

# Algebra 1 Midterm Information 2019-2020



**Exam Date: Wednesday, January 22<sup>nd</sup>**

**Time: Periods 2&3**

## Miscellaneous Information:

- Absence-exam must be taken. Grades will not be issued until it is made up.
- The Midterm makes up 20% of the 2<sup>nd</sup> Quarter Grade
- It can also be used to replace a low grade from Q2 or replace a test that was not taken due to an absence (*it cannot do both*)

## What should you bring the day of the exam?

- graphing calculator, ruler or straight edge, 2 sharpened pencils and 2 pens

## Format:

- comprised of multiple choice, short answer and extended response similar to unit tests.

## Calculator:

- A **Graphing Calculator** is absolutely necessary the day of the exam!
- Calculators will **NOT** be provided.

## Study Process:

1. **Read** the **Midterm Study Guide**.
2. **Redo** all **review sheets, tests and spiral sets**.
3. **Rewatch** all **FLIP Videos**
4. **Complete** the **Practice Problem Set**.
5. Keep a list of questions and bring them to extra help and in-class review days.
6. **DO NOT** let your preparation slide to the night before the exam. Start studying immediately using any available time!

## In-Class Review Sessions:

- In-class review sessions will take place in the days prior to the midterm.
- In-class review sessions will consist of reviewing the practice problem set and addressing student generated questions.
- Make sure you come prepared to review.

# **Midterm Practice Problem Set**

## **Due Dates**

**Questions #46 - 50 due Tuesday, January 14th**

**Questions #1 - 25 due Thursday, January 16th**

**Questions #26 - 33 due Friday, January 17th**

**Questions #34 - 45 due Tuesday, January 21st**

# 1) The Real Number System and Properties

1. Which number is irrational?

(1)  $\sqrt[3]{27}$

(3)  $\sqrt{3}$

(2) 3.14

(4)  $1.\bar{3}$

2. What is the best sequence of words to describe the set of numbers below?

$$\left\{1\frac{3}{5}, -5, 0.\overline{32}, \sqrt[3]{64}, \sqrt{60}, 17\right\}$$

(1) rational, integer, irrational, natural, irrational, whole

(2) real, rational, rational, irrational, irrational, natural

(3) rational, integer, rational, whole, irrational, natural

(4) real, natural, rational, integer, irrational, whole

3. Which expression represents  $\sqrt{48}$  in simplest radical form?

(1)  $2\sqrt{12}$

(3)  $4\sqrt{3}$

(2)  $8\sqrt{3}$

(4)  $4\sqrt{12}$

4. **Given:**

$$A = \sqrt{3}$$

$$B = \sqrt{6}$$

$$C = \sqrt{9}$$

Which expression results in a rational number?

(1)  $A + B$

(2)  $B + C$

(3)  $A^2$

(4)  $BC$

5. State **true** or **false** for each statement. Justify false responses with an example.

a) The product of two irrational numbers is always irrational.

b) The product of a rational number and an irrational number is always irrational.

c) The sum of two irrational numbers is always irrational.

d) The sum or product of a rational and irrational number is always irrational.

6. A part of Jennifer's work to solve the equation  $3(5x^2 - 4) = 12x^2 - x$  is shown below.

$$\text{Given: } 3(5x^2 - 4) = 12x^2 - x$$

$$\text{Step 1: } 15x^2 - 12 = 12x^2 - x$$

Which property justifies her first step?

- (1) identity property of multiplication
- (2) multiplication property of equality
- (3) commutative property of multiplication
- (4) distributive property of multiplication over subtraction

## 2) Polynomial Expressions

Perform the indicated operation. Express answers in standard form.

7.  $(r^2 + 2r - 1) + (3r^2 - 7r + 2)$

8.  $(7b^3 + b^2 - 3) - (8b^3 - 2b^2 + 5b + 1)$

9.  $(1 - 2x)(5 + 3x)$

10.  $(x + 5)(x^2 - 4x + 9)$

11. Rewrite the polynomial expression as a trinomial in standard form.

$$3x(x + 5) - 7(x + 2)^2$$

12. Which expression represents "the sum of 5 and a number subtracted from 17"?

(1)  $x + 5 - 17$

(3)  $17 - x + 5$

(2)  $17 - (x + 5)$

(4)  $17 + x - 5$

13. The sum of Scott's age and Greg's age is 33 years. If Greg's age is represented by  $g$ , which expression represents Scott's age?

(1)  $33 - g$

(3)  $g + 33$

(2)  $g - 33$

(4)  $33g$

14. The Ambrose family has 3 children, each born two years apart. If the age of the youngest child is represented by  $x + 3$ , which expression represents the age of the oldest child?

(1)  $x + 5$

(3)  $x + 7$

(2)  $x + 6$

(4)  $x + 8$

15. Katie and Lisa are splitting the cost of a flower arrangement made up of 7 roses and 3 violets.

The expression  $\frac{7r + 3v}{2}$  is used to find the amount each person will pay.

A. What does the variable  $r$  represent in the expression?

B. What does  $3v$  represent in the expression?

C. Using the expression, determine the amount of money each person will spend if red roses sell for \$2.25 each and violets sell for \$1.75 each.

16. The RMS Mathletes have been selected to compete internationally. The club members are holding a school dance in order to raise money for travel expenditures. They are charging students an admission fee and selling bottles of water. They have made a list of expenses and revenue.

a) Using the list, write a *simplified* polynomial expression that represents their profit from the dance if  $s$  students attend and  $b$  bottles of water are purchased.

<i>Revenue</i>	<i>Expenses</i>
<i>Water Bottle Sales - \$2.50 per bottle</i>	<i>DJ- \$300</i>
<i>Student Admission - \$5.00 per student</i>	<i>Water Bottle Purchase - \$1.00 per bottle</i>
<i>PFA Donation - \$1000</i>	

b) Using your expression, calculate the club's profit if 315 students attend the dance and they sell 219 bottles of water.

### 3) Equations

17. Which equation does not have a solution set equal to 5?

(1)  $3(x - 4) = \frac{15}{x}$

(3)  $\frac{1}{5}x = x - 3$

(2)  $2(x + 10) = 30$

(4)  $0.5x - 2 = 0.5$

18. What is the solution to the equation  $3(x + 4) = 2x + 15 + x$  ?

(1)  $x = 0$

(3) the equation has no solution

(2)  $x = -1$

(4)  $x =$  all real numbers

19. If  $4xyz = 2$ , then what is the value of  $x$  in terms of  $y$  and  $z$ ?

(1)  $\frac{1}{2yz}$

(3)  $2 - 4yz$

(2)  $\frac{1}{2}yz$

(4)  $2yz$

20. The equation  $V = \frac{1}{3}BH$  is equivalent to:

(1)  $H = \frac{3V}{B}$

(3)  $H = \frac{B}{3V}$

(2)  $H = \frac{1}{3}BV$

(4)  $H = 3V - B$

21. The formula  $w = \frac{4e^3}{5}$  is used to calculate the approximate weight,  $w$ , in grams of an ice cube with edges that are  $e$  centimeters long. Solve the formula for  $e$ .



22. The distance a free falling object has traveled can be modeled by the equation  $d = \frac{1}{2}at^2$  where  $a$  is acceleration due to gravity and  $t$  is the amount of time the object has fallen.

a) Express  $t$  in terms of  $a$  and  $d$ .

b) Find the amount of time an object spent falling if it accelerated 2.5 inches/sec<sup>2</sup> and traveled a distance of 20 inches.

23. Solve the equation. For each step, list the property used.

$$3x - [8 - 3(x - 1)] = x + 19$$

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24. Find the value of the variable that makes each statement true.

a)  $\frac{7a-5}{3} = \frac{9a}{4}$

b)  $\frac{1}{6} + \frac{x-2}{3} = \frac{5}{6}$

25. Olivia wants to purchase some fruit. She wants to buy twice as many bananas as apples and three times as many oranges as apples. Each apple sells for \$0.32, a banana sells for \$0.15 and an orange sells for \$0.45. If Olivia has \$10 to spend, which equation can she use to find the number of apples,  $x$ , she can purchase?

(1)  $0.32x + 0.15(2x) + 0.45(3x) = 10$

(2)  $0.32x + 0.45(2x) + 0.15(3x) = 10$

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

(4)  $0.32(3x) + 0.45x + 0.15(2x) = 10$

**For #'s 26 – 27, set up an equation in order to solve the problem. Define all unknowns.**

26. At the local chocolatier, Mark is going to purchase a candy jar and fill it with caramels and taffies. He wants to mix one part caramels and two parts taffies. Caramels sell for \$1.50 per lb and taffies sell for \$1.25 per lb. If he spent \$10 on the candy, how many lbs of each type did he purchase?

27. Using only 32-cent and 20-cent stamps, Cheri put \$3.36 postage on a package. She used double the amount of 32-cent stamps than 20-cent stamps. Determine how many stamps she used of each kind.

## 4) Inequalities

28. Which number is part of the solution set to the inequality  $5x + 3 > 38$ ?

(1) 5                      (3) 6

(2) 7                      (4) 8

29. Which inequality represents the accompanying graph?



(1)  $-3 \leq x < 4$                       (3)  $-3 \leq x \leq 4$

(2)  $-3 < x < 4$                       (4)  $-3 < x \leq 4$

30. An electronics store sells DVD players and cordless telephones. The store makes a \$75 profit on the sale of each DVD player ( $d$ ) and a \$30 profit on the sale of each cordless telephone ( $c$ ). The store wants to make a profit of at least \$255.00 from its sales of DVD players and cordless phones. Which inequality describes this situation?

(1)  $75d + 30c < 255$

(2)  $75d + 30c \leq 255$

(3)  $75d + 30c > 255$

(4)  $75d + 30c \geq 255$

31. a) Write a compound inequality statement that represents the graph pictured below.



b) Represent the solution set in interval notation.

32. David has two jobs. He earns \$8 per hour babysitting his neighbor's children and he earns \$11 per hour working at the coffee shop.

a) Write an inequality to represent the number of hours, ***b***, babysitting and the number of hours, ***c***, working at the coffee shop that David will need to work in order to earn a minimum of \$200.

b) David worked 15 hours at the coffee shop. Use the inequality to find the number of full hours he must babysit to reach his goal of \$200.

33. Solve the inequality below to determine and state the smallest *integer* value of ***x*** that will make the statement true.

$$27x - 20 \leq 5(7x - 2)$$

## 5) Linear Functions

34. Which relation is not a function?

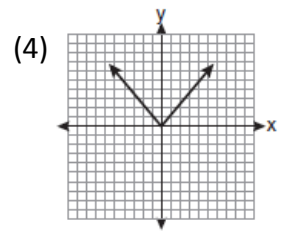
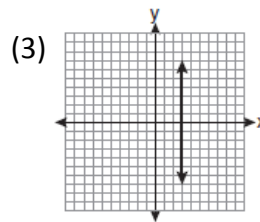
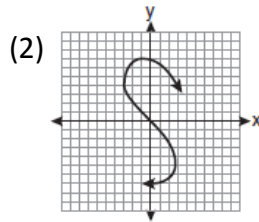
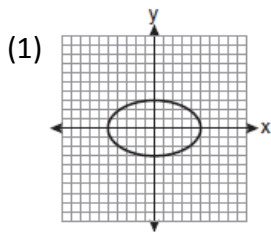
(1)  $\{(1, 5), (2, 6), (3, 6), (4, 7)\}$

(3)  $\{(4, 7), (2, 1), (-3, 6), (3, 4)\}$

(2)  $\{(-1, 6), (1, 3), (2, 5), (1, 7)\}$

(4)  $\{(-1, 2), (0, 5), (5, 0), (2, -1)\}$

35. Which graph represents a function?



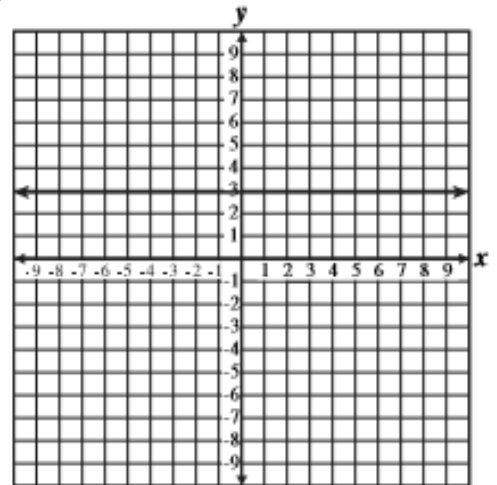
36. The accompanying figure shows the graph of which equation?

(1)  $x = 3$

(2)  $y = x + 3$

(3)  $y = 3$

(4)  $x = 0$



37. Which equation represents a line that is parallel to the line whose equation is  $2x + 3y = 12$ ?

(1)  $6y - 4x = 2$

(3)  $4x - 6y = 2$

(2)  $6y + 4x = 2$

(4)  $6x + 4y = -2$

38. What are the coordinates of the x-intercept of the line  $3x + 4y = 12$ ?

(1) (0,3)

(3) (3,0)

(2) (0,4)

(4) (4,0)

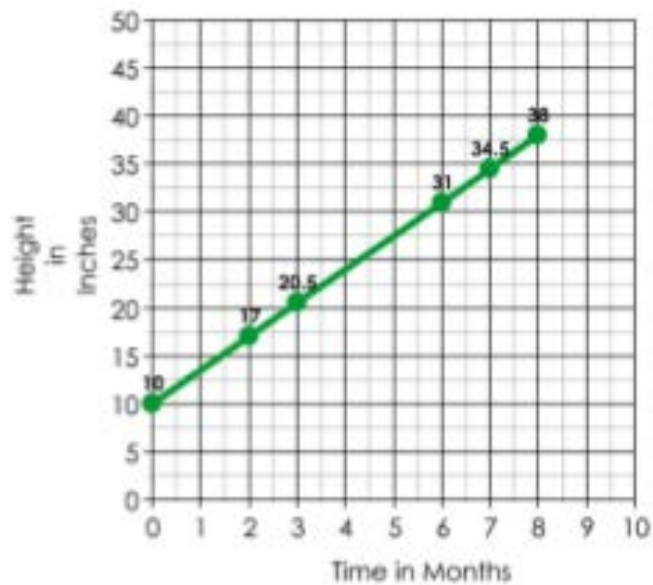
39. Mr. Rich recently planted three apple trees in his garden. Consider the growth patterns of each tree represented by A, B and C.

**A:** The first tree was five inches tall when planted. It has grown four inches every month since being planted.

**B:** Measurements were taken of the second tree and are displayed below in the table.

Months	0	2	3	5
Height	3	12	16.5	25.5

**C:** The growth pattern of the third tree is modeled by the graph below.



**Based on the information above, complete a – c.**

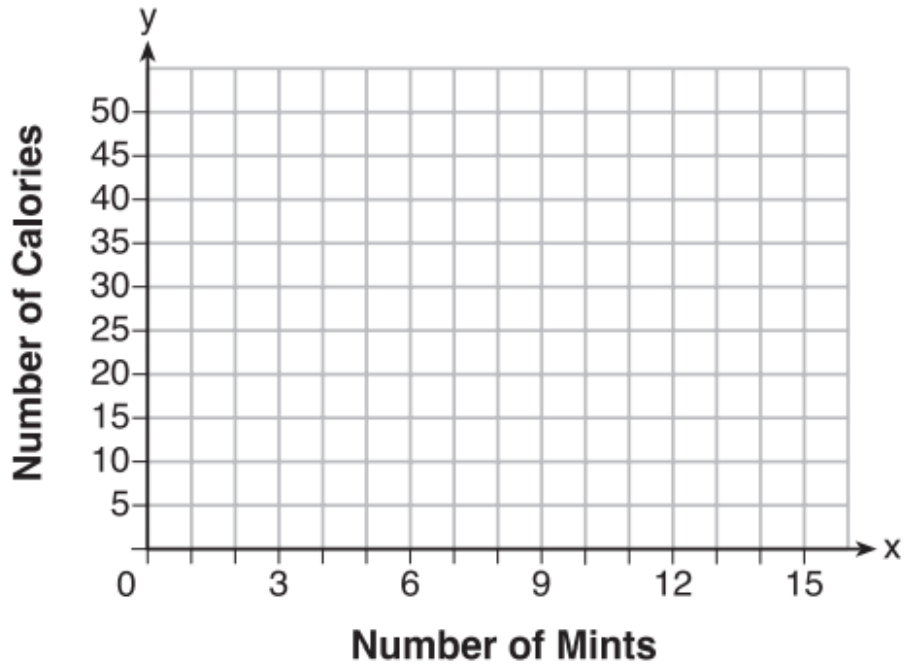
a) Which of the trees is growing the fastest? Justify your response.

b) Which tree was the tallest when it was first planted?

c) Which tree is the tallest after 6 months?

40. Max purchased a box of green tea mints. The nutrition label on the box stated that a serving of three mints contains a total of 10 calories.

a) On the axes below, graph the function that represents the relationship described above.



b) Write an equation that represents the graph.

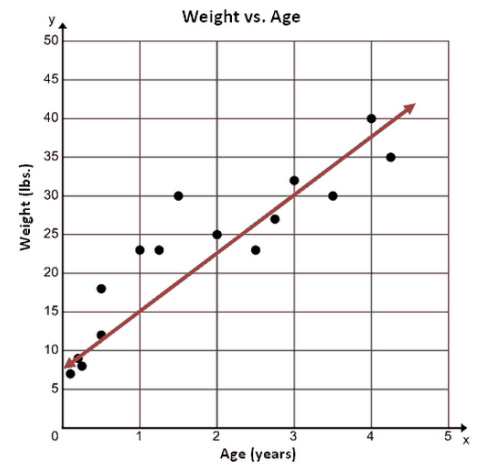
c) A full box of mints contains 180 calories. Use the equation to determine the total number of mints in the box.



41. Examine the graph pictured below which compares the age of a child and his/her corresponding weight.

a) According to the regression line, what is the expected weight of a child who is 3 years old?

b) The value of the y-intercept of the line of best fit is 8. Explain its meaning in the context of the situation.



42. Which correlation coefficient indicates that a linear function would *not* be a good fit to model a data set?

(1)  $r = -0.93$

(2)  $r = 1$

(3)  $r = -1$

(4)  $r = 0.24$

43. Emma recently purchased a new car. She decided to keep track of how many gallons of gas she used on five of her business trips. The results are shown in the table below.

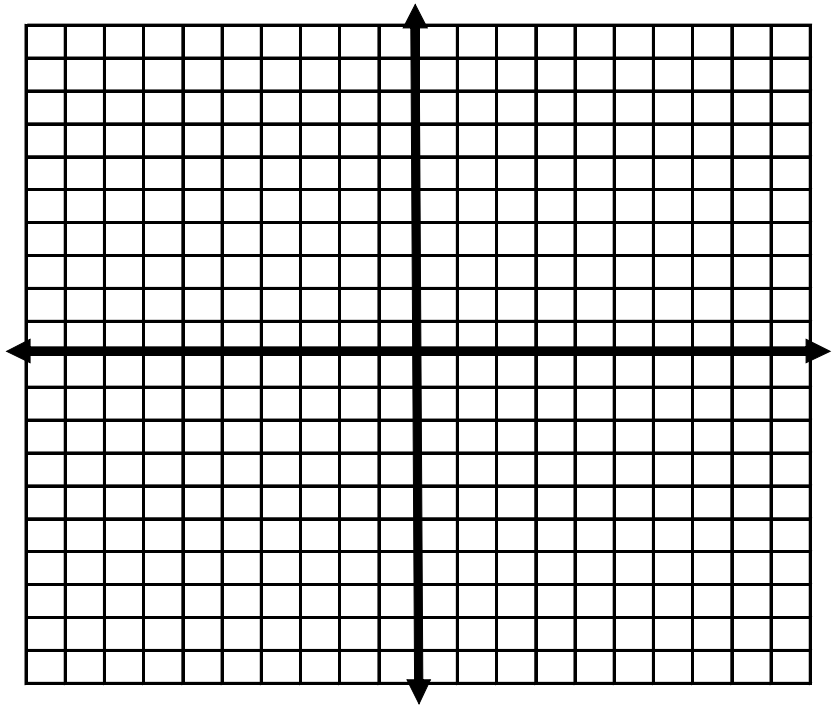
- a) Write the linear regression equation for these data where miles driven is the independent variable (*Round all values to the nearest hundredth*).

Miles Driven	Number of Gallons Used
150	7
200	10
400	19
600	29
1000	51

- b) Emma plans to take a business trip next week that requires her to drive 850 miles. Using your regression equation, predict the number of gallons of gas Emma will use to the nearest whole.

- c) Using the linear regression equation, estimate the number of miles, to the nearest whole, Emma drove if she used 23 gallons of gas.

44. On the set of axes below, draw the graph of the equation  $y = -\frac{3}{4}x + 1$  defined over the domain  $-8 \leq x \leq 8$ . State the range of the function.



45. To thaw a specimen stored at  $-25\text{ }^{\circ}\text{C}$ , the temperature of a refrigeration tank is raised every hour. The temperature in the tank after  $x$  hours can be described by the function  $y = -25 + 5x$ .
- a) Identify the y-intercept of the function. Describe its meaning.
- b) Identify the rate of change of the function. Describe its meaning.

## 6) Linear Systems

46. What is the solution to the system of  $2x = y + 3$  and  $x + y = 3$ ?

(1) (2,1)

(3) (3,0)

(2) (1,2)

(4) (3,3)

47. Which system of equations has the same solution set as the system below?

$$2x + 2y = 16$$

$$3x - y = 4$$

(1)  $2x + 2y = 16$   
 $6x - 2y = 8$

(2)  $2x + 2y = 16$   
 $6x - 2y = 4$

(3)  $x + y = 16$   
 $3x - y = 4$

(4)  $6x + 6y = 48$   
 $6x + 2y = 8$

48. A student store sold a total of 55 shirts for \$620. The shirts sold were either red or white. If the red shirts sold for \$12 each and the white shirts sold for \$10 each, how many of each color were sold?

(1) 20 red and 35 white

(2) 27 red and 28 white

(3) 28 red and 27 white

(4) 35 red and 20 white

49. Diane delivers newspapers for \$5 a day plus \$0.04 per newspaper delivered. Jeremy delivers newspapers for \$2 a day plus \$0.10 per newspaper delivered. How many newspapers would Diane and Jeremy need to deliver in order to earn the same amount of money in one day?

50. Jim and Larry work at a furniture store. Larry earns \$200 per week plus 3.5% of his total sales in dollars,  $x$ . Jim is paid \$350 per week plus 3% of his total sales,  $x$ .

a) Write a system of equations that represents the weekly pay,  $y$ , of Larry and Jim based on total sales,  $x$ .

b) Determine the value of  $x$ , in dollars, that will make their weekly pay the same.