

# Algebra 8 Final Exam Review Packet

**Name:** \_\_\_\_\_ **Period:** \_\_\_\_\_ **Date:** \_\_\_\_\_

The final will be 20 multiple-choice questions. You will have one class period to complete it. You may use a calculator. What you need to know from each unit:

## The Shapes of Algebra

- Graph equations in standard form or slope-intercept form (Inv. 3)
- Solve a system of equations by graphing and finding the point of intersection (Inv. 3)
- Solve a system of equations using the equivalent forms method (Inv. 4)
- Solve a system of equations using the substitution method (Inv. 4)
- Solve a system of equations using the combination/elimination method (Inv. 4)

## From our mini-geometry unit

- Use the Pythagorean Theorem to find side lengths in right triangles
- 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

## Frogs, Fleas, and Painted Cubes

- Factor binomials and trinomial expressions and equations (Inv. 2)
- Multiply a monomial times a binomial using the Distributive Property
- 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)

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

1.)  $5(x - 3) + 11$

2.)  $3x + 15$

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

4.)  $x + x + x + 8 + 8 + 8$

Simplify the following expressions.

5.)  $12(-2x + 1) - 20$

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

7.)  $-2(5 - 4x) + 8(-3x + 3)$

8.)  $10 + 7(-5x + 4x - 5) + 14$

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.

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

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

11.) 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.

$$P = 8C - 400$$

$$C = 250 - 150R$$

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

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

14.) Write an equation for profit  $P$  in terms of probability of rain  $R$ . Think about what variable you *don't* want and how you can get rid of that variable.

15.) Simplify your profit equation from #14. Use it to help you calculate the probability of rain if the profit of the concession stand is \$1540.

Solve for the given variable.

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

$$3x + 9y = 27$$

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

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

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

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

19.)  $w$  in terms of  $P$  and  $I$

$$P = 2I + 2w$$

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 by substitution.

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

$$x = 3y + 4z$$

$$y = 5z + 9$$

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

$$A = BC$$

$$B = 5 + C$$

22.)  $A$  in terms of  $I$  and  $P$

$$A = Iw$$

$$P = 2I + 2w$$

23.)  $I$  in terms of  $n$

$$I = np$$

$$10n = 75 - 5p$$

For 24-27, 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.

24.) How much money will the volleyball team raise if they sell 100 items?

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

26.) If the team needs to raise \$1,600 for new uniforms, how many items will they have to sell?

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

For 28 and 29, identify the key features and graph the equation.

28.)  $y = x^2 + 6x + 8$

**y-intercept:**

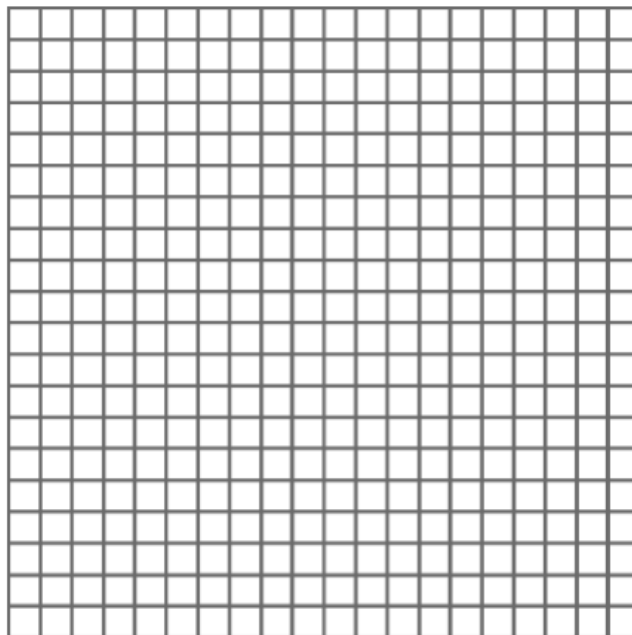
**x-intercepts:**

**line of symmetry:**

**vertex:**

**up/down**

**additional point:**



29.)  $y = (-x - 4)(x - 5)$

**y-intercept:**

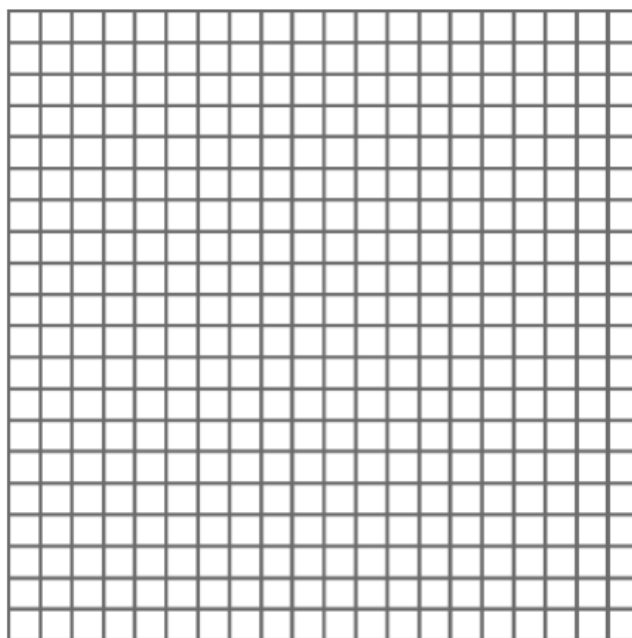
**x-intercepts:**

**line of symmetry:**

**vertex:**

**up/down**

**additional point:**



Solve for the given variable.

30.)  $5x + 2(x + 4) = 64$

31.)  $6(n - 5) - 11n = 0$

32.)  $9y - 4(y + 5) = 40$

33.)  $7(6x - 1) + x = 36$

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

35.)  $33 + 15w = 3w - w + 4w$

36.)  $7(7c + 1) - 4c = 13(3c - 2)$

37.)  $3q - 16q = 7 + \frac{1}{2}(-32q - 12)$

Expand the expression completely.

38.)  $2x(x - 5)$

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

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

41.)  $(2x + 3)(x - 6)$

Factor the expression completely.

42.)  $4x^2 - 20x$

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

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

45.)  $2x^2 + 13x + 6$

Solve the equation by factoring.

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

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

48.)  $(2x + 3)(x - 6)$

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

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

51.)  $2x^2 + 11x + 5 = 0$

52.)  $4x^2 + 7x + 3 = 0$

53.)  $8x^2 + 2x - 15 = 0$

For questions 54-57, use the following information.

A stomp rocket is launched into the air from ground level. Its height  $h$  as a function of time  $t$  can be modeled by the equation  $h = -16t^2 + 64t$ .

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

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

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

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

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

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

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

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

61.)  $y = -x + 14$

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

63.)  $y = .25^x$

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

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

For 66-71, decide whether the following relationships are linear, exponential, quadratic, or none of these by using their first and second differences. Explain your reasoning. If it is one of those three, calculate the next 2 values in the table. 66.)

x	y
-3	33
-2	26
-1	19
0	12
1	5

1<sup>st</sup> Differences    2<sup>nd</sup> Differences    Type of Relationship

67.)

x	y
0	3
1	12
2	48
3	192
4	768

1<sup>st</sup> Differences    2<sup>nd</sup> Differences    Type of Relationship

68.)

x	y
1	469
2	513
3	557
4	601
5	645

1<sup>st</sup> Differences    2<sup>nd</sup> Differences    Type of Relationship

69.)

x	y
-1	9
0	0
1	-7
2	-12
3	-15

1<sup>st</sup> Differences

2<sup>nd</sup> Differences

Type of Relationship

70.)

x	y
2	12
3	33
4	62
5	99
6	144

1<sup>st</sup> Differences

2<sup>nd</sup> Differences

Type of Relationship

71.)

x	y
-3	-5
-2	-1
-1	-6
0	0
1	-7

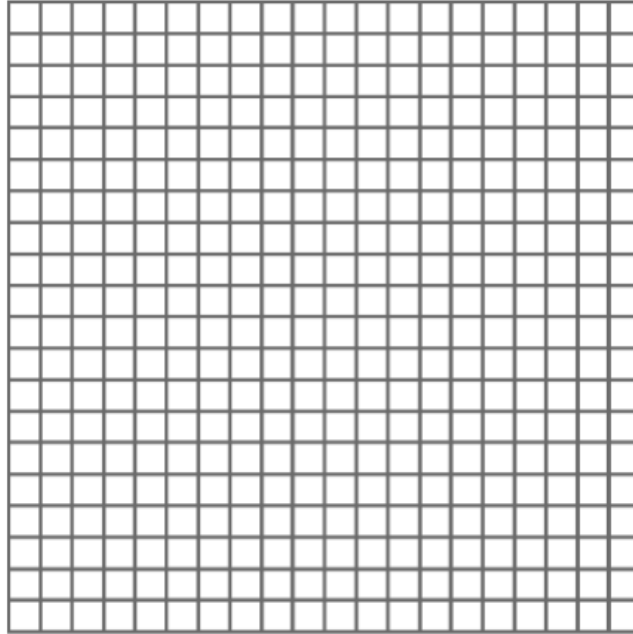
1<sup>st</sup> Differences

2<sup>nd</sup> Differences

Type of Relationship

You are planning a road trip this summer and are considering two car rental companies. Company A charges \$100 up front and an additional \$0.25 per mile. Company B charges \$180 up front and an additional \$0.15 per mile.

72.) Graph both situations. Remember that you may need to go out pretty far on your x and y axes.



73.) Use your graph to estimate at how many miles the costs of the two companies will be the same. What is that cost?

74.) For how many miles is Company A *less than* Company B?

75.) Redo problems 57 and 58 algebraically using your equations.

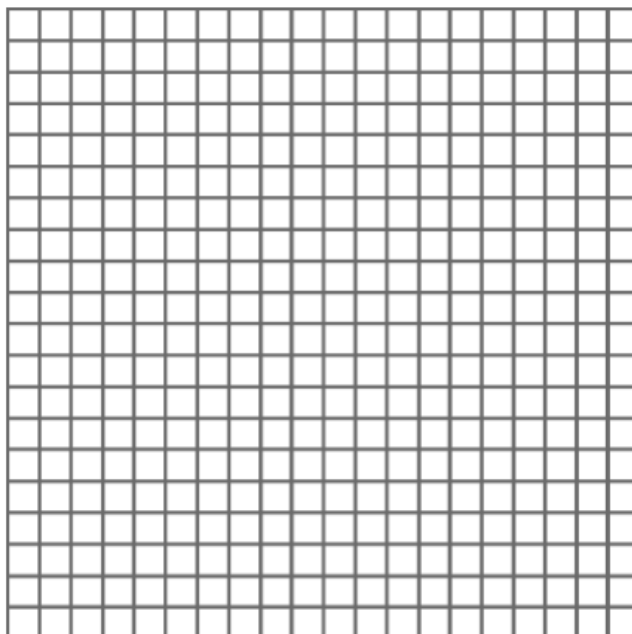
76.) Say you choose Company B and drive 1000 miles. How much will it cost?

77.) Marcello is an artist who makes oil paintings and charcoal sketches. He sells each oil painting for \$500 and each charcoal sketch for \$300. Suppose Marcello makes 86 works in total and earns \$30,000. Write a system of equations that could represent this situation. **DO NOT SOLVE THE SYSTEM.**

78.) The Plano Texans are a youth drum and bugle corps that competes with music and precision marching against other groups all over the country. The corps rents instruments to members. Each bugle rents for \$10 per month and each drum rents for \$5 per month. Suppose that there are 12 members of the drum and bugle corps who rent an instrument. Write a system of equations that finds the number of bugle rentals  $b$  and drum rentals  $d$  that supply 12 members and rental budget of \$100. **DO NOT SOLVE THE SYSTEM.**

Solve the system by graphing.

79.) 
$$\begin{cases} y = 3x - 10 \\ 2x + y = 15 \end{cases}$$



Solve the system using the equivalent forms method.

$$80.) \begin{cases} y = \frac{1}{2}x + 4 \\ y = 4x - 3 \end{cases}$$

Solve the system using the substitution method.

$$81.) \begin{cases} x = 3y + 8 \\ 4x - 2y = 2 \end{cases}$$

Solve the system using the combination/elimination method.

$$82.) \begin{cases} -x + 3y = 9 \\ x + 3y = -1 \end{cases}$$

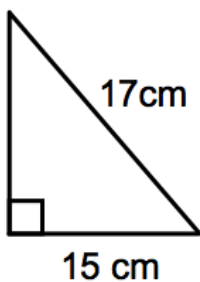
Solve the systems using any method you like.

$$83.) \begin{cases} 6x - 3y = 15 \\ 4x - 3y = 7 \end{cases}$$

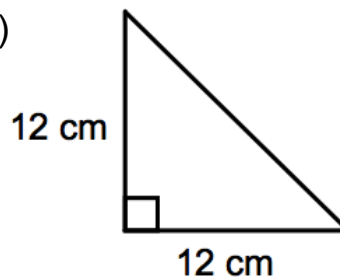
$$84.) \begin{cases} 7x - 3y = -5 \\ -2x + 8y = -20 \end{cases}$$

Find the missing side length using the Pythagorean Theorem.

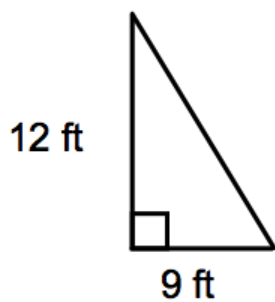
85.)



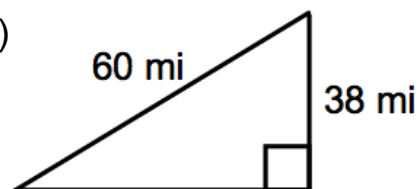
86.)



87.)



88.)



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

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

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

91.) Segment  $CD$  after a reflection across the  $x$ -axis

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

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

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

95.) Quadrilateral  $ABCD$  after a translation of  $(x + 6, y)$

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

97.) Quadrilateral  $ABCD$  after a rotation of 180 degrees about the origin

98.) Quadrilateral  $ABCD$  after a reflection across the  $x$ -axis

