

Thoreau Middle School
Algebra 1 – Summer Packet 2024

Welcome to Algebra 1!

Please spend some time this summer keeping the skills and concepts that were taught in 7th Grade/6th Grade AAP fresh in your mind. This summer packet is for all students enrolled in Algebra 1 at Thoreau Middle School for Fall 2024. It is important that you know and understand these concepts, as we will build on them in Algebra 1. **Be sure to show ALL of your work!** The packet will not be turned in for a grade, however, you will have an assessment on the concepts found in this packet within the first two weeks of school.

Summer opportunities to review:

- Current middle school students will continue to have access to Mathspace through Schoology. Students are encouraged to practice their mathematics through utilizing the Mathspace Skills Check-Ins.
- The Virginia Department of Education has tips and a list of free online resources to support math at Home [VDOE Mathematics Resources for Families](#)
- Khan Academy is a free resource that provides the [Virginia Grade 8 Course](#) as well as a [Get Ready for Algebra 1 Course](#)
- Zearn is another free resource that has a Summer Series for Algebra 1 readiness. Choose the [8th Grade/Rising 9th Grade curriculum](#).

Have a great summer and see you in August!

From,
The Algebra 1 Teachers

A. Order of Operations

Directions: Simplify the following expressions.

$$\begin{aligned}
 1. \quad & -5 + 6(-4 + 1) \div \frac{1}{3} \\
 & -5 + 6(-3) \div \frac{1}{3} \\
 & -5 - 18 \div \frac{1}{3} \\
 & -5 - 54 \\
 & \quad \textcircled{-59}
 \end{aligned}$$

$$\begin{aligned}
 2. \quad & \frac{3(4+2)}{2(4+3)} \quad \frac{3(6)}{2(7)} \\
 & \quad \quad \quad \downarrow \\
 & \quad \quad \quad \frac{18}{14} \\
 & \quad \quad \quad \textcircled{\frac{9}{7}}
 \end{aligned}$$

$$\begin{aligned}
 3. \quad & \frac{9(2+1)^2}{9} - \frac{5(4+2)}{5-3} \\
 & \frac{9(3)^2}{9} - \frac{5(6)}{2} \\
 & \frac{9(9)}{9} - \frac{5(6)}{2} \\
 & \frac{81}{9} - \frac{30}{2} \\
 & 9 - 15 \\
 & \quad \textcircled{-6}
 \end{aligned}$$

$$\begin{aligned}
 4. \quad & 2\sqrt{36} + 10 \div 2(6) - |-5| \\
 & 2 \cdot 6 + 10 \div 2 \cdot 6 - 5 \\
 & 12 + 5 \cdot 6 - 5 \\
 & 12 + 30 - 5 \\
 & 42 - 5 \\
 & \quad \textcircled{37}
 \end{aligned}$$

B. Substitution

Directions: Evaluate each of the following expressions for the given values of the variables:

$$w = -6$$

$$x = 0$$

$$y = 3$$

$$z = \frac{1}{3}$$

$$\begin{aligned}
 5. \quad & y^2 - 2xz \\
 & (3)^2 - 2(0)\left(\frac{1}{3}\right) \\
 & 9 - 0 \\
 & \quad \textcircled{9}
 \end{aligned}$$

$$\begin{aligned}
 6. \quad & \frac{w^2}{3y} \quad \frac{(-6)^2}{3 \cdot 3} \\
 & \quad \quad \quad \frac{36}{9} \rightarrow \textcircled{4}
 \end{aligned}$$

$$\begin{aligned}
 7. \quad & |w - y| - |w + y| \\
 & |-6 - 3| - |-6 + 3| \\
 & |-9| - |-3| \\
 & 9 - 3 \\
 & \quad \textcircled{6}
 \end{aligned}$$

$$\begin{aligned}
 8. \quad & \sqrt{yz} - 2w \\
 & \sqrt{3 \cdot \frac{1}{3}} - 2 \cdot (-6) \\
 & \sqrt{1} + 12 \\
 & 1 + 12 \\
 & \quad \textcircled{13}
 \end{aligned}$$

C. Solving Equations

Directions: Solve each equation for the variable given.

$$9. \quad \frac{w}{-4} + 11 = 5$$

$$\frac{w}{-4} - 11 = -11$$

$$-4 \cdot \frac{w}{-4} = -6 \cdot -4$$

$$w = 24$$

$$10. \quad 30 = 6(x+1) + 5x$$

$$30 = 6x + 6 + 5x$$

$$30 = 11x + 6$$

$$-6 \quad -6$$

$$\frac{24}{11} = 11x$$

$$x = \frac{24}{11}$$

$$11. \quad -3(a-1) + 2(a+3) = 12$$

$$-3a + 3 + 2a + 6 = 12$$

$$-a + 9 = 12$$

$$-a - 9 = -9$$

$$\frac{-a}{-1} = \frac{3}{-1}$$

$$a = -3$$

$$12. \quad \frac{5}{6} = \frac{13}{x}$$

$$5x = 13(6)$$

$$5x = 78$$

$$x = \frac{78}{5}$$

$$13. \quad 7(b+3) = -(b-4)$$

$$7b + 21 = -b + 4$$

$$+1b \quad +1b$$

$$\frac{8b - 21}{-21} = \frac{4}{-21}$$

$$8b = -17$$

$$b = \frac{-17}{8}$$

$$14. \quad \frac{1}{2}(-10x+8) = 5$$

$$-5x + 4 = 5$$

$$-4 \quad -4$$

$$-5x = 1$$

$$x = \frac{1}{-5}$$

D. Solving Inequalities and Graphing on a Number Line

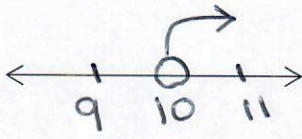
Directions: Solve the following inequality. Graph its solution on a number line.

$$15. \quad 5x - 4 > 4x + 6$$

$$-4x \quad -4x$$

$$x - 4 > 6$$

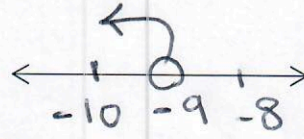
$$+4 \quad +4$$

$$x > 10$$


$$16. \quad \frac{m}{3} - 3 < -6$$

$$+3 \quad +3$$

$$3 \cdot \frac{m}{3} < -3 \cdot 3$$

$$m < -9$$


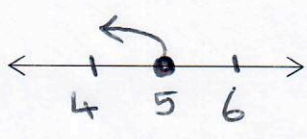
$$17. \quad -3(p+1) \geq -18$$

$$-3p - 3 \geq -18$$

$$+3 \quad +3$$

$$-3p \geq -15$$

$$-3 \quad -3$$

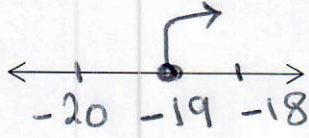
$$p \leq 5$$


$$18. \quad -1 \leq \frac{v-2}{21}$$

$$-21 \leq v - 2$$

$$+2 \quad +2$$

$$-19 \leq v$$

$$v \geq -19$$


E. Functions

Directions: Use the function tables given to find the function rules.

19.

X	Rule: $-3X$
4	-12
5	-15
6	-18
7	-21
8	-24

20.

X	Rule: $3X-2$
1	1
2	4
3	7
4	10
5	13

F. Slope-Intercept Form ($y=mx+b$)

Directions: For each of the following, identify the slope and y-intercept of the line.

21. $y = 7x + 4$ Slope (m): 7 Y-Intercept: 4

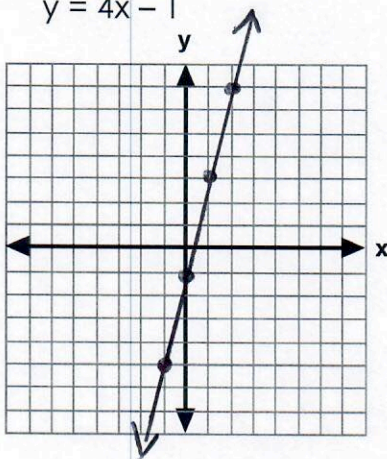
22. $y = 3$ Slope (m): 0 Y-Intercept: 3

G. Table to Graph

Directions: Complete the function table and graph the function.

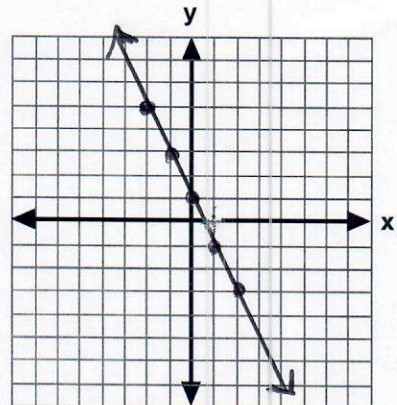
23. $y = 4x - 1$

x	Y
-1	-5
0	-1
1	3
2	7



24. $y = -2x + 1$

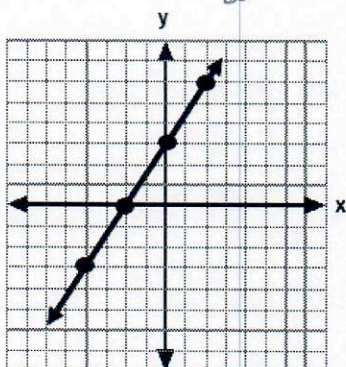
x	Y
-2	5
-1	3
0	1
1	-1
2	-3



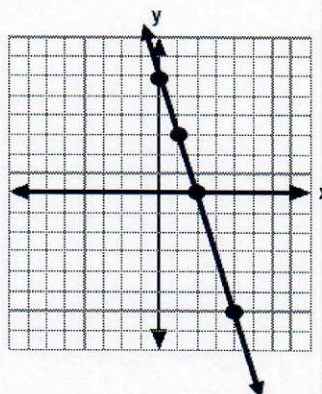
H. Graph to Rule

Directions: Identify the function rule that created the graphs below.

25. Rule: $y = \frac{3}{2}x + 3$



26. Rule: $y = -3x + 6$



I. Domain and Range

Directions: Identify the domain and range of the table and set.

27.

Input	1	3	5	7
Output	7	10	13	16

range = $\{7, 10, 13, 16\}$

28. $\{(2, 0), (8, -3), (0, 2), (5, 5), (10, 13)\}$

range = $\{-3, 0, 2, 5, 13\}$

J. Properties

Directions: Identify the property shown below.

29. $(ab)c = a(bc)$

Associative property
of multiplication

30. $\frac{2}{9} \cdot 1 = \frac{2}{9}$

Identity Property of multiplication

31. $(2 + -8) + 4 = (-8 + 2) + 4$

commutative property
of addition

32. $-17 + 17 = 0$

Inverse Property of addition

K. Laws of Exponents

33. $\frac{40x^6}{2x^5}$
 $20a$

34. $(5y)^2$
 $25y^2$

35. $3x^4 \cdot 4x^3$
 $12x^7$

36. $3x^2 + 7x^2$
 $10x^2$

L. Words to Symbols

Directions: translate the following expressions into numbers and symbols.

Let $n =$ a number

37. Four more than twice a number.

$$2n + 4$$

38. Five less than the square root of a number.

$$x^2 - 5$$

39. The quotient of a number squared and eight.

$$\frac{x^2}{8} \text{ OR } x^2 \div 8$$

40. Six less the product of five and a number.

$$6 - 5x$$