

Christian Heritage School
2021 Required Summer Skills Review
for all students enrolling in Honors Algebra 1

(based on content studied in Math7A)

Objective: Summer review will help students to review and practice needed skills in preparation for Honors Algebra 1.

This assignment contains a review and sample problems of skills you are expected to know for all students enrolling in Honors Algebra 1 for Fall 2021. Students may be quizzed on this assignment in early September, after having an opportunity to ask questions in class during the first week of school.

There are some great resources available online if you are stuck or in need of more practice. For example, Khan Academy has many resources for math.

Please complete the entire assignment **without using a calculator**, and check your answers, which are included at the end.

1. Greatest Common Factor (GCF)

- a. the largest integer that divides evenly into all numbers in a set.
- b. The GCF of 12 and 36 is 12

Try these problems:

- c. Find the GCF of 54 and 45
- d. 54 and 27
- e. -90, 105, and 60

2. Writing algebraic expressions

- a. A mathematical phrase that includes one or more variables
- b. Key words:
 - i. Sum (addition)
 - ii. Difference (subtraction)
 - iii. Product (multiplication)
 - iv. Quotient (division)
 - v. "4 less than" (take 4 away from)
 - vi. "increased by" (add to)
 - vii. Twice (multiply by 2)

Try these problems:

- c. Write an algebraic expression for the word phrase “x increased by six”
- d. Twice q
- e. The quotient of 18 and n
- f. 14 less than a number m
- g. 8 less than the product of a number x and 4
- h. Twice the sum of a number x and 8
- i. The quotient of 5 and the sum of 12 and number x

3. Order of Operations

- a. The accepted order in which mathematical operations are performed
- b. PEMDAS “Please excuse my dear aunt sally”:
 - i. Parentheses
 - ii. Exponents
 - iii. Multiplication AND division from left to right
 - iv. Addition AND subtraction from left to right
- c. $(6 - 2)^3 \div 2 \rightarrow (4)^3 \div 2 \rightarrow 64 \div 2 = 32$
- d. $\frac{2^4-1}{5} \rightarrow \frac{16-1}{5} \rightarrow \frac{15}{5} = 3$

Try these problems:

- e. Simplify: $5 \cdot 7 - 4^2 \div 2$
- f. $12 - 25 \div 5$
- g. $\frac{4+3^4}{7-2}$
- h. Using PEMDAS to evaluate expressions: replace the variable with its given value and apply PEMDAS
- i. Evaluate $(xy)^2 \div x$ when $x = 5$ and $y = 2 \rightarrow (5 \cdot 2)^2 \div 5 \rightarrow 10^2 \div 5 \rightarrow 100 \div 5 = 20$

Try these problems:

- j. Evaluate $m - n \div 4$ when $m = 5$ and $n = 8$
- k. Evaluate $15 - (m + p)$ when $m = 3$ and $p = 10$
- l. Evaluate $x(y \div 3)^2$ when $x = 4$ and $y = 9$

4. Operations with Real Numbers

- a. Real numbers are the set of all rational and irrational numbers. They can be plotted as points on the real number line, to the right (positive) and to the left (negative) of the origin, which is the point that corresponds to 0.
- b. Two rules for addition

- i. Same signs: add and use that sign
 - 1. $(8) + (+2) = 10$
 - 2. $(-4) + (-11) = -15$
- ii. Different signs: subtract and use the sign of the bigger number
 - 1. $(-4) + (2) = -2$
 - 2. $(3) + (-1/2) = 2\frac{1}{2}$

Try these problems:

c. $5.8 + (-2.5)$

d. $-\frac{1}{5} + \frac{7}{4}$

e. $(-7) + 2 + (-9)$

f. Subtraction: to subtract a real number, add its opposite

i. $a - b = a + (-b)$

g. Example: $3 - 5 = 3 + (-5) = -2$

h. Example: $-8 - (-13) = -8 + (+13) = 5$

i. Example: $3.5 - 12.4 = 3.5 + (-12.4) = -8.9$

Try these problems:

j. Evaluate: $(-11) - (-14) + 7$

k. $1.8 - (-3.7)$

l. $\frac{7}{4} - (-\frac{1}{2})$

m. Multiplication & Division of signed numbers

i. $+x +$ and $-x-$: answer is positive

ii. $+x-$ and $-x+$: answer is negative

iii. Division rules are the same

n. When the operations are all multiplication, count the number of negative signs...
odd/even number of signs determine the sign of the answer

o. Example: $(-4)(-3)(2)(6)(-11)(1/5)(-2/3) \rightarrow$ there are 4 negative signs, so the answer will be positive

p. $12 \div -3 = -4$

q. $-5 \cdot -9 = 45$

Try these problems:

r. Evaluate: $\frac{-120}{-20}$

s. $-65 \div 13$

t. $-8 \cdot -11$

u. $8(-6)(-3)$

v. $-\frac{5}{4} \cdot \frac{1}{3}$

- w. $-\frac{9}{5} \div 2$
 x. $-2 \div -3\frac{4}{5}$
 y. $-1\frac{1}{4} \cdot 9$

5. The Distributive Property

- Used to rewrite expressions in simpler form
- Let a, b, and c represent real numbers. Then $a(b+c) = ab+ac$
- Example: $4(20+6) = 4(20) + 4(6) = 80+24 = 104$
- $3(x + 8) = 3(x) + 3(8) = 3x + 24$
- $(5b - 4)(-7) = -7(5b - 4) = -7(5b) - (-7)(4) = -35b + 28$

Try these problems:

- Simplify the expression: $-6(a + 8)$
- $(1 - 7n)5$
- $4(3r - 8)$
- $-(9 - 7c)$
- $2.1(5w - 15)$
- $-\frac{1}{2}\left(\frac{3}{11} - \frac{7d}{17}\right)$

6. Combining Like Terms

- You can simplify algebraic expressions by combining parts of the expressions that are alike (meaning they have the same variables and exponents).
- Are these like terms?
 - $7a$ & $-3a$ (yes)
 - $6a$ & $-5a^2$ (no)
 - $6ab$ & $-2a$ (no)
 - $4x^2$ and $13x^2$ (yes)
 - $7xy^2$ and $-xy^2$ (yes)
- To add (subtract) like terms, add (subtract) the coefficients, leaving the variables and exponents alone. For example, $7x + (-4x) = 7x + (-4x) = 3x$
- $4x^2 - 9x^2 = -5x^2$
- $10x + 20x^2 = 10x + 20x^2$
- $2(3x - 5 + 4x) = 14x - 10$
- $5x - 3 - 3x + 6y + 4 = 2x + 6y + 1$

Try these problems:

- Simplify: $-6k + 7k$
- $12r - 8 - 12$
- $-4x - 10x$
- $12r + 5 + 3r - 5$

- l. $-5n + 3(6 + 7n)$
- m. $-2n - (9 - 10n)$
- n. $-3(10b + 10) + 5(b + 2)$

7. Solving One-step Equations

- a. Equation: a math sentence that uses an = sign. Think of it like a balanced scale that always needs to remain balanced.
- b. The solution of an equation containing a variable is a value of the variable that makes the equation true.
- c. $32 = 2x + 12$; Is $x = 6$ a solution?
 - i. $32 = 2(6) + 12$
 - ii. $32 = 12 + 12$
 - iii. $32 = 24$
 - iv. NOT TRUE. Therefore $x=6$ is not the solution.
- d. $x + 8 = 12$; $x = 4$ IS the solution because $4 + 8 = 12$
- e. Solve by using inverse operations:
 - i. $b - 3 = -7$
 - ii. $+3 \quad +3$
 - iii. $B = -4$
- f. $4x = 6.4 \rightarrow$ divide both sides by 4 $\rightarrow x = 1.6$
- g. $x/3 = -9 \rightarrow$ multiply both sides by 3 $\rightarrow x = -27$

Try these problems:

- h. Solve: $p - 6 = -5$
- i. $14b = -56$
- j. $16 = k/11$
- k. $M + 4 = -12$
- l. $-\frac{3}{4}b = 2$
- m. $\frac{11}{6} = \frac{1}{3} + p$
- n. $y + 4.7 = -4.7$
- o. $-38.48 = -5.2x$

8. Solving Multi-Step Equations

- a. $9x - 7 = -7$
 - i. Add 7 to both sides $\rightarrow 9x = 0$
 - ii. Divide both sides by 9 $\rightarrow x = 0$
- b. $144 = -12(x + 5)$
 - i. Use distributive property $\rightarrow 144 = -12x - 60$
 - ii. Add 60 to both sides $\rightarrow 204 = -12x$
 - iii. Divide both sides by -12 $\rightarrow -17 = x$

Try these problems:

- c. Solve: $-15 = -4m + 5$
- d. $-9x - 13 = -103$
- e. $\frac{n+5}{16} = -1$
- f. $-243 = -9(10 + x)$

- g. When there are variables on both sides:
 - i. Simplify ()
 - ii. Add like terms on either side
 - iii. Move the variable to one side of the equation
 - iv. Move the constants to the other side
 - v. Divide by the coefficient of x
- h. Example:
 - i. $-7k - 4k = 8 - 2k - 8k$
 - ii. No ()
 - iii. $-11k = 8 - 10k$
 - iv. Add $10k$ to both sides $\rightarrow -1k = 8$
 - v. Divide by $-1 \rightarrow k = -8$
- i. Example 2:
 - i. $8k - 6 = 6(k + 3) + 6k$
 - ii. $8k - 6 = 6k + 18 + 6k$
 - iii. $8k - 6 = 12k + 18$
 - iv. Subtract $8k$ from each side $\rightarrow -6 = 4k + 18$
 - v. Subtract 18 from each side $\rightarrow -24 = 4k$
 - vi. Divide each side by $4 \rightarrow -6 = k$

Try these problems:

- j. Solve: $3 + 4n + n = 2n + 15$
 - k. $11 + 2p = p + 4$
 - l. $-8(1 + 4p) + 7p = -25 - 8p$
 - m. $2(-6t - 3) = 6(5t - 1)$
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ANSWERS to "Try These" problems:

1b. 12
1c. 9
1d. 27
1e. 15
2c. $x + 6$
2d. $2q$
2e. $18/n$
2f. $m - 14$
2g. $4x - 8$
2h. $2(x + 8)$
2i. $\frac{5}{12+x}$
3e. 27
3f. 7
3g. 17
3j. 3
3k. 2
3l. 36
4c. 3.3
4d. $31/20$
4e. -14
4j. 10
4k. 5.5
4l. $9/4$
4r. 6
4s. -5
4t. 88
4u. 144
4v. $-5/12$
4w. $-9/10$
4x. $10/19$
4y. $-11\frac{1}{4}$
5f. $-6a - 48$
5g. $5 - 35n$
5h. $12r - 32$
5i. $-9 + 7c$
5j. $10.5w - 31.5$
5k. $-\frac{3}{22} + \frac{7d}{34}$
6h. k
6i. $12r - 20$
6j. $-14x$
6k. 15r

6l. $16n + 18$
6m. $8n - 9$
6n. $-25b - 20$
7h. $p = 1$
7i. $b = -4$
7j. $k = 176$
7k. $m = -16$
7l. $b = -2\frac{2}{3}$
7m. $p = 1\frac{1}{2}$
7n. $y = -9.4$
7o. $x = 7.4$
8c. $m = 5$
8d. $x = 10$
8e. $n = 11$
8f. $x = 17$
8j. $n = 4$
8k. $p = -7$
8l. $p = 1$
8m. $t = 0$