

1. Solve: $(5x - 1)(2x + 3)(x + 6) = 0$

A) $x = \{1, -3, -6\}$

B) $x = \{5, 2, -6\}$

C) $x = \left\{\frac{1}{5}, -\frac{3}{2}, -6\right\}$

D) $x = \{-5, -6\}$

3. Add: $\frac{2x}{x^2 - 4x + 4} + \frac{3}{x - 2}$

A) $\frac{2x + 3}{x^2 - 3x + 2}$

B) $\frac{5x - 6}{(x - 2)^2}$

C) $\frac{2x + 3}{x^2 - 4x + 4}$

D) $\frac{5x - 6}{x - 2}$

5. Simplify: $\left(\frac{9a^4b^3}{16}\right)^{\frac{1}{2}}$

A) $\frac{3a^2b\sqrt{b}}{4}$

B) $\frac{3a^2b^2}{4}$

C) $\frac{4.5a^2b\sqrt{b}}{8}$

D) $\frac{4.5a^4b^3}{4}$

7. Which of the following expressions should be placed in each set of parentheses below in order to solve the quadratic equation by the method of completing the square?

$$x^2 - 5x + (?) = -3 + (?)$$

A) $\frac{5}{2}$ B) $\frac{25}{4}$ C) 10 D) 25

2. Solve: $x^2 + 4 = 54$

A) $x = \pm 2\sqrt{5}$

B) $x = \pm 5\sqrt{2}$

C) $x = \pm 25\sqrt{2}$

D) $x = 5 \pm \sqrt{2}$

4. Solve: $\frac{2}{x + 3} - \frac{x}{x^2 - 9} = \frac{4}{x - 3}$

A) $x = -8$

B) $x = -6$

C) $x = \frac{2}{3}$

D) $x = 6$

6. Simplify: $(-64a^3)^{\frac{1}{3}}$

A) $-21.3a^3$

B) $-4a$

C) $8a$

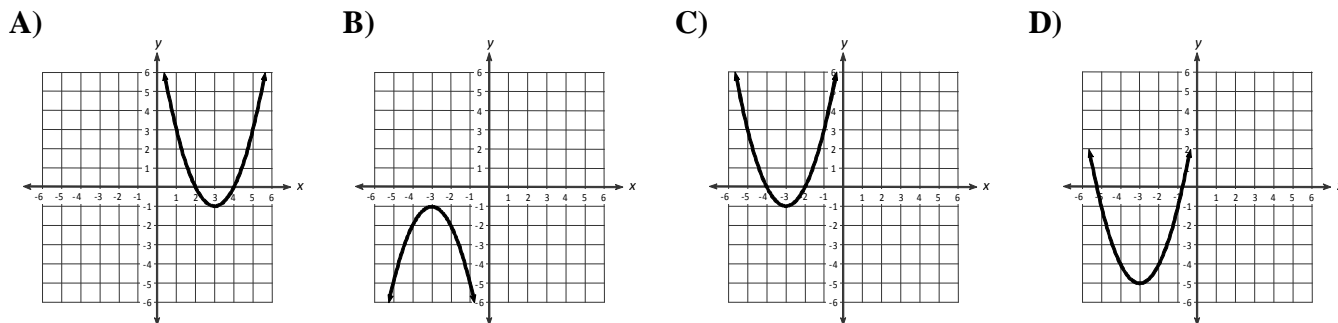
D) Not a real number

8. Which of the following expressions should be placed in each set of parentheses below in order to solve the quadratic equation by the method of completing the square?

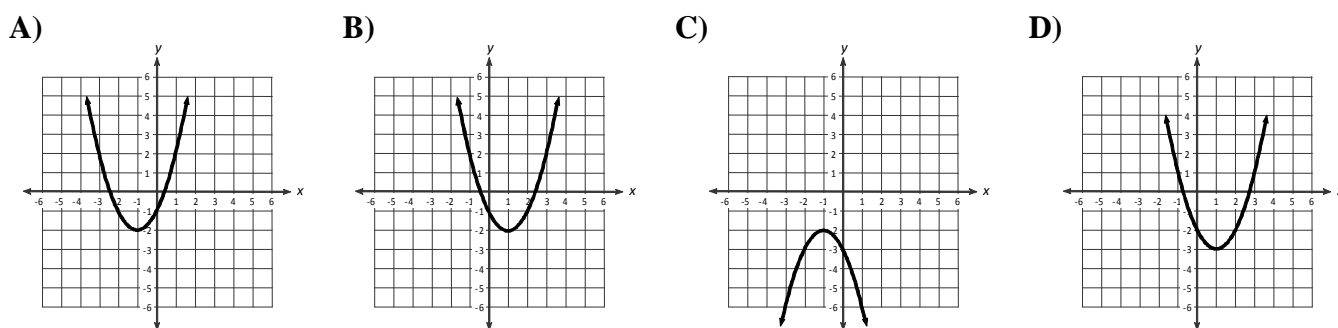
$$x^2 - 9x + (?) = -3 + (?)$$

A) $-\frac{9}{2}$ B) $\frac{9}{2}$ C) $\frac{81}{4}$ D) 81

9. Graph: $y = x^2 + 6x + 8$

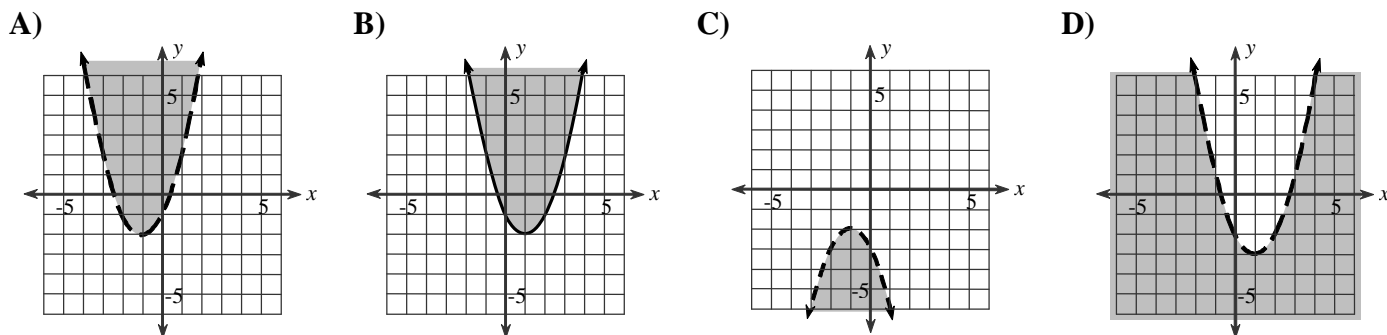


10. Graph: $y = x^2 + 2x - 1$



11. Which graph best represents the solution set for

$$y > x^2 + 2x - 1?$$



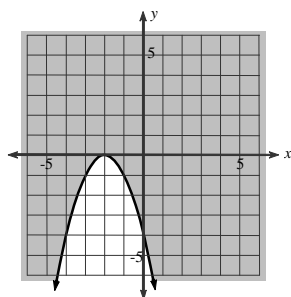
12. Which of the following inequalities describes the shaded region?

A) $y \geq -x^2 - 4x - 4$

B) $y < -x^2 - 4x - 4$

C) $y > -x^2 - 4x + 4$

D) $y \geq -x^2 + 4x + 4$



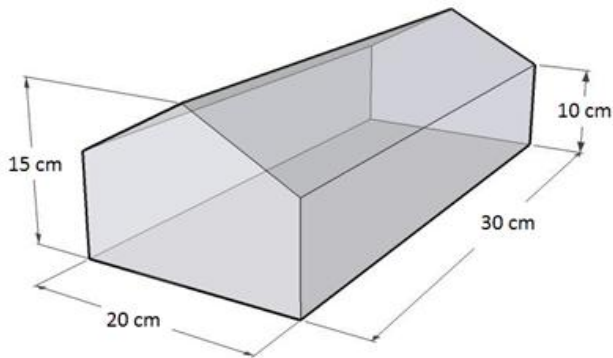
13. If $G(x) = -2x + 5$, evaluate $G(0) - G(1)$.

- A) -5
- B) -2
- C) 2
- D) 5

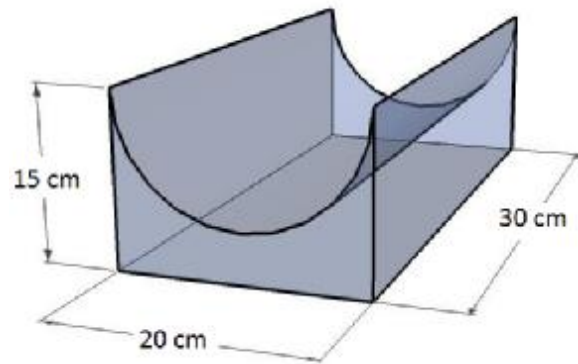
14. If $G(x) = -3x^2 + x - 5$, evaluate $G(0) - G(1)$.

- A) -12
- B) -5
- C) -1
- D) 2

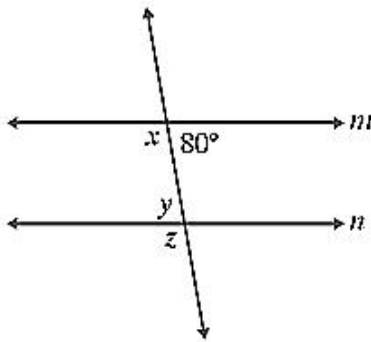
15. Find the volume of the shape shown below.



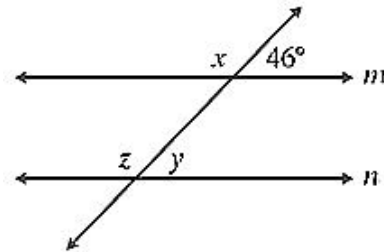
16. Find the volume of the shape shown below.



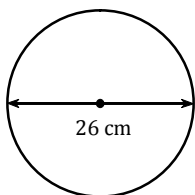
17. Given: $m \parallel n$. Find x , y , and z .



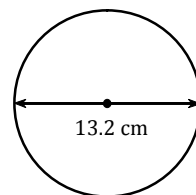
18. Given: $m \parallel n$. Find x , y , and z .



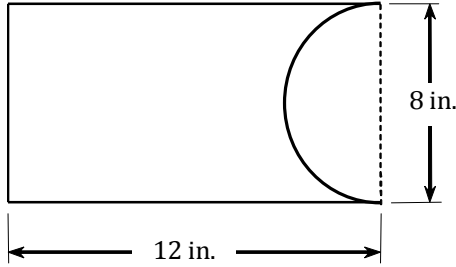
19. Find the circumference of the circle shown. Round your answer to the nearest **tenth**.



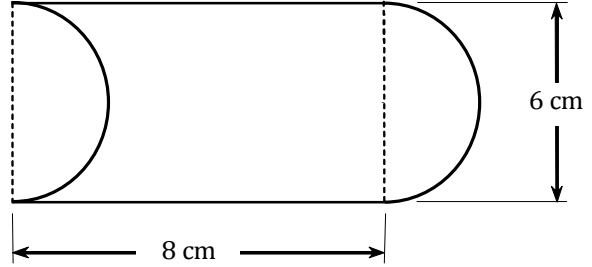
20. Find the circumference of the circle shown. Round your answer to the nearest **hundredth**.



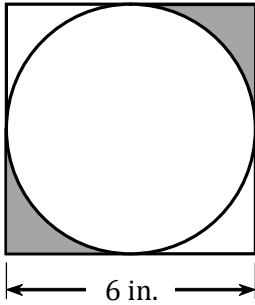
21. Find the perimeter of the figure shown. Round your answer to the nearest **tenth**.



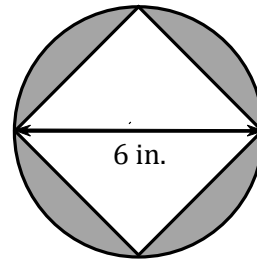
22. Find the perimeter of the figure shown. Round your answer to the nearest **tenth**.



23. Find the area of the shaded region. Round your answer to the nearest tenth.



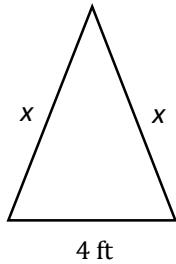
24. Find the area of the shaded region. Round your answer to the nearest tenth.



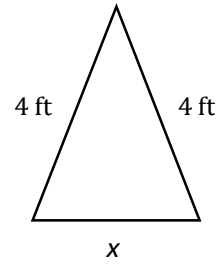
25. If a 30-foot tree casts an 18-foot shadow, find the length of the shadow cast by a 24-foot tree.

26. If a 24-foot flagpole casts a 32-foot shadow, find the length of the shadow cast by a 44-foot antenna. Round to the nearest tenth.

27. The isosceles triangle below has a perimeter of 8 feet. Find the length of one of the equal sides.



28. The isosceles triangle below has a perimeter of 11 feet. Find the length of the unknown side.



29. Solve: $5x(x + 2)(x - 2) = 0$

30. Solve: $x^2 - 6x - 55 = 0$

31. Solve: $x^2 + 7x = -12$

32. Solve: $x^2 - 6 = 42$

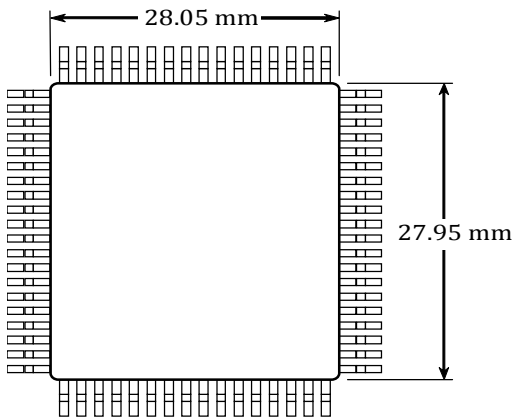
33. Perform the indicated operation.

$$\frac{8}{x + 4} - \frac{3}{3x + 12}$$

34. Solve. Check your answer.

$$\frac{2}{x - 2} + 1 = \frac{x}{x + 2}$$

35. The schematic of a microprocessor is shown below. Find the length of the chip's diagonal dimension. Round your answer to the nearest hundredth.



37. An object is dropped from the roof of a 144-foot-tall building. Neglecting air resistance, the height h in feet of the object above the ground after t seconds is given by the quadratic equation

$$h = -16t^2 + 144.$$

Find how long it takes the object to hit the ground.

39. Find the length of the shorter leg of a right triangle if the longer leg is 12 feet more than the shorter leg and the hypotenuse is 12 feet less than twice the shorter leg. *Hint: Solve by first translating to an equation.*

41. Smith Engineering found that an experienced surveyor can survey a roadbed in 4 hours. An apprentice surveyor needs 5 hours to survey the same stretch of road. If the two work together, find how long it takes them to complete the job.

36. Find the diagonal of a square whose area is 20 square inches. Round your answer to the nearest hundredth.

38. The height h of a javelin thrown at the Olympic Trials can be modelled by the equation

$$h = -16t^2 + 64t,$$

where t is the time in seconds after launch. At what time does the javelin hit the ground?

40. An architect's squaring instrument is in the shape of a right triangle. Find the length of the longer leg of the right triangle if the hypotenuse is 8 centimeters longer than the longer leg and the shorter leg is 8 centimeters shorter than the longer leg. *Hint: Solve by first translating to an equation.*

42. One pipe fills a storage pond in 20 hours. A second pipe fills the same pond in 15 hours. When a third pipe is added and all three are used to fill the pond, it takes only 6 hours. Find how long it would take the third pipe alone to do the job.

43. An instructor is driving from STC's Weslaco campus to the Starr county campus to do a special presentation for nursing students. The trip is 80 miles. If the instructor averages 50 mph, how long does it take to make the trip to Starr county?

44. An Amtrak American Eagle train departs San Antonio on Wednesday at 7 a.m. and arrives in St. Louis the following morning at about 8 a.m.. The 1015 mile journey is interrupted by 18 stops along the way. Find the average speed of the train traveling from San Antonio to St. Louis.

45. Simplify the radical. Assume that all variables represent positive numbers.

$$\sqrt{\frac{24y^2z^{11}}{3x^4}}$$

46. Simplify the radical. Assume that all variables represent positive numbers.

$$\sqrt{\frac{60a^3b^5}{15c^8}}$$

47. Add or subtract by first simplifying each radical and then combining any like radicals.

$$2\sqrt{45} - 2\sqrt{20}$$

48. Add or subtract by first simplifying each radical and then combining any like radicals.

$$5\sqrt{18} + 2\sqrt{32}$$

49. Multiply and simplify. Assume that all variables represent positive real numbers.

$$\sqrt{2xy^2} \cdot \sqrt{8xy}$$

50. Multiply and simplify. Assume that all variables represent positive real numbers.

$$\sqrt{18x^2y^2} \cdot \sqrt{2x^2y}$$

51. Divide and simplify. Assume that all variables represent positive real numbers.

$$\frac{\sqrt{90}}{\sqrt{5}}$$

52. Divide and simplify. Assume that all variables represent positive real numbers.

$$\frac{\sqrt{96}}{\sqrt{8}}$$

Quadratic Formula

If a , b , and c are real numbers and $a \neq 0$, a **quadratic equation** written in the form

$ax^2 + bx + c = 0$ has solutions

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

53. Solve the quadratic equation.

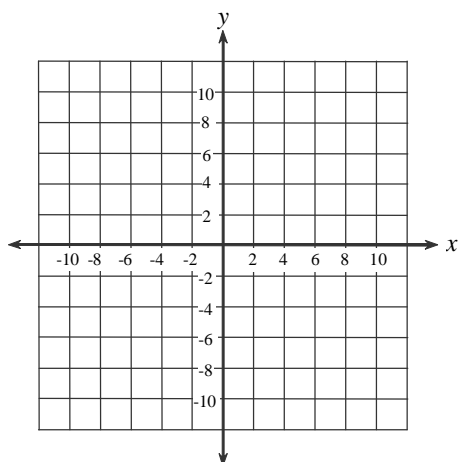
$$x^2 - 10x = -7$$

54. Solve the quadratic equation.

$$x^2 = 3x + 2$$

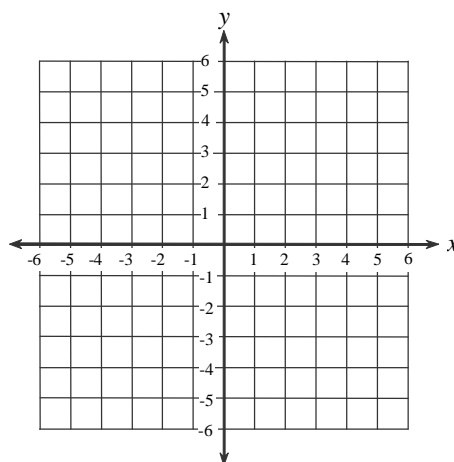
55. Graph. Identify the vertex and intercepts.

$$y = x^2 + 6x$$



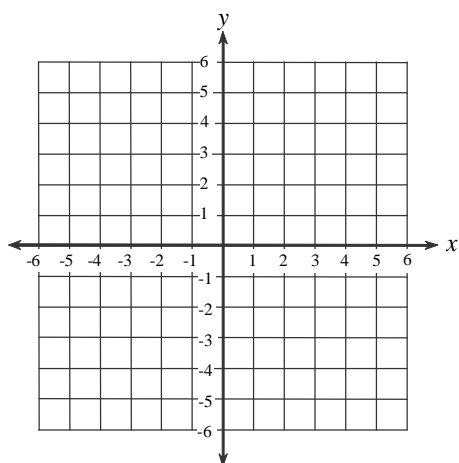
56. Graph. Identify the vertex and intercepts.

$$y = x^2 - 2x - 3$$



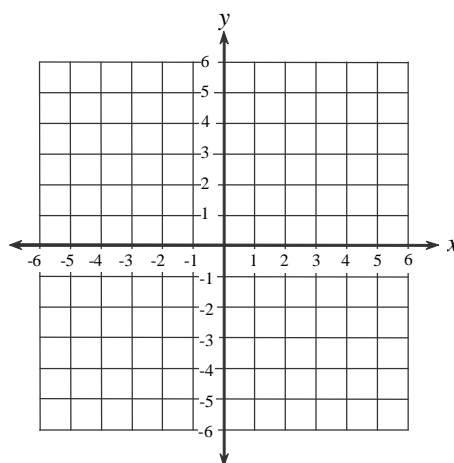
57. Graph. Identify the vertex and intercepts.

$$y = x^2 - 4x + 3$$



58. Graph. Identify the vertex and intercepts.

$$y = x^2 - 6x + 5$$



59. Solve the absolute value equation.

$$|3x - 2| + 6 = 10$$

60. Solve the absolute value equation.

$$-8 = |x - 3| - 10$$

Math 90 Final Exam Study Guide Answer Key

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

15. 7500 cm^3 16. Exact: $(9000 - 1500\pi) \text{ cm}^3$; Approximation: 4290 cm^3

17. $m\angle x = m\angle z = 100^\circ, m\angle y = 80^\circ$ 18. $m\angle x = m\angle z = 134^\circ, m\angle y = 46^\circ$ 19. 81.6 cm

20. 41.45 cm 21. 44.6 in. 22. 34.8 cm 23. 3.9 in.^2 24. 10.3 in.^2

25. $14\frac{2}{5} \text{ ft}$ 26. 58.7 ft 27. 2 ft 28. 3 ft 29. $-2, 0, 2$

30. $-5, 11$ 31. $-3, -4$ 32. $\pm 4\sqrt{3}$ 33. $\frac{7}{x+4}$ 34. 0

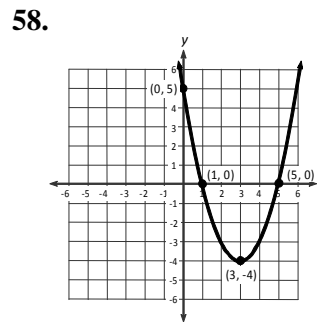
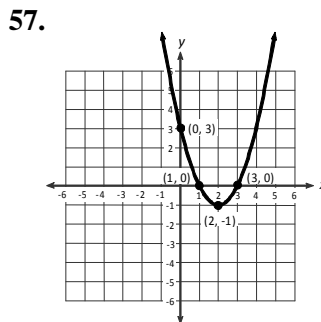
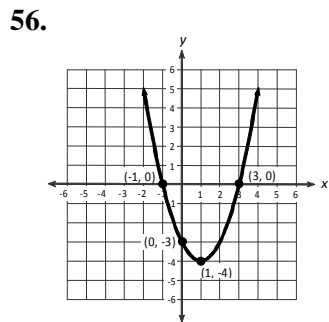
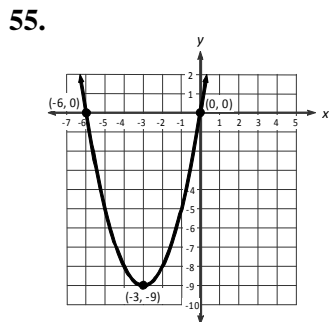
35. 39.60 mm 36. 6.32 in. 37. 3 sec 38. 4 sec

39. $x^2 + (x + 12)^2 = (2x - 12)^2; x = 36 \text{ ft}$ 40. $x^2 + (x - 8)^2 = (x + 8)^2; x = 32 \text{ cm}$

41. $2\frac{2}{9} \text{ hr}$ 42. 20 hr 43. 1.6 hrs or 1 hr, 36 min 44. 40.6 mph

45. $\frac{2yz^5\sqrt{2z}}{x^2}$ 46. $\frac{2ab^2\sqrt{ab}}{c^4}$ 47. $2\sqrt{5}$ 48. $23\sqrt{2}$ 49. $4xy\sqrt{y}$

50. $6x^2y\sqrt{y}$ 51. $3\sqrt{2}$ 52. $2\sqrt{3}$ 53. $5 \pm 3\sqrt{2}$ 54. $\frac{3 \pm \sqrt{17}}{2}$



59. $\left\{ 2, -\frac{2}{3} \right\}$ 60. $\{1, 5\}$