# Rational Numbers and Coordinates

**Lesson 1 Signed Quantities and Zero**

Standards 6.NS.C.5

Learning target I can use positive numbers, negative numbers, and zero in context.

Materials Number lines, coordinate grids, rulers, colored pencils.

**Lesson Flow 50 Minutes**

0–5 Activate prior knowledge. Read the learning target. Ask students what they already know about signed quantities and zero. Use a quick model or estimate to make their starting ideas visible.

5–17 Teach and model. Choose a reference point for zero. Opposite directions or values use opposite signs: above sea level is positive and below sea level is negative. Zero means at the chosen reference, not always nothing. Work through the two examples on the attached instruction page. Have students name the first step before showing it.

17–22 Guided practice. Revisit worked Example 2 with its solution covered. Students propose the next step and explain why it is valid; uncover and compare with the worked solution.

22–45 Independent classwork. Assign the attached 10 questions in order. Check items 1–3 for entry-level understanding, 4–6 for connected procedures, 7–8 for representation and explanation, and 9–10 for application or justification. Ask students to use the instruction-page notes area or extra grids for longer work.

45–50 Check understanding. Use classwork question 10 as an exit discussion: A marker is 42 m below sea level. Write its signed elevation and explain what elevation 0 means. Write the elevation of the point equally far on the opposite side of sea level. Compare the result with the answer key and ask a student to defend the method.

**Support and Extension**

Support Model item 1 together with the listed tools, then have students attempt item 2 independently. Watch order versus absolute value, coordinate order, and which sign changes in a reflection.

Extension Ask students to solve a final item another way, draw a second representation, or create a related problem with a checked answer.

Next step Record which students can explain the target independently. Begin the next teaching session with a brief correction for any recurring error.

Name _____ Date _____

# Rational Numbers and Coordinates

## Lesson 1 Signed Quantities and Zero

Standards 6.NS.C.5

Learning target I can use positive numbers, negative numbers, and zero in context.

### Learn and Discuss

Choose a reference point for zero. Opposite directions or values use opposite signs: above sea level is positive and below sea level is negative. Zero means at the chosen reference, not always nothing.

Example 1 A marker is 35 m below sea level. Write its signed elevation and explain what elevation 0 means.
Solution -35 m; 0 means at sea level. Sea level is the reference. Below is negative and above is positive.
Example 2 A marker is 4 m below sea level. Write its signed elevation and explain what elevation 0 means. Write the elevation of the point equally far on the opposite side of sea level.
Solution -4 m; 0 means at sea level; opposite +4 m. Sea level is the reference. Below is negative and above is positive.

### Classwork Show Your Work

Complete the 10 problems on the following page. Refer to the examples, draw models, and check your results.

**My Notes or Second Method**

# Lesson 1 Signed Quantities and Zero

Name _____ Show calculations, models, and units.

1. A marker is 32 m above sea level. Write its signed elevation and explain what elevation 0 means.

2. A marker is 16 m below sea level. Write its signed elevation and explain what elevation 0 means.

3. A marker is 21 m above sea level. Write its signed elevation and explain what elevation 0 means.

4. A marker is 20 m below sea level. Write its signed elevation and explain what elevation 0 means.

5. A marker is 15 m above sea level. Write its signed elevation and explain what elevation 0 means.

6. A marker is 25 m below sea level. Write its signed elevation and explain what elevation 0 means.

7. A marker is 35 m above sea level. Write its signed elevation and explain what elevation 0 means. Write the elevation of the point equally far on the opposite side of sea level.

8. A marker is 20 m below sea level. Write its signed elevation and explain what elevation 0 means. Write the elevation of the point equally far on the opposite side of sea level.

9. A marker is 12 m above sea level. Write its signed elevation and explain what elevation 0 means. Write the elevation of the point equally far on the opposite side of sea level.

10. A marker is 42 m below sea level. Write its signed elevation and explain what elevation 0 means. Write the elevation of the point equally far on the opposite side of sea level.

# Signed Quantities and Zero

Rational Numbers and Coordinates

1. +32 m; 0 means at sea level
Reasoning Sea level is the reference. Below is negative and above is positive.

2. -16 m; 0 means at sea level
Reasoning Sea level is the reference. Below is negative and above is positive.

3. +21 m; 0 means at sea level
Reasoning Sea level is the reference. Below is negative and above is positive.

4. -20 m; 0 means at sea level
Reasoning Sea level is the reference. Below is negative and above is positive.

5. +15 m; 0 means at sea level
Reasoning Sea level is the reference. Below is negative and above is positive.

6. -25 m; 0 means at sea level
Reasoning Sea level is the reference. Below is negative and above is positive.

7. +35 m; 0 means at sea level; opposite -35 m
Reasoning Sea level is the reference. Below is negative and above is positive.

8. -20 m; 0 means at sea level; opposite +20 m
Reasoning Sea level is the reference. Below is negative and above is positive.

9. +12 m; 0 means at sea level; opposite -12 m
Reasoning Sea level is the reference. Below is negative and above is positive.

10. -42 m; 0 means at sea level; opposite +42 m
Reasoning Sea level is the reference. Below is negative and above is positive.