

Algebra I

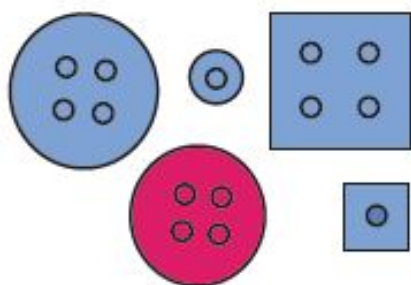
Diagnostic Test

Rules

- This diagnostic test consists of questions from all chapters of the course. If the student scores at least 90% in this test, then the student can skip this course. Signup for the next course.
- If the student scored less than 90% of this test, then you should join this course.
- The student should try to answer all of the questions without a calculator and without any help. No time limit and no negative scoring.
- Each question carries 1 point. Total number of answers are 55. You should score at least 50 out of 55 to score 90% or above.
- Answers are provided at end of test. Print this test if possible but keep the answer sheet away until end of test.

1 Raffi thinks the fraction $\frac{22}{641}$ is irrational because when he changed it to a decimal he couldn't get it to repeat or terminate. Is he right?

2 Connie has 8 small blue buttons that are round. She has 3 large buttons that are blue and square. 5 buttons are blue and square and also small. She knows she has 28 buttons that are small and a total of 26 that are blue. 2 buttons are red, small, and also square. If in total she has 50 buttons, how many are large, square but not blue? Use a Venn diagram to find the answer.



3 $-\frac{2}{3} \cdot \underline{\hspace{2cm}} = 1$

4 $100 \div -5 \div -4 = \underline{\hspace{2cm}}$

5 $23 + [22 - 3(4 + 1)]$

6 $-\frac{3}{4} = \frac{6}{5}w \quad w =$

7 $4(y - 4) + 3(y + 2) - 2(y - 5) + 9 = 2(2y - 1) + 3(y + 2) - 3y$

8. $.08(4y + 5) - .03(2y - 3) = .36$
9. $\frac{2a + 3}{9} - \frac{4a - 1}{6} - \frac{9 - 8a}{18} = 0$
10. In a rectangle, the width must be three less than half the length. If the perimeter is 138 inches, find the dimensions of the rectangle.
11. In a parallelogram the measure of opposite angles are equal. If one angle is $(4x - 5)^\circ$ and its opposite angle is $(3x + 3)^\circ$, find all the angles of the parallelogram. Hint: The measures of the angles of any parallelogram add up to 360° .
12. Find three consecutive even integers such that six times the second results in five times the third.
13. A bank teller dropped all the pennies she was counting on the floor. She knew she had 25 dimes and ten times as many pennies as nickels. Altogether her dimes, nickels, and pennies added up to \$3.70. How many pennies did she drop? Make your own chart.
14. Jacob is two years older than Thomas, and Thomas is three years older than Maria. Find their ages if the sum of their ages now is 44.
15. Tom's uncle lends him \$800 for the summer. At the end of the summer Tom needs to pay the money back plus 5% interest. How much does Tom owe his uncle?
16. Josef measured a picture frame and found it to be $47.5'' \times 72''$. Then he saw in the box that the actual measurements were $48'' \times 72''$. What is the relative error and the percent error?

- 17 Three cubic meters of soil that contains 20% sand was mixed with 7 cubic meters of soil containing 40% sand. What is the concentration of sand in the new mixture?
- 18 How many quarts of a 30% sugar solution should be mixed with 8 quarts of a 50% sugar solution to obtain a 40% solution?
- 19 An airplane leaves Miami, Florida, at the same time that another airplane leaves Santiago, Chile. The planes are heading toward each other at the rates of 625 mph and 575 mph respectively. If the two cities are 4,200 miles apart, how long will it take until the planes pass each other?
- 20 A girl drove her bike at the rate of 10 mph and then after a flat tire she walked at the rate of 2 mph. The entire trip took 2 hours for a total of 16 miles. How long did she walk, and how long did she bike?
- 21 A pipe can fill a city's water tank in 5 days while a second pipe can fill the same water tank in 8 days. There is a third pipe which could be used in emergencies and this last one can fill the tank in 6 days. How many days would it take if they could all be used at the same time? Round your answer to the nearest unit.
- 22 Solve the inequality. $-2(y - 5) \geq y - 11$
- 23 $25 > 5x + 10 \geq -10$
- 24 $6 < |x + 1| \leq 8$

25 Simplify $(8y + 2x + 2xy + 1) + (3xy + 1) - (-8y - 3xy + 2)$

26 $\left(\frac{1}{2}a^5b^3\right)^2(-2a)^2(3ab)$

27 $\frac{3^{-3}g}{3^{-1}g^{-6}}$

28 $\frac{-35yz^6 + 21yz^5 - 7yz}{7z}$

Factor the following problems.

29 $3x^2 + 2x + 21x + 14$

30 $8bx^3y - 60bx^2y + 28bxy$

31 Find the third consecutive positive integer such that the product of the second integer and the third is 30.

32 In a right triangle, one of the legs is one less than twice the smallest leg. If the hypotenuse is one more than twice the smallest leg, find each side of the right triangle.

33 Round to the nearest hundredth. $\sqrt{143}$

- 34 $\sqrt{15} - \sqrt{12} - 2$
- 35 $(2\sqrt{3} + 3\sqrt{5})(2\sqrt{3} + 2\sqrt{7})$
- 36 Solve $y^2 + 3y - 10 = 0$ by factoring AND by using the quadratic formula.
- 37 Which of the following equations is parallel to $3x + y = 2$?
- a $y = -3x + 5$ b $y = 3x + 2$ c $y = 3$ d $y = \frac{1}{3}x + 4$
- 38 Which of the following equations is perpendicular to $y = 4x$?
- a $y = -4x$ b $y = 4$ c $y = -\frac{1}{4}x + 9$ d $y = \frac{1}{4}$

Find the equation of the line that passes by these points.

- 39 $(1, 4)$ and $(-3, 8)$
- 40 $(-4, 5); m = -\frac{1}{2}$
- 41 Solve the following equations by elimination method.

$$\begin{aligned} 8r + 3s &= 0 \\ 12r + 4s &= 1 \end{aligned}$$

- 42 There are a group of chickens and elephants standing together. Someone counted 30 heads and 70 feet. If each chicken had 2 legs and each elephant had 4 legs (just to let you know the elephants had not stomped on the chickens yet ...), how many of each were there?

- 43 Find the vertex and the axis of symmetry of these functions.

$f(x) = (x + 6)^2 - 3$ Vertex: _____ Axis of symmetry: _____

- 44 Write an equation in vertex form given the vertices below.

Vertex (4, -8) Equation in vertex form: _____

- 45 Read the following problems carefully and answer the questions.

During a fireworks display, a flare was shot from the ground and traveled the path given by the equation $h = -4t^2 + 16t$, where h stands for height in meters and t stands for time in seconds. Show your work.

- a How high was the flare at half a second?
- b How high was the flare at three seconds?
- c At how many seconds did the flare hit its maximum height?
- d What was its maximum height?
- e At how many seconds did the flare hit the ground?

- 46) Joaquín kept his grandmother's 1956 Oldsmobile as an investment since it was in perfect condition. The initial price his grandmother paid was \$1,000. The car has increased in value by an average of 7.5% per year. How much will this car worth after 60 years?
- 47) Which equation represents the graph of $y = |x|$ after it has translated down 5 units?
- a $y = |x| + 5$ b $y = |x + 5|$ c $y = |x| - 5$ d $y = |x - 5|$
- 48) Which equation represents the graph of $y = x^2$ after it has been translated 4 units to the left?
- a $y = (x + 4)^2$ b $y = x^2 - 4$ c $y = (x - 4)^2$ d $y = x^2 + 4$
- 49) Which of the following is an exponential function?
- a $y = x^2$ b $y = 5x + 2^3$ c $y = 3^x$ d $y = (x + 2)^2$
- 50) Which of the following is a quadratic function?
- a $y = 3x - 5$ b $y = 4x^2$ c $x = y^2$ d $y = x$
- 51) Which of the following shows an exponential decay equation?
- a $y = 4(.97)^3$ b $y = 4(1.07)^3$ c $y = 4(2.03)^3$ d $y = 4(1+.04)^3$
- 52) Simplify the following algebraic fractions.

$$\frac{x^2 + 5x - 24}{x^2 - 13x + 30} \cdot \frac{x^2 - 12x + 20}{x^2 - 169} \div \frac{x^2 + 6x - 16}{x + 13}$$

53 $\frac{2}{w} + \frac{w+4}{5w} = \frac{9}{10}$

- 54 Carmen can paint a barn in 10 hours. Sara wants to help, and so does her twin sister Camila. Camila is three times as fast as Sara. Together all three work together and finish the job in 6 hours. What is the rate of the twins?

- 55 Joan can prepare a meal for 12 people in 3 hours, and Lucinda can prepare the same meal for the same amount of people in 4 hours. If they could work together, how long would it take them to do this job?

Answer Keys

1. No, Raffi is incorrect. It is a rational number. All fractions when changed to a decimal either repeat or terminate.

1. 9 buttons

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

3. 5

4. 30

5. $W = -\frac{5}{8}$

6. $Y = -5$

7. $Y = -\frac{1}{2}$

8. Identity equation

9. 21" x 48"

10. 27° , 27° , 153° , 153°

11. 8,10,12

12. 80 pennies

13. Thomas: 15; Maria: 12; Jacob: 17

14. \$840

15. Relative error: $\frac{1}{69}$, percent error: 1.04%

16. 34%

17. 8 quarts

18. 3.5 hours

19. Biked 1.5 hours and walked .5 hours

20. 2 days

Answer Keys

22. $Y \leq 7$

23. $3 > x \geq -4$ or $-4 \leq x < 3$

24. $-9 \leq x < -7$ or $5 < x \leq 7$

25. $2x + 8xy + 16y$

26. $3a^{13}b^7$

27. $\frac{g^7}{9}$

28. $-5yz^5 + 3yz^4 - y$

29. $(3x+2)(x+7)$

30. $4bxy(x-7)(2x-1)$

31. 6

32. 8 , 15 , 17 units

33. 11.96

34. $\sqrt{15} - 2\sqrt{3} - 2$

35. $12 + 4\sqrt{21} + 6\sqrt{15} + 6\sqrt{35}$

36. $Y = 2$ or -5

37. A

38. C

39. $Y = -x + 5$

40. $y = -\frac{1}{2}x + 3$

41. $R = \frac{3}{4}$, $s = -2$

Answer Keys

42. 25 chickens , 5 elephants

43. Vertex: $(-6, -3)$;
Axis of symmetry: $x = -6$

44. $y = (x - 4)^2 - 8$

45. a. 7 meters b. 12 meters c. 2 seconds
d. 16 meters e. 4 seconds

46. \$76,649.24

47. C

48. A

49. C

50. B

51. A

52. $1/(x-13)$

53. $w=4$

54. Camila 20 hours , sara 60 hours

55. 1 hour and 43 minutes