

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

Write standard form and identify a, b, and c.

1) $x^2 + 2x - 3 = 0$

A) $x^2 + 2x - 3 = 0$; a = 0, b = 2, c = -3

C) $x^2 + 2x - 3 = 0$; a = 1, b = -2, c = 3

B) $x^2 + 2x - 3 = 0$; a = 1, b = 2, c = -3

D) $x^2 + 2x = 3$; a = 1, b = 2, c = 3

1) _____

2) $6x^2 = 3x + 1$

A) $6x^2 - 3x = 1$; a = 6, b = -3, c = 1

C) $6x^2 + 3x + 1 = 0$; a = 6, b = 3, c = 1

B) $6x^2 + 3x - 1 = 0$; a = 6, b = -3, c = 1

D) $6x^2 - 3x - 1 = 0$; a = 6, b = -3, c = -1

2) _____

3) $2x^2 - 3 = 4x - 1$

A) $2x^2 - 4x - 2 = 0$; a = 2, b = -4, c = -2

C) $2x^2 + 4x + 1 = 0$; a = 2, b = 4, c = 1

B) $2x^2 + 4x + 2 = 0$; a = 2, b = -4, c = 2

D) $2x^2 - 4x - 3 = -1$; a = 2, b = -4, c = -3

3) _____

4) $5 = -3x^2 + 2x$

A) $-3x^2 + 2x - 5 = 0$; a = -3, b = 2, c = -5

C) $-3x^2 - 2x + 5 = 0$; a = -3, b = -2, c = 5

B) $3x^2 + 2x + 5 = 0$; a = 3, b = 2, c = 5

D) $3x^2 - 2x + 5 = 0$; a = 3, b = -2, c = 5

4) _____

Solve the equation.

5) $12m^2 - 24m = 0$

A) 0

B) 2, -2

C) 0, -2

D) 0, 2

5) _____

6) $10n^2 + 18n = 0$

A) $0, \frac{9}{5}$

B) 0

C) $\frac{9}{5}, -\frac{9}{5}$

D) $0, -\frac{9}{5}$

6) _____

7) $8r^2 = 4r$

A) 0

B) 0, 2

C) $0, \frac{1}{2}$

D) $\frac{1}{2}$

7) _____

8) $7y^2 - 2y^2 = 44y + 7y$

A) $0, \frac{57}{5}$

B) 0

C) $0, \frac{51}{5}$

D) $-\frac{57}{5}, \frac{51}{5}$

8) _____

9) $x^2 - x = 72$

A) -8, -9

B) 8, 9

C) 1, 72

D) -8, 9

9) _____

- 10) $x^2 + 7x - 30 = 0$
 A) 10, -3 B) 10, 3 C) -10, 3 D) -10, 1 10) _____
- 11) $4x^2 - 28x + 40 = 0$
 A) -2, -5 B) 4, 2, 5 C) 0, 2, 5 D) 2, 5 11) _____
- 12) $x(x - 1) = 42$
 A) -6, -7 B) -6, 7 C) 6, 7 D) 6, -7 12) _____
- 13) $x^2 + 10x + 25 = 0$
 A) 0, 5 B) -6, -4 C) -5 D) 5 13) _____
- 14) $12d^2 + 40d + 25 = 0$
 A) $-\frac{2}{5}, -\frac{5}{6}$ B) $\frac{5}{2}, \frac{5}{6}$ C) $-\frac{5}{2}, -\frac{5}{6}$ D) $\frac{2}{5}, \frac{6}{5}$ 14) _____
- 15) $30b^2 + 43b - 2 = -17$
 A) $-\frac{5}{3}, -\frac{5}{6}$ B) $\frac{5}{3}, \frac{6}{5}$ C) $\frac{3}{5}, \frac{5}{6}$ D) $-\frac{3}{5}, -\frac{5}{6}$ 15) _____
- 16) $4k^2 - 31k - 8 = 0$
 A) $-\frac{1}{4}, 8$ B) $\frac{1}{31}, -\frac{1}{4}$ C) -4, 8 D) $-\frac{1}{4}, 4$ 16) _____
- 17) $5x(x + 2) = (4x - 6)(x + 2)$
 A) 2, 6 B) -2, -6 C) -6 D) 6 17) _____
- 18) $\frac{15}{x - 2} + \frac{15}{x + 2} = 4$
 A) -2, -8 B) $-\frac{1}{2}, 8$ C) 2, 8 D) $\frac{1}{2}, -8$ 18) _____
- 19) $\frac{m}{m - 1} + \frac{14}{m^2 - 1} = \frac{11}{m + 1}$
 A) 4, 6 B) 6, 4 C) -5, -5 D) 5, 5 19) _____
- 20) $\frac{7 - r}{r - 7} + \frac{r + 3}{r - 3} = 0$
 A) 7, 9 B) -3, 7 C) -7, -9 D) No Solution 20) _____
- 21) $\frac{1}{y + 2} - \frac{3}{y - 2} = \frac{6}{y^2 - 4}$
 A) $\sqrt{1}$ B) -7 C) 14 D) 7 21) _____

$$22) \frac{4}{m-5} - \frac{7}{m+5} = \frac{7}{m^2-25} \quad 22) \underline{\hspace{2cm}}$$

A) 16 B) No solution C) -16 D) $\sqrt{46}$

$$23) \frac{7}{m+4} - \frac{6}{m-4} = \frac{-56}{m^2-16} \quad 23) \underline{\hspace{2cm}}$$

A) -4 B) 4 C) 7 D) No solution

$$24) \frac{6}{m+5} = 1 - \frac{1}{m-5} \quad 24) \underline{\hspace{2cm}}$$

A) 1, 5 B) 0, -5 C) No solution D) 0, 7

Solve the problem.

25) A polygon has 27 diagonals. How many sides does it have? 25) $\underline{\hspace{2cm}}$

A) 8 B) 9 C) 10 D) 12

26) A polygon has 8 sides. How many diagonals does it have? 26) $\underline{\hspace{2cm}}$

A) 20 B) 11 C) 7 D) 9

Solve the equation. Express radicals in simplest form.

$$27) y^2 = 2 \quad 27) \underline{\hspace{2cm}}$$

A) $\sqrt{2}$ B) $\pm\sqrt{2}$ C) 1 D) 4

$$28) x^2 = 25 \quad 28) \underline{\hspace{2cm}}$$

A) 12.5 B) 5 C) ± 6 D) ± 5

$$29) x^2 + 2 = 18 \quad 29) \underline{\hspace{2cm}}$$

A) ± 3 B) 9 C) ± 4 D) 4

$$30) 5x^2 - 20 = 0 \quad 30) \underline{\hspace{2cm}}$$

A) 12 B) ± 2 C) ± 3 D) 2

$$31) -2k^2 - 1 = -19 \quad 31) \underline{\hspace{2cm}}$$

A) ± 3 B) ± 6 C) 3 D) -9.5

$$32) 8x^2 - 56 = 0 \quad 32) \underline{\hspace{2cm}}$$

A) ± 7 B) 7 C) 8 D) $\pm\sqrt{7}$

$$33) 9x^2 - 81 = 0 \quad 33) \underline{\hspace{2cm}}$$

A) 0, 3 B) $\frac{1}{3}, 9$ C) 9, -9 D) 3, -3

- 34) $(x - 6)^2 = 49$
 A) 7, -7 B) 13, -1 C) 55 D) -1, -13 34) _____
- 35) $(r + 5)^2 = 17$
 A) $-5 + \sqrt{17}, -5 - \sqrt{17}$ B) 12
 C) $5 + \sqrt{17}, 5 - \sqrt{17}$ D) $\sqrt{17}, \sqrt{17}$ 35) _____
- 36) $(x + 2)^2 = 12$
 A) $-2 + 2\sqrt{6}, -2 - 2\sqrt{6}$ B) $2\sqrt{3}, -2\sqrt{3}$
 C) $-2 + 2\sqrt{3}, -2 - 2\sqrt{3}$ D) $2\sqrt{3} - 2, 2\sqrt{3} + 2$ 36) _____
- 37) $(2m - 5)^2 = 25$
 A) 0, -10 B) 10, 0 C) 0, -5 D) 5, 0 37) _____
- 38) $(2x + 2)^2 = 16$
 A) 9, -9 B) 1, 3 C) 0, 1 D) 1, -3 38) _____
- 39) $(3x + 4)^2 = 5$
 A) $\frac{-4 \pm \sqrt{5}}{3}$ B) $\frac{4 \pm \sqrt{5}}{3}$ C) $-3, \frac{1}{3}$ D) $\frac{\sqrt{5} \pm 4}{3}$ 39) _____
- 40) $(3z - 1)^2 = \frac{4}{9}$
 A) $\frac{2}{3}, -\frac{2}{3}$ B) $\frac{2}{9}, -\frac{2}{9}$ C) 3, -1 D) $\frac{5}{9}, \frac{1}{9}$ 40) _____
- 41) $(7 - 5x)^2 = 2$
 A) $\frac{-7 + \sqrt{2}}{5}, \frac{7 - \sqrt{2}}{5}$ B) $\frac{-7 - \sqrt{2}}{5}, \frac{7 + \sqrt{2}}{5}$
 C) $\frac{-7 + \sqrt{2}}{5}, \frac{-7 - \sqrt{2}}{5}$ D) $\frac{7 + \sqrt{2}}{5}, \frac{7 - \sqrt{2}}{5}$ 41) _____
- 42) $(x + 16)^2 - 2 = 0$
 A) $-16 \pm \sqrt{2}$ B) $16 \pm \sqrt{2}$ C) $-4 \pm \sqrt{2}$ D) -14, 18 42) _____
- 43) $x^2 + 16x + 62 = 0$
 A) $-2 + \sqrt{2}, -2 - \sqrt{2}$ B) $8 + \sqrt{2}, 8 - \sqrt{2}$
 C) $2 + \sqrt{2}, 2 - \sqrt{2}$ D) $-8 + \sqrt{2}, -8 - \sqrt{2}$ 43) _____
- Solve the equation by completing the square.
- 44) $a^2 - 4a - 21 = 0$
 A) 7, -3 B) $\sqrt{-21}, -\sqrt{-21}$ C) -18, -3 D) -7, 3 44) _____

- 45) $z^2 + 10z + 4 = 0$
 A) $5 \pm \sqrt{4}$ B) $5 \pm \sqrt{21}$ C) $5 + \sqrt{21}$ D) $-10 + \sqrt{21}$ 45) _____
- 46) $p^2 + 4p - 4 = 0$
 A) $\frac{-4 - 4\sqrt{2}}{2}$ B) $-4 \pm 4\sqrt{2}$ C) $\frac{4 + 4\sqrt{2}}{2}$ D) $\frac{-4 \pm 4\sqrt{2}}{2}$ 46) _____
- 47) $7x^2 + 5x - 2 = 0$
 A) $\frac{7}{2}, -1$ B) $\frac{7}{2}, 0$ C) $\frac{7}{2}, 1$ D) $\frac{2}{7}, -1$ 47) _____
- 48) $15d^2 + 43d + 30 = 0$
 A) $-\frac{5}{3}, -\frac{6}{5}$ B) $\frac{5}{3}, \frac{6}{5}$ C) $\frac{3}{5}, \frac{5}{6}$ D) $-\frac{3}{5}, -\frac{6}{5}$ 48) _____

Solve the problem. Round to the nearest tenth, if necessary.

- 49) A rock falls from a tower that is 480 feet high. As it is falling, its height is given by the formula $h = 480 - 16t^2$. How many seconds will it take for the rock to hit the ground ($h = 0$)?
 A) 14,400 sec B) 21.9 sec C) 21.5 sec D) 5.5 sec 49) _____
- 50) A rock falls from a tower that is 63.7 m high. As it is falling, its height is given by the formula $h = 63.7 - 4.9t^2$. How many seconds will it take for the rock to hit the ground ($h = 0$)?
 A) 8 sec B) 7.7 sec C) 3.6 sec D) 828.1 sec 50) _____

Solve. Try factoring first. If factoring is not possible or is difficult, use the quadratic formula.

- 51) $2m^2 + 6m + 3 = 0$
 A) $\frac{-3 \pm \sqrt{3}}{4}$ B) $\frac{-3 \pm \sqrt{3}}{2}$ C) $\frac{-3 \pm \sqrt{15}}{2}$ D) $\frac{-6 \pm \sqrt{3}}{2}$ 51) _____
- 52) $6n^2 = -10n - 3$
 A) $\frac{-5 \pm \sqrt{43}}{6}$ B) $\frac{-10 \pm \sqrt{7}}{6}$ C) $\frac{-5 \pm \sqrt{7}}{6}$ D) $\frac{-5 \pm \sqrt{7}}{12}$ 52) _____
- 53) $5x^2 + 12x = -6$
 A) $\frac{-12 \pm \sqrt{6}}{5}$ B) $\frac{-6 \pm \sqrt{6}}{5}$ C) $\frac{-6 \pm \sqrt{66}}{5}$ D) $\frac{-6 \pm \sqrt{6}}{10}$ 53) _____
- 54) $x^2 - x = 6$
 A) -2, -3 B) 2, 3 C) -2, 3 D) 1, 6 54) _____
- 55) $x^2 + 9x - 22 = 0$
 A) -11, 2 B) -11, 1 C) 11, 2 D) 11, -2 55) _____

- 56) $2x^2 - 14x + 24 = 0$
 A) 0, 3, 4 B) 2, 3, 4 C) -3, -4 D) 3, 4 56) _____
- 57) $15y^2 + 19y + 6 = 0$
 A) $\frac{3}{5}, \frac{2}{3}$ B) $-\frac{1}{5}, -\frac{1}{3}$ C) $\frac{3}{5}, -\frac{2}{3}$ D) $-\frac{3}{5}, -\frac{2}{3}$ 57) _____
- 58) $25k^2 - 81 = 0$
 A) $\frac{9}{5}, -\frac{9}{5}$ B) $\frac{5}{9}, 0$ C) 9, 0 D) $\frac{5}{9}, -\frac{5}{9}$ 58) _____
- 59) $\frac{x^2}{x-2} - \frac{12}{x-2} = 0$
 A) 2, $-2\sqrt{3}$, $2\sqrt{3}$ B) 2, $2\sqrt{3}$ C) $2\sqrt{3}$ D) $-2\sqrt{3}$, $2\sqrt{3}$ 59) _____
- 60) $\frac{1}{x} + \frac{1}{x+3} = \frac{1}{2}$
 A) $\frac{7 \pm \sqrt{29}}{2}$ B) $\frac{-1 \pm \sqrt{29}}{2}$ C) $\frac{1 \pm \sqrt{29}}{2}$ D) $\frac{-7 \pm \sqrt{29}}{2}$ 60) _____

Solve. Round results to the nearest thousandth.

- 61) $x^2 + 8x - 32 = 0$
 A) 2.928, -10.928 B) 19.748, -11.748 C) 11.748, -19.748 D) 10.928, -2.928 61) _____
- 62) $2x^2 + 8x + 1 = 0$
 A) 3.984, 0.016 B) 3.871, 0.129 C) -0.016, -3.984 D) -0.129, -3.871 62) _____
- 63) $x^2 + 6x = -8$
 A) 4.000, 2.000 B) 1.123, -7.123 C) -5.000, -5.000 D) -2.000, -4.000 63) _____
- 64) $2x^2 + 4x = -1$
 A) 0.225, -2.225 B) 1.707, 0.293 C) -0.293, -1.707 D) -0.586, -3.414 64) _____
- 65) $5x^2 - 5x = -1$
 A) -0.276, -0.724 B) 0.724, 0.276 C) 1.448, 0.552 D) 1.171, -0.171 65) _____
- 66) $9x^2 = 6 + 10x$
 A) 0.043, -1.154 B) 0.432, -1.543 C) 1.154, -0.043 D) 1.543, -0.432 66) _____

Solve for the specified variable.

67) $\frac{1}{a} + \frac{1}{b} = c$ for b 67) _____

A) $ac - \frac{1}{a}$

B) $\frac{a}{ac - 1}$

C) $\frac{1}{ac}$

D) $\frac{1}{c} - a$

68) $\frac{1}{a} + \frac{1}{b} = \frac{1}{c}$ for c 68) _____

A) $\frac{ab}{a + b}$

B) $a + b$

C) $\frac{a + b}{ab}$

D) $ab(a + b)$

69) $P = \frac{A}{1 + rt}$ for r 69) _____

A) $P - tA$

B) $\frac{P - A}{1 + t}$

C) $\frac{A - P}{Pt}$

D) $\frac{P - 1}{At}$

70) $\frac{PV}{T} = \frac{pv}{t}$ for P 70) _____

A) $\frac{tvT}{pV}$

B) $\frac{pvV}{tT}$

C) $\frac{pvT}{tV}$

D) $\frac{pv}{tTV}$

71) $I = \frac{E}{R + r}$ for r 71) _____

A) $r = \frac{IR}{E}$

B) $r = \frac{E}{I} - IR$

C) $r = \frac{E - R}{I}$

D) $r = \frac{E - IR}{I}$

72) $I = \frac{kE}{R}$ for R 72) _____

A) $R = \frac{kE}{I}$

B) $R = \frac{I}{kE}$

C) $R = kEI$

D) $R = kE - I$

73) $S = \frac{a}{1 - r}$ for r 73) _____

A) $r = \frac{S - a}{S}$

B) $r = S - a$

C) $r = \frac{a}{S} - 1$

D) $r = \frac{a}{S}$

74) $7x + \frac{5}{z} = \frac{3}{y}$ for z 74) _____

A) $z = \frac{-5y}{7xy - 3}$

B) $z = \frac{3 - 7xy}{5y}$

C) $z = \frac{5y}{3 - 7x}$

D) $z = \frac{-5y}{7x - 3}$

Solve the formula for the specified variable.

75) $M = \pi r^2 h d$ for r 75) _____

A) $r = \frac{\pm M \sqrt{\pi h d}}{\pi h d}$

B) $r = \frac{\pm \sqrt{\pi M h d}}{h d}$

C) $r = \frac{\pm \sqrt{M \pi h d}}{\pi h d}$

D) $r = \pm \sqrt{\pi M h d}$

76) $A = 3\pi a^2$ for a 76) _____

A) $a = \sqrt{3\pi A}$ B) $a = \frac{\pm\sqrt{A\pi}}{3}$ C) $a = \frac{\pm\sqrt{3\pi A}}{3\pi}$ D) $a = \frac{\pm A\sqrt{3\pi}}{3\pi}$

77) $V_e = \frac{1}{2}mv^2$ for v 77) _____

A) $v = \pm 2\sqrt{\frac{V_e}{m}}$ B) $v = \frac{\pm\sqrt{2mV_e}}{m}$ C) $v = \pm\sqrt{\frac{V_e}{2m}}$ D) $v = \pm\sqrt{2V_e}$

78) $v = \sqrt{\frac{2gE}{m}}$, for E 78) _____

A) $E = \frac{v^2m}{g}$ B) $E = \frac{v^2m}{4g}$ C) $E = \frac{vm}{2g}$ D) $E = \frac{v^2m}{2g}$

79) $c = \sqrt{a^2 + b^2}$ for b 79) _____

A) $b = \sqrt{b^2 - c^2}$ B) $b = \sqrt{c^2 - b^2}$ C) $b = \sqrt{a^2 - c^2}$ D) $b = \sqrt{c^2 - a^2}$

80) $h = \frac{a}{2}\sqrt{3}$ for a 80) _____

A) $a = \frac{\sqrt{3}}{2}h$ B) $a = \frac{\sqrt{3}}{3}h$ C) $a = \frac{2\sqrt{3}}{3h}$ D) $a = \frac{2\sqrt{3}}{3}h$

Solve for the indicated letter.

81) Solve the formula $S = \frac{1}{3}\pi r^2h + 4\pi rh$ for r . 81) _____

A) $r = \frac{-6\pi h \pm \sqrt{36\pi^2h^2 + 3\pi hS}}{\pi h}$ B) $r = \frac{12\pi h \pm \sqrt{36\pi^2h^2 + 3\pi hS}}{\pi h}$

C) $r = \frac{-12\pi h \pm \sqrt{36\pi^2h^2 + 3\pi hS}}{2\pi h}$ D) $r = \frac{-6\pi h \pm 2\sqrt{36\pi^2h^2 + 3\pi hS}}{\pi h}$

82) Solve $S = x^2 + y^2 - 8x + 10y - 4$ for x . 82) _____

A) $x = 4 \pm \sqrt{12 - y^2 - 10y - S}$ B) $x = 4 \pm \sqrt{68 - y^2 - 10y + S}$

C) $x = 4 \pm \sqrt{20 - y^2 - 10y + S}$ D) $x = 4 \pm \sqrt{16 - y^2 - 10y + S}$

83) Solve $S = \pi rh + \pi r^2$ for r . 83) _____

A) $r = \frac{-\pi \pm \sqrt{\pi^2 + 4\pi S}}{2\pi}$ B) $r = \frac{-\pi h \pm \sqrt{\pi h + 4\pi S}}{2\pi}$

C) $r = \frac{-\pi h \pm \sqrt{\pi^2h^2 - 4\pi S}}{2\pi}$ D) $r = \frac{-\pi h \pm \sqrt{\pi^2h^2 + 4\pi S}}{2\pi}$

84) Solve $S = \frac{1}{2} \pi r^2 + (r + 4)h$ for r . 84) _____

A) $r = \frac{-h \pm \sqrt{h^2 - 8\pi h + 2\pi S}}{\pi}$

B) $r = \frac{-h \pm \sqrt{h^2 - 8\pi h - 2\pi S}}{\pi}$

C) $r = \frac{h \pm \sqrt{h^2 - 8\pi h + 2\pi S}}{\pi}$

D) $r = \frac{-h \pm \sqrt{h^2 + 8\pi h + 2\pi S}}{\pi}$

85) $n = aT^2 + 4T + m$, for T 85) _____

A) $T = \frac{-2 \pm \sqrt{4 - a(m - n)}}{a}$

B) $T = \frac{4 \pm \sqrt{4 - a(m - n)}}{2a}$

C) $T = \frac{-2 \pm \sqrt{4 - a(m - n)}}{2a}$

D) $T = \frac{-4 \pm 2\sqrt{4 - a(m - n)}}{a}$

Solve the problem.

86) A ladder is resting against a wall. The top of the ladder touches the wall at a height of 18 ft. Find the length of the ladder if the length is 6 ft more than its distance from the wall. 86) _____

A) 24 ft

B) 30 ft

C) 18 ft

D) 36 ft

87) A lot is in the shape of a right triangle. The shorter leg measures 150 m. The hypotenuse is 50 m longer than the length of the longer leg. How long is the longer leg? 87) _____

A) 150 m

B) 250 m

C) 200 m

D) 300 m

88) The area of a square is 81 square centimeters. If the same amount is added to one dimension and removed from the other, the resulting rectangle has an area 9 square centimeters less than the area of the square. How much is added and subtracted? 88) _____

A) 4 cm

B) 3 cm

C) 9 cm

D) 12 cm

89) A square has an area of 49 square inches. If the same amount is added to the length and removed from the width, the resulting rectangle has an area of 45 square inches. Find the dimensions of the rectangle. 89) _____

A) 3 in. by 4 in.

B) 5 in. by 10 in.

C) 5 in. by 9 in.

D) 4 in. by 9 in.

90) An open box is to be made from a rectangular piece of tin by cutting two inch squares out of the corners and folding up the sides. The volume of the box will be 100 cubic inches. Find the dimensions of the rectangular piece of tin. 90) _____

A) Not enough information

B) 5 in. by 10 in.

C) 4 in. by 9 in.

D) 5 in. by 9 in.

91) A rectangular garden has dimensions of 23 feet by 13 feet. A gravel path of equal width is to be built around the garden. How wide can the path be if there is enough gravel for 352 square feet? 91) _____

A) 6.5 ft

B) 6 ft

C) 4 ft

D) 5 ft

- 92) A picture 21 inches by 25 inches is to be mounted on a piece of matboard so that there is an even amount of mat all around the picture. How wide will the border be if the area of the mounted picture is 1085 square inches? 92) _____
 A) 7 in. B) 6 in. C) 5 in. D) 7.5 in.
- 93) A rug is to fit in a room so that a border of even width is left on all four sides. If the room is 11 feet by 17 feet and the area of the rug is 27 square feet, how wide will the border be? 93) _____
 A) 6 ft B) 6.5 ft C) 5 ft D) 4 ft
- 94) Chuck and Dana agree to meet in Chicago for the weekend. Chuck travels 148 miles in the same time that Dana travels 124 miles. If Chuck's rate of travel is 6 mph more than Dana's, and they travel the same length of time, at what speed does Chuck travel? 94) _____
 A) 31 mph B) 33 mph C) 37 mph D) 41 mph
- 95) The speed of a stream is 4 mph. If a boat travels 86 miles downstream in the same time that it takes to travel 43 miles upstream, what is the speed of the boat in still water? 95) _____
 A) 14 mph B) 8 mph C) 15 mph D) 12 mph
- 96) A plane flies 420 miles with the wind and 300 miles against the wind in the same length of time. If the speed of the wind is 25 mph, what is the speed of the plane in still air? 96) _____
 A) 175 mph B) 140 mph C) 155 mph D) 150 mph
- 97) Tom Quig traveled 220 miles east of St. Louis. For most of the trip he averaged 60 mph, but for one period of time he was slowed to 20 mph due to a major accident. If the total time of travel was 7 hours, how many miles did he drive at the reduced speed? 97) _____
 A) 95 miles B) 110 miles C) 100 miles D) 120 miles
- 98) A boat goes 450 miles downstream in the same time it can go 360 miles upstream. The speed of the current is 3 miles per hour. Find the speed of the boat in still water. 98) _____
 A) 30 mph B) 24 mph C) 27 mph D) 81 mph
- 99) A jet plane traveling at a constant speed goes 1200 miles with the wind, then turns around and travels for 1000 miles against the wind. If the speed of the wind is 50 mph and the total flight took 4 hours, find the speed of the plane. 99) _____
 A) 605 mph B) 435 mph C) 525 mph D) 550 mph
- 100) A man rode a bicycle for 12 miles and then hiked an additional 8 miles. The total time for the trip was 5 hours. If his rate when he was riding a bicycle was 10 miles per hour faster than his rate walking, what was each rate? 100) _____
 A) Bike: 13 mph Hike: 3 mph B) Bike: 12 mph Hike: 2 mph C) Bike: 11.5 mph Hike: 1.5 mph D) Bike: 14.5 mph Hike: 4.5 mph
- 101) A boat can go 30 mph in still water. It takes as long to go 180 miles upstream as it does to go downstream 270 miles. How fast is the current? 101) _____
 A) 1 mph B) 9 mph C) 5 mph D) 6 mph

Find the ordered pair for the vertex.

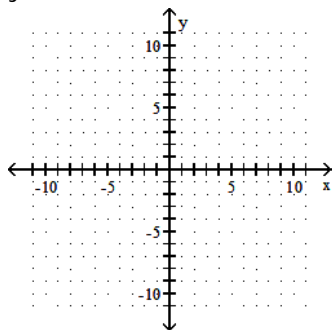
- | | | | | | |
|----------------------------|------------|-------------|-------------|------------|------------|
| 102) $y = x^2 + 1$ | A) (0, 1) | B) (0, -1) | C) (-1, 0) | D) (1, 0) | 102) _____ |
| 103) $y = 2x^2 - 12x + 14$ | A) (4, -3) | B) (-3, 4) | C) (3, -4) | D) (-4, 3) | 103) _____ |
| 104) $y = 3x^2 + 18x + 32$ | A) (-5, 3) | B) (-3, 5) | C) (3, -5) | D) (5, -3) | 104) _____ |
| 105) $y = 3x^2 - 6x + 5$ | A) (1, 2) | B) (-1, -2) | C) (-2, -1) | D) (2, 1) | 105) _____ |
| 106) $y = 4x^2 - 8x + 7$ | A) (3, 1) | B) (-3, -1) | C) (-1, -3) | D) (1, 3) | 106) _____ |
| 107) $y = x^2 - 6x + 17$ | A) (8, 3) | B) (3, 8) | C) (0, 3) | D) (8, 0) | 107) _____ |

Find the ordered pair for the y-intercept of the graph of the quadratic equation.

- | | | | | | |
|---------------------------|-------------|----------------------------------|----------------------------------|------------|------------|
| 108) $y = x^2 + 3$ | A) (3, 0) | B) (0, 3) | C) (0, -3) | D) (-3, 0) | 108) _____ |
| 109) $y = 2x^2$ | A) (2, 0) | B) (0, 2) | C) (0, 0) | D) (2, 2) | 109) _____ |
| 110) $y = -x^2 + 2x$ | A) (0, 0) | B) (0, -2) | C) (2, 0) | D) (0, 2) | 110) _____ |
| 111) $y = x^2 - 10x$ | A) (-10, 0) | B) (0, 0) | C) (0, -10) | D) (0, 10) | 111) _____ |
| 112) $y = x^2 - 2x - 15$ | A) (-3, 0) | B) (0, -15) | C) (0, -2) | D) (5, 0) | 112) _____ |
| 113) $y = 11 - 2x - x^2$ | A) (11, 0) | B) (0, 11) | C) (0, -2) | D) (0, -1) | 113) _____ |
| 114) $y = 3x^2 - 4x + 15$ | A) (0, 15) | B) $\left(0, \frac{5}{3}\right)$ | C) $\left(\frac{5}{3}, 0\right)$ | D) (0, -4) | 114) _____ |

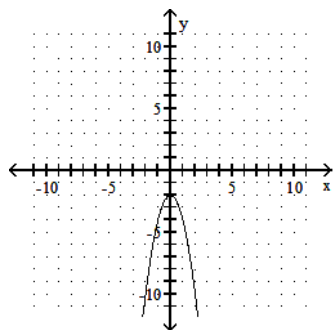
Graph the quadratic equation.

115) $y = -2x^2$

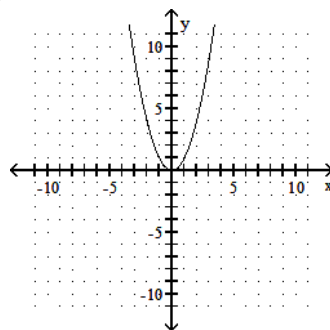


115) _____

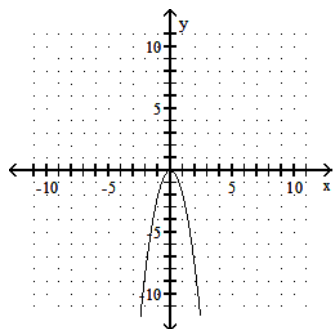
A)



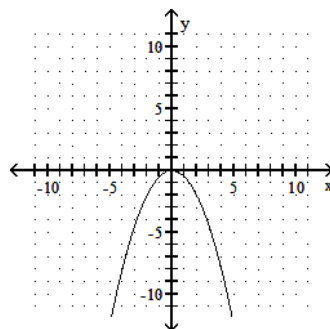
B)



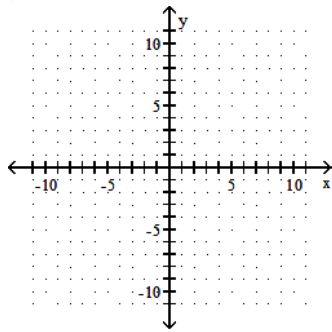
C)



D)

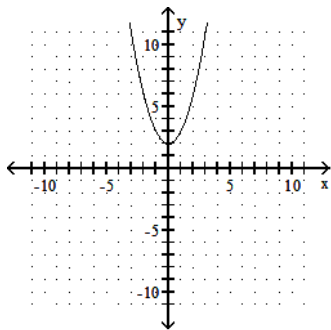


116) $y = x^2 + 2$

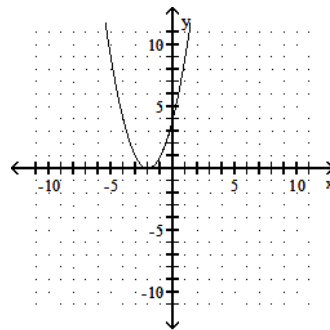


116) _____

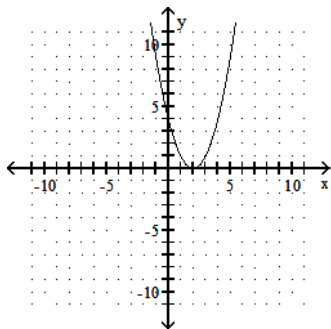
A)



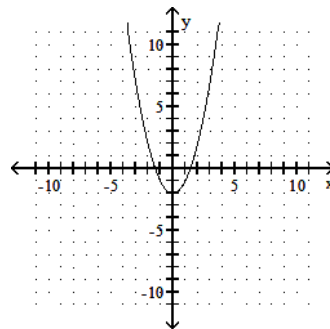
B)



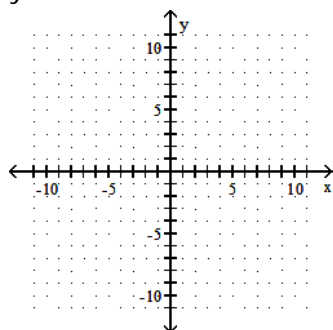
C)



D)

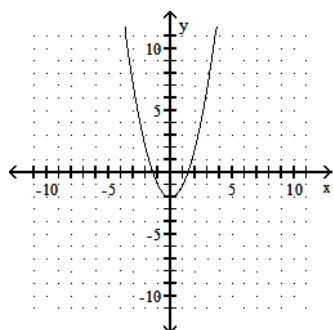


117) $y = x^2 + 4x + 4$

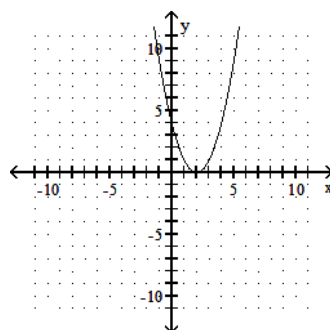


117) _____

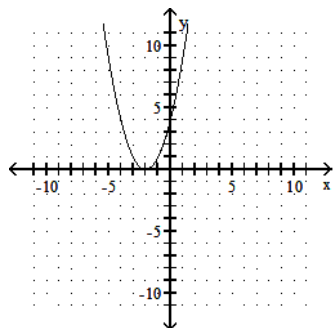
A)



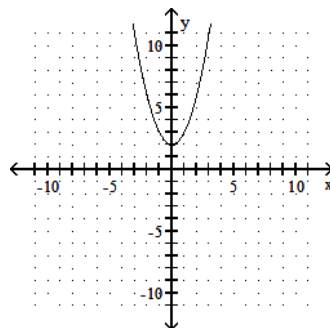
B)



C)

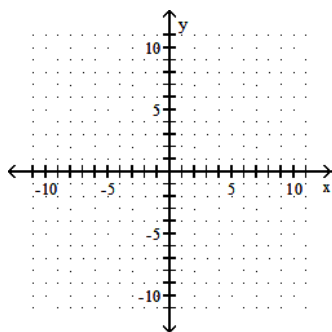


D)

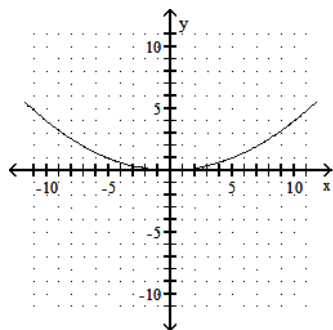


118) $y = \frac{1}{5}x^2$

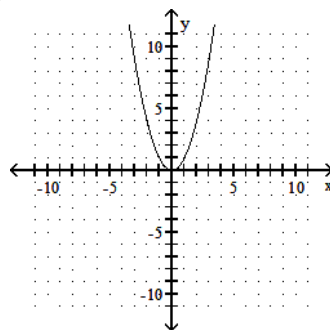
118) _____



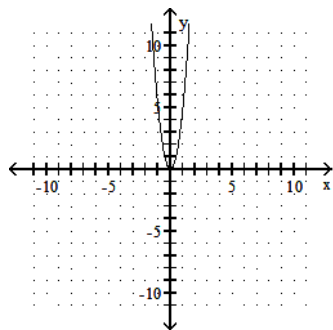
A)



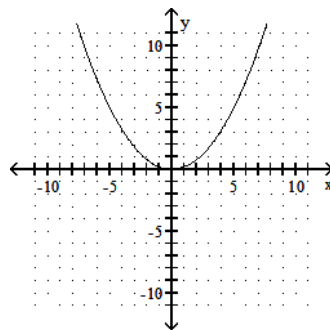
B)



C)

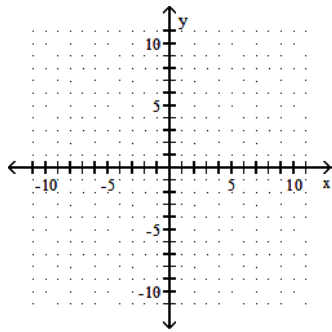


D)

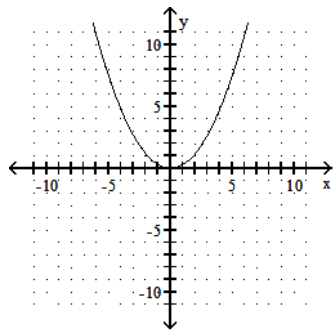


119) $y = -0.3x^2$

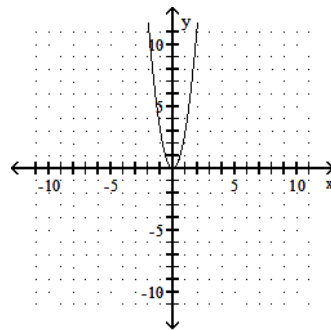
119) _____



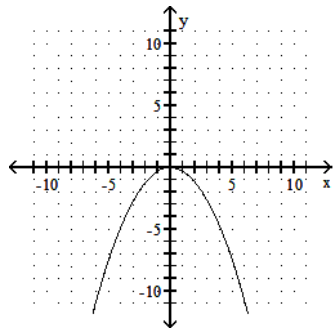
A)



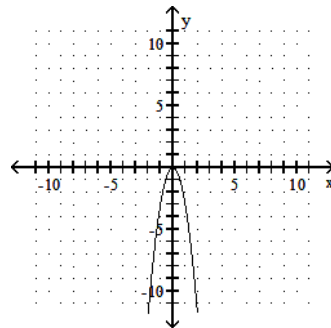
B)



C)

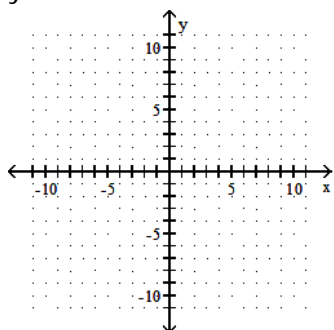


D)

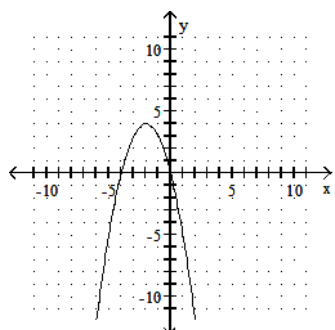


120) $y = x^2 + 4x$

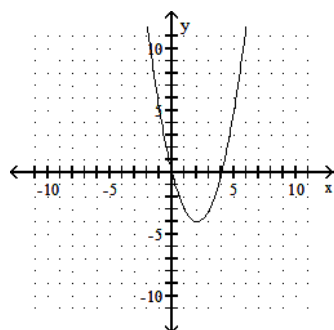
120) _____



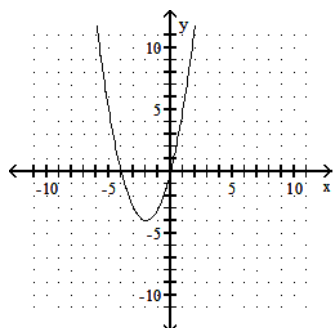
A)



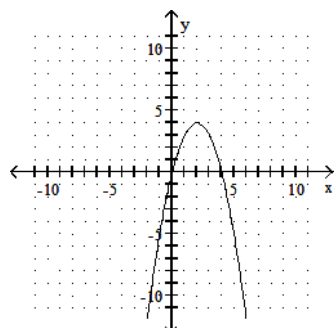
B)



C)

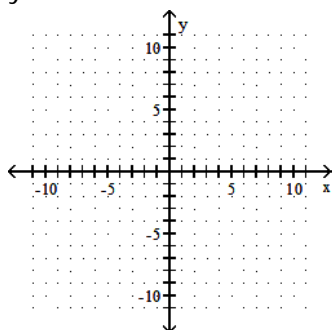


D)

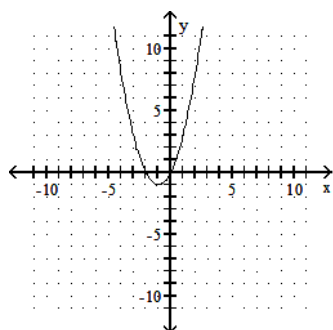


121) $y = -x^2 + 2x$

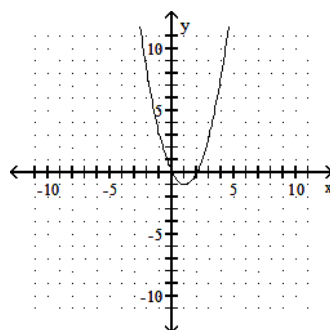
121) _____



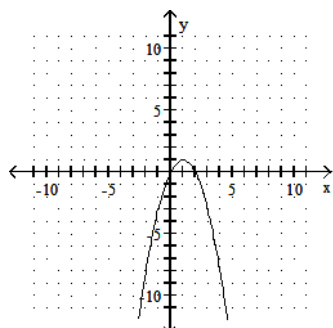
A)



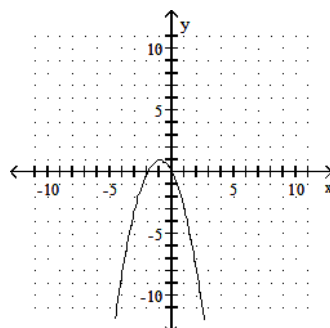
B)



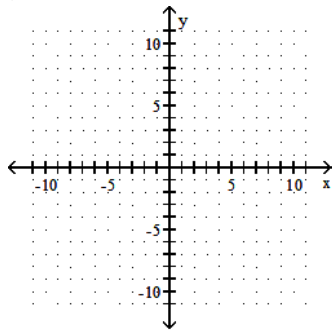
C)



D)

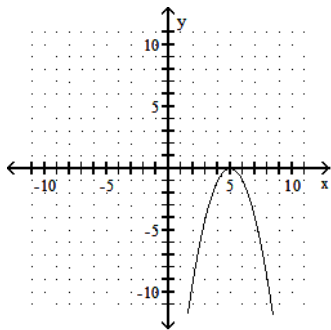


122) $y = -x^2 - 5$

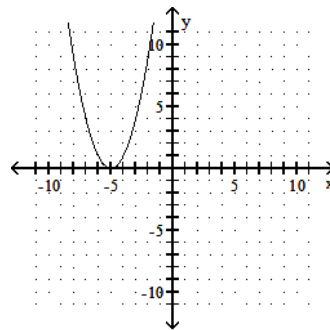


122) _____

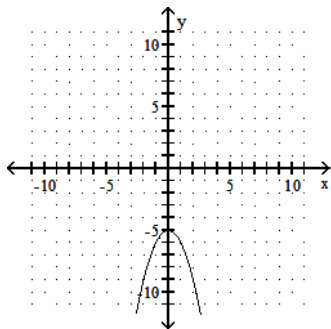
A)



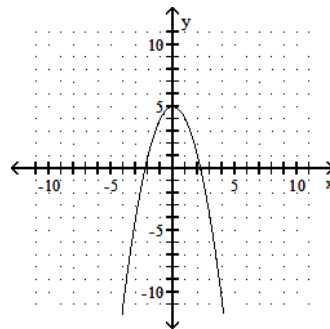
B)



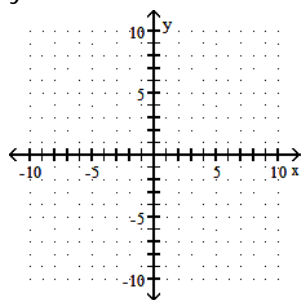
C)



D)

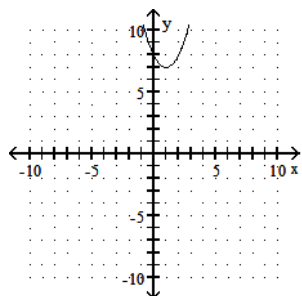


123) $y = x^2 - 2x - 8$

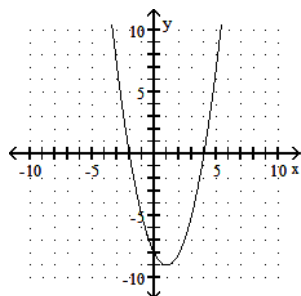


123) _____

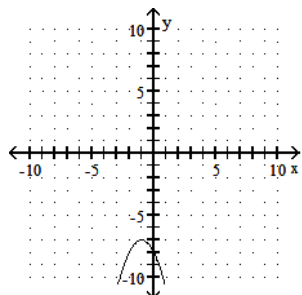
A)



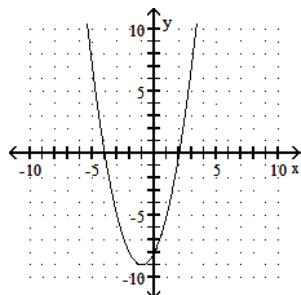
B)



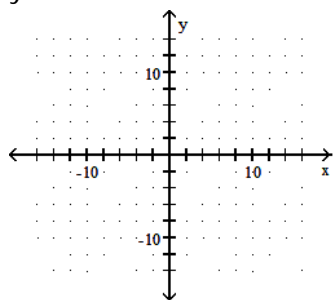
C)



D)

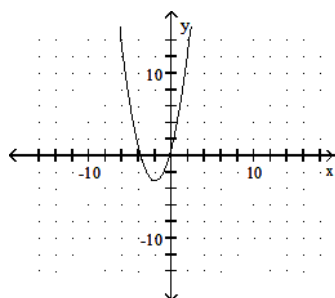


124) $y = -x^2 + 4x - 1$

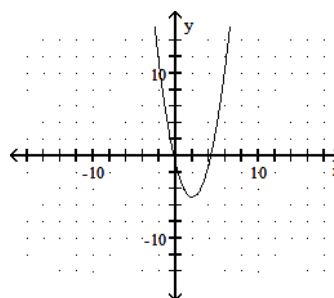


124) _____

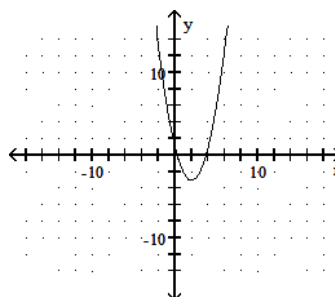
A)



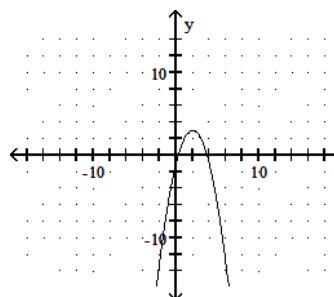
B)



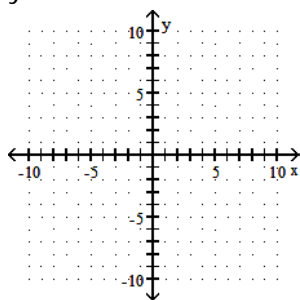
C)



D)

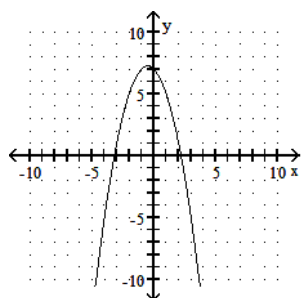


125) $y = -7 - 8x - x^2$

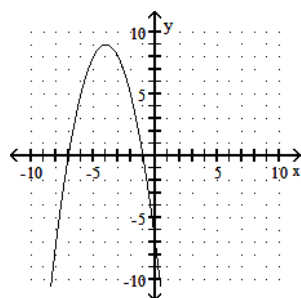


125) _____

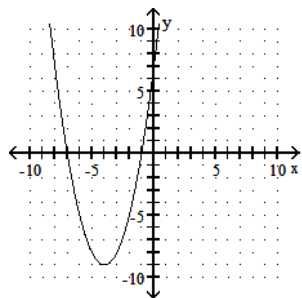
A)



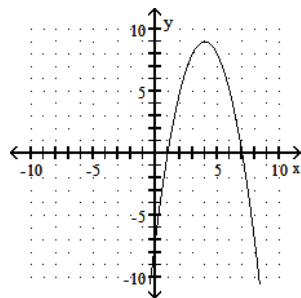
B)



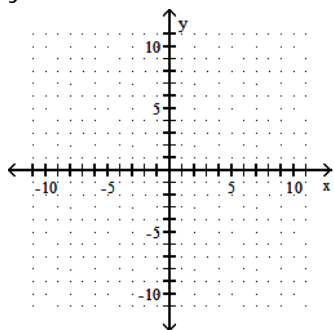
C)



D)

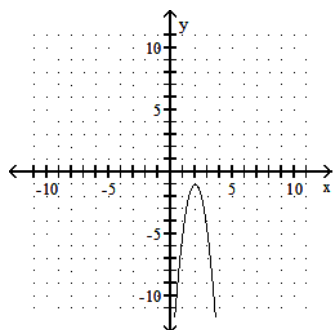


126) $y = -4x^2 + 16x - 17$

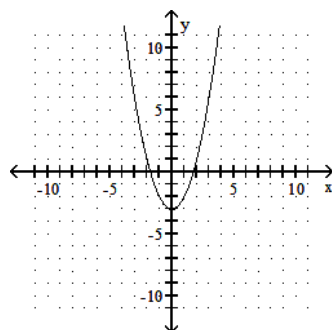


126) _____

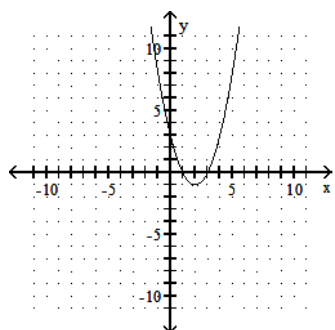
A)



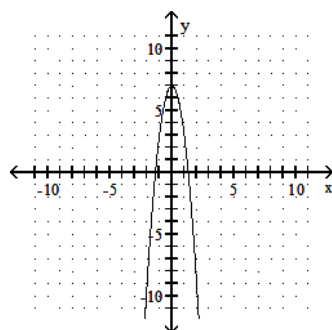
B)



C)



D)



Find the x-intercepts.

127) $y = x^2 + 3$

A) (3, 0)

C) (0, 3)

B) (3, 3)

D) no x-intercepts

127) _____

128) $y = x^2 + 5$

A) (5, 5)

C) no x-intercepts

B) (5, 0)

D) (0, 5)

128) _____

129) $y = x^2 - 3$

A) $(\sqrt{3}, 0)$ and $(-\sqrt{3}, 0)$ C) $(0, \sqrt{3})$ and $(0, -\sqrt{3})$ B) $(\sqrt{3}, 0)$

D) (0, 3)

129) _____

130) $y = x^2 + 7x$

A) (0, 0) and (0, -7)

C) (0, 0) and (7, 0)

B) (-7, 0)

D) (0, 0) and (-7, 0)

130) _____

131) $y = 2x^2 - 5x$

A) (0, 0) and (2.5, 0)

C) (0, 0) and (0, 2.5)

B) (2.5, 0)

D) (0, 0) and (-2.5, 0)

131) _____

132) $y = x^2 - 5x - 6$

- A) (6, 0) and (0, -1)
C) (0, 6) and (0, -1)

- B) (-6, 0) and (1, 0)
D) (6, 0) and (-1, 0)

132) _____

133) $y = x^2 + 2x + 8$

- A) (4, 0)
C) (-2, 0)

- B) No x-intercepts
D) (0, -2)

133) _____

134) $y = 2x^2 + 9x - 18$

- A) No x-intercepts
C) (-6, 0)

- B) (6, 0) and $\left(-\frac{3}{2}, 0\right)$
D) (-6, 0) and $\left(\frac{3}{2}, 0\right)$

134) _____

135) $y = 2x^2 + 6x - 1$

- A) $\left(\frac{-3 + 2\sqrt{11}}{2}, 0\right)$ and $\left(\frac{-3 - 2\sqrt{11}}{2}, 0\right)$
C) $\left(\frac{-3 + \sqrt{11}}{2}, 0\right)$ and $\left(\frac{-3 - \sqrt{11}}{2}, 0\right)$

- B) No x-intercepts
D) $(-3 + \sqrt{11}, 0)$ and $(-3 - \sqrt{11}, 0)$

135) _____

136) $y = -3x^2 - 8x + 2$

- A) $\left(\frac{-4 + \sqrt{22}}{3}, 0\right)$ and $\left(\frac{-4 - \sqrt{22}}{3}, 0\right)$
C) No x-intercepts

- B) $\left(\frac{4 + \sqrt{22}}{3}, 0\right)$ and $\left(\frac{4 - \sqrt{22}}{3}, 0\right)$
D) $\left(\frac{-4 + 2\sqrt{22}}{3}, 0\right)$ and $\left(\frac{-4 - 2\sqrt{22}}{3}, 0\right)$

136) _____

Is the following correspondence a function?

- 137) Domain Range
a → x
b → y
c → z
A) Yes

- B) No
137) _____

- 138) Domain Range
a → x
b → y
c → y
A) No

- B) Yes
138) _____

- 139) Domain Range
a → x
b → y
c → z
A) Yes

- B) No
139) _____

140) Domain Range
 $1 \rightarrow -15$
 $-6 \rightarrow 15$
 $-16 \rightarrow -7$

A) No

B) Yes

140) _____

141) Domain Range
 $9 \rightarrow -17$
 $-10 \rightarrow 13$
 $-15 \rightarrow -10$

A) Yes

B) No

141) _____

142) Domain Range
 $-9 \rightarrow -16$
 $-6 \rightarrow -16$
 $-15 \rightarrow -16$

A) No

B) Yes

142) _____

143) Domain Range
 $-9 \rightarrow -18$
 $2 \rightarrow 13$
 $-15 \rightarrow -7$

A) No

B) Yes

143) _____

144) Domain: All students attending Laughlin Community College
Correspondence: Each student's Social Security Number
Range: A set of Social Security Numbers

A) No

B) Yes

144) _____

145) Domain: All students attending the University of Ohio
Correspondence: Each student's teachers
Range: A set of teachers

A) No

B) Yes

145) _____

146)

Name	Test Score
Bob L.	89
Susan H.	83
Jim H.	76
Bruce B.	96

A) Yes

B) No

146) _____

Find the function value.

147) $f(x) = -2x - 1$, find $f(-5)$

A) 10

B) 9

C) -9

D) -6

147) _____

148) $f(x) = (x - 2)^2$, find $f(-6)$

A) -64

B) 16

C) 64

D) -16

148) _____

- 149) $f(x) = -6x - 5$, find $f(1)$ 149) _____
 A) 4 B) -6 C) -4 D) 6
- 150) $f(x) = 3x^2 - 6x + 6$, find $f(-3)$ 150) _____
 A) 51 B) 45 C) 27 D) 15
- 151) $f(x) = x^2 + 2x - 6$, find $f(2)$ 151) _____
 A) -6 B) 2 C) 14 D) 6
- 152) $f(x) = x^4$, find $f(-1)$ 152) _____
 A) 0 B) 1 C) -4 D) 2
- 153) $f(x) = -2x$, find $f(12.4)$ 153) _____
 A) -2480 B) -24.8 C) 10.4 D) -247.9
- 154) $f(x) = -3x - 5$, find $f(-\frac{1}{4})$ 154) _____
 A) $\frac{23}{4}$ B) $\frac{7}{4}$ C) $-\frac{17}{4}$ D) $\frac{3}{4}$

Solve the problem.

- 155) Suppose the sales of a particular brand of appliance satisfy the relationship $S(x) = 90x + 3600$, where $S(x)$ represents the number of sales in year x , with $x = 0$ corresponding to 1982. Find the number of sales in 1994. 155) _____
 A) 9360 sales B) 4680 sales C) 4590 sales D) 9270 sales
- 156) Suppose the function $T(t) = 0.8t - 2.7$ determines the actual time that has elapsed, in minutes, for t minutes of a person's estimate of the elapsed time. Find the actual time that has elapsed for an estimate of $t = 120$ minutes. 156) _____
 A) 93.3 min B) 117.84 min C) 122.16 min D) 98.7 min
- 157) The mathematical model $C(x) = 300x + 40,000$ represents the cost in dollars a company has in manufacturing x items during a month. Based on this, how much does it cost to produce 200 items? 157) _____
 A) \$1 B) \$60,000 C) \$133 D) \$100,000
- 158) The function $A(x) = 1.06x - .02x^3$ gives the approximate alcohol level (in tenths of a percent) in a person's blood x hours after drinking about 8 ounces of 100-proof whiskey. What would the person's alcohol level be 2 hours after drinking? Give answer as a percent. 158) _____
 A) 0.208% B) 2.08% C) 0.196% D) 1.96%

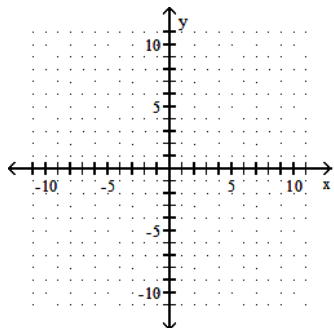
- 159) If an object is dropped, the distance it falls during t seconds is given by $d(t) = \frac{1}{2}gt^2$, where g is about 32 ft/sec^2 . Find the distance an object would fall in 10 seconds.
- A) 1600 ft B) 800 ft C) 3200 ft D) 160 ft

159) _____

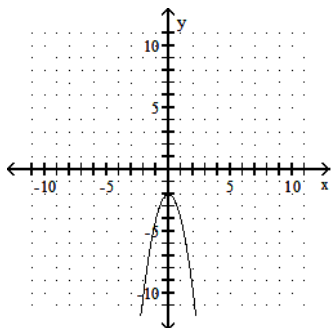
Graph the function.

160) $f(x) = -2x^2$

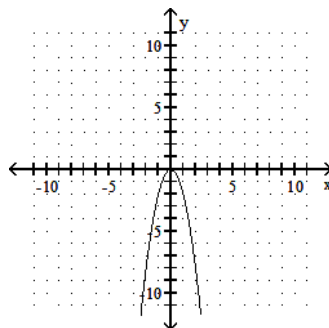
160) _____



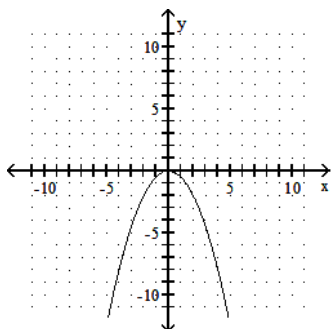
A)



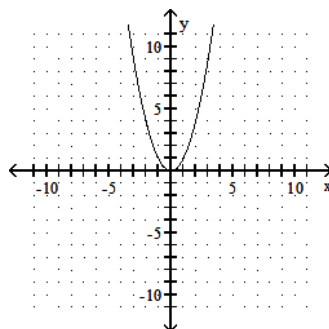
B)



C)

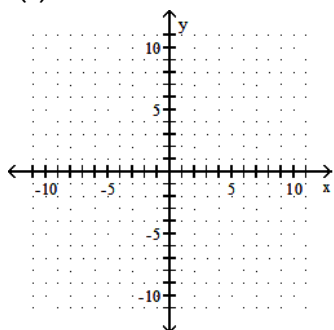


D)

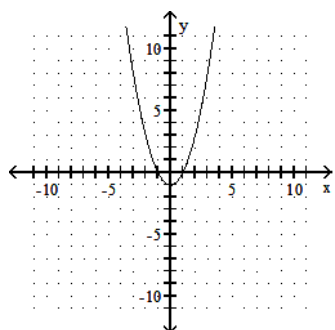


161) $f(x) = x^2 - 1$

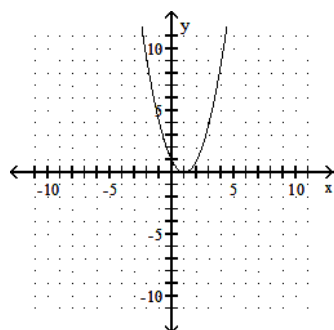
161) _____



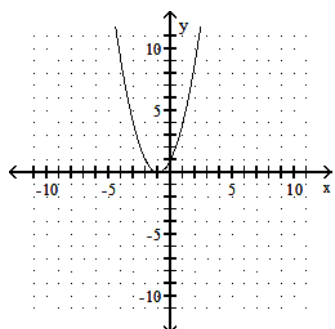
A)



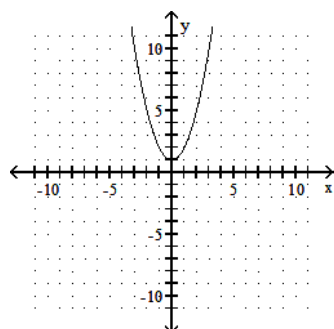
B)



C)

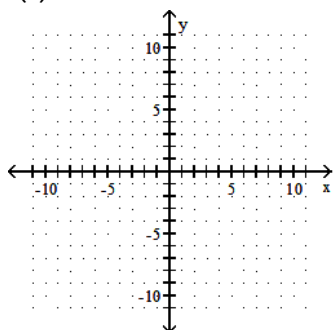


D)

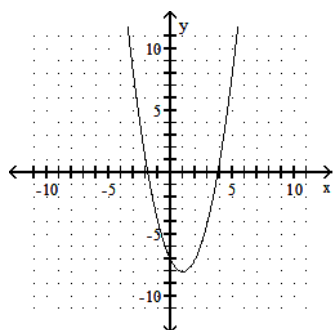


162) $f(x) = x^2 + 2x - 7$

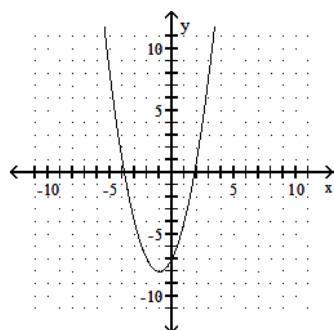
162) _____



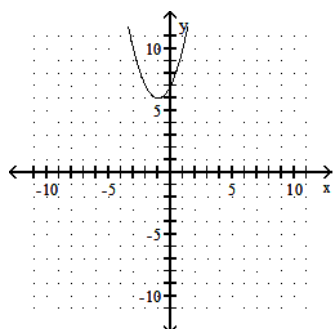
A)



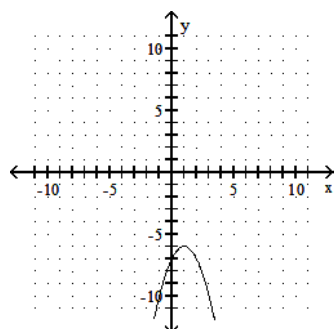
B)



C)

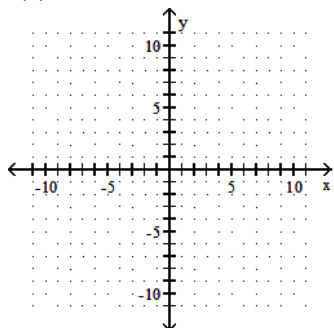


D)

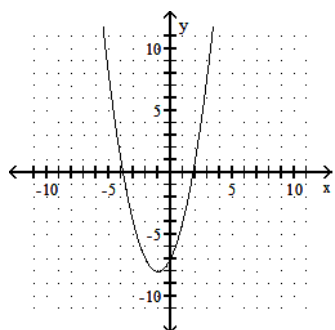


163) $f(x) = -x^2 - 2x - 7$

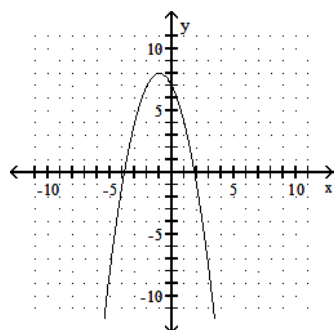
163) _____



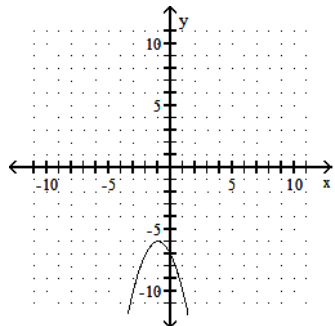
A)



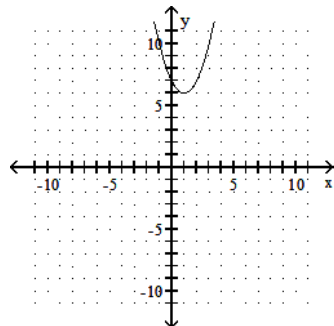
B)



C)

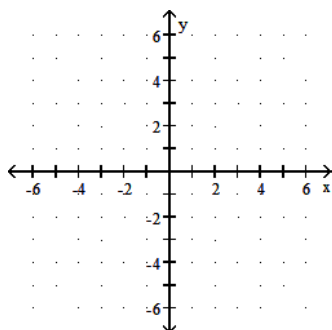


D)

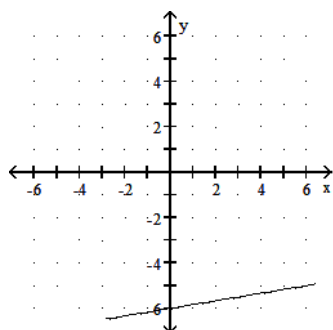


164) $f(x) = \frac{1}{6}x + 6$

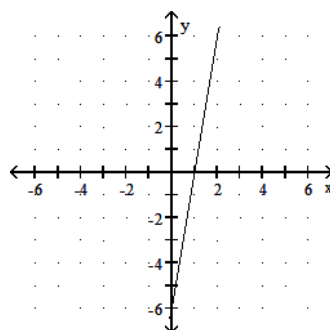
164) _____



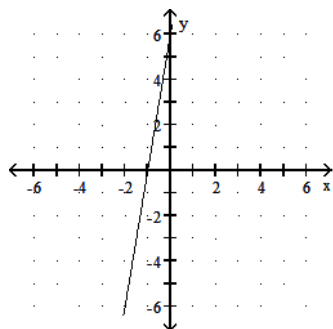
A)



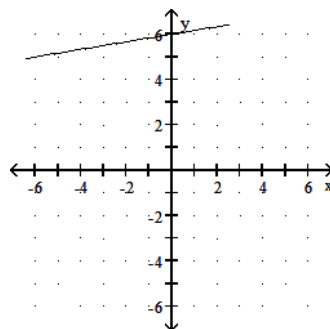
B)



C)

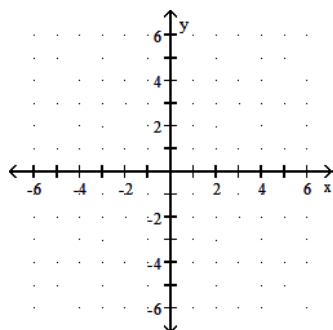


D)

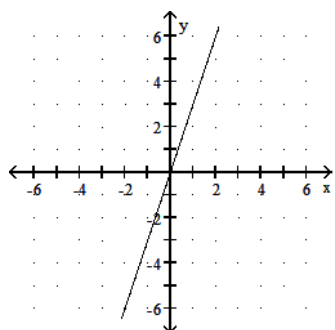


165) $f(x) = \frac{1}{3}x$

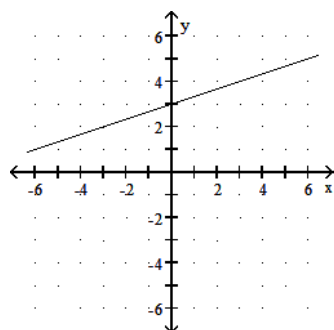
165) _____



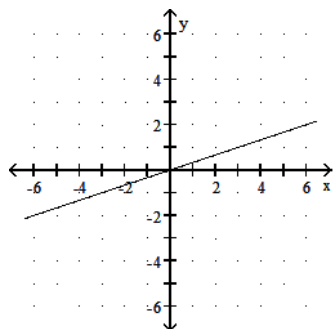
A)



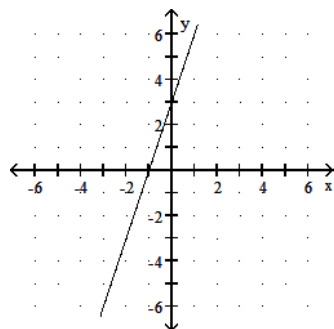
B)



C)

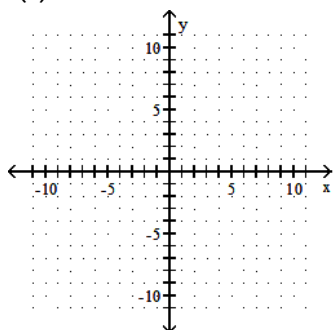


D)

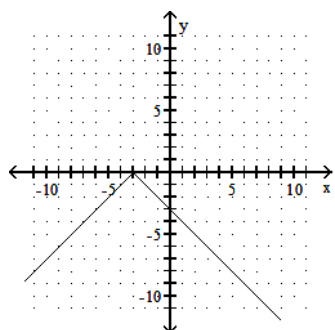


166) $f(x) = |-3 - x|$

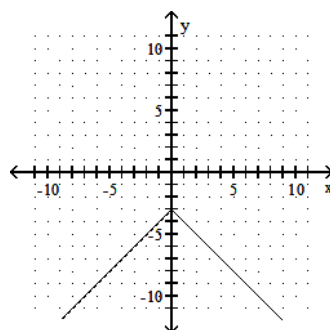
166) _____



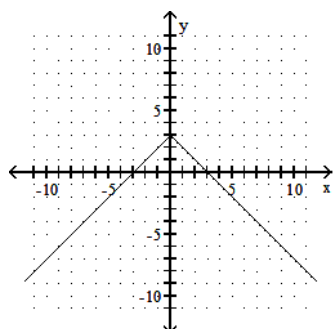
A)



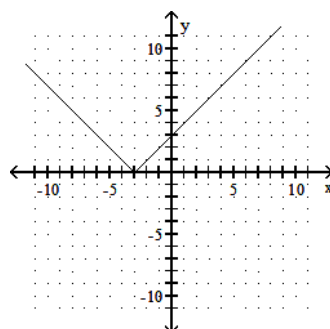
B)



C)

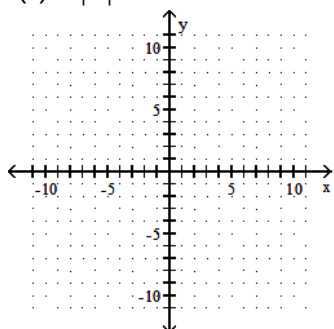


D)

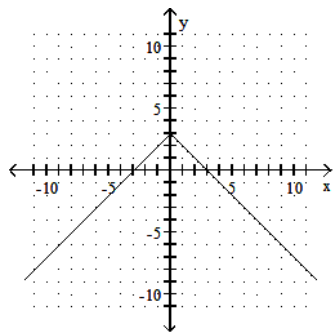


167) $f(x) = |x| - 3$

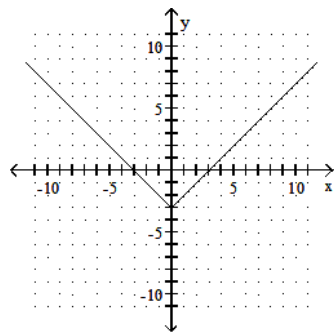
167) _____



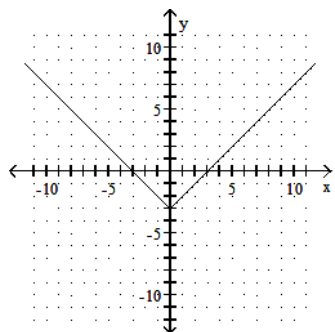
A)



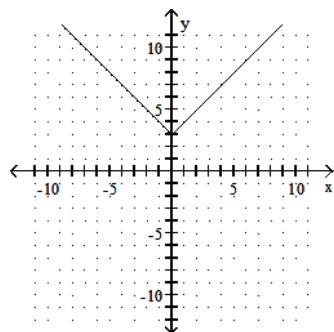
B)



C)

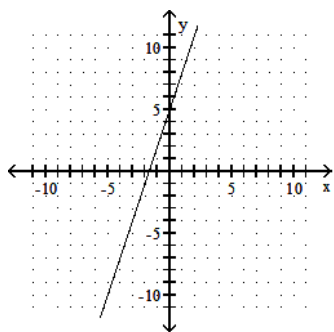


D)



Determine whether the following is the graph of a function.

168)

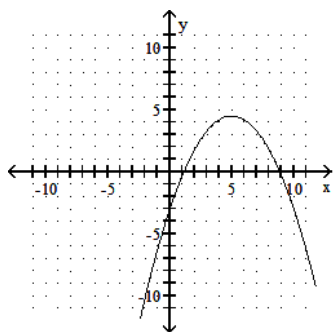


168) _____

A) Yes

B) No

169)

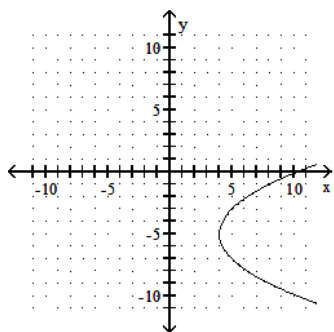


A) Yes

B) No

169) _____

170)

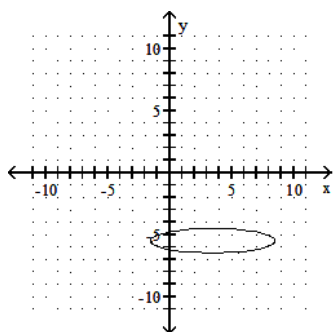


A) Yes

B) No

170) _____

171)

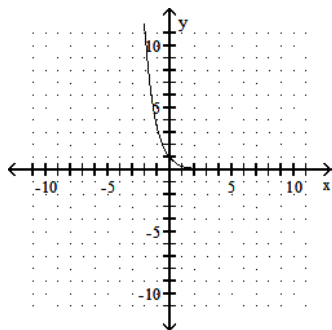


A) Yes

B) No

171) _____

172)

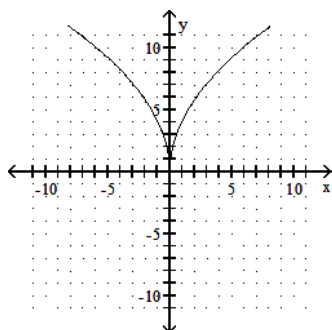


A) Yes

B) No

172) _____

173)

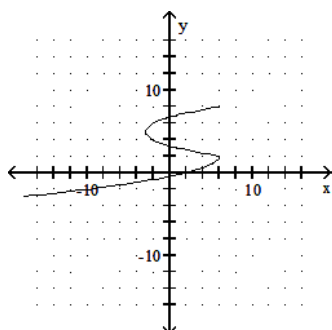


A) Yes

B) No

173) _____

174)



A) Yes

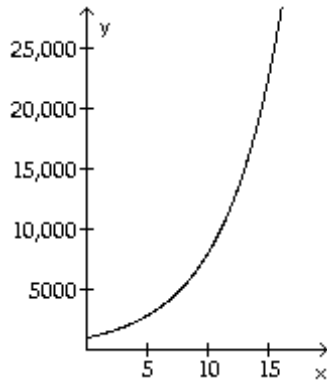
B) No

174) _____

Solve.

- 175) The air pollution, y , in appropriate units, in a large industrial city has been growing as shown by the graph below, where x is time in years from 1990. That is, $x = 0$ represents 1990. Approximate the air pollution in the year 2005 ($x = 15$) to the nearest thousand.

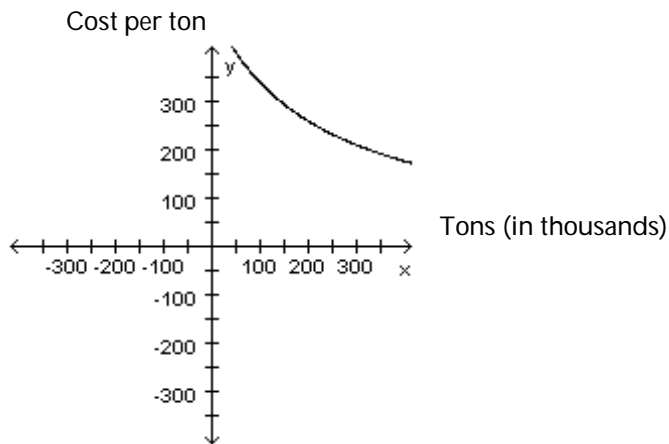
175) _____



- A) 20,000 B) 18,000 C) 22,000 D) 15,000

- 176) The U.S. Maritime Administration determined that the cost of building an oil tanker was approximated by the graph shown below. The cost per ton decreased as the weight (in thousands of tons) of the tanker increased. What is the approximate cost per ton to build a tanker of 75,000 tons?

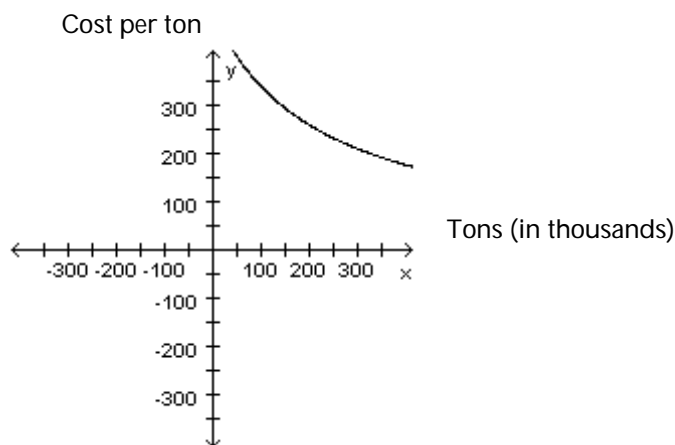
176) _____



- A) \$330 per ton B) \$375 per ton C) \$450 per ton D) \$350 per ton

- 177) The U.S. Maritime Administration determined that the cost of building an oil tanker could be approximated by the graph shown below. The cost per ton decreased as the weight (in thousands of tons) of the tanker increased. What is the approximate cost per ton to build a tanker of 300,000 tons?

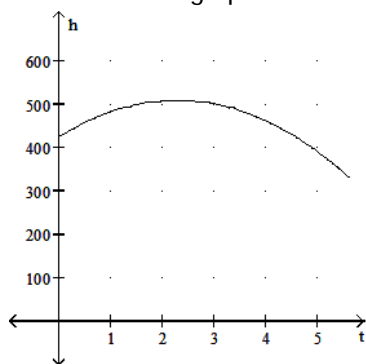
177) _____



- A) \$150 per ton B) \$210 per ton C) \$170 per ton D) \$250 per ton

- 178) The height h in feet of a projectile thrown upward from the roof of a building after time t seconds is shown in the graph below. How high will the projectile be after 2.8 seconds?

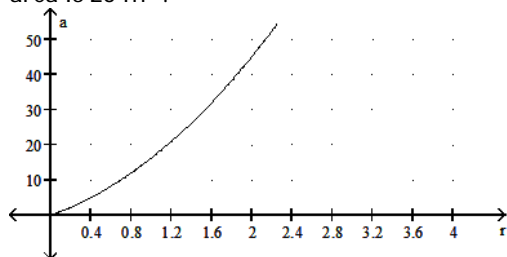
178) _____



- A) 450 ft B) 500 ft C) 550 ft D) 600 ft

- 179) The surface area a of a cylinder is shown in the graph below. What is the radius r if the surface area is 25 m^2 ?

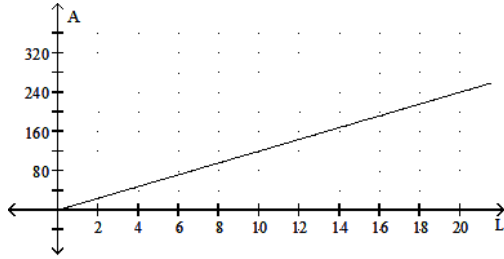
179) _____



- A) 1.4 m B) 1.6 m C) 1.0 m D) 1.2 m

- 180) The graph shows the relationship between the area A of a rectangle and the length L , if the width is fixed. Find the area if the length is 10 cm.

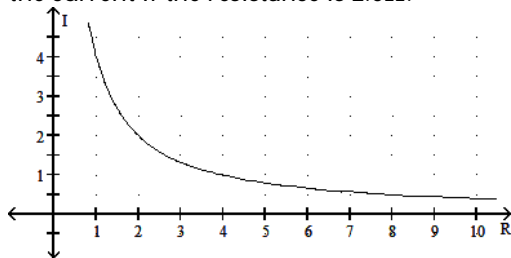
180) _____



- A) 96 cm^2 B) 144 cm^2 C) 120 cm^2 D) 84 cm^2

- 181) The graph shows the relationship between current I and resistance R if the voltage is fixed. Find the current if the resistance is 2.0Ω .

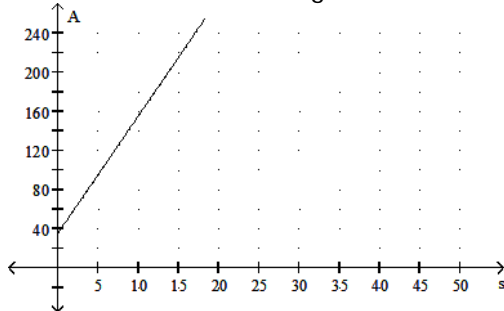
181) _____



- A) 2.0 A B) 2.4 A C) 1.8 A D) 2.2 A

- 182) The graph shows the relationship between the total surface area A of a square pyramid with a fixed base and its slant height s . Find the slant height if the surface area is 220 m^2 .

182) _____



- A) 14 m B) 13 m C) 15 m D) 16 m

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

- 183) What is the first step in order to solve the equation $4x^2 + 5x = 4$ by completing the square? 183) _____

- 184) To complete the square from an equation in the form $x^2 - ax = b$, is it ever appropriate to subtract a positive number from each side? 184) _____
- 185) To complete the square of $2x^2 + 4x = 8$, is it ever a good idea to divide by the coefficient of x^2 ? 185) _____
- 186) Use the equation $2x^2 - 6x = c$ to explain how to solve a quadratic equation by completing the square. 186) _____

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

- 187) Which one of the following methods cannot be used to solve the equation $x^2 - 4x - 1 = 0$? 187) _____
 A) Quadratic formula B) All of the methods can be used.
 C) Factoring D) Completing the square
- 188) Suppose that a problem asks you to find the height of a triangle, and that the problem leads to a quadratic equation. If h represents the height of the triangle, which of the following solutions to the equation cannot be an answer to the problem? 188) _____
 A) $h = \frac{3}{2}$ B) $h = \frac{3}{4}$ C) $h = 3 + \sqrt{3}$ D) $h = 3 - \sqrt{3}$
- 189) A student solved an equation by the quadratic formula and reached the step $x = \frac{3 \pm 4}{2}$. 189) _____
 What are the solutions of the original equation?
 A) $\frac{7}{2}, -\frac{1}{2}$
 B) $\frac{3}{2}, 2$
 C) $\frac{7}{2}$
 D) The equation has no real number solutions.
- 190) The graph of the equation $y = -4x^2 + 3x - 9$ opens _____. 190) _____
 A) to the right B) upward C) to the left D) downward
- 191) The graph of $y = (x - 10)^2$ has _____ x-intercept(s) and _____ y-intercept(s). 191) _____
 A) two; one B) one; one C) one; two D) no; one

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

192) Without graphing explain the differences between the graphs of $y = x^2$, $y = x^2 - 1$,
 $y = x^2 + 1$, $y = (x - 1)^2$, and $y = (x + 1)^2$.

192) _____

Answer Key

Testname: UNTITLED7

- 1) B
- 2) D
- 3) A
- 4) D
- 5) D
- 6) D
- 7) C
- 8) C
- 9) D
- 10) C
- 11) D
- 12) B
- 13) C
- 14) C
- 15) D
- 16) A
- 17) B
- 18) B
- 19) D
- 20) D
- 21) B
- 22) A
- 23) D
- 24) D
- 25) B
- 26) A
- 27) B
- 28) D
- 29) C
- 30) B
- 31) A
- 32) D
- 33) D
- 34) B
- 35) A
- 36) C
- 37) D
- 38) D
- 39) A
- 40) D
- 41) D
- 42) A

Answer Key

Testname: UNTITLED7

- 43) D
- 44) A
- 45) B
- 46) D
- 47) D
- 48) A
- 49) D
- 50) C
- 51) B
- 52) C
- 53) B
- 54) C
- 55) A
- 56) D
- 57) D
- 58) A
- 59) D
- 60) C
- 61) A
- 62) D
- 63) D
- 64) C
- 65) B
- 66) D
- 67) B
- 68) A
- 69) C
- 70) C
- 71) D
- 72) A
- 73) A
- 74) A
- 75) C
- 76) C
- 77) B
- 78) D
- 79) D
- 80) D
- 81) A
- 82) C
- 83) D
- 84) A

Answer Key

Testname: UNTITLED7

- 85) A
- 86) B
- 87) C
- 88) B
- 89) C
- 90) A
- 91) C
- 92) C
- 93) D
- 94) C
- 95) D
- 96) D
- 97) C
- 98) C
- 99) D
- 100) B
- 101) D
- 102) A
- 103) C
- 104) B
- 105) A
- 106) D
- 107) B
- 108) B
- 109) C
- 110) A
- 111) B
- 112) B
- 113) B
- 114) A
- 115) C
- 116) A
- 117) C
- 118) D
- 119) C
- 120) C
- 121) C
- 122) C
- 123) B
- 124) D
- 125) B
- 126) A

Answer Key

Testname: UNTITLED7

- 127) D
- 128) C
- 129) A
- 130) D
- 131) A
- 132) D
- 133) B
- 134) D
- 135) C
- 136) A
- 137) A
- 138) B
- 139) B
- 140) B
- 141) B
- 142) B
- 143) A
- 144) B
- 145) A
- 146) A
- 147) B
- 148) C
- 149) C
- 150) A
- 151) B
- 152) B
- 153) B
- 154) C
- 155) B
- 156) A
- 157) D
- 158) C
- 159) A
- 160) B
- 161) A
- 162) B
- 163) C
- 164) D
- 165) C
- 166) D
- 167) C
- 168) A

Answer Key

Testname: UNTITLED7

169) A

170) B

171) B

172) A

173) A

174) B

175) C

176) B

177) B

178) B

179) A

180) C

181) A

182) C

183) Divide both sides by 4

184) No

185) Yes

186) Divide both sides of the equation by 2. Add $\frac{9}{4}$ to both sides of the equation. Take the square root of both sides of the equation, being careful to remember to use the positive and negative square roots of the right side. Then add $\frac{3}{2}$ to both sides of the equation.

187) C

188) D

189) A

190) D

191) B

192) All graphs are the same shape. The graph of $y = x^2 - 1$ is shifted 1 units down, the graph of $y = x^2 + 1$ is shifted 1 units up, the graph of $y = (x - 1)^2$ is shifted 1 units to the right, and the graph of $y = (x + 1)^2$ is shifted 1 units to the left.