Adding Integers with Tiles

Recall that when you add two numbers, such as $5 + 3$, you can show the addition by combining 5 counters with 3 counters to obtain 8 counters.
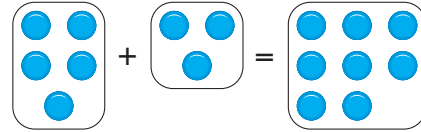
You can add two integers in a similar way.

You know that $+1$ and -1 combine to make a zero pair.

We can combine coloured tiles to add integers.

Explore

You will need coloured tiles.

➤ Choose two different positive integers.
   Add the integers.
   Draw a picture of the tiles you used.
   Write the addition equation.
➤ Repeat the activity for a positive integer and
   a negative integer.
➤ Repeat the activity for two different negative integers.

Reflect & Share

Share your equations with another pair of classmates.
How did you use the tiles to find a sum of integers?
How can you predict the sign of the sum?

Connect

➤ To add two positive integers: $(+5) + (+4)$
   We can model each integer with tiles.

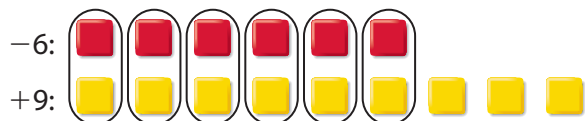 $+5$: 🟨 🟨 🟨 🟨 🟨

   $+4$: 🟨 🟨 🟨 🟨

   Combine the tiles. There are 9 yellow tiles.
   They model $+9$.
   So, $(+5) + (+4) = +9$

   This is an addition equation.

➤ To add a negative integer
and a positive integer: $(-6) + (+9)$
We can model each integer with tiles. Circle zero pairs.

−6:
+9:

There are 6 zero pairs.
There are 3 yellow tiles left.
They model $+3$.
So, $(-6) + (+9) = +3$

➤ To add two negative integers: $(-3) + (-7)$
We can model each integer with tiles.

−3:
−7:

Combine the tiles. There are 10 red tiles.
They model -10.
So, $(-3) + (-7) = -10$

Example

The temperature rises 5°C, then falls 8°C.
a) Represent the above sentence with integers.   b) Find the overall change in temperature.

A Solution

a) $+5$ represents a rise of 5°C.
   -8 represents a fall of 8°C.
   Using integers, the sentence is: $(+5) + (-8)$
b) Model each integer with tiles.
   Circle zero pairs.

+5
−8

There are 3 red tiles left.
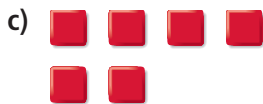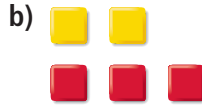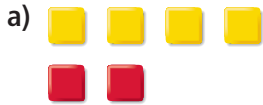They model -3.
So, $(+5) + (-8) = -3$
The overall change in temperature is -3°C.

Use coloured tiles.

1. What sum does each set of tiles model?
Write the addition equation.

a)

b)

c)

d)

e)

f)

2. What sum does each set of tiles model?
How do you know you are correct?
a) 3 yellow tiles and 2 red tiles
b) 3 yellow tiles and 4 red tiles
c) 2 red tiles and 2 yellow tiles

3. Use coloured tiles to represent each sum. Find each sum.
Sketch the tiles you used. What do you notice?
a) $(+2) + (-2)$ b) $(-4) + (+4)$ c) $(+5) + (-5)$

4. Add. Sketch coloured tiles to show how you did it.
a) $(+2) + (+3)$ b) $(-3) + (+4)$ c) $(-4) + (-1)$
d) $(+1) + (-1)$ e) $(-3) + (-4)$ f) $(+5) + (-2)$

5. Add. Write the addition equations.
a) $(+4) + (+3)$ b) $(-7) + (+5)$ c) $(-4) + (-5)$
d) $(+8) + (-1)$ e) $(-10) + (-6)$ f) $(+4) + (-13)$

6. Represent each sentence with integers, then find each sum.
a) The temperature drops 3°C and rises 4°C.
b) Marie earned $5 and spent $3.
c) A stock rises 15¢, then falls 7¢.
d) Jerome moves his game piece 3 squares backward, then 8 squares forward.
e) Duma deposits $12, then withdraws $5.

7. Use question 6 as a model.
   Write 3 integer addition problems.
   Trade problems with a classmate.
   Solve your classmate's problems with coloured tiles.

8. Copy and complete.
   a) $(+5) + \square = +8$ **b)** $\square + (-3) = -4$ **c)** $(+3) + \square = +1$
   d) $(-5) + \square = -3$ **e)** $(+2) + \square = +1$ **f)** $\square + (-6) = 0$

9. **Assessment Focus**
   a) Add: $(+3) + (-7)$
   b) Suppose you add the integers in the opposite order:
      $(-7) + (+3)$. Does the sum change?
      Use coloured tile drawings and words to explain the result.
   c) How is $(-3) + (+7)$ different from $(+3) + (-7)$? Explain.
   d) Repeat parts a to c with a sum of integers of your choice.
      What do you notice?

10. **Take It Further** Add. Sketch coloured tiles to show how you did it.
   a) $(+1) + (+2) + (+3)$ **b)** $(+2) + (-1) + (+3)$
   c) $(-3) + (-1) + (-1)$ **d)** $(+4) + (-3) + (+1)$

11. **Take It Further** In a magic square, every row, column, and diagonal has
   the same sum. Copy and complete each magic square. How did you do it?
   a)

+3		+1
	0	
−1		

   b)

−1		+1
	−2	
		−3

12. **Take It Further** Copy each integer pattern.
   What do you add each time to get the next term?
   Write the next 4 terms.
   a) $+8, +4, 0, -4, \ldots$ **b)** $-12, -9, -6, -3, \ldots$

Reflect

Talk to a partner. Tell how you used coloured tiles to add
two integers when the integers have:
- the same signs   • opposite signs