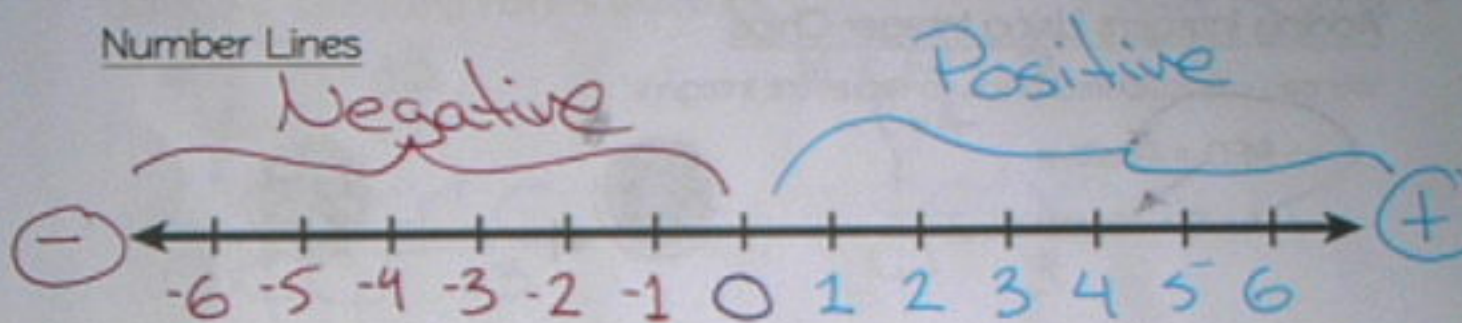


Integers

Every integer (except 0) has a corresponding one with the *opposite* sign.

$$5 \rightarrow \underline{-5} \quad -2 \rightarrow \underline{2} \quad 321 \rightarrow \underline{-321} \quad -63 \rightarrow \underline{63} \quad 10,109 \rightarrow \underline{-10,109}$$

Number Lines



Adding Integers Using a Number Line

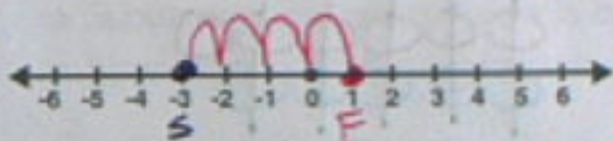
When adding two integers using a # line, mark the first # on a number line.

⇒ If you are adding a *positive* integer, go to the *right* →

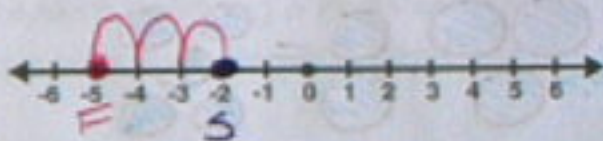
⇒ If you are adding a *negative* integer, go to the *left* ←

Example 1: Add the following using a Number Line

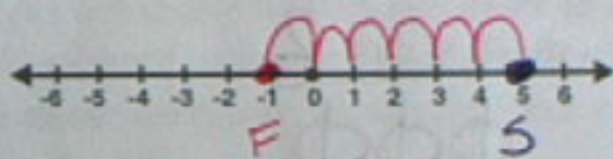
a) $-3 + 4 = \underline{1}$



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



c) $5 + (-6) = \underline{-1}$



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



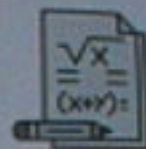
Rule: $\oplus + \oplus \Rightarrow \oplus$

$\ominus + \ominus \Rightarrow \ominus$

$\oplus + \ominus =$

$\ominus + \oplus =$

★
is 6



Example 2: Adding Integers Without Models

a) $-6 + (-4) = \underline{-10}$

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

c) $-10 + 12 = \underline{2}$

d) $23 + (-21) = \underline{2}$

e) $-10 + (-7) = \underline{-17}$

f) $-9 + (-4) = \underline{-13}$

Adding Integers Using Integer Chips

We can use coloured chips to represent integers.

⇒ RED = Positive

⇒ BLUE = Negative



The Zero Principle

One RED chip and one BLUE chip form a pair and cancel each other out to equal 0.



+



= 0

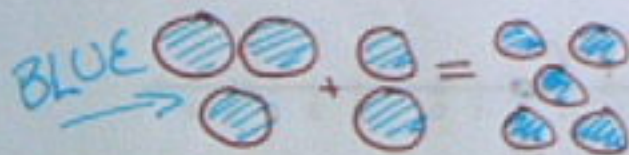
(+1)

(-1)

When adding two integers, use the zero principle and remove sets of *zero pair*. Whatever remains will be your answer

Example 3: Use Integer chips to model and answer the following.

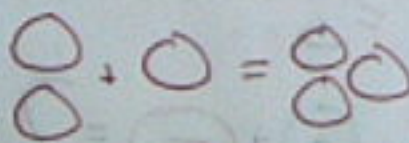
a) $(+3) + (+2) = \underline{5}$



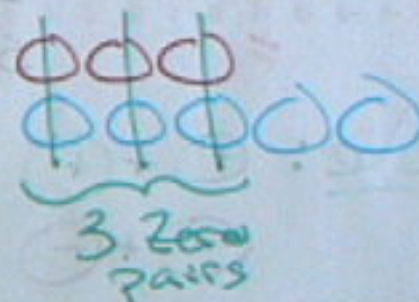
b) $5 + (-6) = \underline{-1}$

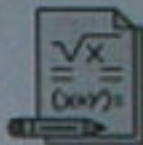


c) $(-2) + (-1) = \underline{-3}$



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





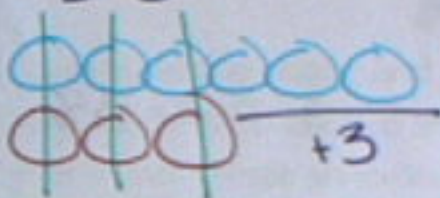
Subtracting Integers Using Integer Chips

When subtracting two integers, we ~~add zero pairs~~ *add zero pairs* according to the second integer and ~~subtract~~ as needed.

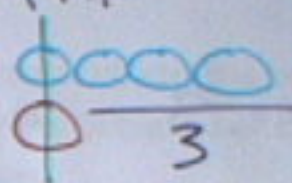
* "subtracting a negative #, switch to add. iswap sign."

Example 4: Subtracting Integers with chips

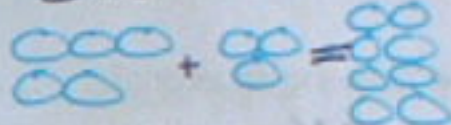
$$\begin{aligned} \text{a) } -3 - (-6) &= +3 \\ -3 + 6 \end{aligned}$$



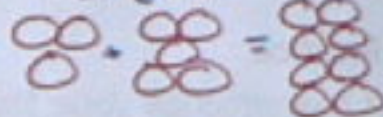
$$\begin{aligned} \text{b) } -1 - (-4) &= 3 \\ -1 + 4 \end{aligned}$$



$$\begin{aligned} \text{c) } 5 - (-3) &= 8 \\ 5 + 3 \end{aligned}$$



$$\begin{aligned} \text{d) } -3 - 5 &= -8 \\ -3 + (-5) \end{aligned}$$



Examine the above examples and complete the following statements.

- ⇒ Subtracting a *positive* integer is equivalent to adding a *negative* integer.
- ⇒ Subtracting a *negative* integer is equivalent to adding a *positive* integer.

Subtracting Integers without Models

Subtracting an integer is *equivalent to adding the opposite integer*.

To subtract, change from a subtraction question to an addition question and evaluate using your knowledge about integer addition.

$-3 - (-6)$	$-3 + 6$	$= 3$
$-1 - (-4)$	$-1 + 4$	$= 3$
$5 - (-3)$	$5 + 3$	$= 8$
$-3 - 5$	$-3 + (-5)$	$= -8$

Example 5: Subtracting Integers Without Models

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

b) $-6 - 4 = \underline{-10}$

c) $-10 - 12 = \underline{-22}$

d) $23 - (-21) = \underline{44}$

e) $-10 - (-7) = \underline{-3}$

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

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

h) $5 - (-6) = \underline{11}$

i) $(-2) - (-1) = \underline{-1}$

j) $(-3) - (+5) = \underline{-8}$

k) $7 - (-8) = \underline{15}$

l) $-10 - 8 = \underline{-18}$

m) $-5 - (-14) = \underline{9}$

n) $-2 - 7 = \underline{-9}$

o) $30 - (-6) = \underline{36}$

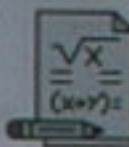
Application & Practice

1. What is the mathematical value for each of the following situations?

a) The temperature outside is 10°C below zero. $\underline{-10^{\circ}\text{C}}$ b) The water level is 4m below sea level. $\underline{+4\text{m}}$ c) A loss of \$200. $\underline{-200}$

2. In the table below determine the New Temperature by creating a math expression using integers.

Original Temperature	Temperature Change	Math Expression	New Temperature
13°C	Decreases by 9°C	$13 - 9 = 4$	4°C
2°C	Decreases by 5°C	$2 - 5 = -3$	-3°C
-2°C	Increases by 3°C	$-2 + 3 = 1$	1°C
-9°C	Decreases by 3°C	$-9 - 3 = -12$	-12°C



3. Tom has \$50 in his wallet. He spends \$20 on lunch and then receives \$30 as a birthday gift. What is the total amount of money in his wallet now? Create an expression using integers.

$$\begin{aligned} & \$50 - \$20 + \$30 = \$60 \\ \text{or } & \$50 - \$20 = \$30 \\ & \quad \quad \quad + \$30 \\ & \quad \quad \quad \hline & \quad \quad \quad \$60 \end{aligned}$$

4. Sarah is at the beach, and she swims 10 meters out into the ocean. Later, she decides to swim back to the shore for 6 meters. What is her distance from the shore? Create an expression using integers.

$$10\text{ m} - 6\text{ m} = 4\text{ m}$$

5. In a football game, a team loses 7 yards on one play and gains 12 yards on the next play. What is the total (i.e. net) yardage gained or lost? Create an expression using integers.

$$-7\text{ yds} + 12\text{ yds} = 5\text{ yds}$$

6. A submarine descends 200 meters below sea level and then ascends 150 meters. What is the submarine's final depth relative to sea level? Create an expression using integers.

$$-200\text{ m} + 150\text{ m} = -50\text{ m}$$