

Algebra 1 Summer Review Assignment - 2024-2025 School Year

DUE DATE: September 9th, 2024

Course Description: This course marks the beginning of many students' high school math career. Algebra I sets up a strong foundation in a variety of numerical operations that will allow students to more easily understand and engage with complex math and science topics. The course's main focus is on understanding of basic mathematical modeling through variables. Being able to appropriately use numbers and variables to represent real world scenarios can greatly improve the value of math for students, as well as their interest level. This goal is achieved through frequent introduction of word problems in each unit, as well as projects that test content knowledge and provide students some agency and creative freedom over their work. Special attention is also given to graphing lessons, since graphs are one of the primary ways data is presented and being able to read and understand them is critical.

Specific Topics include: Solving equations and inequalities, polynomials, factoring, algebraic fractions, the Cartesian plane, quadratic equations and graphing linear and systems of equations and inequalities.

Purpose of this assignment:

To ensure students are adequately prepared for the topics that will be explored in this class, this summer assignment is meant to encourage students to review and practice previously learned concepts, and make sure they are up to par. These concepts will be reviewed and tested within the first 2 weeks of school, before jumping into the main curriculum.

Extra Instructions:

Aside from the problem solving section, **it is intended that you do the majority of this assignment without a calculator**, to practice your own skill working with numbers. You should only use a calculator for the problem solving section (Page 2) if needed. This assignment should be done within the last few weeks of summer vacation so that the knowledge is more fresh come the beginning of the school year

Topics covered on this assignment:

- Solving Multi-Step Word Problems
- Sets of Real Numbers
- Operations with Integers (adding, subtracting, multiplication and division)
- Operations with Fractions (Adding/Subtracting, Multiplication/Division)
- Percent as a proportion
- Finding Greatest Common Factors of Numbers
- Exponents

Helpful Resources: If at any point during the assignment you need a refresher on the topic, or to learn it for the first time, don't be afraid to look for video tutorials and articles on the internet. Here are some good sites that I recommend using as reference when needed. **It is intended that you practice searching for the guidance you need on the internet for this assignment.** Algebra is one of the most documented subjects on the internet, learning to find content that helps you learn now will come in handy during your educational career. **Remember to search for an explanation of the process, not just the answer to a specific question!**

-[Math is Fun \(mathsisfun.com\)](https://www.mathsisfun.com)

-[Pre-algebra | Khan Academy](https://www.khanacademy.com/pre-algebra)

-[Algebra 1 | Math | Khan Academy](https://www.khanacademy.com/math)

-[Free and clear online algebra help! | Purplemath](https://www.purplemath.com)

Problem Solving

Using the **four-step problem-solving plan** can help you solve any word problem. Each step of the plan is important.

Step 1 Understand the Problem

To solve a verbal problem, first read the problem carefully and explore what the problem is asking.

- Identify what information is given.
- Identify what you need to find.

Step 2 Plan the Solution

One strategy you can use is to write an equation. Choose a variable to represent one of the unspecified numbers in the problem. This is called **defining a variable**. Then use the variable to write expressions for the other unspecified numbers in the problem.

Step 3 Solve a Problem

Use the plan or strategy you chose in Step 2 to find a solution to the problem.

Step 4 Check the Solution

Check your answer in the context of the original problem.

- Are the steps that you took to solve the problem effective?
- Is your answer reasonable?

Example 2 Use the Four-Step Plan



TRAVEL Emily's family drove 254.6 miles. Their car used 19 gallons of gasoline. Describe the car's gas mileage.

Understand We are given the total miles driven and how much gasoline was used. We are asked to find the gas mileage of the car.

Plan Write an equation. Let G represent the car's gas mileage.
gas mileage = number of miles \div number of gallons used
 $G = 254.6 \div 19$

Solve $G = 254.6 \div 19$
 $= 13.4$ mi/gal
The car's gas mileage is 13.4 miles per gallon.

Check Use estimation to check your solution.
 $260 \text{ mi} \div 20 \text{ gal} = 13 \text{ mi/gal}$

Since the solution 13.4 is close to the estimate, the answer is reasonable. Dividing total miles by the gallons of gas used provides the gas mileage.

Determine whether you need an estimate or an exact answer. Then use the four-step problem-solving plan to solve.

- DRIVING** While on vacation, the Jacobson family drove 312.8 miles the first day, 177.2 miles the second day, and 209 miles the third day. About how many miles did they travel in all?
- PETS** Ms. Hernandez boarded her dog at a kennel for 4 days. It cost \$28.90 per day, and she had a coupon for \$5 off. What was the final cost for boarding her dog?
- MEASUREMENT** William is using a 1.75-liter container to fill a 14-liter container of water. About how many times will he need to fill the smaller container?
- SEWING** Fabric costs \$12.05 per yard. The drama department needs 18 yards of the fabric for their new play. About how much should they expect to pay?
- FINANCIAL LITERACY** The table shows donations to help purchase a new tree for the school. How much money did the students donate in all?

Number of Students	Amount of Each Donation
20	\$2.50
15	\$3.25

- SHOPPING** Is \$12 enough to buy a half gallon of milk for \$2.49, a bag of apples for \$4.35, and four cups of yogurt that cost \$0.89 each? Explain.

SETS OF REAL NUMBERS

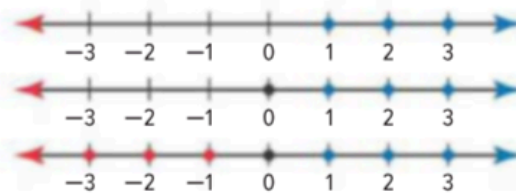
A number line can be used to show the sets of natural numbers, whole numbers, integers, and rational numbers. Values greater than 0, or **positive numbers**, are listed to the right of 0, and values less than 0, or **negative numbers**, are listed to the left of 0.

natural numbers: 1, 2, 3, ...

whole numbers: 0, 1, 2, 3, ...

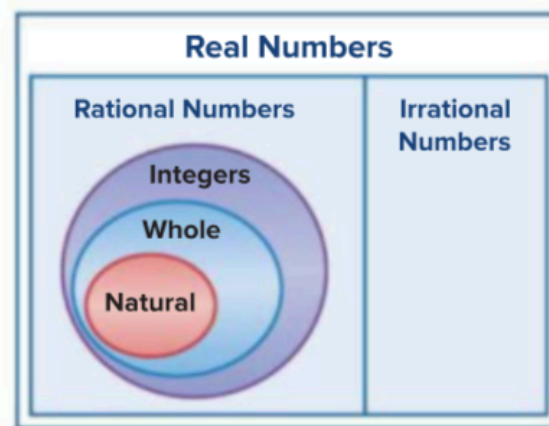
integers: ... , -3, -2, -1, 0, 1, 2, 3, ...

rational numbers: numbers that can be expressed in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$



A **square root** is one of two equal factors of a number. For example, one square root of 64, written as $\sqrt{64}$, is 8 since $8 \cdot 8$ or 8^2 is 64. The nonnegative square root of a number is the **principal square root**. Another square root of 64 is -8 since $(-8) \cdot (-8)$ or $(-8)^2$ is also 64. A number like 64, with a square root that is a rational number, is called a **perfect square**. The square roots of a perfect square are rational numbers.

A number such as $\sqrt{3}$ is the square root of a number that is not a perfect square. It cannot be expressed as a terminating or repeating decimal; $\sqrt{3} \approx 1.73205\dots$. Numbers that cannot be expressed as terminating or repeating decimals, or in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$, are called **irrational numbers**. Irrational numbers and rational numbers together form the set of **real numbers**.



Name the set or sets of numbers to which each real number belongs.

1. $-\sqrt{64}$

2. $\frac{8}{3}$

3. $\sqrt{28}$

4. $\frac{56}{7}$

5. $-\sqrt{22}$

6. $\frac{36}{6}$

7. $-\frac{5}{12}$

8. $\frac{18}{3}$

Note: For the above problems, simplifying before classification may help! (If you need more guidance try looking for “how to classify numbers” on Khan Academy for example)

Operations with Integers (Try searching “Adding and Subtracting Integers” if you need a refresher)

Find each sum or difference.

1. $-8 + 13$

2. $11 + (-19)$

3. $-19 - 8$

4. $-77 + (-46)$

5. $12 - 34$

6. $41 + (-56)$

7. $50 - 82$

8. $-47 - 13$

9. $-80 + 102$

(Try Searching “Multiplying and dividing Integers if you need a refresher for the next section)

Find each product or quotient.

10. $5(18)$

11. $60 \div 12$

12. $-12(15)$

13. $-64 \div (-8)$

14. $8(-22)$

15. $54 \div (-6)$

16. $30(14)$

17. $-23(5)$

18. $-200 \div 2$

19. **WEATHER** The outside temperature was -4°F in the morning and 13°F in the afternoon. By how much did the temperature increase?

20. **DOLPHINS** A dolphin swimming 24 feet below the ocean’s surface dives 18 feet straight down. How many feet below the ocean’s surface is the dolphin now?

21. **MOVIES** A movie theater gave out 50 coupons for \$3 off each movie. What is the total amount of discounts provided by the theater?

22. **WAGES** Emilio earns \$11 per hour. He works 14 hours a week. His employer withholds \$32 from each paycheck for taxes. If he is paid weekly, what is the amount of his paycheck?

Replace each \bullet with $<$, $>$, or $=$ to make a true sentence.

1. $-\frac{5}{8} \bullet \frac{3}{8}$

2. $\frac{4}{5} \bullet 0.71$

3. $\frac{5}{6} \bullet 0.875$

4. $1.2 \bullet 1\frac{2}{9}$

5. $\frac{8}{15} \bullet 0.5\bar{3}$

6. $-\frac{7}{11} \bullet -\frac{2}{3}$

Order each set of rational numbers from least to greatest.

7. $3.8, 3.06, 3\frac{1}{6}, 3\frac{3}{4}$

8. $2\frac{1}{4}, 1\frac{7}{8}, 1.75, 2.4$

9. $0.11, -\frac{1}{9}, -0.5, \frac{1}{10}$

10. $-4\frac{3}{5}, -3\frac{2}{5}, -4.65, -4.09$

Find each sum or difference. Write in simplest form.

11. $\frac{2}{5} + \frac{1}{5}$

12. $\frac{3}{9} + \frac{4}{9}$

13. $\frac{5}{16} - \frac{4}{16}$

14. $\frac{6}{7} - \frac{3}{7}$

15. $\frac{2}{3} + \frac{1}{3}$

16. $\frac{5}{8} + \frac{7}{8}$

17. $\frac{4}{3} + \frac{4}{3}$

18. $\frac{7}{15} - \frac{2}{15}$

19. $\frac{1}{3} - \frac{2}{9}$

20. $\frac{1}{2} + \frac{1}{4}$

21. $\frac{1}{2} - \frac{1}{3}$

22. $\frac{3}{7} + \frac{5}{14}$

23. $\frac{7}{10} - \frac{2}{15}$

24. $\frac{3}{8} + \frac{1}{6}$

25. $\frac{13}{20} - \frac{2}{5}$

Find each sum or difference. Write in simplest form if necessary.

26. $-1.6 + (-3.8)$

27. $-32.4 + (-4.5)$

28. $-38.9 + 24.2$

29. $-9.16 - 10.17$

30. $26.37 + (-61.1)$

31. $72.5 - (-81.3)$

32. $43.2 + (-27.9)$

33. $79.3 - (-14)$

34. $1.34 - (-0.458)$

35. $-\frac{1}{6} - \frac{2}{3}$

36. $\frac{1}{2} - \frac{4}{5}$

37. $-\frac{2}{5} + \frac{17}{20}$

38. $-\frac{4}{5} + \left(-\frac{1}{3}\right)$

39. $-\frac{1}{12} - \left(-\frac{3}{4}\right)$

40. $-\frac{7}{8} - \left(-\frac{3}{16}\right)$

41. **GEOGRAPHY** About $\frac{7}{10}$ of the surface of Earth is covered by water. The rest of the surface is covered by land. How much of Earth's surface is covered by land?

Multiply/Dividing Rational Numbers (Decimals and Fractions)

Find each product or quotient. Round to the nearest hundredth if necessary.

- | | | |
|------------------|-----------------------|----------------------|
| 1. $6.5(0.13)$ | 2. $-5.8(2.3)$ | 3. $42.3 \div (-6)$ |
| 4. $-14.1(-2.9)$ | 5. $-78 \div (-1.3)$ | 6. $108 \div (-0.9)$ |
| 7. $0.75(-6.4)$ | 8. $-23.94 \div 10.5$ | 9. $-32.4 \div 21.3$ |

Find each product. Simplify before multiplying if possible.

- | | | |
|---|---|---|
| 10. $\frac{3}{4} \cdot \frac{1}{5}$ | 11. $\frac{2}{5} \cdot \frac{3}{7}$ | 12. $-\frac{1}{3} \cdot \frac{2}{5}$ |
| 13. $-\frac{2}{3} \cdot \left(-\frac{1}{11}\right)$ | 14. $2\frac{1}{2} \cdot \left(-\frac{1}{4}\right)$ | 15. $3\frac{1}{2} \cdot 1\frac{1}{2}$ |
| 16. $\frac{2}{9} \cdot \frac{1}{2}$ | 17. $\frac{3}{2} \cdot \left(-\frac{1}{3}\right)$ | 18. $\frac{1}{3} \cdot \frac{6}{5}$ |
| 19. $\frac{9}{4} \cdot \frac{1}{18}$ | 20. $\frac{11}{3} \cdot \frac{9}{44}$ | 21. $\left(-\frac{30}{11}\right) \cdot \left(-\frac{1}{3}\right)$ |
| 22. $-\frac{3}{5} \cdot \frac{5}{6}$ | 23. $\left(-\frac{1}{3}\right)\left(-7\frac{1}{2}\right)$ | 24. $\frac{2}{7} \cdot 4\frac{2}{3}$ |

Name the reciprocal of each number.

- | | |
|---------------------|--------------------|
| 25. $\frac{6}{7}$ | 26. $\frac{1}{22}$ |
| 27. $\frac{14}{23}$ | 28. $2\frac{3}{4}$ |
| 29. $-5\frac{1}{3}$ | 30. $3\frac{3}{4}$ |

Find each quotient.

- | | |
|--|--|
| 31. $\frac{2}{3} \div \frac{1}{3}$ | 32. $\frac{16}{9} \div \frac{4}{9}$ |
| 33. $\frac{3}{2} \div \frac{1}{2}$ | 34. $\frac{3}{7} \div \left(-\frac{1}{5}\right)$ |
| 35. $-\frac{9}{10} \div 3$ | 36. $\frac{1}{2} \div \frac{3}{5}$ |
| 37. $2\frac{1}{4} \div \frac{1}{2}$ | 38. $-1\frac{1}{3} \div \frac{2}{3}$ |
| 39. $\frac{11}{12} \div 1\frac{2}{3}$ | 40. $4 \div \left(-\frac{2}{7}\right)$ |
| 41. $-\frac{1}{3} \div \left(-1\frac{1}{5}\right)$ | 42. $\frac{3}{25} \div \frac{2}{15}$ |
43. **PIZZA** A large pizza at Pizza Shack has 12 slices. If Bobby ate $\frac{1}{4}$ of the pizza, how many slices of pizza did he eat?
44. **MUSIC** Samantha practices the flute for $4\frac{1}{2}$ hours each week. How many hours does she practice in a month?
45. **BAND** How many band uniforms can be made with $131\frac{3}{4}$ yards of fabric if each uniform requires $3\frac{7}{8}$ yards?
46. **CARPENTRY** How many boards, each 2 feet 8 inches long, can be cut from a board 16 feet long if there is no waste?
47. **SEWING** How many 9-inch ribbons can be cut from $1\frac{1}{2}$ yards of ribbon?

Percent as a Proportion

A **percent** is a ratio that compares a number to 100. To write a percent as a fraction, express the ratio as a fraction with a denominator of 100. Fractions should be expressed in simplest form.

In the **percent proportion**, the ratio of a part of something to the whole (base) is equal to the percent written as a fraction.

$$\begin{array}{l} \text{part} \rightarrow \\ \text{whole} \rightarrow \end{array} \frac{a}{b} = \frac{p}{100} \leftarrow \begin{array}{l} \text{percent} \\ \text{percent} \end{array}$$

Example: percent whole part
 ↓ ↓ ↓
 25% of 40 is 10.

You can use the percent proportion to find the part.

Example 2 Find the Part



40% of 30 is what number?

$$\frac{a}{b} = \frac{p}{100} \quad \text{The percent is 40, and the base is 30. Let } a \text{ represent the part.}$$

$$\frac{a}{30} = \frac{40}{100} \quad \text{Replace } b \text{ with 30 and } p \text{ with 40.}$$

$$100a = 30(40) \quad \text{Find the cross products.}$$

$$100a = 1200 \quad \text{Simplify.}$$

Express each percent as a fraction or mixed number in simplest form.

- | | | |
|---------|---------|----------|
| 1. 5% | 2. 60% | 3. 11% |
| 4. 120% | 5. 78% | 6. 2.5% |
| 7. 0.6% | 8. 0.4% | 9. 1400% |

Use the percent proportion to find each number.

- | | |
|--------------------------------|--------------------------------|
| 10. 25 is what percent of 125? | 11. 16 is what percent of 40? |
| 12. 14 is 20% of what number? | 13. 50% of what number is 80? |
| 14. What number is 25% of 18? | 15. Find 10% of 95. |
| 16. What percent of 48 is 30? | 17. What number is 150% of 32? |

Factors/Finding GCF (Greatest Common Factor)

Find the Greatest Common factor of each Pair of numbers in parentheses. If you need to review factors and GCF, try searching “How to find the Greatest Common Factor of Two Numbers” or just “Greatest Common Factors”

1) GCF (20, 14) =

13) GCF (25, 45) =

2) GCF (12, 15) =

14) GCF (18, 36) =

3) GCF (13, 18) =

15) GCF (36, 21) =

4) GCF (22, 16) =

16) GCF (22, 33) =

5) GCF (24, 15) =

17) GCF (21, 16) =

6) GCF (18, 30) =

18) GCF (35, 28) =

7) GCF (21, 32) =

19) GCF (30, 42) =

8) GCF (18, 27) =

20) GCF (26, 34) =

9) GCF (33, 25) =

21) GCF (31, 23) =

Exponents

Recall that an exponent is an indication of how many times a number should be multiplied by itself, and is shown with a smaller number or superscript, written above the base number.

For example,

$$2^2 = 2 \times 2 = 4 \text{ In words "2 squared equals 4, or Two 2's multiplied together equals 4"}$$

Commonly, we also cube number (Cubing means a number is given an exponent of 3)

$$2^3 = 2 \times 2 \times 2 = 8 \text{ In words "2 cubed equals 8, or Three 2's multiplied together equals 4"}$$

With this in mind, compute the following values:

1. 3^3

2. 1^3

3. 4^2

4. 2^4

5. 7^2

6. 8^2

7. 10^3

8. 12^2

9. 1^5

10. 11^2