1.1 Absolute Value

Absolute value: the distance between a number and zero on the number line.

\[ |2| = 2 \]
\[ |-3| = 3 \]

*absolute value is positive because it is a distance! Distance is always positive.*

Compare: \( |1| \) and \( |-4| \)

Order: \( |-5|, 2, |-1|, 10, |-3| \)
\( 5, 2, 1, 0, 3 \)

Summary:
1.2 Adding Integers

EQ: Is the sum of two integers positive, negative, or zero?

Integers: positive or negative numbers

Sum → add

2 cases:

Same Sign:  
\[ 5 + 2 = 7 \]
\[ -5 + (-2) = -7 \]

* If both numbers have the same sign, you add the numbers and keep the same sign.

Different Signs:  
\[ 5 + (-2) = 3 \]
\[ -5 + 2 = -3 \]

* If the numbers have different signs, you subtract and take the sign of the "greater number"

(greater absolute value)

Summary:
### 1.3 Subtracting Integers

**EQ:** How are adding and subtracting integers related?

**Steps:**
1. Keep the first number.
2. Change the subtraction sign to addition.
3. Take the opposite (change the sign) of the second number.

**Summary:**

**Subtracting integers:** are just adding the opposite.

**Example 1:** $10 + (+3)$ "Boom Boom!"

- Change $+$ to $-$.
- Take the opposite of $3$.
- $10 + 3 = 13$

**Example 2:** $-5 + 15$

- Keep $-$.
- Change $+$ to $-$.
- Take the opposite of $15$.
- $-5 + 15 = 10$

**Example 3:** $-8 + (+2)$ "Boom Boom!"

- Keep $-$.
- Change $+$ to $-$.
- Take the opposite of $2$.
- $-8 + 2 = -6$

**On your own!**

1) $7 - (-4)$
   - $7 + 4 = 11$
2) $-8 - 10$
   - $-8 + (-10) = -18$
3) $-5 - (-9)$
   - $-5 + 9 = 4$
4) $-3 - 4 - (-2)$
   - $-3 + 4 = -1$
   - $-1 - (-2) = -1 + 2 = 1$
   - $-7 + 2 = -5$
1.4 Multiplying Integers

* 3 cases *

Case 1: both integers are positive
Example: \( 8 \cdot 2 = 16 \)
* positive \( \uparrow \) positive \( \uparrow \) positive
* positive \( \times \) positive = positive

Case 2: integers have different signs.
One is positive and the other is negative
Example: \( -8 \cdot 2 = -16 \)
* negative \( \uparrow \) positive \( \uparrow \) negative
or
\( 8 \cdot (-2) = -16 \)
* positive \( \uparrow \) negative \( \uparrow \) negative

* If integers have different signs their product is negative.
* negative \( \times \) positive = negative

Case 3: both integers are negative
Example: \( -8 \cdot (-2) = 16 \)
* negative \( \uparrow \) negative \( \uparrow \) positive
* negative \( \times \) negative = positive

Summary:
1.5 Dividing Integers

*5 cases*

**Case 1:** both integers are positive
Example: \(15 \div 5 = 3\)
* positive \(\div\) positive = positive

**Case 2:** Integers have different signs.
Example: \(-15 \div 5 = -3\) \(\frac{15}{-5} = -3\)
* positive \(\div\) negative = negative

**Case 3:** both integers are negative
Example: \(-15 \div -5 = 3\) \(-15 \div (-5) = 3\)
* negative \(\div\) negative = positive

Case 4
\[
\frac{15}{0} = \text{undefined}
\]

Case 5
\[
\frac{0}{15} = 0
\]

Find the mean of the numbers
\[
2, 10, 8, 22
\]
\[
2 + (-10) + 8 + 22 = \frac{22}{4} = 5.5
\]

Summary: