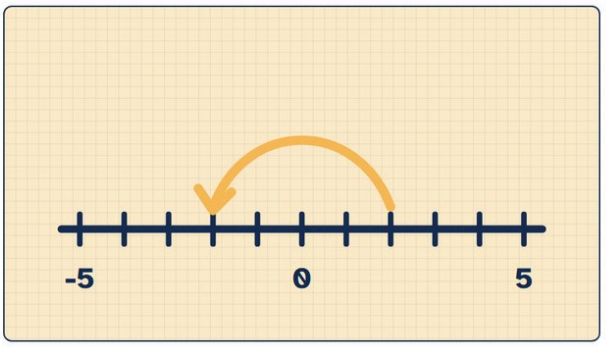
Maths · Number line, the four operations and key properties

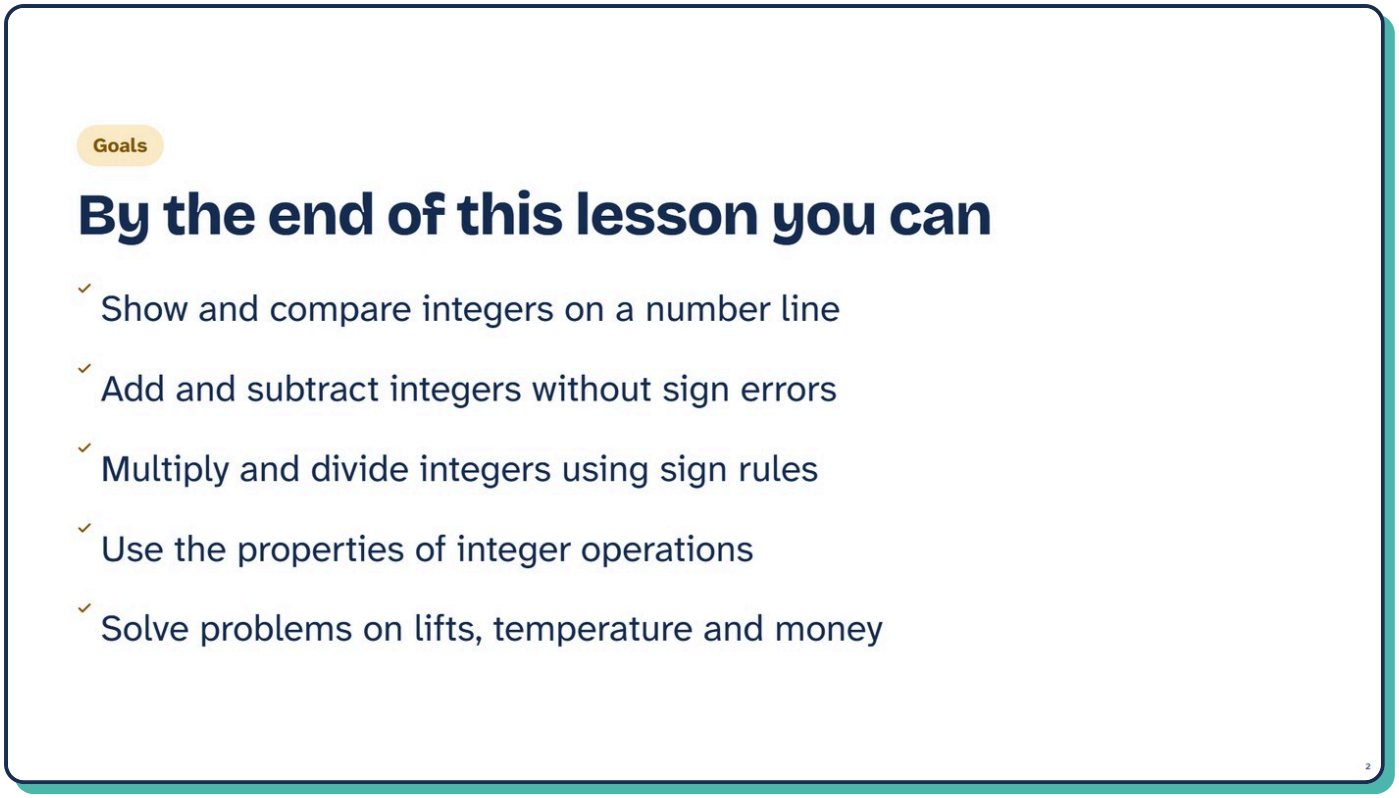
Integers



Integers

Teacher notes

Ask the class: which floor is below the ground floor in a mall, and what number would you give it? Collect answers such as B1 or minus one. Tell students that today we learn how such numbers behave when we add, subtract, multiply and divide them.

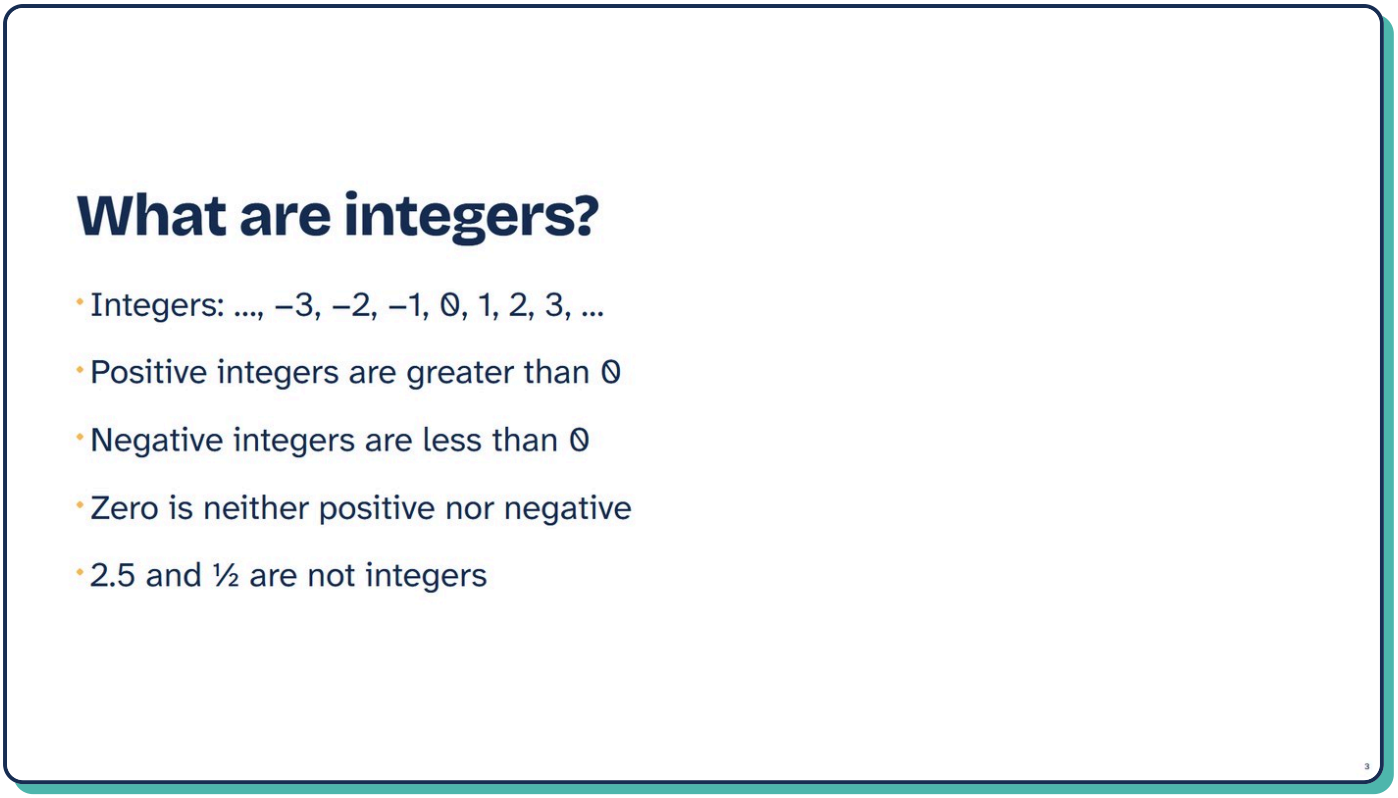


By the end of this lesson you can

Teacher notes

Read the objectives aloud. Tell students there is a five-question quiz at the end, so they should note one rule from each part of the lesson.

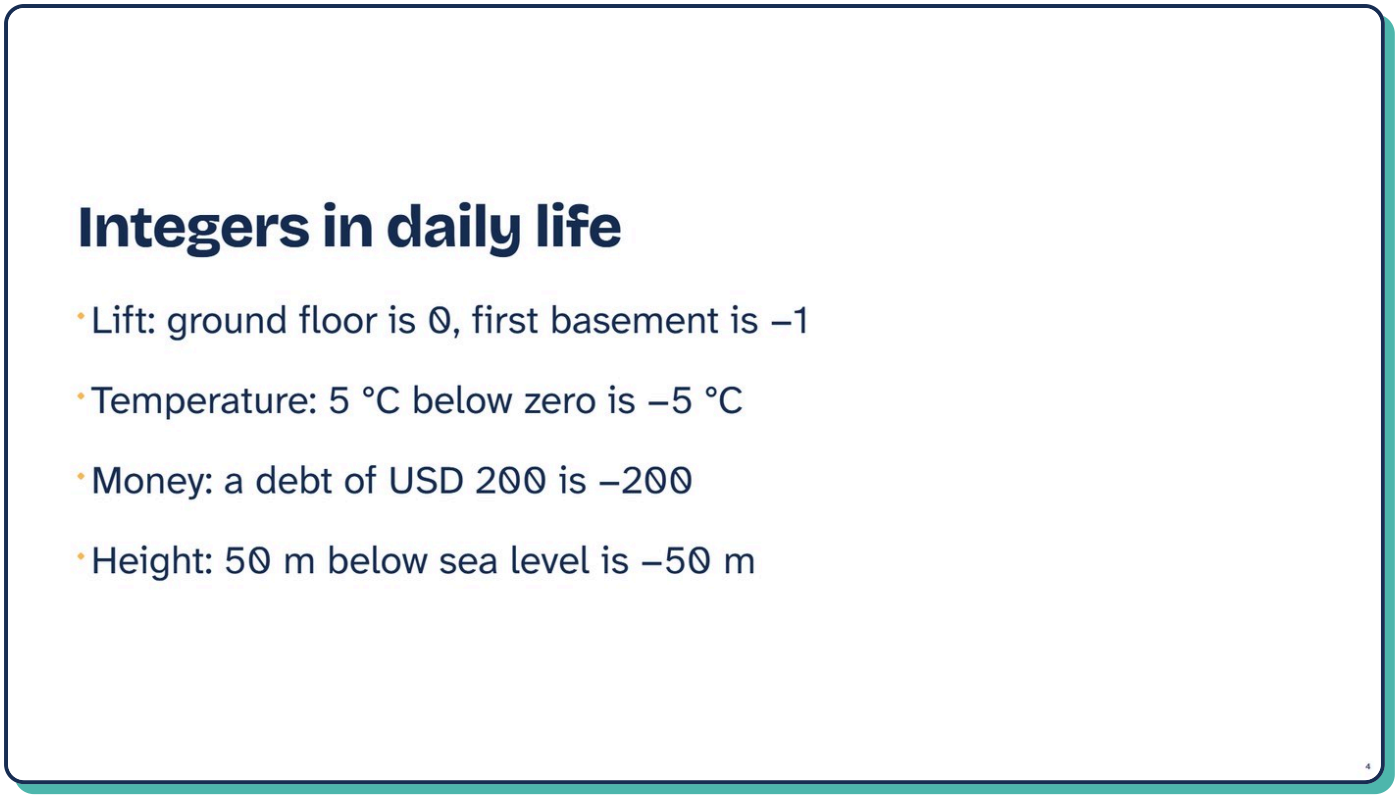
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What are integers?

Teacher notes

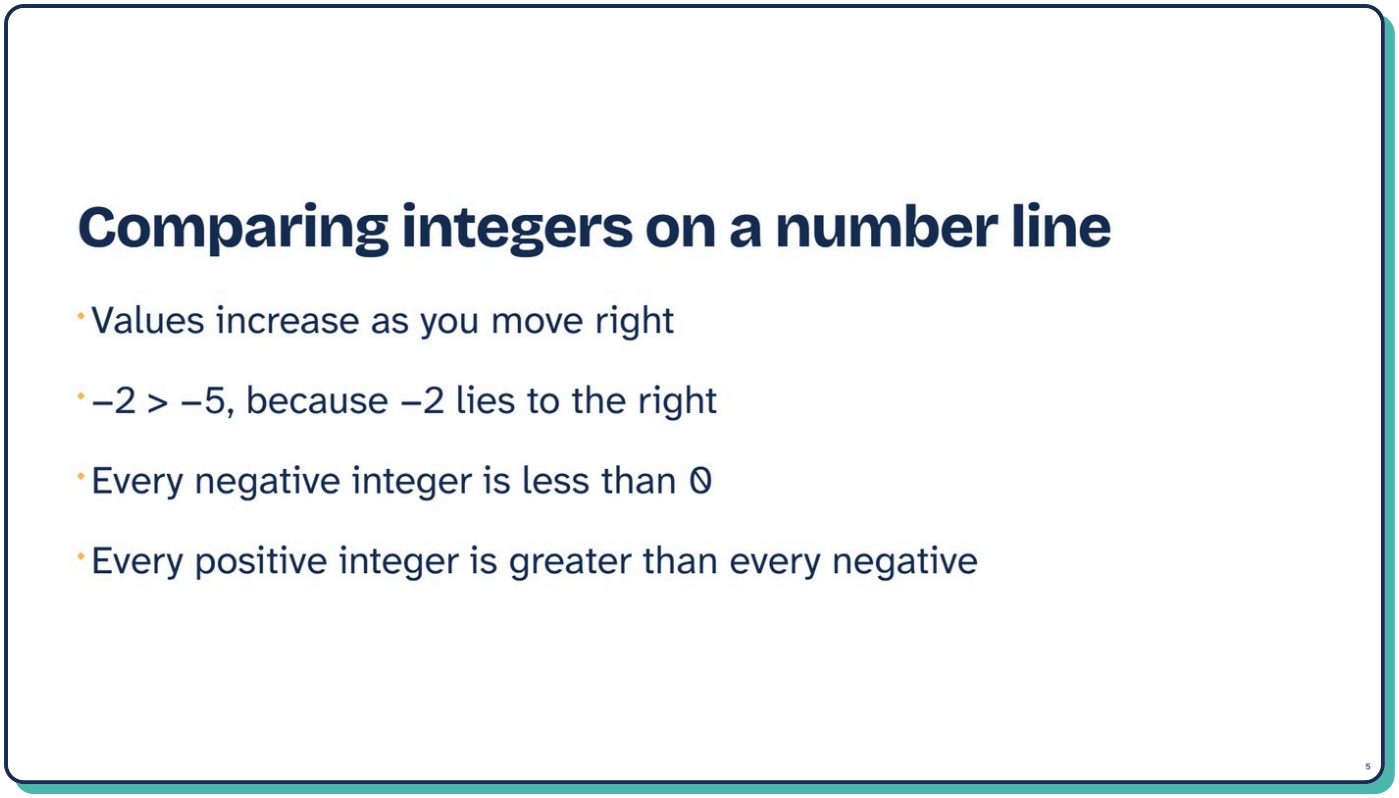
Write the list on the board with dots on both sides to show it never ends. Ask: is −0 different from 0? A common mistake is to think fractions such as −½ are integers; they are not.



Integers in daily life

Teacher notes

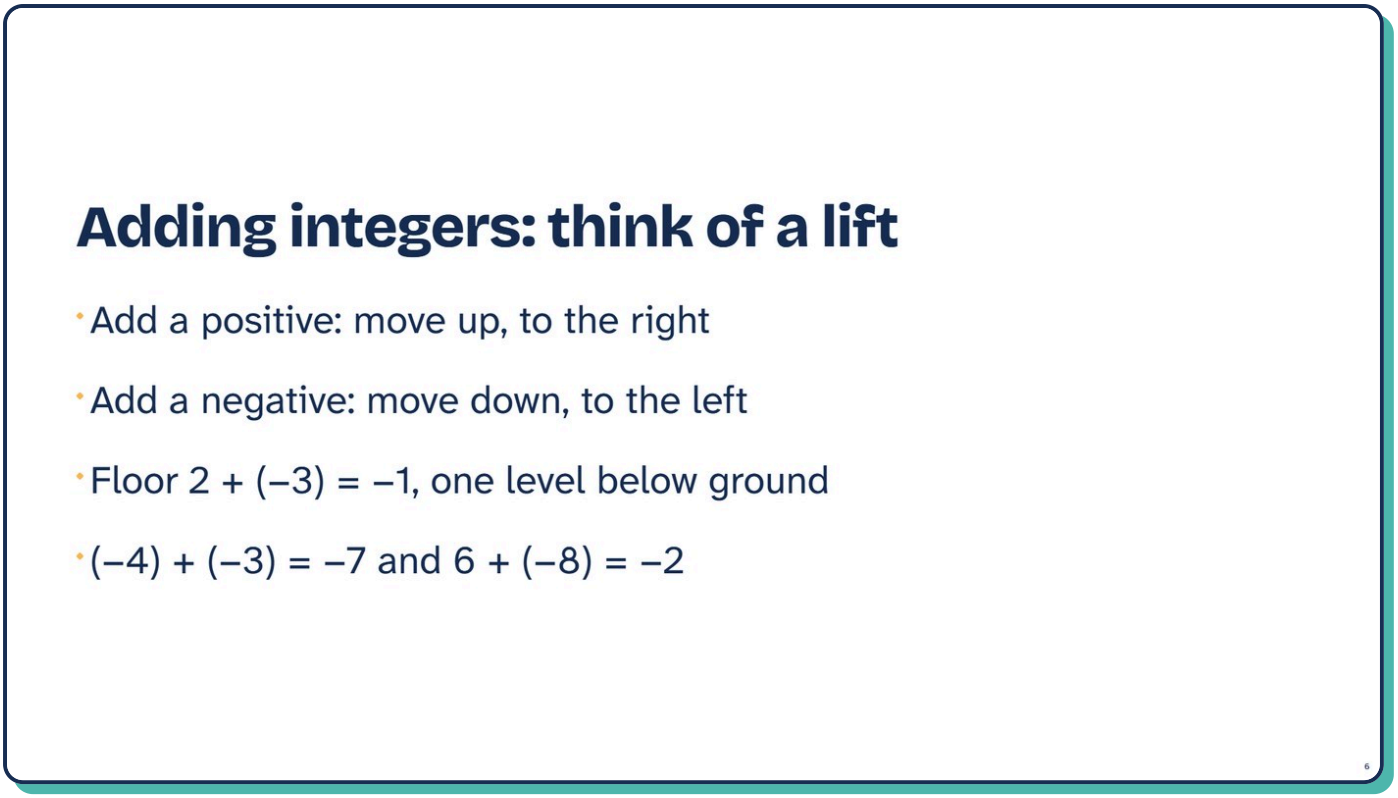
Ask students for one more situation where a negative number makes sense, such as a loss in a shop. Point out that every example has a natural zero: ground floor, freezing point, no money owed, sea level. In °F classrooms, use the same idea: −5 °F is colder than 5 °F.



Comparing integers on a number line

Teacher notes

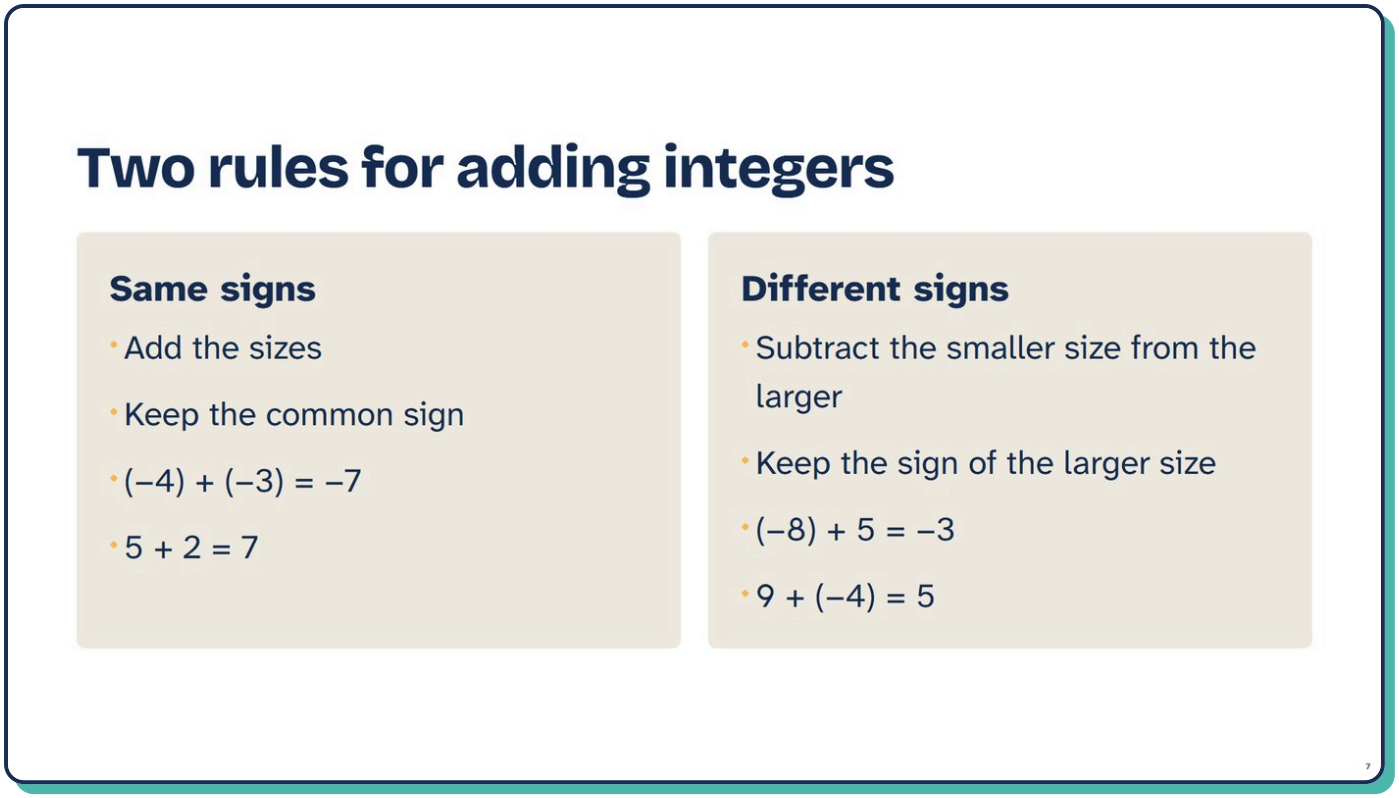
Draw a number line from −6 to 6. Ask: which is colder, −2 °C or −5 °C? Many students say −2 is smaller because 2 is smaller than 5; the temperature question fixes this misconception quickly.



Adding integers: think of a lift

Teacher notes

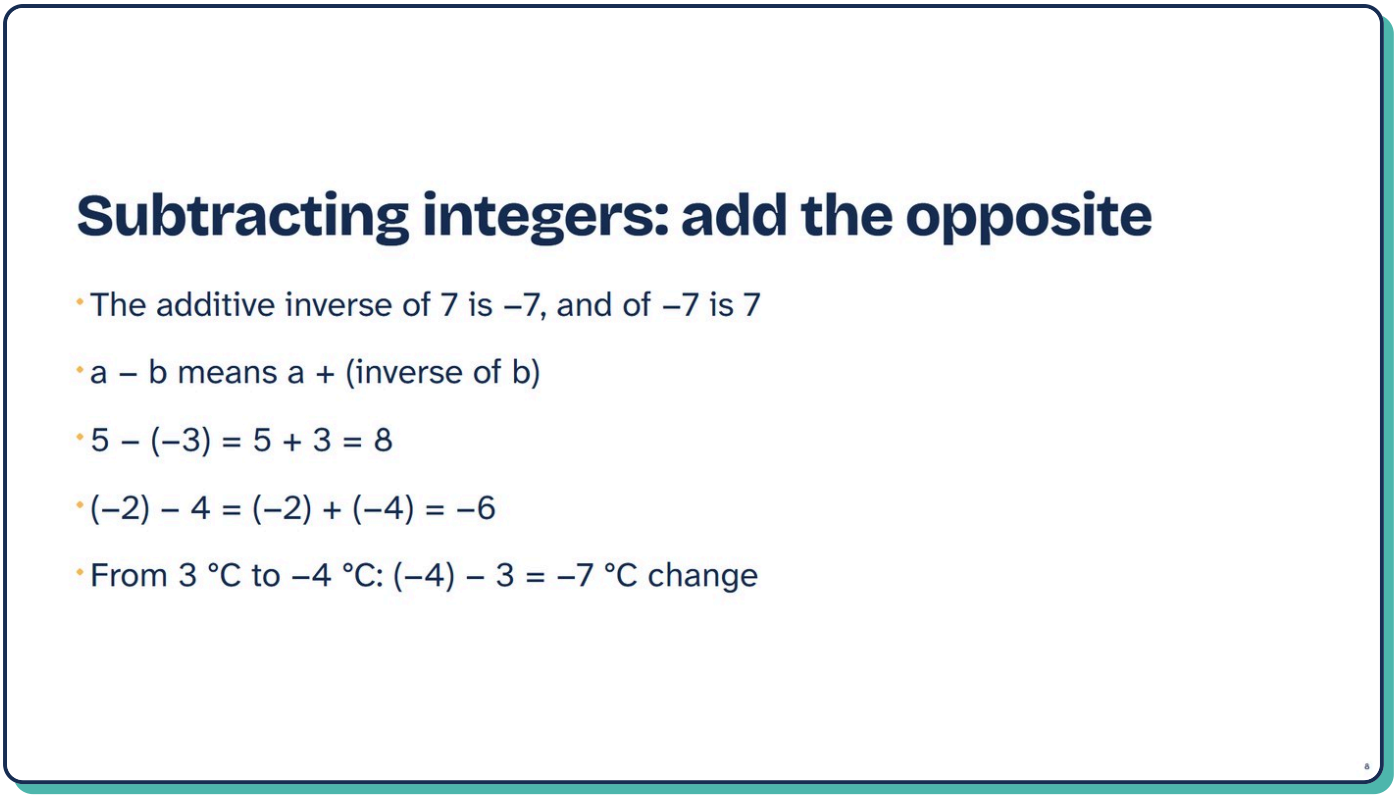
Act it out with a vertical number line drawn like a lift shaft. Ask a student to start at floor 2 and press minus 3. Stress that adding a negative number gives a smaller result.



Two rules for adding integers

Teacher notes

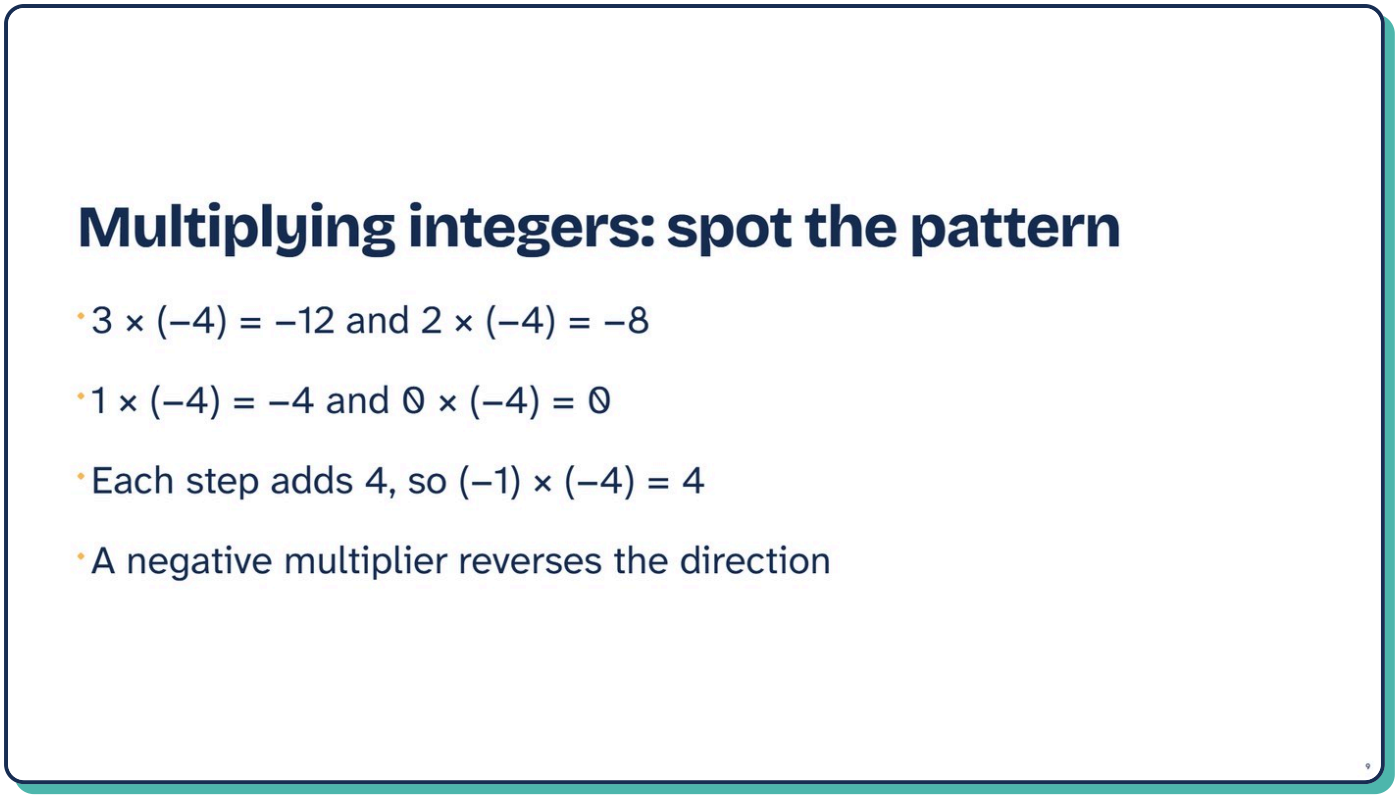
Size means the value without its sign (the absolute value). Ask students to copy both rules into a box in their notebooks. Check with the number line: from −8, move 5 steps right and you land on −3.



Subtracting integers: add the opposite

Teacher notes

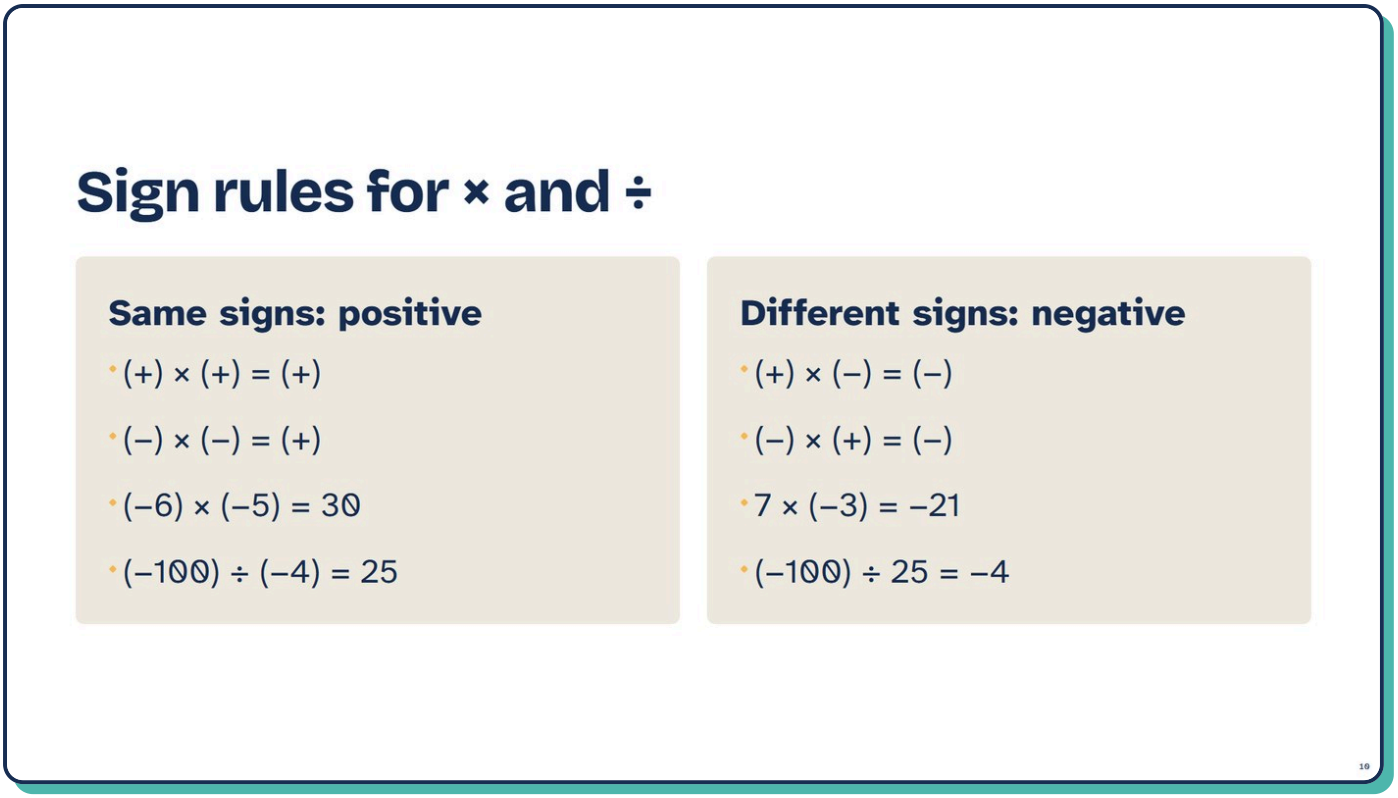
Repeat the phrase: subtracting means adding the opposite. Ask: why does 5 – (–3) give more than 5? Taking away a debt of 3 leaves you better off by 3. The temperature change is final minus initial.



Multiplying integers: spot the pattern

Teacher notes

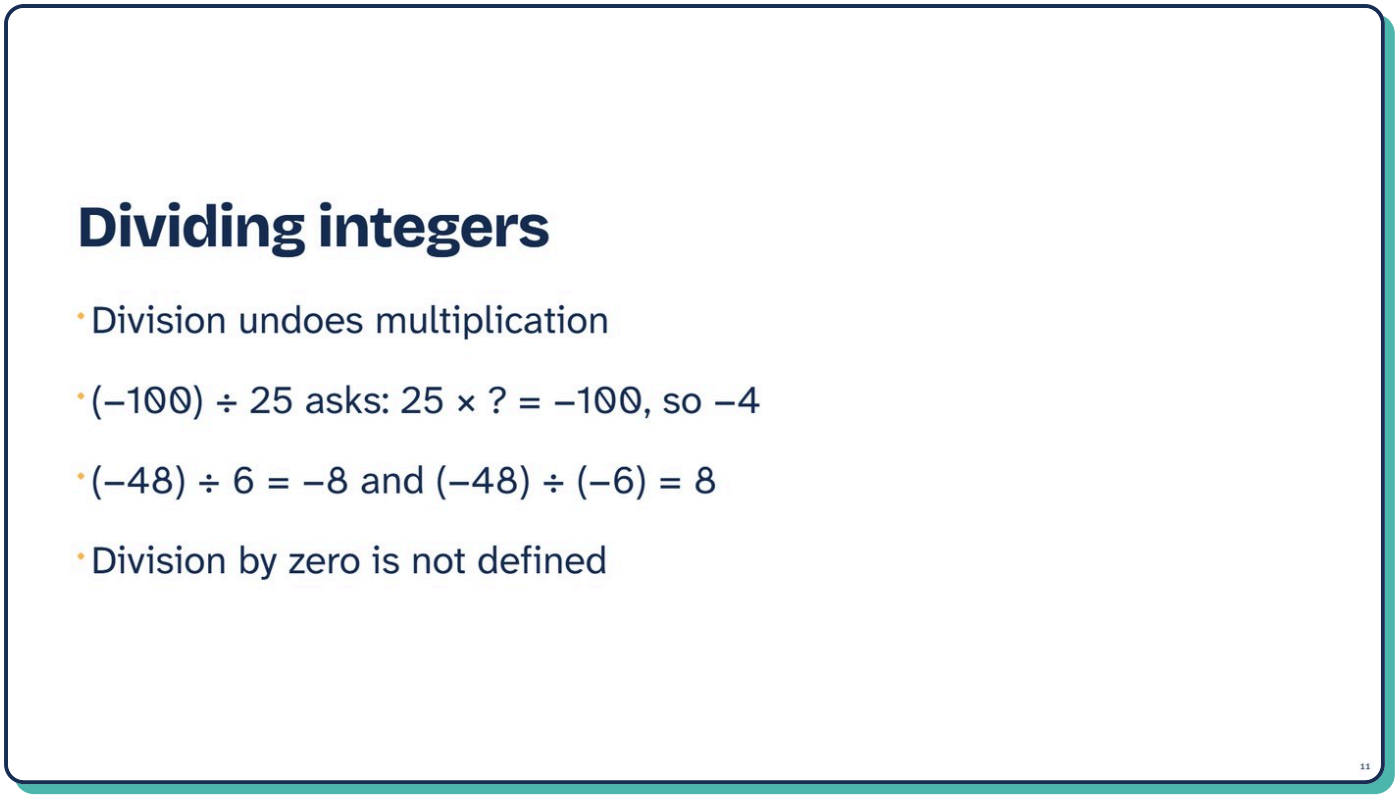
Build the table on the board and let students predict the next line before you write it. Ask: what is (−2) × (−4)? The pattern gives 8. A frequent mistake is to use the addition rule, giving −8.



Sign rules for × and ÷

Teacher notes

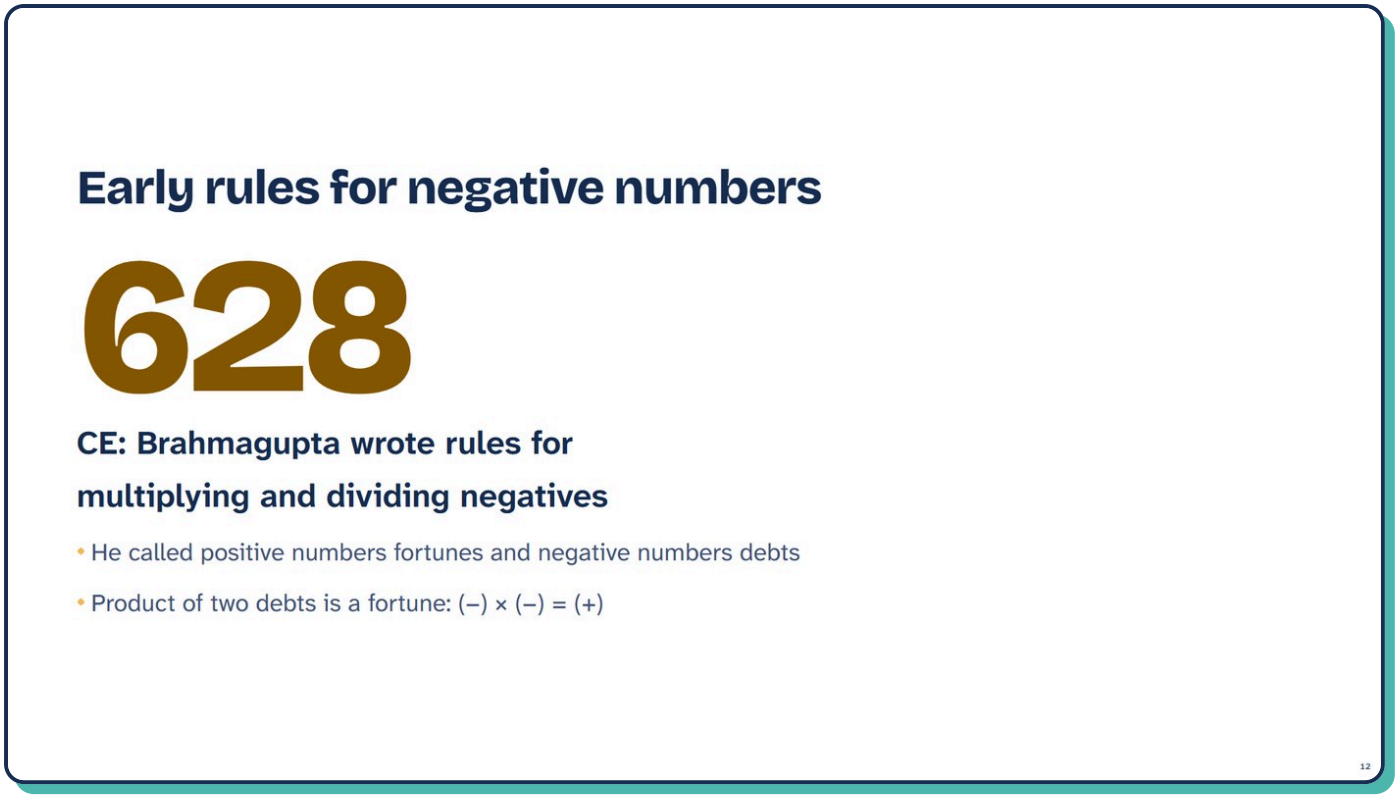
Stress that the same rules work for division because division undoes multiplication. Ask: what is the sign of (−2) × (−3) × (−4)? Three negatives give a negative answer, −24.



Dividing integers

Teacher notes

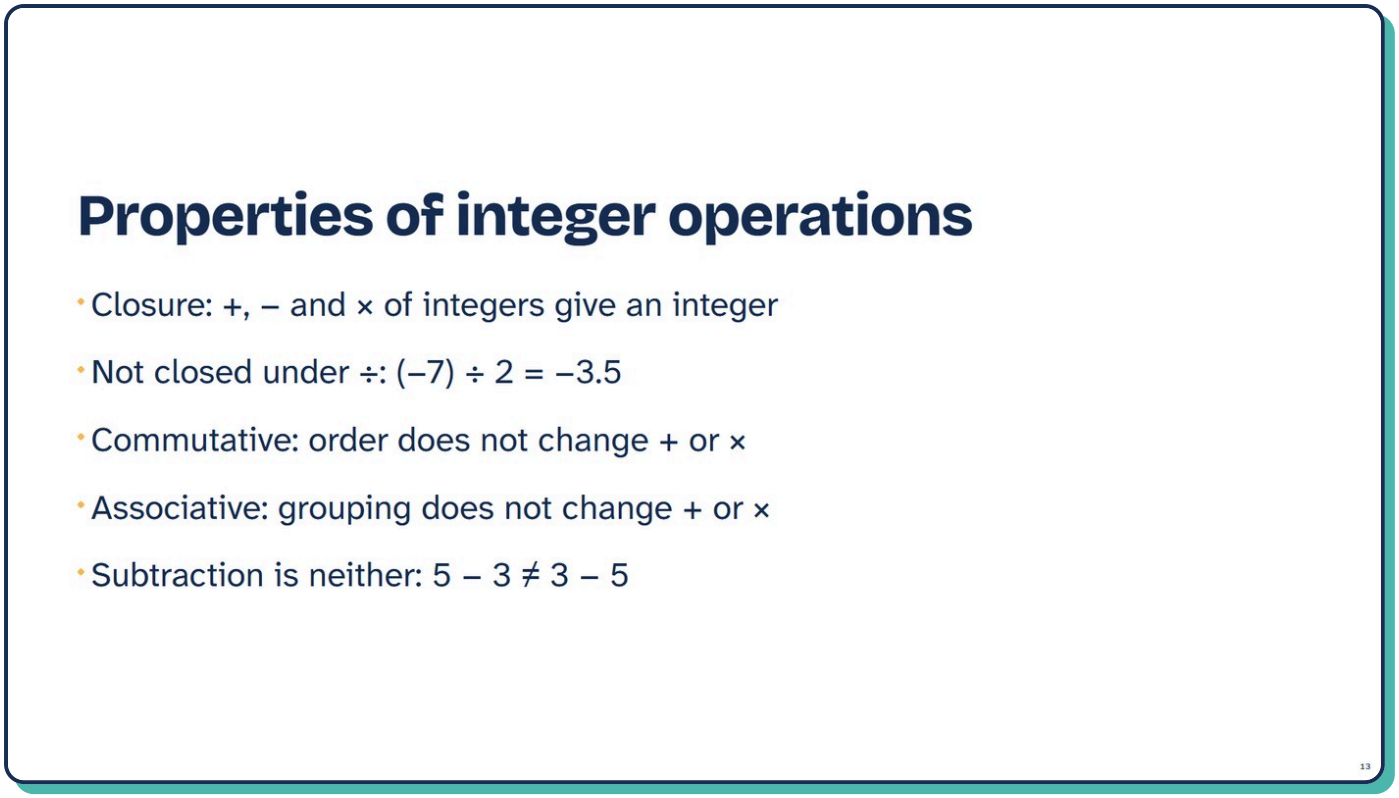
Turn each division into a missing-number multiplication. Ask: what is 0 ÷ (–5)? It is 0. Then ask why (–5) ÷ 0 has no answer: no number times 0 gives –5.



Early rules for negative numbers

Teacher notes

Brahmagupta, an Indian mathematician and astronomer, set out these rules in his Brahmasphutasiddhanta, written in 628 CE. Ask students to restate his rule for a debt times a fortune; the answer is a debt, a negative number.

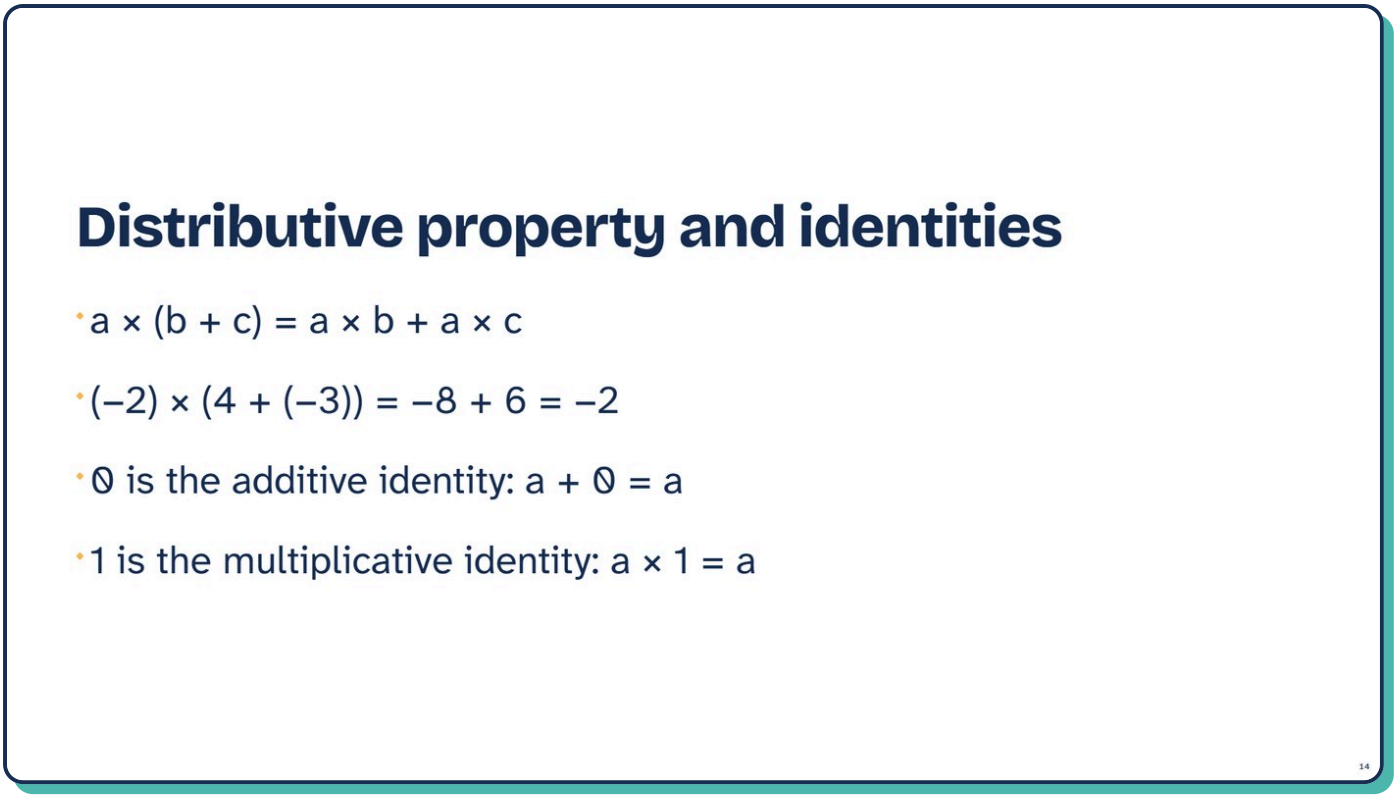


Properties of integer operations

Teacher notes

Test each property with small numbers on the board, such as (–2) + 5 and 5 + (–2). Ask students to find one example that shows subtraction is not associative, for instance (8 – 5) – 2 and 8 – (5 – 2).

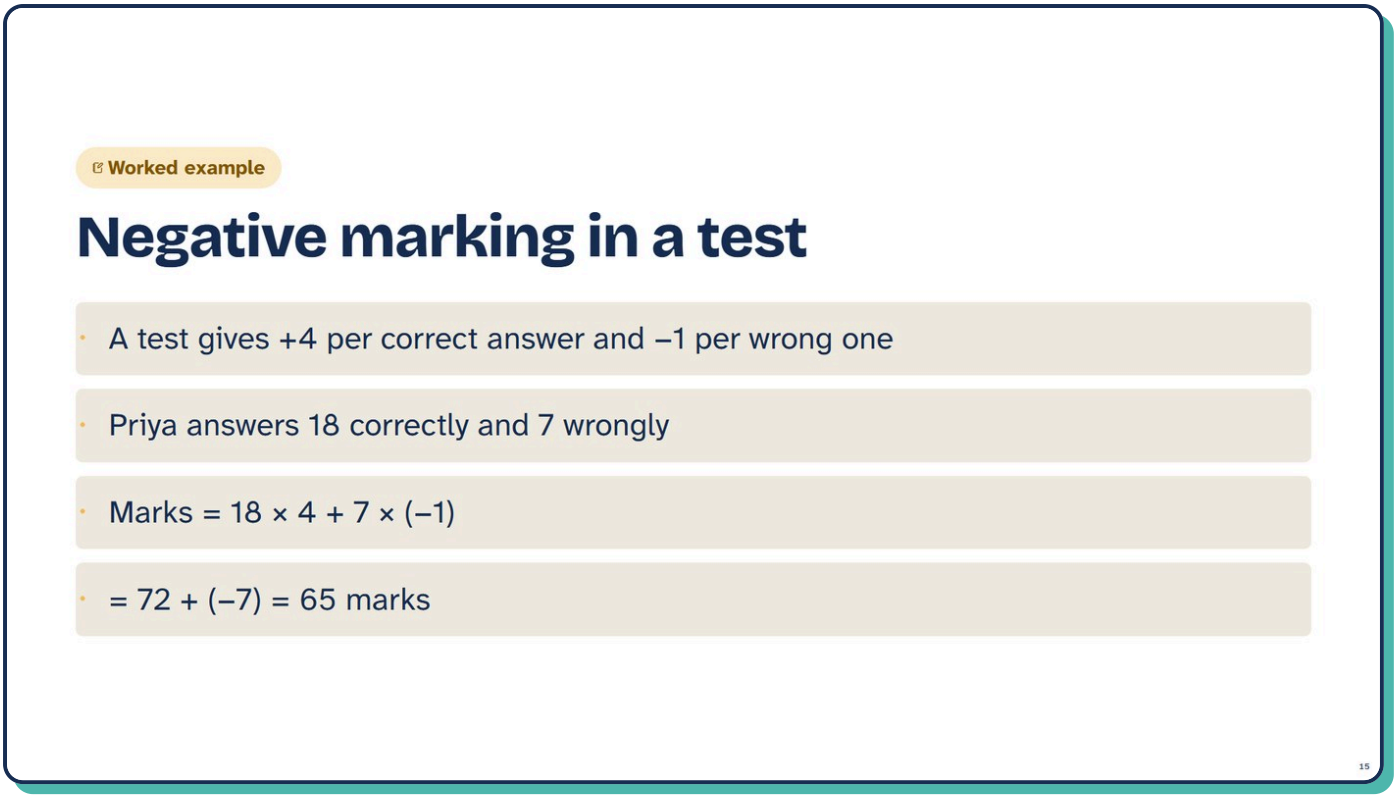
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Distributive property and identities

Teacher notes

Show that both sides of the distributive example give −2. Ask: how does the property help with 99 × (−5)? Write it as 100 × (−5) − 1 × (−5) = −500 + 5 = −495.

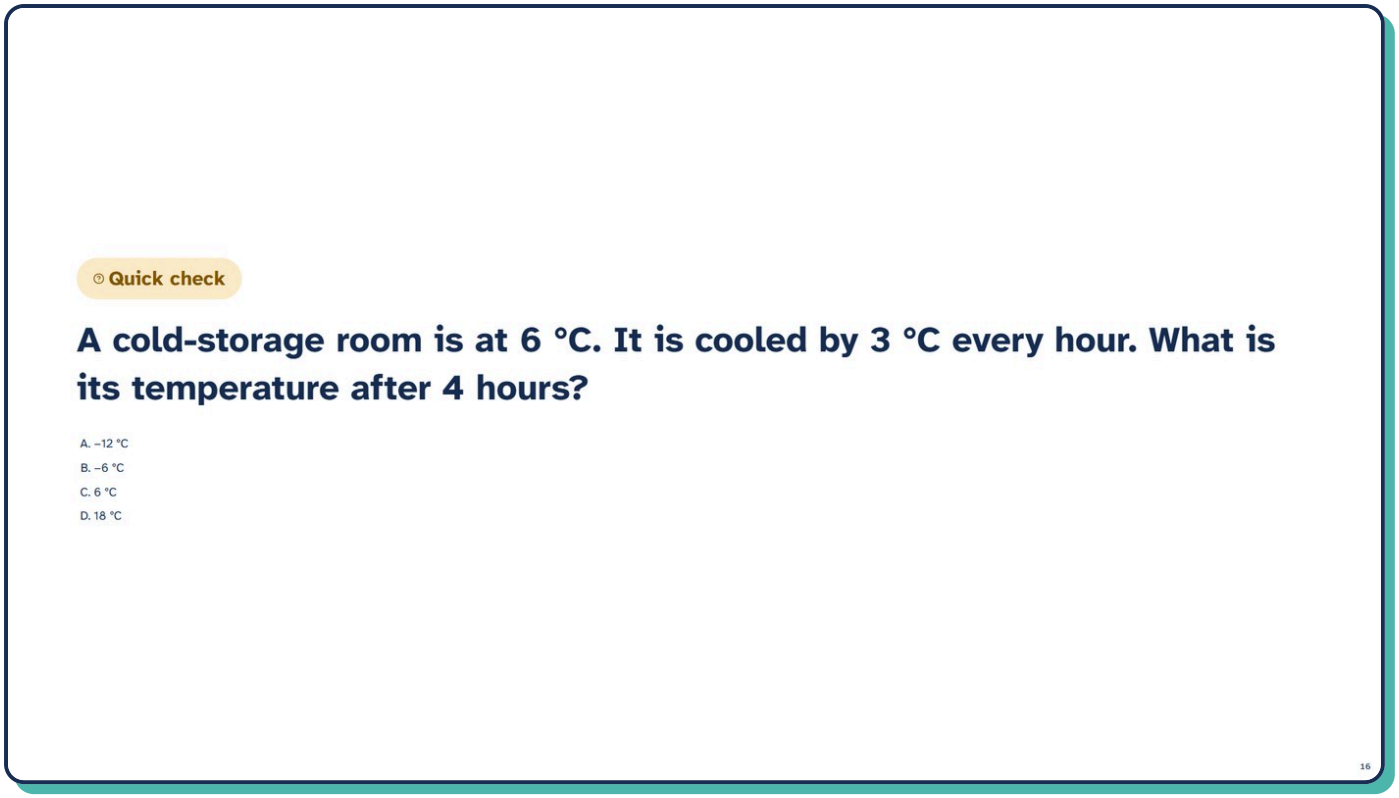


Negative marking in a test

Teacher notes

Many multiple-choice tests and competitions use negative marking, so this example feels real. Ask: how many marks would Priya lose if she guessed 10 more questions wrongly? Each wrong answer adds –1, so 10 × (–1) = –10.

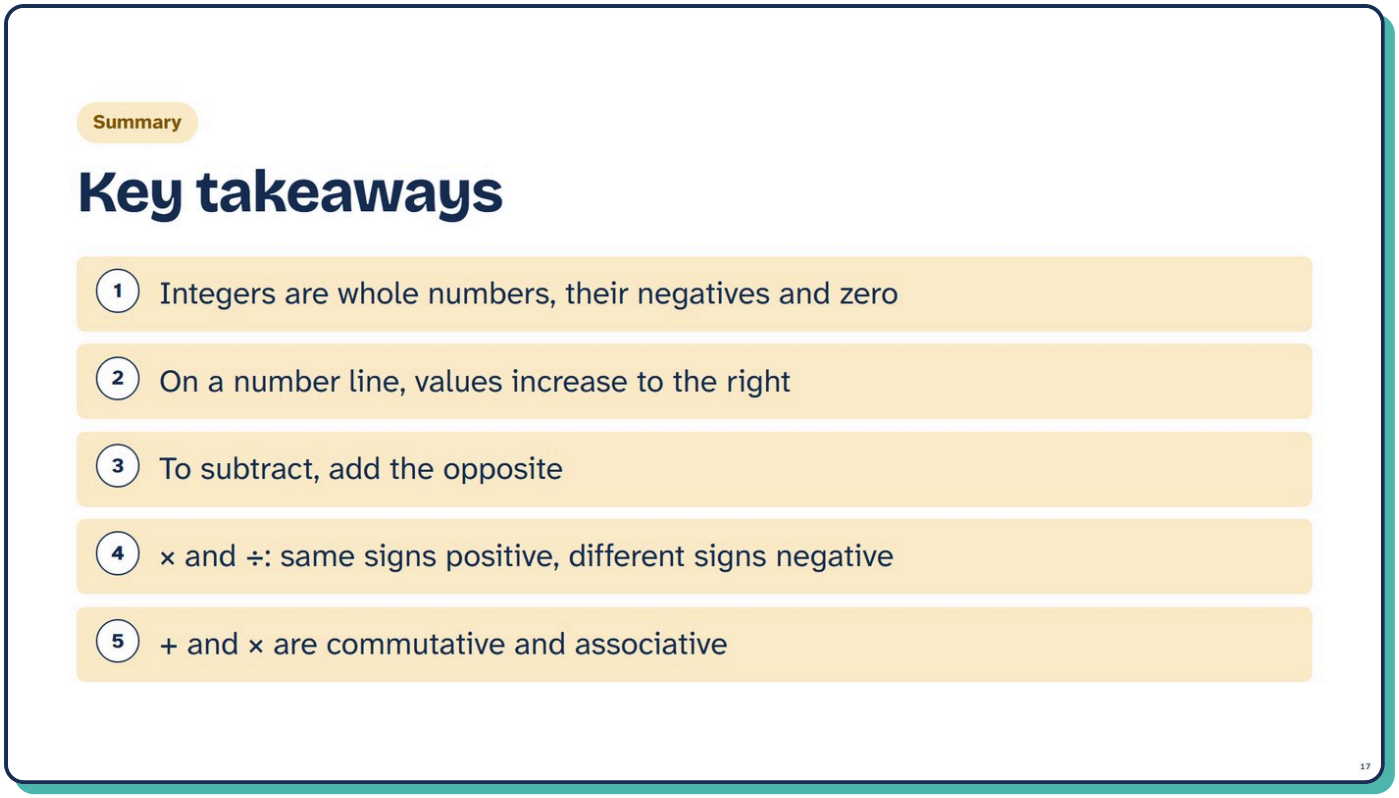
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Quick check

Teacher notes

Answer: B, −6 °C. The change is 4 × (−3) = −12, and 6 + (−12) = −6. Students who pick −12 °C forgot the starting temperature.



Key takeaways

Teacher notes

Recap one rule per bullet with a quick oral example. Then move to the five-question quiz on the page and set practice questions on integer operations.