

Integers 1

Note

This packet assumes you have already learned how to add and subtract integers using chips from sections 2.2 and 2.3 in the 7th Grade Core Focus book: Rational Numbers and Equations.

While integer models are helpful when first working with negative numbers, you need to be able to quickly add and subtract integers without drawing a model.

Adding Integers

Same Signs

When adding two integers of the same sign, add the absolute value of the numbers and keep the same sign.

Examples:

$$5 + 7 = 12$$

$$19 + 6 = 25$$

$$-5 + (-7) = -12$$

$$-19 + (-6) = -25$$

You Try:

$$10 + 7 = \underline{\hspace{2cm}}$$

$$-8 + (-5) = \underline{\hspace{2cm}}$$

Different Signs

When adding two integers with different signs, subtract the absolute value of the numbers and keep the sign of the larger number.

Examples:

$$5 + (-7) = -2$$

$$-5 + 7 = 2$$

$$-9 + 15 = 6$$

$$9 + (-15) = -6$$

You Try:

$$10 + (-7) = \underline{\hspace{2cm}}$$

$$-8 + 5 = \underline{\hspace{2cm}}$$

Add the following.

$$15 + (-17) = \underline{\hspace{2cm}}$$

$$-4 + (-6) = \underline{\hspace{2cm}}$$

$$7 + (-3) = \underline{\hspace{2cm}}$$

$$15 + 8 = \underline{\hspace{2cm}}$$

Subtracting Integers

Do not subtract integers.

Rewrite every subtraction problem as an addition problem by *adding the opposite*.

Adding the Opposite

Keep the first number the same. **Change** the minus sign to plus. **Change** the sign of the second number. Then use the rules for adding integers.

Examples:

$$-10 - 7 \rightarrow -10 + (-7) = -17$$

$$10 - 28 \rightarrow 10 + (-28) = -18$$

$$30 - (-10) \rightarrow 30 + 10 = 40$$

$$-3 - (-5) \rightarrow -3 + 5 = 2$$

You Try:

$$20 - (-15) \rightarrow \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$-20 - 35 \rightarrow \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$-20 - (-15) \rightarrow \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$20 - 35 \rightarrow \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Add or subtract the following.

$$-16 - 13 = \underline{\hspace{2cm}}$$

$$6 + (-9) = \underline{\hspace{2cm}}$$

$$-10 - (-4) = \underline{\hspace{2cm}}$$

$$8 + -7 = \underline{\hspace{2cm}}$$

Multiplying & Dividing Integers

The rules for multiplying and dividing integers are the same.

Same Signs (Both Positive or Both Negative)

When multiplying or dividing two integers with the same sign, you simply multiply or divide.

Your answer will always be positive.

Examples:

$$5 \cdot 7 = 35$$

$$24 \div 6 = 4$$

$$-5 \cdot (-7) = 35$$

$$-24 \div (-6) = 4$$

You Try:

$$-10 \cdot (-7) = \underline{\hspace{2cm}}$$

$$-40 \div (-2) = \underline{\hspace{2cm}}$$

Different Signs (One Positive and One Negative)

When multiplying or dividing two integers with different signs, you simply multiply or divide.

Your answer will always be negative.

Examples:

$$-5 \cdot 7 = -35$$

$$24 \div (-6) = -4$$

$$5 \cdot (-7) = -35$$

$$-24 \div 6 = -4$$

You Try:

$$-10 \cdot 7 = \underline{\hspace{2cm}}$$

$$40 \div (-2) = \underline{\hspace{2cm}}$$

Multiply or divide the following.

$$-15 \div 3 = \underline{\hspace{2cm}}$$

$$-3 \cdot (-6) = \underline{\hspace{2cm}}$$

$$-9 \cdot 2 = \underline{\hspace{2cm}}$$

$$-30 \div (-5) = \underline{\hspace{2cm}}$$

Mixed Operations Practice

$-9 + 13 =$	$6 - (-15) =$	$-100 \div (-4) =$
$-3 - (-7) =$	$-19 + (-7) =$	$-3 \cdot -4 =$
$8 \cdot -7 =$	$72 \div (-8) =$	$-10 - (-31) =$
$-19 + 11 =$	$18 - (-6) =$	$-6 \cdot -6 =$
$7 + (-11) =$	$-30 \div -3 =$	$-14 - (-11) =$
$-7 \cdot -5 =$	$10 + (-14) =$	$-9 \cdot 5 =$
$-9 - 18 =$	$-54 \div -6 =$	$8 \cdot -3 =$
$-18 + -13 =$	$40 \div 8 =$	$5 - 20 =$

check
with
key

Integers 2

Recall

Numerical expressions are evaluated using Order of Operations (or PEMDAS).
Grouping Symbols, **E**xponents, **M**ultiply/**D**ivide left to right and **A**dd/**S**ubtract left to right.

In Algebra, another type of grouping symbols you will see besides parenthesis is the fraction bar line. When evaluating with the fraction bar line you should simplify the top and bottom separately, then divide.

Evaluate each of the following expressions. Show your work.

$2 + 2 \cdot 7 + 2 + 3$	$5 \cdot 3 - 1 - \frac{16}{8}$
$\frac{(13 - 9) \cdot 2}{6 - 2}$	$9 - \left(\frac{5}{3 + 2} + 4 \right)$

check
with
key

Evaluating Expressions with Integers

You need to be able to evaluate expressions that also contain negative numbers. When doing this you must follow both Order of Operations and the integer rules you practiced in Integers 1.

$(10 \div -1 + 8) \cdot -9$ $(10 \div -1 + 8) \cdot -9$ $(-10 + 8) \cdot -9$ $-2 \cdot -9$ 18	$-9 - 8 - (7 + 3)$
$\frac{(-6 + 4) \cdot 2}{-4 + 6}$	$\frac{-9 + 2 - 5}{6 - 3}$

check
with
key

Evaluating Expressions with Integers Practice
Evaluate each expression. Show your work.

$$-14 \cdot 2 \div 7$$

$$-1 + 6 \cdot 2 + 3$$

$$-2 + 2 \cdot 6 + 4$$

$$2 \cdot -18 \div (-1 - 2)$$

$$(10 \cdot 2) \div 4 - (-3)$$

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

$$\frac{13 + 3}{-3 \cdot -3 - 5}$$

$$\frac{(-8) - 5 + 3}{2} - 1$$

$$5 + 2 \cdot \frac{8}{1 - 5}$$

$$(-6 - 1) \cdot \frac{18}{2 - 5}$$

Integers 3

Recall

Algebraic expressions can be simplified by combining like terms.
You can combine like terms by adding or subtracting coefficients.

Combining Like Terms with Integers

Simplify each of the following by combining like terms.

$5x - 10x$ $-5x$ $5 - 10 = -5$, therefore $5x - 10x = -5x$.	$3y - 8y + 2y$ $-5y + 2y$ $(-3y)$	Subtract $3y - 8y$ first to get $-5y$. Then add $-5y$ and $2y$ to get $-3y$.
$-14m - 6m$	$10k - 15k$	
$8g - (-4g)$	$-23h + 3h - 4h$	

check
with
key

Simplify each of the following by combining like terms.

$-9m + 2m$	$8a - 20a$	
$15c + (-3c)$	$-4e - (-6e)$	
$-2x + 9x - 14x$	$-8f + (-2f) + (-7f)$	
$-7u + 13u - 4u$	$-5n - (-3n) + (-14n)$	
$4r + 2r - (-10r) - r$	$8y - 7y - 15y + 10y$	

check
with
key

Simplify each of the following by combining like terms.



$18 - 6r - (-9r)$ $18 - 6r + 9r$ $3r + 18$	$-6r - (-9r)$ equals $3r$. The expression simplifies to $3r + 18$.	$-8k + 9 - 4k + (-15)$ $-8k - 4k + 9 + (-15)$ $-12k - 6$	$-8k - 4k$ equals $-12k$ and $9 + (-15)$ equals -6 . The expression simplifies to $-12k - 6$.
$-3x + 5x + 14$		$10k + 3 - 15k$	

check
with
key

Simplify each of the following by combining like terms.

$-3p - 4 + 9p$	$-9 - 3k - 6 + 2k$
$10y + 5 - (-2y) + 17$	$-5x + 4 + 5x$
$-4 - 9k + k + 6$	$3 + 4n - 8n - 6$
$-9a + 4 - 9a - 8$	$-r + 11 - 11r$
$10 + 11p + (-3p) - 12$	$n + 6 - 9n - (-8)$

check
with
key

Integers 4

Recall

Algebraic expressions can be simplified using Distributive Property.
Multiply the coefficient to entire expression inside parentheses.

Distributive Property with Integers



Simplify each of the following by performing the distributive property.

$-4(r + 3)$ $-4r + 12$ Distribute the -4 . Multiply r and 3 by -4 to get $-4r + 12$.	$-(2e + 8)$ $-2e - 8$ Distribute the -1 . Multiply $2e$ and 8 by -1 to get $-2e - 8$
$-9(n + 8)$	$-(5h - 10)$

check
with
key

Simplify each of the following by performing the distributive property.

$-5(1 - 8v)$	$6(x - 7)$
$-(7a + 5)$	$-6(1 + 9n)$
$8(5 - 5a)$	$-9(-r + 1)$
$-(-4r - 1)$	$-4(6 + m)$
$-(2 - 10m)$	$8(4h + 6)$

check
with
key

Simplify each of the following by performing the distributive property then combining like terms.



$-7(j + 3) + 10j$ $-7j - 21 + 10j$ $-7j + 10j - 21$ $3j - 21$ <p>Distribute the -7. Multiply j and 3 by -7 to get -7j - 21. Then combine like terms.</p>	$-5(2y - 7) + 4y - 30$ $-10y + 35 + 4y - 30$ $-10y + 4y + 35 - 30$ $-6y + 5$ <p>Distribute the -5. Multiply 2y and -7 by -5 to get -10y + 35. Then combine like terms.</p>
$-4(7 - k) - 8k$	$-10(5 + 5k) - 5k$
$5 - 2(x + 4)$ $5 - 2x - 8$ $-2x + 5 - 8$ $-2x - 3$ <p>Distribute the -2. Multiply x and 4 by -2 to get -2x - 8. Then combine like terms.</p>	$7 - (x - 2)$ $7 - x + 2$ $-x + 9$ <p>Distribute the -1. Multiply x and -2 by -1 to get -x + 2. Then combine like terms.</p>
$5x - 4(2x + 6)$	$4b - (b + 10)$

check
with
key

Simplify each of the following by performing the distributive property then combining like terms.

$5 - 2(x + 4)$	$7 - (x - 2)$
$3k - 5(3 - 8k)$	$-8(2 - 3x) - 9x$
$5 - 2(m + 2)$	$-4(10 + 5w) + 20 - 6w$

check
with
key

Integers 5

Solving One-Step Equations

Solve each one step equation.

$-6y = 24$ $\div -6 \div -6$ $y = -4$	$5n = -30$	$-2h = -20$
$8k = -48$	$-3p = 21$	$-2r = -30$

check
with
key

Solving Two-Step Equations

Solve each two step equation.

$4x - 9 = -29$ $+ 9 + 9$ $4x = -20$ $\div 4 \div 4$ $x = -5$	$10 - 7b = -88$	$-a + 4 = 16$
$-18 = -4 + 7r$	$-4 - 4y = 32$	$-23 = 5 - 7x$

check
with
key

Combining Like-Terms Before Solving

Combine like terms. Then solve the remaining equation.

$4x - 3 - 9x = 27$ $-5x - 3 = 27$ $+ 3 + 3$ $-5x = 30$ $\div -5 \div -5$ $x = -6$	$9n - 4 + 3 = -19$	$1 - 4m - 2m = 25$
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check
with
key

Distributive Property Before Solving

Simplify using distributive property. Then solve the remaining equation.



$$-3(n + 2) = 39$$

$$-3n - 6 = 39$$

$$+ 6 \quad + 6$$

$$-3x = 45$$

$$\div -3 \quad \div -3$$

$$x = -15$$

$$9(6 + v) = -54$$

$$117 = 9(-n - 7)$$

check
with
key

Variables on Both Sides

Solve each equation by moving the variables to one side.



$$-12 + 5x = -3x + 4$$

$$+ 3x \quad + 3x$$

$$-12 + 8x = 4$$

$$+ 12 \quad + 12$$

$$8x = 16$$

$$\div 8 \quad \div 8$$

$$x = 2$$

$$-10 + 4n = n - 1$$

$$6 + 6n = 15 + 7n$$

check
with
key

Solving Multi-Step Equations

Solve each multi-step equation.



$$-2(x - 3) = -19 + 5x$$

$$-2x + 6 = -19 + 5x$$

$$+ 2x \quad + 2x$$

$$6 = -19 + 7x$$

$$+ 19 \quad + 19$$

$$25 = 7x$$

$$\div 7 \quad \div 7$$

$$3 = x$$

$$-130 = -6(5 + 6a) + 8$$

$$7y + 5(4y + 1) = -157$$

$$4(g - 4) = 16 + 8g$$

check
with
key