2.1 Representing Integers

Focus Use coloured tiles to represent integers.

One of the coldest places on Earth is Antarctica, with an average annual temperature of about −58°C.
This is a **negative integer**.

One of the hottest places on Earth is Ethiopia, with an average annual temperature of about +34°C.
This is a **positive integer**.

We can use yellow tiles to represent positive integers and red tiles to represent negative integers.

One yellow tile can represent +1.

One red tile can represent −1.

A red tile and a yellow tile combine to model 0: −1, +1

We call this a **zero pair.**

Explore

You will need coloured tiles.

- One of you uses 9 tiles and one uses 10 tiles. You can use any combination of red and yellow tiles each time.
  How many different integers can you model with 9 tiles?
  How many different integers can your partner model with 10 tiles?

- Draw a picture to show the tiles you used for each integer you modelled. Circle the zero pairs. Write the integer each picture represents. How do you know?

Reflect & Share

Compare your models with those of your partner.
Which integers did you model? Your partner?
Were you able to model any of the same integers?
Why or why not?

Connect

We can model any integer in many ways.

Each set of tiles below models +5.

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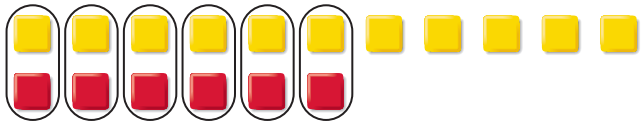
- 

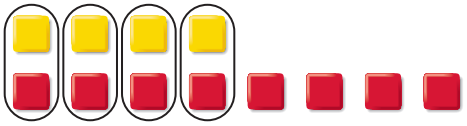
Each pair of 1 yellow tile and 1 red tile makes a zero pair. The pair models 0.

Example

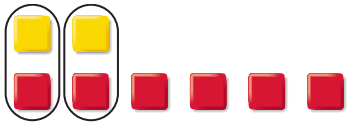
Use coloured tiles to model −4 in three different ways.

A Solution

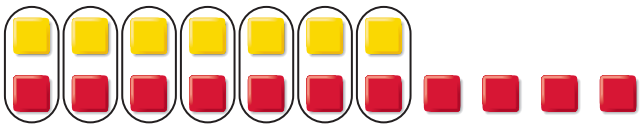
Start with 4 red tiles to model −4.
Add different numbers of zero pairs.
Each set of tiles below models −4.

- 

  Adding 4 zero pairs does not change the value.

- 

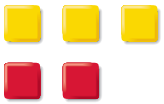
  Adding 2 zero pairs does not change the value.

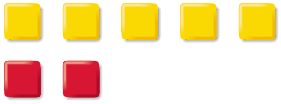
- 

  Adding 7 zero pairs does not change the value.

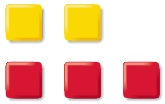
Practice

1. Write the integer modelled by each set of tiles.

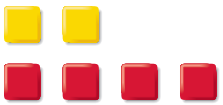
a) 

b) 

c) 

d) 

e) 

f) 

2. Draw yellow and red tiles to model each integer in two different ways.

a) -6 **b)** $+7$ **c)** $+6$ **d)** -2

e) $+9$ **f)** -4 **g)** 0 **h)** $+10$

3. Work with a partner.

Place 10 yellow and 10 red tiles in a bag.

a) Suppose you draw 6 tiles from the bag.
What integers might the tiles model?
List all seven possible integers.

b) Without looking, draw 6 tiles from the bag.
Record the integer that these tiles model.
Repeat the experiment 9 more times.
Which integer was modelled most often?

Math Link

Sports

In golf, a hole is given a value called **par**. Par is the number of strokes a good golfer takes to reach the hole.
A score of $+2$ means a golfer took 2 strokes more than par, or 2 strokes over par.
A score of -1 means a golfer took 1 stroke fewer than par, or 1 stroke under par.
Some scores have special names.
A score of $+1$ is a bogey.
A score of -1 is a birdie.
A score of -2 is an eagle.

In a golf tournament, the golfer with the fewest strokes wins the game.

4. Assessment Focus

a) Choose an integer between -9 and $+6$.
Use coloured tiles to model the integer.

b) How many more ways can you find to model the integer with tiles?
Create a table to order your work.

c) What patterns can you find in your table?

d) Explain how the patterns in your table can help you model an integer between -90 and $+60$.

5. a) Suppose you have 10 yellow tiles, and use all of them.
How many red tiles would you need to model $+2$?
How do you know?

b) Suppose you have 100 yellow tiles, and use all of them.
How many red tiles would you need to model $+2$?
How do you know?

6. Write the integer suggested by each of the following situations.
Draw yellow or red tiles to model each integer.
Explain your choice.

a) You move your game piece forward 9 squares on the game board.

b) You ride down 5 floors on an elevator.

c) You walk up 11 stairs.

d) The temperature drops 9°C.

e) You climb down 7 rungs on a ladder.

7. Write two integers suggested by each of the following situations.

a) You deposit $100 in your bank account, then pay back your friend $20.

b) While shopping in a large department store, you ride the elevator up 6 floors, then down 4 floors.

c) The temperature rises 12°C during the day, then falls 8°C at night.

Reflect

How is it possible to use coloured tiles to model any integer in many different ways?