1. Negative numbers and number lines



Name _____ Class _____ Date _____

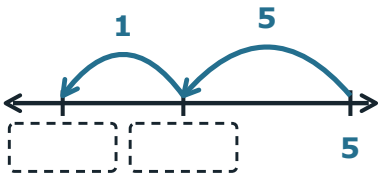
Max's stop · Mbombela · arrival stop. In Mbombela, the first town of the violet chapter, Max walks up a brick path under a jacaranda with his nose in the atlas.

Today: Numbers carry on below zero: a **negative number** sits to the left of zero on the number line, as far from zero as its positive partner.

Warm-up Zero is the friendly number

Each answer helps with the next one. Fill in the model, then write the equation.

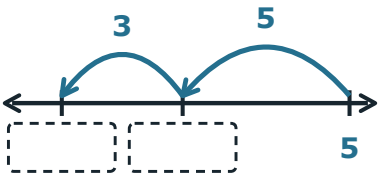
1 **a)** 5 − 6



5 − 5 = _____

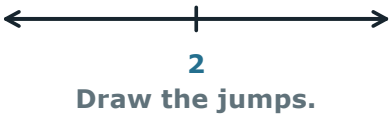
5 − 6 = _____

b) 5 − 8



5 − 8 = _____

c) 2 − 7



Draw the jumps.

2 − 7 = _____

d) −3 + 3



Draw the jump.

−3 + 3 = _____

e) −3 + 5

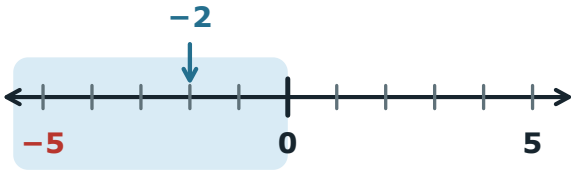


Draw the jumps.

−3 + 5 = _____

KNOWLEDGE **Reading below zero**

WORKED EXAMPLE **What number is the arrow pointing to?**



1. Zero is the tall tick. The arrow points 2 ticks to the left of zero, so it points to **−2**. We say "negative 2".

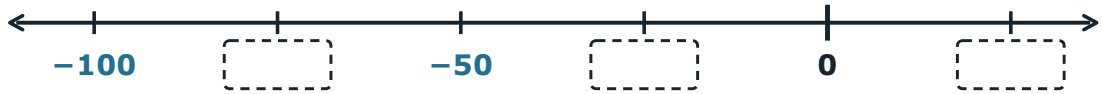
the arrow points to −2

2 ★ Count back in ones: **1, 0, … Write the next three numbers.**



1, 0, _____, _____, _____

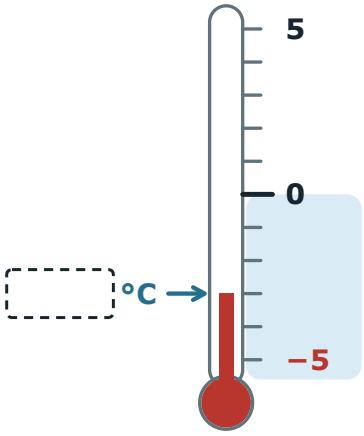
3 ★ The marks are 25 apart. **Write the missing numbers.**



−100, _____, −50, _____, 0, _____

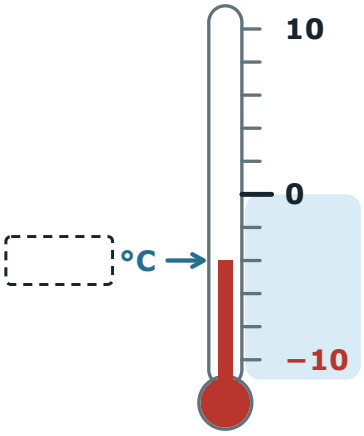
4 ★ Fill in or finish the model, then write the equation.

a) What temperature is shown?



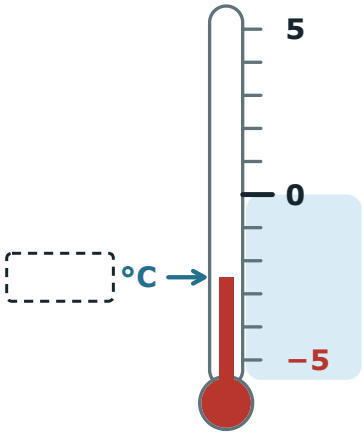
the thermometer shows _____ °C

b) What temperature is shown?



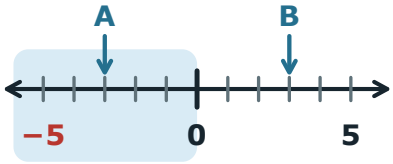
the thermometer shows _____ °C

c) What temperature is shown?



the thermometer shows _____ °C

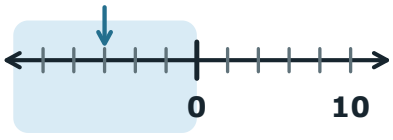
d) What number is each arrow pointing to? How far from zero is each arrow?



A = _____ and B = _____

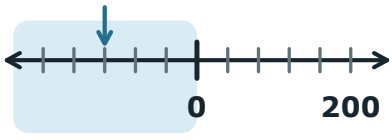
A to zero = _____ · B to zero = _____

e) What number is the arrow pointing to?



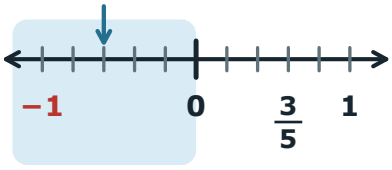
the arrow points to _____

f) What number is the arrow pointing to?



the arrow points to _____

g) What number is the arrow pointing to?



the arrow points to _____

4 *Question 4 continued: fill in or finish the model, then write the equation.*

h) Continue the linear sequence.



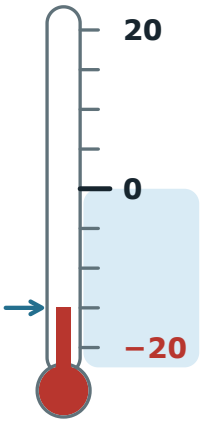
5, 3, 1, _____, _____

i) Round **−47** to the nearest 10.



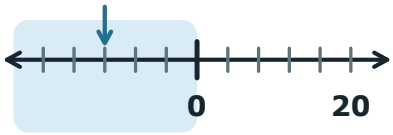
nearest 10: −47 ≈ _____

j) What temperature is shown?



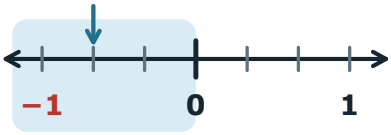
the thermometer shows _____ °C

k) What number is the arrow pointing to?



the arrow points to _____

l) What number is the arrow pointing to?



the arrow points to _____

m) Round **−1 024** to the nearest 100.

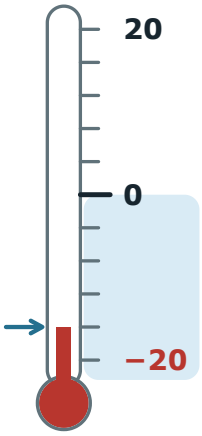


nearest 100: −1 024 ≈ _____

APPLICATION **On the brick path** Show your thinking on the model, then complete the equation.

5 ★★ For the hot walk into Mbombela Max froze the water bottle in his backpack. This is the thermometer in the freezer it came out of. **What temperature is shown?**

the freezer is at _____ °C



Negative numbers and number lines

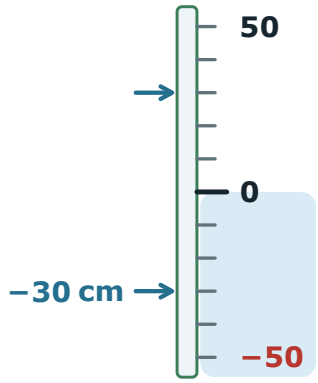
6 ★★

Max measures the stone planter beside the path: **0** is the top of its wall, and the marks are 10 cm apart. **Which number shows the brick path** at the arrow?

The lowest flower of an aloe in the planter opens at the **opposite** number. **Which number is that?**

the brick path is at _____ cm

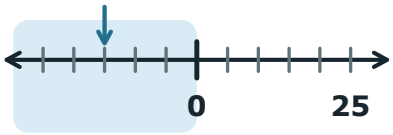
the opposite number is _____ cm



7 ★★

Max's pockets are empty, and he still owes Bongani, the taxi driver, **R15** of his fare into Mbombela. On this number line of rand, the arrow shows Max's money. **Which number is it?**

How far is that number from zero? That is the size of the debt.



Max's money = _____ rand

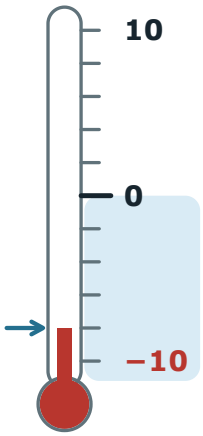
distance from zero = _____ rand

8 ★★

a) Which of these could the number **−6** describe? Tick every one that fits.

- ◯ a freezer at 6 degrees below zero
- ◯ a debt of R6
- ◯ R6 paid into a bank account
- ◯ an aloe flower 6 cm above the wall

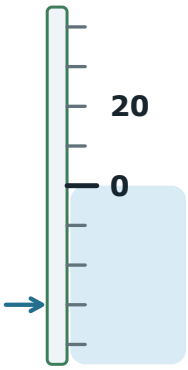
b) Max left the freezer door open, and it has warmed up inside. **Write the temperature the thermometer shows now.**



the freezer is at _____ °C

9 ★★

The flower beds beside the path get their water from a borehole. **Ground level is 0 m**. The top of the tower across the street is at 20 m. The pump hangs in the borehole at the arrow. **Which number shows the pump?**



the pump is at _____ m

Negative numbers and number lines

REASONING **Convince Max** Decide, then explain how you know.

10 ★★★

a) Max is counting backwards: **5, 4, 3, 2, 1, 0**. Sipho, a learner from Mbombela, says: "Max can't carry on. The numbers stop at zero." **Do you agree with Sipho?**

- ◯ Yes: zero means nothing, and nothing can be less than nothing
- ◯ No: the numbers carry on below zero, as negative numbers
- ◯ Yes: after 0 the numbers start again at 1

b) Sipho counts back in 2s: **2, 0, ...** **Write the next two numbers.**

Draw your model

2, 0, _____, _____

Explain: _____

11 ★★★

a) Naledi, Sipho's classmate, is counting up from −3: **−3, −2, −1, 1, 2, 3, 4 ...** **Explain the mistake Naledi has made.**

- ◯ She should have started at −4
- ◯ There is no mistake
- ◯ She left out 0: it comes between −1 and 1

b) Count up in ones from −3. **Write the missing numbers.**

Draw your model

−3, _____, −1, _____, 1, _____

Explain: _____

12 ★★★

a) "**Negative eight** is as far from zero as **positive eight**." Is the statement true or false?

◯ True ◯ False

b) **How far from zero** is −8? And how far is 8?

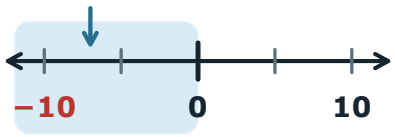
Draw your model

_____ = _____ · _____ = _____

Explain: _____

13 ★★★

a) The arrow points to a number on this line. **Which number is the tick just to the right of the arrow?**



the arrow lies between −10 and _____

b) **The arrow could be pointing to ...** Circle every number that works.

−7	−4	8	−6,5	−12	−7,5

Explain: _____

Negative numbers and number lines

14 ★★★

a) Max and Naledi round **−26** to the nearest 10. Max says: "−26 rounds **up** to −30." Naledi says: "−26 rounds **down** to −30." **Who do you agree with?**

- ◯ Max: 30 is more than 26, so the number went up
- ◯ Naledi: −30 is less than −26, so the number went down
- ◯ Neither: −26 rounds to −20

b) Round **−26** to the nearest 10.



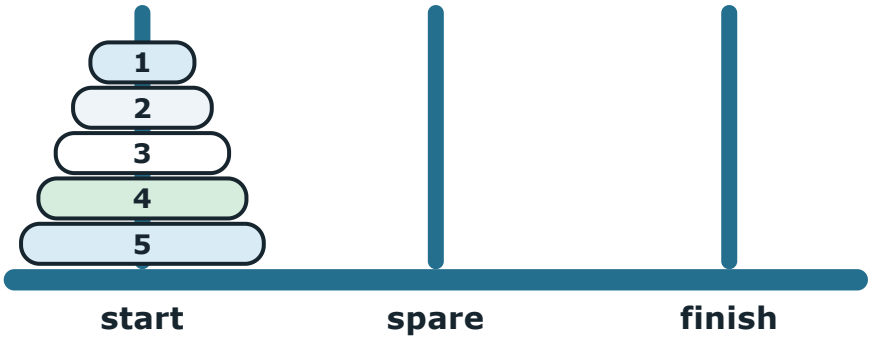
nearest 10: −26 ≈ _____

Explain: _____

15 PROBLEM OF THE DAY **The tower of discs**

In Mbombela, Max finds a wooden toy: five discs stacked on a pole, the biggest at the bottom. The whole tower must move to the pole marked finish. Only one disc moves at a time, and a bigger disc may never sit on a smaller one.

Move the tower in at most 40 moves. It can be done in 31: can you find that way? Write down every move.



Think further: What is the fewest number of moves for 6 discs? For 10?

Explain one thing you learned.

I can do this: ◯ independently ◯ with help ◯ I need more practice