

Integer: a counting number, zero, or the opposite of a counting number [...-2, -1, 0, 1, 2...]

NOT a fraction, decimal, or percent -2.5, $\frac{3}{4}$, 35%

Integers are used to represent everyday situations in word problems.

positive situations

- above
- deposit
- rise
- gain
- after
- increase

negative situations

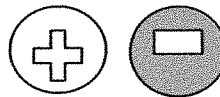
- below
- withdraw
- fall
- loss
- before
- decrease

Adding Integers

Model the addition of integers using zero pairs.

Zero Pair: the pairing of a positive with a negative; has a value of zero

- 1 represent each integer with counters
- 2 remove zero pairs
- 3 record value of remaining counters



Formulated Rules:

positive + positive = *always* positive $5 + 3 = 8$
 negative + negative = *always* negative $-5 + -3 = -8$

positive + negative = ?

If there are more positives, the answer will be positive. $5 + -3 = 2$
 If there are more negatives, the answer will be negative. $-5 + 3 = -2$

In other words...

- 1 identify the larger number
- 2 the sign (positive or negative) of the larger number will be the sign of the answer
- 3 subtract the numbers

Example: $12 + -15 = ?$



The larger number is 15, which is negative... therefore, the answer will be negative.

Subtract $15 - 12 = 3$
 so the answer is **-3**.

Practice: $8 + -5 = ?$

(Are there more positives or negatives?)

(How many more?)

Answer:

Subtracting Integers

Use the KCO method to turn the subtraction problem into an addition problem.
Then, add the numbers accordingly.

Keep, Change, Opposite

Examples:

$10 - 18 = \underline{\quad}$	\longrightarrow	$10 + -18 = \mathbf{-8}$
$-7 - 2 = \underline{\quad}$	\longrightarrow	$-7 + -2 = \mathbf{-9}$
$8 - (-7) = \underline{\quad}$	\longrightarrow	$8 + (+7) = \mathbf{15}$
$-3 - (-11) = \underline{\quad}$	\longrightarrow	$-3 + (+11) = \mathbf{8}$

Multiplying and Dividing Integers

Formulated Rules:

same signs (get along)

positive \cdot positive = positive

negative \cdot negative = positive

$$12 \cdot 4 = \mathbf{48}$$

$$-9 \cdot -3 = \mathbf{27}$$

different signs (do *not* get along)

negative \cdot positive = negative

positive \cdot negative = negative

$$-5 \cdot 6 = \mathbf{-30}$$

$$2 \cdot -11 = \mathbf{-22}$$

* Use same rules for division

$$10 \div 7 = \mathbf{70}$$

$$-8 \div -6 = \mathbf{48}$$

$$-9 \div 5 = \mathbf{-45}$$

$$3 \div -6 = \mathbf{-18}$$

Practice

Complete the following equations. Draw a picture to model some of your work!

1. $-3 + -10 = \underline{-13}$

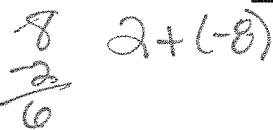


2. $4 + 12 = \underline{16}$



3. $-5 + -5 = \underline{-10}$

4. $2 - 8 = \underline{-6}$



5. $5 - (-4) = \underline{9}$



6. $-13 - 3 = \underline{-16}$

$-13 + (-3)$



7. $3 \cdot (-5) = \underline{-15}$

8. $-2(-12) = \underline{24}$

9. $-4 \cdot 8 = \underline{-32}$

10. $-72 \div 9 = \underline{-8}$

11. $55 \div (-5) = \underline{-11}$

12. $\frac{-24}{-2} = \underline{12}$

Study Guide for Integers Test

Write an integer for each situation:

A deposit of \$55 55

A withdrawal of \$84 -84

32 degrees below zero -32°

temperature of 72 degrees 72°

An elevator goes down 10 floors -10

160 below sea level -160

200 A.D. 200

670 B.C. -670

Absolute Value

$|+2| + |7|$
 $2 + 7 = 19$

Determine the value of the following:

$$|-20| = \underline{20}$$

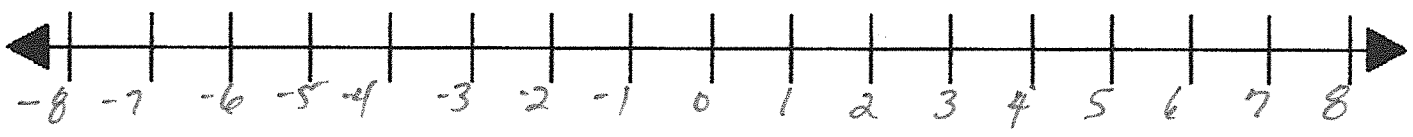
$$|5| = \underline{5}$$

$$|-12 + 7| = \underline{5}$$

$| -5 |$

Number lines

Plot each point on a number line, then replace each ___ with < or >.



$$-7 \underline{<} 5$$

$$4 \underline{>} -4$$

$$-8 \underline{<} -4$$

Replace each ___ with < or >:

$$5 \underline{>} -11$$

$$-12 \underline{>} -23$$

$$20 \underline{>} -5$$

$$-11 \underline{<} 0$$

$$-2 \underline{<} 9$$

$$15 \underline{>} 10$$

Order the following from least to greatest:

51, -63, 49, -24, -38, 38 -63, -38, -24, 38, 49, 51

17, 0, -20, -1, 25, 1 -20, -1, 0, 1, 17, 25

Complete the following problems:

$3 + -2 = \underline{1}$

$5 + 2 = \underline{7}$

$-3 + (-2) = \underline{-5}$

$-2 + 2 = \underline{0}$

$3 + (-3) = \underline{0}$

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

$-6 + 2 = \underline{-4}$

$0 + (-3) = \underline{-3}$

$5 + 0 = \underline{5}$

First change each subtraction problem to an addition problem by doing the "boom/boom" method.

$3 + (-1) = \underline{2}$

$-10 + 5 = \underline{-5}$

$-7 + -3 = \underline{-10}$

$-5 + -2 = \underline{-7}$

$3 + 2$
 $3 - (-2) = \underline{5}$

$-1 - 4 = \underline{-5}$
 $-1 + -4$

Adding Integers

Write out the rule for adding integers in your own words:

The rule when adding integers with the same sign is:

add + keep sign.

When adding integers with different signs, the rule is:

subtract and take sign of larger number.

Now complete the following problems using the rules above:

$15 + 7 = \underline{22}$

$15 + 7 = \underline{-8}$
 $\begin{array}{r} 15 \\ -7 \\ \hline 8 \end{array}$

$-15 + -7 = \underline{-22}$ $15 + -7 = \underline{8}$
 $\begin{array}{r} 15 \\ -7 \\ \hline 8 \end{array}$

With subtraction problems, you make 2 strokes (boom-boom):

$8 - 10 = \underline{-2}$
 $8 + (-10)$
 $\begin{array}{r} 10 \\ -8 \\ \hline 2 \end{array}$

$5 - (-4) = \underline{9}$
 $5 + 4$

$30 - (-10) = \underline{40}$ $7 - 15 = \underline{-8}$
 $30 + 10$ $7 + (-15)$
 $\begin{array}{r} 15 \\ -7 \\ \hline 8 \end{array}$

The rule when multiplying and dividing integers is:

Same sign: positive + different signs negative.

Complete the following problems using the rule above:

$-5(2) = \underline{-10}$ $-5(-2) = \underline{10}$ $6(0) = \underline{0}$ $4(-7) = \underline{-28}$

$40 \div -5 = \underline{-8}$ $\frac{-15}{-3} = \underline{5}$ $15 \div -3 = \underline{-5}$

Word problems with integers:

1. The lowest recorded temperature for Sterling for the month of January is -15 degrees Fahrenheit. The lowest recorded temperature for the month of March is 7 degrees Fahrenheit. What is the difference between the two temperatures?

2.

Toy	Year
Yo-yo	500 BC
Teddy bear	102 AD
Chess	600 AD
Checkers	2000 BC

$-15 - 7$
 $-15 + (-7) = -22$

AD - positive BC negative

Using the table above, order the inventions from earliest to most recent:

Checkers, Yo-yo, Teddy bear, Chess

3. You pay your brother \$35 that you owe him. The same week you earn \$42 dog sitting for the neighbors.

How much money do you have now?

$-35 + 42 = +7$

$$\begin{array}{r} 342 \\ -35 \\ \hline 7 \end{array}$$

4. Stephanie has \$43 dollars in the bank. She withdraws \$16. What is her balance after the withdrawal?

$43 - 16 = 27$

$$\begin{array}{r} 343 \\ -16 \\ \hline 27 \end{array}$$

5. The members of the Investment Club purchased a stock for \$50. The next day the price of the stock dropped \$15. On the second and third days, the price dropped another \$12 and then rose \$20. How much was the stock worth at the end of the third day?

$50 - 15 - 12 + 20$

$$\begin{array}{r} \checkmark \\ 35 - 12 \\ \checkmark \\ 23 + 20 \\ \hline 43 \end{array}$$