Rational numbers: position, opposites and absolute value — Teacher answers

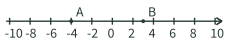
Year 7, upper volume • text pp. 1–14 • foundation lessons 1–7

Use the prerequisite checks to choose support, project the worked and guided items, then let learners work on paper. Select supplements or extensions as needed. No learner answers are saved by this presentation.

Worked example 1

A is at −4 and B at 3. Find their distance in units and explain why adding the signed coordinates is wrong.

$$3 - (-4)$$



Geometry diagram; not drawn to scale except for construction tasks.

Reference answer

7 units; from −4 to 0 is 4, then from 0 to 3 is 3.

$$7$$

1. The points are on opposite sides of zero.
2. Distance = right coordinate − left coordinate = 3 − (−4) = 7.
3. Their coordinate sum is −1; it is not a distance.

- Apply the relevant sign and order rules to every operation.
- Show an intermediate calculation and obtain the exact stated value.

Guided attempt 2

Find the absolute value of −6. Explain why a distance cannot be negative.

1. Write the relevant rule or relation: ____.
2. Show an intermediate line: ____.
3. State the answer and check it: ____.

Reference answer

|−6| = 6.

1. Absolute value is distance from 0 on a number line.
2. That distance is 6, so the absolute value is 6.

- State the applicable definition or condition accurately.
- Support the conclusion with the given numbers, a check or a concrete counterexample.

Prerequisite 3

Is 0 a positive number? Explain your classification.

Reference answer

No. Zero is neither positive nor negative; it is an integer and a rational number.

1. Positive numbers are strictly greater than zero.
2. 0 is not greater than itself.

- State the applicable definition or condition accurately.
- Support the conclusion with the given numbers, a check or a concrete counterexample.

Prerequisite 4

Taking a gain as positive, write the signed amount for a loss of 12 dollars.

Reference answer

−12 dollars.

$$-12$$

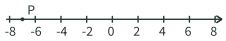
1. A loss is in the direction opposite to a positive gain.
2. Attach a negative sign to the magnitude 12.

- Apply the relevant sign and order rules to every operation.
- Show an intermediate calculation and obtain the exact stated value.

Independent practice 5

Write the opposite of −7 and explain its position relative to 0.

$$-(-7)$$



Geometry diagram; not drawn to scale except for construction tasks.

Reference answer

The value is 7.

$$7$$

1. The two points have the same distance from 0.
2. The opposite of −7 is 7.

- Apply the relevant sign and order rules to every operation.
- Show an intermediate calculation and obtain the exact stated value.

Independent practice 6

Find the absolute value of −9. Explain why a distance cannot be negative.

Reference answer

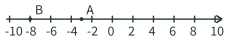
$|-9| = 9$.

1. Absolute value is distance from 0 on a number line.
2. That distance is 9, so the absolute value is 9.

- State the applicable definition or condition accurately.
- Support the conclusion with the given numbers, a check or a concrete counterexample.

Independent practice 7

Which is greater, −3 or −8? Calculate the greater number minus the smaller one.



Geometry diagram; not drawn to scale except for construction tasks.

Reference answer

−3 is greater; the difference is 5.

$$-3-(-8)$$

1. −3 is to the right of −8 on the number line.
2. The greater-minus-smaller difference is −3 − (−8) = 5.

- Apply the relevant sign and order rules to every operation.
- Show an intermediate calculation and obtain the exact stated value.

Independent practice 8

A learner calls −3/4 an integer because it has a minus sign. Is the claim valid? Classify the number correctly.

Reference answer

No. −3/4 is a negative rational number and a fraction, not an integer.

1. A sign alone does not distinguish an integer from a fraction.
2. −3/4 is not a whole-number multiple of 1.

- State the applicable definition or condition accurately.
- Support the conclusion with the given numbers, a check or a concrete counterexample.

Exit question 9

Start with −5 and take the opposite twice. What number do you obtain? Explain the two reversals.

$$-(-(-5))$$

Reference answer

The value is −5.

$$-5$$

1. The first opposite is 5.
2. The opposite of 5 is −5, returning to the starting number.

- Apply the relevant sign and order rules to every operation.
- Show an intermediate calculation and obtain the exact stated value.

Exit question 10

Find the absolute value of 0. Explain why a distance cannot be negative.

Reference answer

|0| = 0.

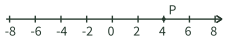
1. Absolute value is distance from 0 on a number line.
2. That distance is 0, so the absolute value is 0.

- State the applicable definition or condition accurately.
- Support the conclusion with the given numbers, a check or a concrete counterexample.

Further practice 11

Write the opposite of 4 and explain its position relative to 0.

$$-(4)$$



Geometry diagram; not drawn to scale except for construction tasks.

Reference answer

The value is −4.

$$-4$$

1. The two points have the same distance from 0.
2. The opposite of 4 is −4.

- Apply the relevant sign and order rules to every operation.
- Show an intermediate calculation and obtain the exact stated value.

Further practice 12

Find the absolute value of −2.5. Explain why a distance cannot be negative.

Reference answer

|−2.5| = 2.5.

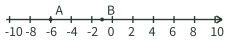
1. Absolute value is distance from 0 on a number line.
2. That distance is 2.5, so the absolute value is 2.5.

- State the applicable definition or condition accurately.
- Support the conclusion with the given numbers, a check or a concrete counterexample.

Further practice 13

A is at −6 and B at −1. Find the distance between them.

$$-1-(-6)$$



Geometry diagram; not drawn to scale except for construction tasks.

Reference answer

5 units.

$$5$$

1. Both points are left of zero; the right point is −1.
2. Distance = −1 − (−6) = 5.

- Apply the relevant sign and order rules to every operation.
- Show an intermediate calculation and obtain the exact stated value.

Further practice 14

Which is greater, −1/2 or −3/4? Find the greater-minus-smaller difference.

Reference answer

−1/2 is greater; the difference is 1/4.

$$-\frac{1}{2}-(-\frac{3}{4})$$

1. Write −1/2 as −2/4; −2/4 is to the right of −3/4.
2. The difference is −2/4 + 3/4 = 1/4.

- Apply the relevant sign and order rules to every operation.
- Show an intermediate calculation and obtain the exact stated value.

Extension 15

A learner writes |−4| = −4. Explain the error using distance from zero.

Reference answer

The distance from −4 to 0 is 4, so |−4| = 4. A distance cannot be −4.

1. The minus sign describes the point’ s direction.
2. Absolute value removes direction and keeps distance 4.

- State the applicable definition or condition accurately.
- Support the conclusion with the given numbers, a check or a concrete counterexample.

Extension 16

P starts at −5, moves 2 units right, reflects in 0, then moves 1 unit left. Find its final coordinate.

$$-(-5+2)-1$$

Reference answer

The value is 2.

$$2$$

1. After moving right: −5 + 2 = −3.
2. Reflecting in zero gives 3; moving left once gives 2.

- Apply the relevant sign and order rules to every operation.
- Show an intermediate calculation and obtain the exact stated value.