

Algebra I
Summer Review

☐ Objective A: I can write algebraic expressions.

<https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-expressions-and-variables/cc-6th-writing-expressions/v/writing-expressions-2>

1A. 12 more than a number x

$$12 + x$$

2A. 5 less than a number n

$$n - 5$$

3A. 8 times a number n

$$8n$$

4A. the quotient of a number n and 5

$$\frac{n}{5}$$

5A. 2 times the sum of a number n and 8

$$2(n + 8)$$

6A. 9 less than the product of a number x and 3

$$3x - 9$$

☐ Objective B: I can write a word phrase for an algebraic expression.

<https://www.khanacademy.org/math/cc-fifth-grade-math/cc-5th-algebraic-thinking/cc-5th-writing-expressions-tut/v/translating-expressions-with-parentheses>

1B. $x + 2$

two more than a number

or The sum of a number and 2

2B. $3(x + 4)$

Three times the sum of
a number and four

3B. $\frac{n}{7}$

The quotient of a number
and seven

4B. $8n - 1$

one less than the product
of 8 and a number

☐ Objective C: I can use order of operations to simplify expressions.

https://www.khanacademy.org/math/pre-algebra/order-of-operations/order_of_operations/v/introduction-to-order-of-operations

1C. $(5-2)^2 \div 3$

$$\begin{aligned} 3^2 \div 3 \\ 9 \div 3 \\ \boxed{3} \end{aligned}$$

2C. $10-18 \div 6$

$$\begin{aligned} 10-3 \\ \boxed{7} \end{aligned}$$

3C. $4 \cdot 7 - 6^2 \div 9$

$$\begin{aligned} 4 \cdot 7 - 36 \div 9 \\ 28 - 36 \div 9 \\ 28 - 4 \\ \boxed{24} \end{aligned}$$

4C. $\frac{1+2^3}{7-4}$

$$\begin{aligned} \frac{1+8}{7-4} \\ \frac{9}{3} \quad \boxed{3} \end{aligned}$$

5C. $\left(\frac{2(5)}{8-6}\right)^3$

$$\begin{aligned} \left(\frac{10}{2}\right)^3 \\ 5^3 \\ \boxed{125} \end{aligned}$$

6C. $2[(8+3)-3^2]$

$$\begin{aligned} 2[(8+3)-9] \\ 2[11-9] \\ 2[2] \quad \boxed{4} \end{aligned}$$

7C. $2^5 - 4^2 \div 2^2$

$$\begin{aligned} 32 - 16 \div 4 \\ 32 - 4 \\ \boxed{28} \end{aligned}$$

8C. $(4(5))^3$

$$\begin{aligned} (20)^3 \\ \boxed{8000} \end{aligned}$$

9C. $\left(\frac{27-12}{8-3}\right)^2$

$$\begin{aligned} \left(\frac{15}{5}\right)^2 \\ 3^2 = \boxed{9} \end{aligned}$$

10C. $\left(\frac{2}{3}\right)^2$

$$\frac{2}{3} \cdot \frac{2}{3} = \boxed{\frac{4}{9}}$$

☐ Objective D: I can evaluate algebraic expressions.

<https://www.khanacademy.org/math/algebra/introduction-to-algebra/variable-and-expressions/v/expressions-with-two-variables>

Evaluate each expression for $s = 4$ and $t = 2$

1D. $t + 6$

$$2 + 6$$
$$\boxed{8}$$

2D. $s^2 + t^2$

$$4^2 + 2^2$$
$$16 + 4$$
$$\boxed{20}$$

3D. $\frac{s^4}{4} - 10$

$$\frac{4^4}{4} - 10$$
$$\frac{256}{4} - 10$$
$$64 - 10$$
$$\boxed{54}$$

4D. $\left(\frac{2s}{-t^2}\right)^3$

$$\left(\frac{2(4)}{-2^2}\right)^3$$
$$\left(\frac{8}{-4}\right)^3$$
$$(-2)^3$$
$$\boxed{-8}$$

Evaluate the following expressions for $x = 3$ and $y = -1$.

5D. $x^2 + x - 10 \div y^2$

$$(3)^2 + (3) - 10 \div (-1)^2$$
$$9 + 3 - 10 \div 1$$
$$9 + 3 - 10$$
$$\boxed{2}$$

6D. $2x - 7y$

$$2(3) - 7(-1)$$
$$6 - 7(-1)$$
$$6 + 7$$
$$\boxed{13}$$

7D. $(xy)^2 \div 3y$

$$(3 \cdot -1)^2 \div 3(-1)$$
$$(-3)^2 \div 3(-1)$$
$$9 \div 3(-1)$$
$$3(-1) \boxed{-3}$$

8D. $-2x^2 + y^3$

$$-2(3)^2 + (-1)^3$$
$$-2(9) + -1$$
$$-18 - 1$$
$$\boxed{-19}$$

☐ Objective E: I can simplify and estimate square roots.

Estimate the following square roots with a calculator.

1E. $\sqrt{45}$

≈ 6.71

2E. $\sqrt{2}$

≈ 1.41

Estimate the following square roots without a calculator. Tell which two integers the square root falls between.

3E. $\sqrt{10}$

$\sqrt{9}$ $\sqrt{16}$
 $\boxed{3 \text{ and } 4}$

4E. $-\sqrt{39}$

$-\sqrt{36}$ $-\sqrt{49}$
 $\boxed{-6 \text{ and } -7}$

5E. $\sqrt{84}$

$\sqrt{81}$ $\sqrt{100}$
 $\boxed{9 \text{ and } 10}$

6E. $-\sqrt{18}$

$-\sqrt{16}$ $-\sqrt{25}$
 $\boxed{-4 \text{ and } -5}$

Simplify the following square roots.

7E. $\sqrt{64}$

8

8E. $\sqrt{\frac{1}{9}}$

$\frac{1}{3}$

9E. $\sqrt{\frac{81}{25}}$

$\frac{9}{5}$

10E. $\sqrt{36}$

6

☐ Objective F: I can classify and compare real numbers.

<https://www.khanacademy.org/math/pre-algebra/fractions-pre-alg/number-sets-pre-alg/v/number-sets>

Rational Number – any number that you can write in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$. Can also be written as a terminating (ending) decimal or a repeating decimal.

Examples: $-\frac{2}{3}$ $\sqrt{25}$.333333...

Other examples of rational numbers we can see on a number line:

Natural Numbers {1, 2, 3, ...}
Whole Numbers {0, 1, 2, 3, ...}
Integers {... -2, -1, 0, 1, 2, 3, ...}

Irrational Number – cannot be represented in the form $\frac{a}{b}$, in other words non-terminating (non-ending), non-repeating decimals

Examples: π $\sqrt{7}$.210922902390...

To which subsets of the real numbers does each number belong? Circle ALL possible subsets.

- | | | | | | | |
|-----|----------------|------------|----------|---------|-------|---------|
| 1F. | 15 | irrational | rational | integer | whole | natural |
| 2F. | $\sqrt{9}$ | irrational | rational | integer | whole | natural |
| 3F. | $\frac{3}{10}$ | irrational | rational | integer | whole | natural |
| 4F. | -0.45 | irrational | rational | integer | whole | natural |
| 5F. | $\sqrt{12}$ | irrational | rational | integer | whole | natural |
| 6F. | π | irrational | rational | integer | whole | natural |

Put the following real numbers in order from least to greatest.

7F. $\sqrt{4}, 0.4, -\frac{2}{3}, \sqrt{2}, -1.5$

$-1.5, -\frac{2}{3}, 0.4, \sqrt{2}, \sqrt{4}$

8F. $3.5, -2.1, \sqrt{9} - \frac{7}{2}, \sqrt{5}$

$-\frac{7}{2}, -2.1, \sqrt{5}, \sqrt{9}, 3.5$

Compare the following real numbers using one of the following inequality symbols:

Inequality – a mathematical sentence that compares the values of two expressions using an inequality symbol.

<, less than

≤, less than or equal to

>, greater than

≥, greater than or equal to

9F. $\sqrt{17} < 4\frac{1}{3}$

10F. $\frac{4}{3} < \sqrt{2}$

11F. $-3.1 > -\frac{16}{5}$

12F. $\frac{1}{3} > .333$
not repeating!

☐ **Objective G: I can identify and use properties of real numbers.**

Properties of Real Numbers

Let x, y and z be any real numbers.

Commutative Properties of Addition and Multiplication (Changing order does not change the sum or product)

	Algebra	Example
Addition	$x + y = y + x$	$10 + 4 = 4 + 10$
Multiplication	$x \bullet y = y \bullet x$	$2 \bullet 3 = 3 \bullet 2$

Associative Properties of Addition and Multiplication (Changing the grouping does not change the sum or product)

	Algebra	Example
Addition	$x + (y + z) = (x + y) + z$	$10 + (4 + 3) = (10 + 3) + 4$
Multiplication	$(x \bullet y) \bullet z = x \bullet (y \bullet z)$	$(2 \bullet 3) \bullet 4 = 2 \bullet (3 \bullet 4)$

Let x be any real number.

Identity Properties of Addition and Multiplication

	Algebra	Example
Addition	$x + 0 = x$	$2 + 0 = 2$
Multiplication	$x \bullet 1 = x$	$9 \bullet 1 = 9$
Zero Property of Multiplication	$x \bullet 0 = 0$	$-4 \bullet 0 = 0$
Multiplication Property of -1	$-1 \bullet x = -x$	$-1 \bullet 5 = -5$

Name the property illustrated by each statement.

1G. $42 \cdot 0 = 0$

Zero property of multiplication

2G. $(y + 2.5) + 28 = y + (2.5 + 28)$

Associative Property of Addition

3G. $10x + 0 = 10x$

Identity property of Addition

4G. $4x \cdot 1 = 4x$

Identity Property of multiplication

5G. $x \cdot y = y \cdot x$

Commutative Property of multiplication

6G. $-1 \cdot x = -x$

multiplication Property of -1

Write an equivalent expression using the indicated property.

7G. $x + (y + z) = \underline{(y + z) + x}$
Commutative Property

$x + (y + z) = \underline{(x + y) + z}$
Associative Property

8G. $5(3n) = \underline{(3n)5}$
Commutative Property

$5(3n) = \underline{(5 \cdot 3)n}$
Associative Property

☐ Objective H: I can find sums and differences of real numbers.

https://www.khanacademy.org/math/arithmetic/absolute-value/adding_subtracting_negatives/v/adding-and-subtracting-negative-number-examples

https://www.khanacademy.org/math/arithmetic/absolute-value/adding_subtracting_negatives/v/adding-integers-with-different-signs

Simplify.

1H. $2 + 5$

7

2H. $-4 + 6$

2

3H. $-3 + 7$

4

4H. $-8 + (-5)$

-13

5H. $2 - 7$

-5

6H. $-12 - 6$

-18

7H. $0 - 17$

-17

8H. $-3 + 4$

1

9H. $5 - 10$

-5

10H. $7 - (-4)$

11

11H. $-15 - (-1)$

-14

12H. $0 - (-10)$

10

13H. $7 - (-3) - 2 - (-3) + 2$

$7 + 3 - 2 + 3 + 2$

$10 - 2 + 3 + 2$

$8 + 3 + 2$

$11 + 2$

13

14H. $2 - (-1) + 6 + (-11)$

$2 + 1 + 6 + (-11)$

$3 + 6 + (-11)$

$9 + (-11)$

-2

16H. $4 + (-2) + 6 - (-5)$

$4 + (-2) + 6 + 5$

$2 + 6 + 5$

$8 + 5$

13

17H. $14 - (-5) + 3 - 9$

$14 + 5 + 3 - 9$

$19 + 3 - 9$

$22 - 9$

13

15H. $-3 + 2 - (-4)$

$-3 + 2 + 4$

$-1 + 4$

3

18H. $(-5) + 4 + (-3)$

$-5 + 4 + (-3)$

$-1 + (-3)$

-4

☐ Objective I: I can find products and quotients of real numbers.

<https://www.khanacademy.org/math/arithmetic/absolute-value/mult-div-negatives/v/multiplying-negative-real-numbers>

1I. $(-4)(5)$

-20

2I. $(-7)(-6)$

42

3I. $(3)(-8)$

-24

4I. $-44 \div 4$

-11

5I. $21 \div (-7)$

-3

6I. $-49 \div (-7)$

7

7I. $(-1)(7)(-5)$

35

8I. $(1)(1)(-1)$

-1

9I. $(-8)(0)(-1)$

0

10I. $(-2)^3$

-8

11I. $-4 \div 2(-5) \div -1$

$(-2)(-5) \div -1$
 $10 \div -1$
 -10

12I. $-6(-1)^5$

$-6(-1)$
 6
 3

☐ Objective J: I can find sums and differences of fractions.

<https://www.khanacademy.org/math/pre-algebra/fractions-pre-alg/fractions-unlike-denom-pre-alg/v/adding-and-subtracting-fractions>

<https://www.khanacademy.org/math/pre-algebra/fractions-pre-alg/fractions-unlike-denom-pre-alg/v/adding-fractions-ex-1>

1J. $\frac{2}{9} + \frac{5}{9}$

$\frac{7}{9}$

2J. $\frac{7}{9} - \frac{5}{9}$

$\frac{2}{9}$

3J. $\frac{3}{7} + \frac{2}{7}$

$\frac{5}{7}$

4J. $\frac{2}{3} + \frac{1}{6}$

$\frac{4}{6} + \frac{1}{6}$

$\frac{5}{6}$

5J. $\frac{3}{4} - \frac{1}{8}$

$\frac{6}{8} - \frac{1}{8}$

$\frac{5}{8}$

6J. $\frac{2}{5} - \frac{3}{10}$

$\frac{4}{10} - \frac{3}{10} = \frac{1}{10}$

7J. $-\frac{5}{6} + \frac{5}{12}$

$-\frac{10}{12} + \frac{5}{12}$

$-\frac{5}{12}$

8J. $\frac{2}{5} + \frac{1}{3}$

$\frac{6}{15} + \frac{5}{15}$

$\frac{11}{15}$

9J. $\frac{1}{4} - \frac{3}{7}$

$\frac{7}{28} - \frac{12}{28} = -\frac{5}{28}$

☐ Objective K: I can find products and quotients of fractions.

https://www.khanacademy.org/math/arithmetic/fractions/multiplying_fractions/v/multiplying-negative-and-positive-fractions

<https://www.khanacademy.org/math/arithmetic/fractions/div-fractions-fractions/v/dividing-fractions-example>

1K. $\left(\frac{1}{2}\right)\left(\frac{3}{4}\right)$
 $\boxed{\frac{3}{8}}$

2K. $\left(-\frac{1}{3}\right)\left(\frac{2}{5}\right)$
 $\boxed{-\frac{2}{15}}$

3K. $(4)\left(-\frac{2}{7}\right)$
 $\boxed{-\frac{8}{7}}$

4K. $(2)\left(-\frac{1}{4}\right) =$
 $\boxed{-\frac{1}{2}}$

5K. $\left(\frac{1}{2}\right) \div \left(\frac{3}{7}\right)$
 $\frac{1}{2} \cdot \frac{7}{3} = \boxed{\frac{7}{6}}$

6K. $\left(-\frac{3}{4}\right) \div 8$
 $-\frac{3}{4} \cdot \frac{1}{8} = \boxed{-\frac{3}{32}}$

7K. $\frac{2}{3} \div \frac{1}{4}$
 $\boxed{\frac{8}{3}}$

8K. $5 \div -\frac{3}{8}$
 $5 \cdot -\frac{8}{3} = \boxed{-\frac{40}{3}}$

9K. $\left(-\frac{6}{7}\right)\left(-\frac{2}{5}\right)$
 $\boxed{\frac{12}{35}}$

Evaluate each expression for $m = -5$, $n = \frac{3}{2}$, $p = -8$.

10K. $-7m - 10n$
 $-7(-5) - 10\left(\frac{3}{2}\right)$
 $35 - \frac{30}{2}$
 $35 - 15 = \boxed{20}$

11K. $-3mnp$
 $-3(-5)\left(\frac{3}{2}\right)(-8)$
 $\frac{-360}{2} = \boxed{-180}$

12K. $8n \div (-6p)$
 $8\left(\frac{3}{2}\right) \div -6(-8)$
 $12 \div 48$
 $\frac{12}{48} = \boxed{\frac{1}{4}}$

13K. $2p^2(-n) \div m$
 $2(-8)^2\left(-\frac{3}{2}\right) \div (-5)$
 $2(64)\left(-\frac{3}{2}\right) \div (-5)$
 $\frac{-384}{2} \cdot \frac{1}{5} = \boxed{-\frac{192}{5}}$

☐ Objective L: I can use the distributive property to simplify expressions.

https://www.khanacademy.org/math/pre-algebra/order-of-operations/distributive_property/v/distributive-property-example-1

1L. $3(x + 8)$

$$3x + 24$$

2L. $-7(5b - 4)$

$$-35b + 28$$

3L. $5(x + 7)$

$$5x + 35$$

4L. $12\left(3 - \frac{1}{6}x\right)$

$$36 - 2x$$

5L. $(4x + 8)(3)$

$$12x + 24$$

6L. $(2y - 1)(-4)$

$$-8y + 4$$

7L. $-(2y - 3x)$

$$-2y + 3x$$

8L. $-(a - 5)$

$$-a + 5$$

9L. $\frac{3}{4}(20x - 8)$

$$15x - 6$$