4, 1); r = 6$
 C) $(h, k) = (1, -4); r = 6$

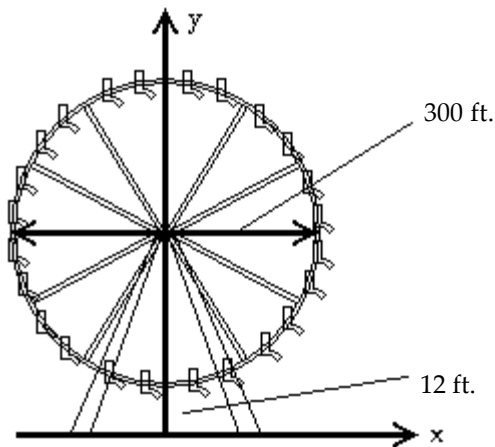
- B) $(h, k) = (4, -1); r = 36$
 D) $(h, k) = (-1, 4); r = 36$

5) $x^2 + y^2 + 18x + 6y + 90 = 25$

- A) $(h, k) = (-3, -9); r = 5$
 C) $(h, k) = (9, 3); r = 25$

- B) $(h, k) = (3, 9); r = 25$
 D) $(h, k) = (-9, -3); r = 5$

- 16) A power outage affected all homes and businesses within a 20 mi radius of the power station. If the power station is located 8 mi north of the center of town, find an equation of the circle consisting of the furthest points from the station affected by the power outage.
- A) $x^2 + y^2 = 400$ B) $x^2 + (y + 8)^2 = 400$ C) $x^2 + (y - 8)^2 = 20$ D) $x^2 + (y - 8)^2 = 400$
- 17) A power outage affected all homes and businesses within a 2 mi radius of the power station. If the power station is located 1 mi west and 1 mi north of the center of town, find an equation of the circle consisting of the furthest points from the station affected by the power outage.
- A) $(x + 1)^2 + (y + 1)^2 = 4$ B) $(x + 1)^2 + (y - 1)^2 = 4$
 C) $(x - 1)^2 + (y + 1)^2 = 4$ D) $(x - 1)^2 + (y - 1)^2 = 4$
- 18) A Ferris wheel has a diameter of 300 feet and the bottom of the Ferris wheel is 12 feet above the ground. Find the equation of the wheel if the origin is placed on the ground directly below the center of the wheel, as illustrated.



- A) $x^2 + (y - 150)^2 = 90,000$ B) $x^2 + (y - 150)^2 = 22,500$
 C) $x^2 + y^2 = 22,500$ D) $x^2 + (y - 162)^2 = 22,500$

2.4 Variation

1 Construct a Model Using Direct Variation

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Write a general formula to describe the variation.

- 1) v varies directly with t ; $v = 19$ when $t = 14$

A) $v = \frac{19}{14}t$ B) $v = \frac{19}{14t}$ C) $v = \frac{14}{19t}$ D) $v = \frac{14}{19}t$

- 2) A varies directly with t^2 ; $A = 100$ when $t = 5$

A) $A = \frac{20}{t^2}$ B) $A = 20t^2$ C) $A = \frac{4}{t^2}$ D) $A = 4t^2$

- 3) z varies directly with the sum of the squares of x and y ; $z = 5$ when $x = 3$ and $y = 4$

A) $z = \frac{1}{25}(x^2 + y^2)$ B) $z^2 = x^2 + y^2$ C) $z = \frac{1}{10}(x^2 + y^2)$ D) $z = \frac{1}{5}(x^2 + y^2)$

If y varies directly as x , write a general formula to describe the variation.

4) $y = 3$ when $x = 24$

A) $y = \frac{1}{3}x$

B) $y = \frac{1}{8}x$

C) $y = 8x$

D) $y = x + 21$

5) $y = 21$ when $x = 18$

A) $y = \frac{7}{6}x$

B) $y = x + 3$

C) $y = \frac{6}{7}x$

D) $y = 3x$

6) $y = 7$ when $x = \frac{1}{4}$

A) $y = x + \frac{27}{4}$

B) $y = \frac{1}{7}x$

C) $y = 28x$

D) $y = \frac{1}{28}x$

7) $y = 0.8$ when $x = 0.2$

A) $y = 0.25x$

B) $y = 4x$

C) $y = 0.2x$

D) $y = x + 0.6$

8) $y = 0.8$ when $x = 1.6$

A) $y = x - 0.8$

B) $y = 2x$

C) $y = 0.5x$

D) $y = 0.8x$

Write a general formula to describe the variation.

9) The volume V of a right circular cone varies directly with the square of its base radius r and its height h . The constant of proportionality is $\frac{1}{3}\pi$.

A) $V = \frac{1}{3}r^2h$

B) $V = \frac{1}{3}\pi r^2h$

C) $V = \frac{1}{3}\pi r^2h^2$

D) $V = \frac{1}{3}\pi rh$

10) The surface area S of a right circular cone varies directly as the radius r times the square root of the sum of the squares of the base radius r and the height h . The constant of proportionality is π .

A) $S = \pi r\sqrt{r^2h}$

B) $S = \pi r\sqrt{r^2 + h^2}$

C) $S = \pi\sqrt{r^2 + h^2}$

D) $S = \pi r\sqrt{r^2h^2}$

Solve the problem.

11) In simplified form, the period of vibration P for a pendulum varies directly as the square root of its length L . If P is 3.5 sec. when L is 49 in., what is the period when the length is 100 in.?

A) 50 sec

B) 20 sec

C) 200 sec

D) 5 sec

12) The amount of water used to take a shower is directly proportional to the amount of time that the shower is in use. A shower lasting 23 minutes requires 9.2 gallons of water. Find the amount of water used in a shower lasting 5 minutes.

A) 1.84 gal

B) 12.5 gal

C) 2 gal

D) 42.32 gal

13) If the resistance in an electrical circuit is held constant, the amount of current flowing through the circuit is directly proportional to the amount of voltage applied to the circuit. When 5 volts are applied to a circuit, 50 milliamperes (mA) of current flow through the circuit. Find the new current if the voltage is increased to 6 volts.

A) 30 mA

B) 54 mA

C) 60 mA

D) 70 mA

14) The amount of gas that a helicopter uses is directly proportional to the number of hours spent flying. The helicopter flies for 4 hours and uses 24 gallons of fuel. Find the number of gallons of fuel that the helicopter uses to fly for 5 hours.

A) 36 gal

B) 35 gal

C) 30 gal

D) 20 gal

15) The distance that an object falls when it is dropped is directly proportional to the square of the amount of time since it was dropped. An object falls 288 feet in 3 seconds. Find the distance the object falls in 5 seconds.

A) 800 ft

B) 15 ft

C) 480 ft

D) 160 ft

2 Construct a Model Using Inverse Variation

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Write a general formula to describe the variation.

1) A varies inversely with x^2 ; $A = 10$ when $x = 2$

A) $A = \frac{40}{x^2}$

B) $A = \frac{20}{x^2}$

C) $A = 20x^2$

D) $A = \frac{5}{2}x^2$

Write an equation that expresses the relationship. Use k as the constant of variation.

2) a varies inversely as m.

A) $a = \frac{k}{m}$

B) $ka = m$

C) $a = km$

D) $a = \frac{m}{k}$

3) w varies inversely as the square of t.

A) $w = \frac{\sqrt{t}}{k}$

B) $w = \frac{k}{t^2}$

C) $w = \frac{t^2}{k}$

D) $w = \frac{k}{\sqrt{t}}$

If y varies inversely as x, write a general formula to describe the variation.

4) $y = 7$ when $x = 3$

A) $y = \frac{21}{x}$

B) $y = \frac{7}{3}x$

C) $y = \frac{1}{21x}$

D) $y = \frac{x}{21}$

5) $y = 30$ when $x = 5$

A) $y = \frac{1}{150x}$

B) $y = \frac{150}{x}$

C) $y = 6x$

D) $y = \frac{x}{150}$

6) $y = 12$ when $x = \frac{1}{3}$

A) $y = \frac{4}{x}$

B) $y = 36x$

C) $y = \frac{1}{4x}$

D) $y = \frac{x}{4}$

7) $y = \frac{1}{4}$ when $x = 20$

A) $y = \frac{1}{80}x$

B) $y = \frac{5}{x}$

C) $y = \frac{1}{5x}$

D) $y = \frac{x}{5}$

8) $y = 0.2$ when $x = 0.8$

A) $y = \frac{6.25}{x}$

B) $y = \frac{0.16}{x}$

C) $y = 0.25x$

D) $y = 6.25x$

Solve the problem.

9) x varies inversely as v, and $x = 28$ when $v = 6$. Find x when $v = 24$.

A) $x = 42$

B) $x = 4$

C) $x = 36$

D) $x = 7$

10) x varies inversely as y^2 , and $x = 4$ when $y = 8$. Find x when $y = 4$.

A) $x = 16$

B) $x = 2$

C) $x = 32$

D) $x = 64$

- 11) When the temperature stays the same, the volume of a gas is inversely proportional to the pressure of the gas. If a balloon is filled with 320 cubic inches of a gas at a pressure of 14 pounds per square inch, find the new pressure of the gas if the volume is decreased to 64 cubic inches.
- A) 56 psi B) $\frac{32}{7}$ psi C) 65 psi D) 70 psi
- 12) The amount of time it takes a swimmer to swim a race is inversely proportional to the average speed of the swimmer. A swimmer finishes a race in 100 seconds with an average speed of 3 feet per second. Find the average speed of the swimmer if it takes 75 seconds to finish the race.
- A) 6 ft/sec B) 5 ft/sec C) 3 ft/sec D) 4 ft/sec
- 13) If the force acting on an object stays the same, then the acceleration of the object is inversely proportional to its mass. If an object with a mass of 30 kilograms accelerates at a rate of 2 meters per second per second (m/sec^2) by a force, find the rate of acceleration of an object with a mass of 5 kilograms that is pulled by the same force.
- A) 6 m/sec^2 B) 10 m/sec^2 C) $\frac{1}{3} \text{ m/sec}^2$ D) 12 m/sec^2
- 14) If the voltage, V , in an electric circuit is held constant, the current, I , is inversely proportional to the resistance, R . If the current is 200 milliamperes (mA) when the resistance is 2 ohms, find the current when the resistance is 8 ohms.
- A) 800 mA B) 100 mA C) 50 mA D) 796 mA
- 15) While traveling at a constant speed in a car, the centrifugal acceleration passengers feel while the car is turning is inversely proportional to the radius of the turn. If the passengers feel an acceleration of 20 feet per second per second (ft/sec^2) when the radius of the turn is 70 feet, find the acceleration the passengers feel when the radius of the turn is 280 feet.
- A) 6 ft/sec^2 B) 8 ft/sec^2 C) 5 ft/sec^2 D) 7 ft/sec^2

3 Construct a Model Using Joint Variation or Combined Variation

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Write a general formula to describe the variation.

- 1) The square of G varies directly with the cube of x and inversely with the square of y ; $G = 4$ when $x = 4$ and $y = 3$

A) $G^2 = \frac{1}{36} (x^3 + y^2)$ B) $G^2 = 3 \frac{x^3}{y^2}$ C) $G^2 = \frac{1024}{9} \frac{y^3}{x^2}$ D) $G^2 = \frac{9}{4} \frac{x^3}{y^2}$

- 2) R varies directly with g and inversely with the square of h ; $R = 3$ when $g = 3$ and $h = 5$.

A) $R = 25gh^2$ B) $R = 5 \frac{g}{h^2}$ C) $R = 25 \frac{g}{h^2}$ D) $R = 5 \frac{h^2}{g}$

- 3) z varies jointly as the square root of x and the square of y ; $z = 125$ when $x = 4$ and $y = 5$.

A) $z = \frac{3125\sqrt{x}}{2y^2}$ B) $z = \frac{2}{5}\sqrt{xy^2}$ C) $z = \frac{2}{3125} \frac{\sqrt{x}}{y^2}$ D) $z = \frac{5}{2}\sqrt{xy^2}$

- 4) The centrifugal force F of an object speeding around a circular course varies directly as the product of the object's mass m and the square of its velocity v and inversely as the radius of the turn r .

A) $F = \frac{kmr}{v^2}$ B) $F = \frac{kmv^2}{r}$ C) $F = \frac{kmv}{r}$ D) $F = \frac{km^2v}{r}$

- 5) The safety load λ of a beam with a rectangular cross section that is supported at each end varies directly as the product of the width W and the square of the depth D and inversely as the length L of the beam between the supports.

$$A) \lambda = \frac{k(W + D^2)}{L}$$

$$B) \lambda = \frac{kL}{WD^2}$$

$$C) \lambda = \frac{kWD^2}{L}$$

$$D) \lambda = \frac{kWD}{L}$$

- 6) The illumination I produced on a surface by a source of light varies directly as the candlepower c of the source and inversely as the square of the distance d between the source and the surface.

$$A) I = kcd^2$$

$$B) I = \frac{kc^2}{d^2}$$

$$C) I = \frac{kc}{d^2}$$

$$D) I = \frac{kd^2}{c}$$

Solve the problem.

- 7) The volume V of a given mass of gas varies directly as the temperature T and inversely as the pressure P . A measuring device is calibrated to give $V = 318 \text{ in}^3$ when $T = 530^\circ$ and $P = 20 \text{ lb/in}^2$. What is the volume on this device when the temperature is 270° and the pressure is 25 lb/in^2 ?

$$A) V = 139.6 \text{ in}^3$$

$$B) V = 119.6 \text{ in}^3$$

$$C) V = 10.8 \text{ in}^3$$

$$D) V = 129.6 \text{ in}^3$$

- 8) The time in hours it takes a satellite to complete an orbit around the earth varies directly as the radius of the orbit (from the center of the earth) and inversely as the orbital velocity. If a satellite completes an orbit 810 miles above the earth in 14 hours at a velocity of 33,000 mph, how long would it take a satellite to complete an orbit if it is at 1100 miles above the earth at a velocity of 25,000 mph? (Use 3960 miles as the radius of the earth.)

$$A) 19.6 \text{ hr}$$

$$B) 4.26 \text{ hr}$$

$$C) 196.04 \text{ hr}$$

$$D) 25.1 \text{ hr}$$

- 9) The pressure of a gas varies jointly as the amount of the gas (measured in moles) and the temperature and inversely as the volume of the gas. If the pressure is 900 kiloPascals (kPa) when the number of moles is 7, the temperature is 300° Kelvin, and the volume is 560 cc, find the pressure when the number of moles is 5, the temperature is 310° K, and the volume is 300 cc.

$$A) 560 \text{ kPa}$$

$$B) 1240 \text{ kPa}$$

$$C) 1360 \text{ kPa}$$

$$D) 620 \text{ kPa}$$

- 10) Body-mass index, or BMI, takes both weight and height into account when assessing whether an individual is underweight or overweight. BMI varies directly as one's weight, in pounds, and inversely as the square of one's height, in inches. In adults, normal values for the BMI are between 20 and 25. A person who weighs 171 pounds and is 68 inches tall has a BMI of 26. What is the BMI, to the nearest tenth, for a person who weighs 122 pounds and who is 63 inches tall?

$$A) 21.2$$

$$B) 21.6$$

$$C) 20.9$$

$$D) 22$$

- 11) The amount of paint needed to cover the walls of a room varies jointly as the perimeter of the room and the height of the wall. If a room with a perimeter of 45 feet and 8-foot walls requires 3.6 quarts of paint, find the amount of paint needed to cover the walls of a room with a perimeter of 50 feet and 6-foot walls.

$$A) 6 \text{ qt}$$

$$B) 30 \text{ qt}$$

$$C) 300 \text{ qt}$$

$$D) 3 \text{ qt}$$

- 12) The power that a resistor must dissipate is jointly proportional to the square of the current flowing through the resistor and the resistance of the resistor. If a resistor needs to dissipate 150 watts of power when 5 amperes of current is flowing through the resistor whose resistance is 6 ohms, find the power that a resistor needs to dissipate when 6 amperes of current are flowing through a resistor whose resistance is 9 ohms.

$$A) 270 \text{ watts}$$

$$B) 486 \text{ watts}$$

$$C) 54 \text{ watts}$$

$$D) 324 \text{ watts}$$

- 13) While traveling in a car, the centrifugal force a passenger experiences as the car drives in a circle varies jointly as the mass of the passenger and the square of the speed of the car. If a passenger experiences a force of 162 newtons (N) when the car is moving at a speed of 60 kilometers per hour and the passenger has a mass of 50 kilograms, find the force a passenger experiences when the car is moving at 70 kilometers per hour and the passenger has a mass of 100 kilograms.
- A) 392 N B) 441 N C) 539 N D) 490 N
- 14) The amount of simple interest earned on an investment over a fixed amount of time is jointly proportional to the principle invested and the interest rate. A principle investment of \$1100.00 with an interest rate of 4% earned \$176.00 in simple interest. Find the amount of simple interest earned if the principle is \$2600.00 and the interest rate is 1%.
- A) \$104.00 B) \$44.00 C) \$10,400.00 D) \$416.00
- 15) The voltage across a resistor is jointly proportional to the resistance of the resistor and the current flowing through the resistor. If the voltage across a resistor is 32 volts (V) for a resistor whose resistance is 8 ohms and when the current flowing through the resistor is 4 amperes, find the voltage across a resistor whose resistance is 3 ohms and when the current flowing through the resistor is 7 amperes.
- A) 56 V B) 28 V C) 12 V D) 21 V

Ch. 2 Graphs

Answer Key

2.1 Intercepts; Symmetry; Graphing Key Equations

1 Find Intercepts from an Equation

- 1) D
- 2) A
- 3) C
- 4) B
- 5) D
- 6) B
- 7) D
- 8) D
- 9) D
- 10) B
- 11) B
- 12) C
- 13) A

2 Test an Equation for Symmetry

- 1) C
- 2) D
- 3) D
- 4) D
- 5) C
- 6) D
- 7) B
- 8) A
- 9) B
- 10) B
- 11) C
- 12) A
- 13) A
- 14) E
- 15) A
- 16) C
- 17) A
- 18) D
- 19) D
- 20) E
- 21) B
- 22) A
- 23) A
- 24) E
- 25) A
- 26) E
- 27) B
- 28) A

3 Know How to Graph Key Equations

- 1) A
- 2) A
- 3) C
- 4) C

2.2 Lines

1 Calculate and Interpret the Slope of a Line

- 1) C
- 2) C
- 3) A
- 4) B
- 5) A
- 6) B
- 7) B
- 8) D
- 9) D
- 10) B

2 Graph Lines Given a Point and the Slope

- 1) D
- 2) D
- 3) D
- 4) C
- 5) C
- 6) B
- 7) B
- 8) C
- 9) D

3 Find the Equation of a Vertical Line

- 1) C
- 2) B
- 3) B
- 4) D

4 Use the Point-Slope Form of a Line; Identify Horizontal Lines

- 1) B
- 2) C
- 3) C
- 4) A
- 5) D

5 Find the Equation of a Line Given Two Points

- 1) A
- 2) D
- 3) D
- 4) A
- 5) C
- 6) A
- 7) B
- 8) D
- 9) D
- 10) B
- 11) D
- 12) D
- 13) D
- 14) A
- 15) B
- 16) C

6 Write the Equation of a Line in Slope-Intercept Form

- 1) B
- 2) A
- 3) A

- 4) B
- 5) D
- 6) D
- 7) A
- 8) D
- 9) D
- 10) C
- 11) A
- 12) A
- 13) C

7 Identify the Slope and y-Intercept of a Line from Its Equation

- 1) C
- 2) D
- 3) B
- 4) B
- 5) D
- 6) C
- 7) A
- 8) C
- 9) D
- 10) A
- 11) C
- 12) C

8 Graph Lines Written in General Form Using Intercepts

- 1) C
- 2) C
- 3) C
- 4) A
- 5) D
- 6) D
- 7) A

9 Find Equations of Parallel Lines

- 1) C
- 2) A
- 3) A
- 4) C
- 5) C
- 6) D
- 7) B
- 8) D

10 Find Equations of Perpendicular Lines

- 1) D
- 2) B
- 3) B
- 4) C
- 5) B
- 6) B
- 7) B
- 8) A
- 9) D
- 10) A
- 11) B
- 12) B
- 13) A

2.3 Circles

1 Write the Standard Form of the Equation of a Circle

- 1) B
- 2) C
- 3) A
- 4) A
- 5) A
- 6) B
- 7) C
- 8) D
- 9) D
- 10) B
- 11) C
- 12) D
- 13) B
- 14) A
- 15) C
- 16) D
- 17) A

2 Graph a Circle

- 1) D
- 2) B
- 3) D
- 4) C
- 5) D
- 6) C
- 7) A
- 8) D

3 Work with the General Form of the Equation of a Circle

- 1) A
- 2) B
- 3) A
- 4) A
- 5) D
- 6) D
- 7) D
- 8) D
- 9) D
- 10) B
- 11) D
- 12) A
- 13) C
- 14) C
- 15) D
- 16) D
- 17) B
- 18) D

2.4 Variation

1 Construct a Model Using Direct Variation

- 1) A
- 2) D
- 3) D
- 4) B
- 5) A

- 6) C
- 7) B
- 8) C
- 9) B
- 10) B
- 11) D
- 12) C
- 13) C
- 14) C
- 15) A

2 Construct a Model Using Inverse Variation

- 1) A
- 2) A
- 3) B
- 4) A
- 5) B
- 6) A
- 7) B
- 8) B
- 9) D
- 10) A
- 11) D
- 12) D
- 13) D
- 14) C
- 15) C

3 Construct a Model Using Joint Variation or Combined Variation

- 1) D
- 2) C
- 3) D
- 4) B
- 5) C
- 6) C
- 7) D
- 8) A
- 9) B
- 10) B
- 11) D
- 12) D
- 13) B
- 14) A
- 15) D