

# Algebra 8R Final Exam Review Packet

The final will be 20 multiple choice/ short answer questions. You will have one class period to complete it. You may use a scientific calculator (no graphing calculators). You should be able to:

## Frogs, Fleas and Painted Cubes

- Factor binomials and trinomial expressions and equations (Inv. 2)
- Multiply a monomial times a binomial using the Distributive Property (Inv. 2)
- Multiply a binomial times a binomial using either the Box/Area method, the Vertical method, or the FOIL/Claw method (Inv. 2)
- Identify the key features of a quadratic equation algebraically (Inv. 2)
- Graph a quadratic equation using the key features (Inv. 2)
- Given a real life situation, make a table and identify key features to answer questions about the situation like how high an object travels and how long it is in the air (Inv. 4)
- Identify whether a relationship shown in a table is either linear, exponential, quadratic, or none by using the first and second differences (Inv. 4)

## Say it With Symbols

- Write equivalent equations and expressions using distributive, commutative, and associative properties (Inv. 1)
- Combine equations together by adding or by substituting one equation in for another equation and simplifying (Inv. 2)
- Solve linear equations with parentheses using distributive property and properties of equality (Inv. 3)
- Solve quadratic equations by factoring and using the zero product property, also the same process as finding the x-intercepts (Inv. 3)
- Solve problems about objects in motion in a real life context by using the above strategy (Inv. 3)
- Solve for one variable in terms of another (Inv. 3)
- Decide whether an equation represents a linear, exponential, or quadratic relationship (Inv. 4)
- Solve quadratic equations by factoring, completing the square, and using the quadratic formula.
- Use the discriminant to determine the number of solutions for a quadratic equation.
- Explain the significance of the key features of a parabola in the context of a real life problem.

In addition:

- Translate a figure in a coordinate plane given an algebraic rule (Ex:  $(x - 1, y + 2)$ )
- Reflect a figure across a line of reflection in a coordinate plane
- Rotate a figure  $90^\circ$  clockwise or counterclockwise about the origin
- Rotate a figure  $180^\circ$  about the origin
- Use the Pythagorean Theorem to find side lengths in right triangles
- Simplify radicals

Expand the expression completely.

1.)  $2x(x - 5)$

2.)  $(x + 3)(x + 10)$

3.)  $(x - 7)(x - 5)$

4.)  $(2x + 3)(x - 6)$

5.)  $(x + 4)(2x^2 + 3x - 1)$

6.)  $(2x^2 - 4x - 3)(3x^2 + 2x - 5)$

Factor the expression completely.

7.)  $4x^2 - 20x$

8.)  $x^2 + 7x + 10$

9.)  $x^2 - x - 30$

10.)  $2x^2 + 13x + 6$

Solve the equation by factoring.

11.)  $x^2 + 8x + 16 = 0$

12.)  $x^2 - 3x - 10 = 0$

13.)  $(2x + 3)(x - 6) = 0$

14.)  $x^2 - 49 = 0$

15.)  $x^2 - 45 = -12x$

16.)  $2x^2 + 11x + 5 = 0$

17.)  $4x^2 + 7x + 3 = 0$

18.)  $8x^2 + 2x - 15 = 0$

For 19 through 23, identify the key features and graph the equation.

19.)  $y = 4x^2 - x - 5$

**y-intercept:**

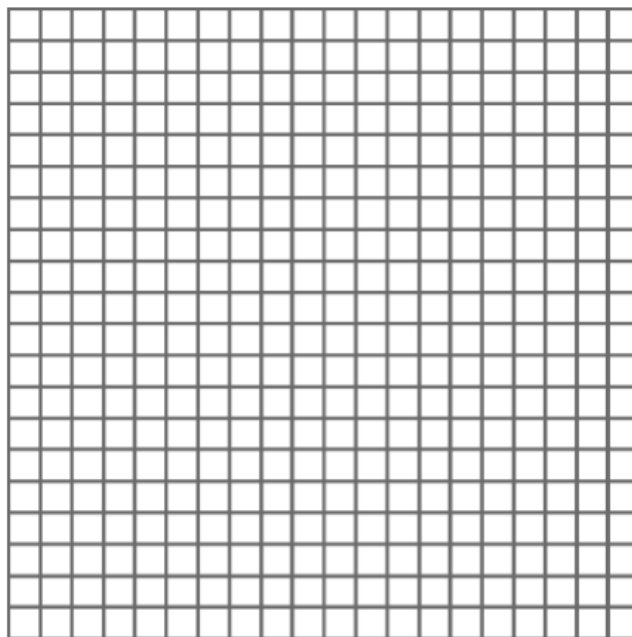
**x-intercepts:**

**line of symmetry:**

**vertex:**

**up/down**

**additional point:**



20.)  $y = 6x^2 - 15x - 21$

**y-intercept:**

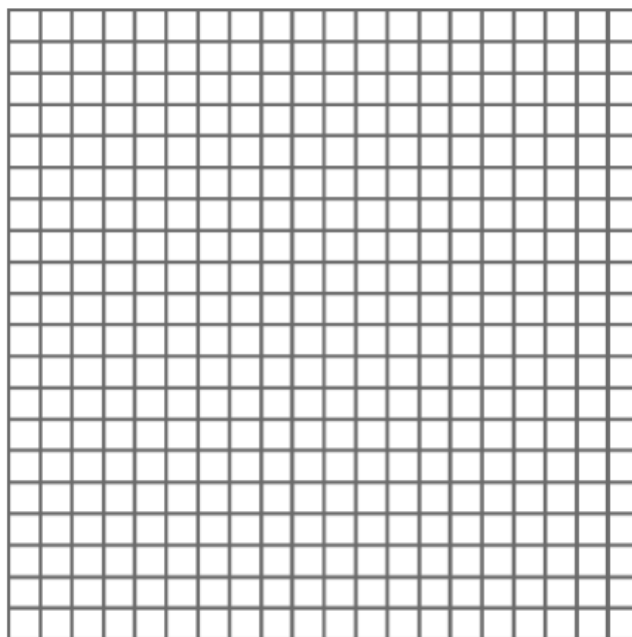
**x-intercepts:**

**line of symmetry:**

**vertex:**

**up/down**

**additional point:**



21.)  $y = x^2 - 4x - 45$

**y-intercept:**

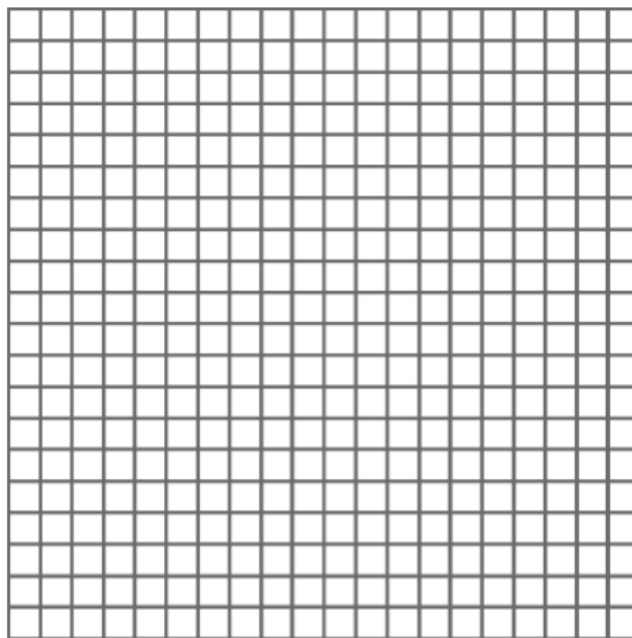
**x-intercepts:**

**line of symmetry:**

**vertex:**

**up/down**

**additional point:**



22.)  $y = 2x^2 + 9x + 10$

**y-intercept:**

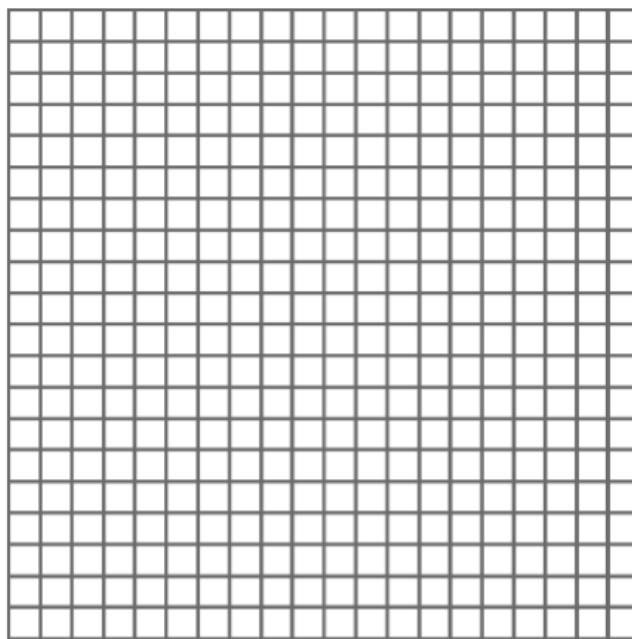
**x-intercepts:**

**line of symmetry:**

**vertex:**

**up/down**

**additional point:**



23.)  $y = x^2 + 6x - 16$

**y-intercept:**

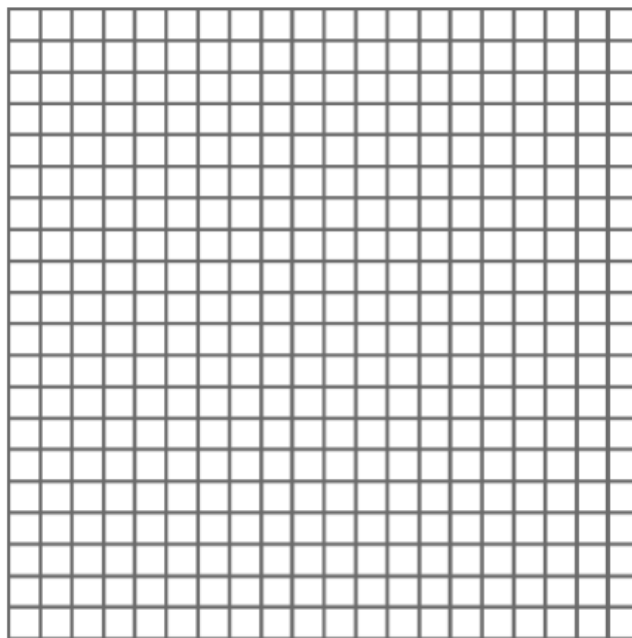
**x-intercepts:**

**line of symmetry:**

**vertex:**

**up/down**

**additional point:**



For questions 24-27, use the following information.

A stomp rocket is launched into the air from ground level. It's height  $h$  as a function of time  $t$  can be modeled by the equation  $h = -16t^2 + 64t$ .

24.) How high will the rocket be at 1.5 seconds?

25.) How long will it take for the rocket to hit the ground?

26.) When will the rocket reach its maximum height?

27.) The advertising on the package says "Can fly over 60 feet high!" Does this rocket exceed the height listed on the package?

Write **two** expressions that are equivalent to the given expression.

28.)  $5(x - 3) + 11$

29.)  $3x + 15$

30.)  $4x - 2 - 3x + x$

31.)  $x + x + x + 8 + 8 + 8$

Simplify the following expressions.

32.)  $12(-2x + 1) - 20$

33.)  $-5x - (x - 6)$

34.)  $-2(5 - 4x) + 8(-3x + 3)$

35.)  $10 + 7(-5x + 4x - 5) + 14$

The Student Council is organizing a charity bake sale. They came up with the following expenses and incomes:

- They need to spend \$70 on baking materials – flour, sugar, butter, etc
- They will sell each baked good for \$2.50.

36.) Write an equation for the profit  $P$  based on selling  $n$  baked goods. Simplify your equation.

37.) How many baked goods do they need to sell to break even?

38.) Their goal is to raise \$325. How many baked goods do they need to sell to reach their goal?

The profit  $P$  of a concession stand outside Fenway park is depended on the number of customers  $C$  that go to the stand before, during, and after the game. The number of customers depends on the probability of rain  $R$ . The owner of the stand came up with the following equations to help predict their daily profit.

$$P = 8C - 400$$

$$C = 250 - 150R$$

39.) What do the numbers in the profit equation mean **in the context of this situation?**

40.) What is the profit of the concession stand if the probability of rain is 40%?

41.) Write an equation for profit  $P$  in terms of probability of rain  $R$ .

42.) Simplify your profit equation from #40. Use it to help you calculate the probability of rain if the profit of the concession stand is \$1540.

Solve for the given variable.

43.)  $x$  in terms of  $y$

$$3x + 9y = 27$$

44.)  $y$  in terms of  $x$

$$5(2x + y) = 35 - 6x$$

45.)  $z$  in terms of  $x$  and  $y$

$$2x - 8y + 4z = 20$$

46.)  $w$  in terms of  $P$  and  $l$

$$P = 2l + 2w$$

Using the two given equations, write a new equation relating the given variables. Think about what variable you *don't* want and how you can rid of that variable. Simplify your final equation.

47.)  $x$  in terms of  $z$

$$x = 3y + 4z$$

$$y = 5z + 9$$

48.)  $A$  in terms of  $B$

$$A = BC$$

$$B = 5 + C$$

49.)  $A$  in terms of  $l$  and  $P$

$$A = lw$$

$$P = 2l + 2w$$

50.)  $l$  in terms of  $n$

$$I = np$$

$$10n = 75 - 5p$$

For 51-54, use the following information.

The Metropolis Middle School volleyball team is operating the concession stand at school basketball games to help raise money for new uniforms. The profit in dollars  $P$  from operating the stand is given by the equation  $P = 15n - 5(2n + 20)$ , where  $n$  is the total number of items sold.

51.) How much money will the volleyball team raise if they sell 65 items?

52.) How many items does the team need to sell in order to **break even**?

53.) If the team needs to raise \$1,000 for new uniforms, how many items will they have to sell?

54.) Write an equivalent equation for the profit  $P$ .

Solve for the given variable using the most efficient method.

55.)  $5x + 2(x + 4) = 64$

56.)  $x^2 - 3x - 10 = 0$

57.)  $x^2 - 12x = 0$

58.)  $7(6x - 1) + x = 36$

59.)  $2x^2 + 45 = -12x$

60.)  $33 + 15w = 3w - w + 4w$

61.)  $7(7c + 1) - 4c = 13(3c - 2)$

62.)  $8x^2 + 2x - 15 = 0$

63.)  $x^2 + 8x + 16 = 0$

64.)  $6(n - 5) - 11n = -5n + 4$

65.)  $9y - 4(y + 5) = 40$

66.)  $x^2 - 49 = 0$

67.)  $\frac{2}{7}(4m - 18) = 12$

68.)  $3x^2 + 11x - 10 = 0$

69.)  $4x^2 + 7x + 3 = 0$

70.)  $3q - 16q = 7 + \frac{1}{2}(-32q - 12)$

For questions 71-74, use the following information.

A rocket is launched into the air from ground level with an initial velocity of 120 feet per second.

71.) Write an equation that models how the height  $h$  of the rocket changes over time  $t$ .

72.) How long will it take for the rocket to hit the ground?

73.) The advertising on the package says "Can fly over 250 feet high!" Does this rocket exceed the height listed on the package?

74.) When is the rocket 160 feet off the ground?

State whether each equation below represents a linear, exponential, or quadratic relationship and **explain how you know**.

75.)  $y = 3x^2 - 12$

76.)  $y = 2(3.5)^x$

77.)  $y = (x - 4)(2x + 8)$

78.)  $y = -x + 14$

79.)  $y = 6(x - 2) + 7(x + 1)$

80.)  $y = .25^x$

81.)  $y = \frac{1}{2}x^2 - 15x + 11$

82.)  $y = 3(2x + 12)(-3x + 2)$

Simplify the radical expressions.

83.)  $\sqrt{300}$

84.)  $\sqrt{63}$

85.)  $\sqrt{384}$

86.)  $\sqrt{8400}$

87.)  $\sqrt{45} \cdot 3\sqrt{10}$

88.)  $2\sqrt{150} \cdot 4\sqrt{8}$

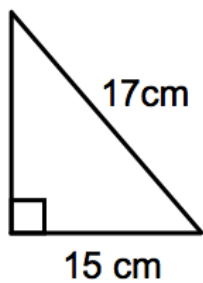
89.)  $\frac{\sqrt{75}}{\sqrt{3}}$

90.)  $\frac{\sqrt{10}}{\sqrt{35}}$

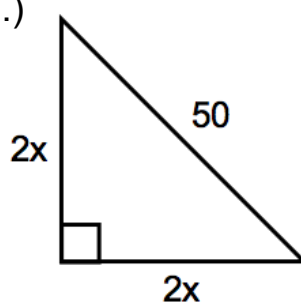
91.)  $\frac{\sqrt{15}}{\sqrt{45}}$

Find the missing side length. Leave your answer in simplest radical form.

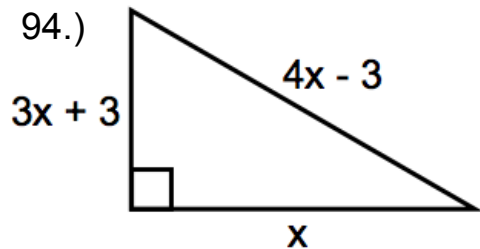
92.)



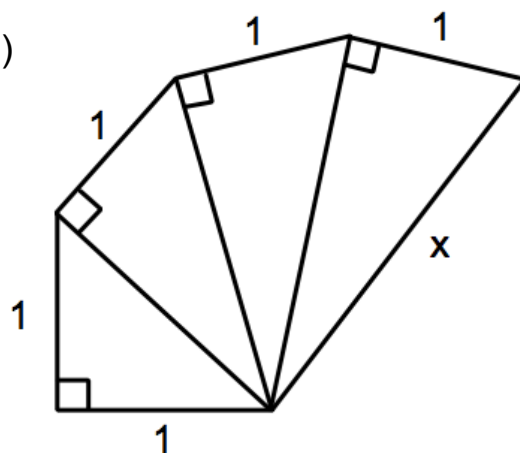
93.)



94.)



95.)



Use the following diagram to perform the given transformations. Identify the coordinates of the new point, segment, or shape.

96.)  $A$  after a translation of  $(x - 7, y + 2)$

97.)  $B$  after a reflection across the  $y$ -axis

98.) Segment  $CD$  after a reflection across the line  $y = -3$

99.)  $D$  after a rotation 90 degrees about the origin

100.) Segment  $AB$  after a rotation of 180 degrees about the origin

101.) Quadrilateral  $ABCD$  after a reflection across the  $y$ -axis

102.) Quadrilateral  $ABCD$  after a 180 degree rotation about the point  $(0, 2)$

103.) Quadrilateral  $ABCD$  after a rotation of 90 degrees counterclockwise about the origin

104.) Quadrilateral  $ABCD$  after a rotation of 180 degrees about the origin followed by a reflection in the line  $x = 3$

