



Summer Math Packet – Algebra I

You should complete this packet if you are entering 8th Grade Algebra or 7th Grade Accelerated Math in 2026.

The Middle School Math Department is asking you to do summer math to make the transition back to class easier for you. Check the answers that are available to you at the end of the packet. If you find that you need the answer sheet to answer the questions, then you may want to review those topics before school begins. Your teacher will spend little time reviewing the skills and concepts in this packet. Expect an evaluation on this in the first week of school. Good luck and see you in August!

Instructions:

1. **Use a pencil.**
2. Do all of your work on **separate paper**. Copy the problem onto your paper. To save paper, you do not have to print this packet unless you want to. We will only collect your work.
3. Show your work, even if you are capable of doing it in your head. Show us your steps and thought process on paper. Just writing an answer is not sufficient for most problems.
4. Check your answers with the back of the packet. If any problems are incorrect, put an X through your incorrect work (but do not erase it) and rework the problem again.
5. The packet must be completed and brought to class by the second day of school to be graded. This will count as an assignment. Since most answers are provided, it will mostly be graded on thoroughness of showing your work, neatness, and following directions

Skill Building: Perfect Squares

Memorize your perfect squares of the numbers 1 to 15. Every time that you pick up this packet to do work, test yourself on your perfect squares. Before you do work, run through your list once and then go through it again before quitting. You should be able to run through the list quickly. Here are your perfect squares to memorize.

$1^2 = 1$	$4^2 = 16$	$7^2 = 49$	$10^2 = 100$	$13^2 = 169$
$2^2 = 4$	$5^2 = 25$	$8^2 = 64$	$11^2 = 121$	$14^2 = 196$
$3^2 = 9$	$6^2 = 36$	$9^2 = 81$	$12^2 = 144$	$15^2 = 225$

Exercises:

While not looking at the list, practice listing off the perfect squares from 1-15. Do this 10-15 times over the course of the 2 weeks prior to school starting. When you are memorizing the list you can just practice saying “1, 4, 9, 16, 25, 36 ...” and you do not have to say to yourself “3 squared is 9”, etc. You will be quizzed on this in the first days of school. You should be aiming to do it in less than 12 seconds. (Challenge yourself: The fastest time that we have heard was just under 6 seconds.)

Skill Building: Multiplication Tables

You should know your multiplication tables up through 15 times 15 fluently! Work to have a 2 second recall. If you cannot do this, make a set of multiplication flash cards and practice these until you can. You should have them memorized so that you can fill out a table like this quickly and accurately. Check to make sure that you can complete each table correctly in less than 2 minutes.

X	3	7	11	4	8	9	5	10	13	12	6
8											
12											
5											
10											
3											
7											
9											
13											
4											
11											
6											

X	4	9	10	6	7	12	5	14	3	11	8
14											
5											
10											
3											
11											
9											
6											
4											
8											
12											
7											

Section I: Number Basics

Exercises:

Use the divisibility rules above to list the factors of the following numbers. Do not use a calculator. Only state the factors for which you have divisibility rules. You do not need to worry about rules for 7 and 8 so you do not have to test or list those factors.

1) 108

2) 72

3) 55

4) 224

5) 48

6) 96

7) 225

8) 432

9) If a number is divisible by 9, then it is automatically divisible by which other number, 2, 3, or 6? Why is this?

10) If a number is divided by 4 and then in the next step is divided by 7, what has the original number really been divided by during those two steps?

11) If a number is divided by 6 and then in the next step is divided by 5, what has the original number really been divided by during those two steps?

12) Memorize the divisibility rules above. Be sure that you are able to state them QUICKLY and use them.

Section II: Algebra Translation

Many people are challenged by mathematical word problems. However, if you can view them like your foreign language and realize that they have translations just like another language then they might become easier. Algebra frequently refers to things that we do not actually know the value of and thus we use a variable to represent that unknown.

Exercises:

Translate the following phrases into expressions. (Commas are important.)

- 1) Six more than twice a number
- 2) Four subtracted from a number
- 3) Five times the quantity of a number and 3
- 4) The difference of 8 and a number minus 11
- 5) The quotient of c and 9, plus 14

Translate the following sentences into equations. Do NOT solve.

- 6) A number plus four is the same as three times the number minus six.
- 7) Five times the quantity of three plus twice a number is twenty.
- 8) Eight subtracted from the opposite of a number is the number plus 5.
- 9) The sum of two numbers is twelve.
- 10) The difference of two numbers is fourteen.

Section III: Operations on Integers

To do algebra you must be able to work accurately with integers. Perform these operations to find the value of each expression. Show one step for each calculation. These will take 2 or more steps.

1) $-5 + 8 - 14$

2) $-12 - 17 + 5$

3) $-31 + 42 - 17$

4) $-1 + 2 - 3 + 4 - 5$

5) $-8 \cdot 3 \cdot (-2)$

6) $-14(-2)(-7)$

7) $(1 + 2) - (3 \cdot 4)(5)$

8) $728 \div 7 \div (-2)$

9) $42 \div (-3)$

10) $-51 \div (-3)$

11) $54 \div 6 \cdot 3$

12) $-224 \div 8$

Section IV: Order of Operations

As you move into Algebra, it will be important for you to be able to simplify all kinds of algebraic expressions. This includes being comfortable with using “order of operations” (PEMDAS) without making any mistakes and being able to combine “like terms” accurately.

Like terms: Remember that you can only add and subtract terms that have the same variables with the same exponents. (Example: $3x^2 - 2x + 5 + 5x - x^2$ simplifies to $2x^2 + 3x + 5$).

Order of Operations: Scan the expression and look to simplify it in this order using PEMDAS.

P (parentheses or other grouping symbol first – simplify what is INSIDE)

E (exponents next)

DM (then division or multiplication, from left to right)

SA (and last of all, subtraction or addition, from left to right)

Exercises:

Simplify each expression completely by using order of operations (PEMDAS) and by combining like terms. Rewrite the whole expression after each step to keep your work organized and so that you don't miss anything (and to get full credit on this assignment ☺).

Example: $-3 + (2 - 4)^2$

$$-3 + (-2)^2$$

$$-3 + 4$$

$$1$$

1) -13^2

2) $(-13)^2$

3) $-(-5)^3$

4) $5 - 12(9 - 3)$

5) $16 + 3(6 + 15) - 2(5)$

6) $11(2x - 3) + 19x + 7x$

7) $3x + 17 - 4x + 2$

8) $35 - 5(8 \div 4 \cdot 3)$

9) $5 + 5(11 + 2^3)$

10) $\frac{12+4}{3} - 5$

11) $8 - (-2)^2$

12) $6 \div 2 \cdot 3 + 12 \cdot 2(5 + 3)$

13) $3 + (-10) + 19$

14) $14 - 22 + 3 \cdot 6$

15) $(-8 - 6 + 7 + 3)2^3$

16) $(4 - 3)^2 + 50 - 60$

Section V: Substitution

This integer work focuses on application of positive and negative numbers. Read the example below before you begin. Be sure to include parentheses when substituting so that everyone will know what value was substituted where.

Exercises:

Evaluate the following expressions, given the values for the variables. **Be sure to show** what numbers are being substituted in before you go on to do any work, as shown in the example.

Evaluate the following using these values:

$$x = -7 \quad y = 0 \quad z = -8$$

Example:

$$3x + yz$$

$$3(-7) + (0)(-8)$$

$$-21 + 0$$

$$-21$$

1) $xyz + x =$

2) $\frac{2x^2 - z}{2}$

3) $\frac{3x}{3z} =$

4) $z^2 - x^2 + y^1$

5) $x^2 + y - z$

6) $5z + y^3 - x^2$

Evaluate if $a = \frac{-2}{3}$, $b = \frac{3}{7}$, $c = \frac{-5}{6}$, $d = \frac{4}{9}$. Be careful with the negative signs. Use canceling.

7) $27d + 6a$

8) $3a - 7b + 6c - 9d$

9) $14b - 12c$

Section VI: Equations

When you solve equations, you are finding the value for the variable that makes the math statement work. Use PEMDAS backward to “undo” and find the answer. This means that you start by doing addition or subtraction then multiplication or division. (Example: In the equation $-3x - 5 = 1$, start by adding 5 to each side. After this you can solve by dividing each side by -3).

Exercises:

Solve each problem for the variable. Show all steps. Do not use decimals, only fractions if necessary.

Example:

$$\begin{array}{rcl} -(x+7) = -9x & 1) & -5+x = -9 \\ -x-7 = -9x & & 2) \quad 5x = -25 \\ +x \quad +x & & 3) \quad -6m = 27 \\ \underline{-7} = \underline{-8x} & & \\ -8 \quad -8 & & \\ \boxed{\frac{7}{8} = x} & 4) \quad \frac{r}{7} = -11 & 5) \quad \frac{x}{6.2} = -2.1 \\ & & 6) \quad 3x - 2 = 8 \end{array}$$

$$\begin{array}{rcl} 7) \quad 4(2x+3) = 60 & 8) \quad \frac{y}{2} = \frac{13}{8} & 9) \\ k + 4.37 = 9.21 & & \end{array}$$

Section VII: Percent Change and Simple Interest

Percent Change

- | | |
|---|--|
| 1) Original: \$40
% Change: 35% mark up
New: <u> x </u> | 2) Original: \$80
% Change: <u> x </u>
New: \$36 |
| 3) Original: <u> x </u>
% Change: 20% discount | 4) Original: <u> x </u>
% Change: 15% mark up |

New: **\$46**

New: **\$59.80**

Simple Interest

- 5) You invested \$500 at a 4% interest rate for 3 years. What is your new **balance**?
- 6) What is the **interest rate** if you invested \$1,000 for 4 years and earned \$200?
- 7) How many **years** would it take to earn \$144 if you invested \$400 at 6% interest rate?

Section VIII: Decimal and Percent

As you move into Algebra, it will be important that you can work with percentages and decimals.
Convert the following into decimals. (No calculators.)

- 1) 61.4% 2) 1.36% 3) $\frac{7}{9}$ 4) $\frac{32}{40}$ 5) $\frac{14}{35}$

Respond to the following:

- 6) 18 is what percent of 40? 7) 75 is what percent of 50? 8) 30% of what is 19.5

Section IX: Formula Matching

Match the formula with the description on the right. (There is one extra description.) On your graph paper, please copy the formula from the left column and write the description (not the letter).

1. $I = Prt$ _____
2. $\frac{\text{part}}{\text{whole}} = \frac{\%}{100}$ _____
3. $A = bh$ _____
4. $d = 2r$ _____
5. $a = p \cdot w$ _____

6. $C = 2\pi r$ _____
7. $A = \frac{1}{2}b \cdot h$ _____
8. $A = \pi r^2$ _____
9. $A = 2(lw + lh + wh)$ _____
A. Circumference
B. Surface area of rectangular prism

- | | |
|--------------------------------|-----------------------|
| C. Volume of rectangular prism | G. Percent Proportion |
| D. Simple Interest | H. Percent equation |
| E. Diameter of a circle | I. Area of a triangle |
| F. Area of a parallelogram | J. Area of a circle |

Section X: Proportions

Write the ratio as a fraction in simplest form.

- 1) 25 to 45 2) 63:28 3) 35 girls to 15 boys

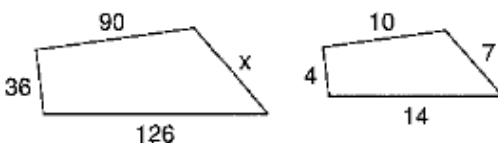
Find the unit rate.

- 4) 180 miles in 3 hours 5) 256 miles per 8 gallons

Solve the proportion.

6. $\frac{2-x}{2} = \frac{x-7}{3}$ 7) $\frac{2x}{x+4} = \frac{9}{5}$

- 8) Set-up a proportion and solve for the missing side length.



Section XI: Geometry

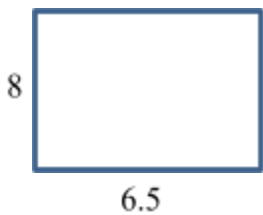
This section will introduce you to a few new basic geometric principles as well as review some geometry that you have already learned. Please work to pick up new vocabulary if/when you come across it.

Area and Perimeter

Find the area, perimeter or circumference of each figure as indicated. Leave all answers in most accurate form. Be sure to show work as you find an answer.

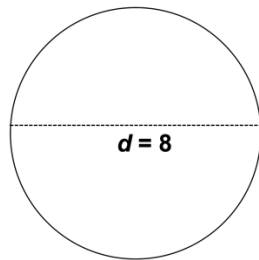
1) Area =

Perimeter =

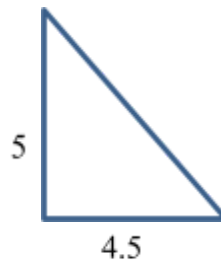


2) Area =

Circumference =

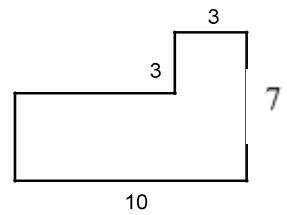


3) Area =

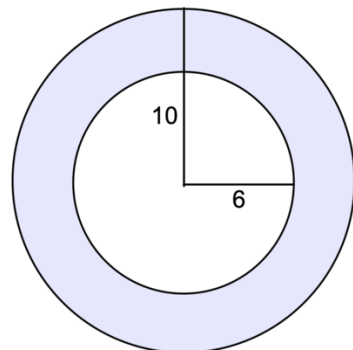


4) Area =

Perimeter =



5) Find the area of the shaded region (the region that is the donut shape on the outside). Leave your answer in two forms – most accurate and rounded to the nearest hundredth.



Algebra Summer Packet Answers

Section I: Number Basics

- 1) 1-108, 2-54, 3-36, 4-27, 6-18, 9-12
- 2) 1-72, 2-36, 3-24, 4-18, 6-12, 8-9
- 3) 1-55, 5-11
- 4) 1-224, 2-112, 4-56, 7-32, 8-28, 14-16
- 5) 1-48, 2-24, 3-16, 4-12, 6-8,
- 6) 1-96, 2-48, 3-32, 4-24, 6-16, 8-12
- 7) 1-225, 3-75, 5-45, 9-25, 15-15
- 8) 1-432, 2-216, 3-144, 4-108, 6-72, 8-54, 9-48, 12-36, 16-27, 18-24
- 9) It is also divisible by 3 because 9 is a greater multiple of 3.
- 10) 28
- 11) 30

Section II: Algebra Translation

- 1) $2x + 6$
- 2) $x - 4$
- 3) $5(m + 3)$
- 4) $(8 - x) - 11$
- 5) $\frac{c}{9} + 14$
- 6) $n + 4 = 3n - 6$
- 7) $5(3 + 2y) = 20$
- 8) $-x - 8 = x + 5$
- 9) $x + y = 12$
- 10) $x - y = 14$

Section III: Integers

- 1) -11
- 2) -24
- 3) -6
- 4) -3
- 5) 48
- 6) -196
- 7) -57

8) - 52

9) -14

10) 17

11) 27

12) -28

Section IV: Order of Operator

1) -169

2) 169

3) 125

4) -67

5) 69

6) $48x - 33$

7) $-x + 19$

8) 5

9) 100

10) $\frac{1}{3}$

11) 4

12) 201

13) 12

14) 10

15) 16

16) -9

Section V: Substitution

1) -7

2) 53

3) $\frac{7}{8}$

4) 15

5) 57

6) -89

7) 8

8) -14

9) 16

Section VI: Equations

1) $x = -4$

2) $x = -5$

3) $m = -\frac{9}{2}$

4) $r = -77$

5) $x = -13.02$

6) $x = \frac{10}{3}$

7) $x = 6$

8) $m = \frac{13}{4}$

9) $k = 4.84$

Section VII: Percent Change / Simple Interest

1) \$54

2) 55% discount

3) \$57.50

4) \$52

5) \$560

6) 5%

7) 6 years

Section VIII: Decimal and Percent

1) 0.614

2) 0.0136

3) $0.\bar{7}$

4) 0.8

5) 0.4

6) 45%

7) 150%

8) 65

Section IX: Matching

1) D

2) G

3) F

4) E

5) H

6) A

7) I

8) J

9) B

Section X: Proportions

1) $\frac{5}{9}$

2) $\frac{9}{4}$

- 3) $\frac{7}{3}$
- 4) 60mph
- 5) 32mpg
- 6) $x=4$
- 7) $x=36$
- 8) $x=63$

Section XI: Geometry

- 1) area = 52, perimeter = 29
- 2) area = 16π or 50.24
circumference = 8π or 25.12
- 3) area = 11.25
- 4) area = 49, perimeter = 34
- 5) 64π or 200.96