

## Expressions and Equations

### Grade Seven Expressions and Equations HLC

Operate with signed numbers and create equivalent expressions.

September

## Grade Seven (EE) Learning Progressions

June

Students must use visual representations to build understanding along this learning progression. Algebra tiles are strongly recommended since students use tiles to model in elementary through high school mathematics. \*\*Be VERY cautious of introducing algorithms before conceptual understanding is SOLID\*\*

**Critical Strategies:** Zero pairs are useful tools when working with signed numbers.

### Understanding Integers

Possible contexts: temperature, money/debt, elevation

#### Models:

- Number line  
(horizontal + vertical)
- 2 sided chips/Algebra tiles

#### Students should:

- Compare integers by thinking about their distance from zero and using  $>$ ,  $<$ ,  $=$
- Use zero pairs



1 zero pair

$$1 + -1 = 0$$



2 zero pairs

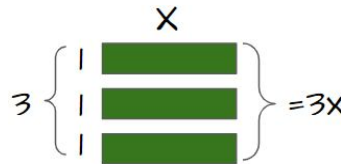
$$2 + -2 = 0$$

### Build and Create Equivalent Expressions

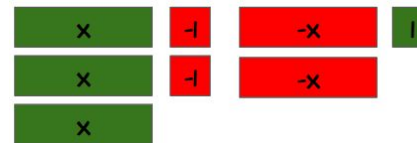
Possible contexts: temperature, money/debt, elevation, area, perimeter, emotions scale

#### Algebra Tiles

$$x+x+x = 3x$$



$$3x + -2 + -2x + 1$$



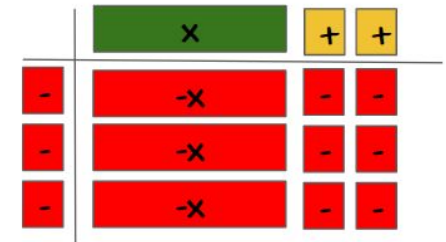
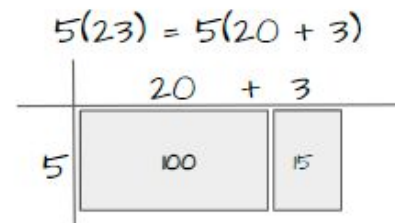
#### Collect Like Terms

$$3x + -2x + -2 + 1$$

$$x + -1$$

#### Distributive Property

Make connections between **whole number** and **variable models**

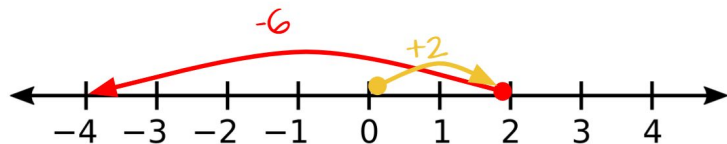
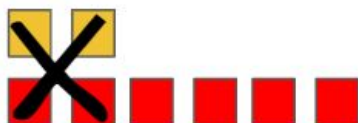


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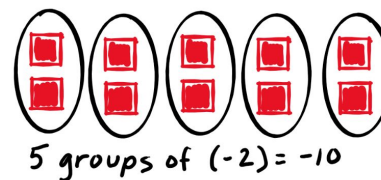
## Operations with Integers

Possible contexts: temperature, money/debt, elevation, area, perimeter, emotions scale

**Add**  $2 + (-6) = -4$

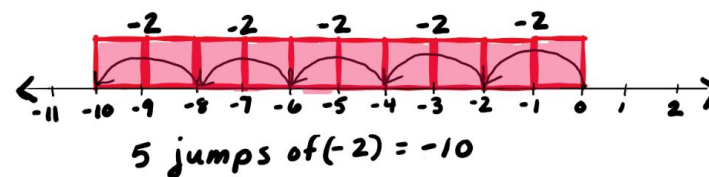


**Multiply**  $5 \times (-2) = -10$

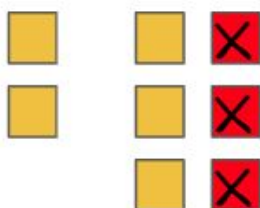


**Notice Patterns:**

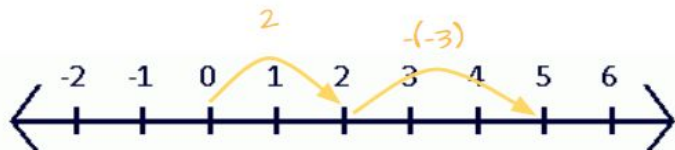
$-3 \times 3 = -9$   
 $-3 \times 2 = -6$   
 $-3 \times 1 = -3$   
 $-3 \times 0 = 0$   
 $-3 \times -1 = 3$   
 $-3 \times -2 = 6$   
 etc...



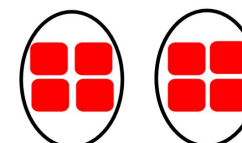
**Subtract**  $2 - (-3) = 5$



By adding 3 "zero pairs" you can then take away 3 negatives.



**Divide**  $-8 \div 2 = -4$



$-8$  in 2 groups of  $-4$

Two jumps of  $-4 = -8$

