Opposites Around Zero

Teacher		**Class**	Grade 6
Subject	Math	**Topic**	Positive and negative numbers
Date		**Room**	
Lesson length	60 minutes	**Country**	United States

Students learn how positives and negatives show opposite values around zero. They match real cases and write signed numbers with zero explained.

Curriculum links

- Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. [1]

Learning objectives

- Students will pair positive and negative numbers for opposite real-world quantities.
- Students will write signed numbers for temperature, elevation, money and charge.
- Students will explain what zero means in each real-world situation.

Success criteria

- I can write + and - to show opposite values in context.
- I can show where positive, negative and zero sit.
- I can explain what 0 means each time in words.

What students already know

Show -3, 0, +4 on a line and ask: Which are above zero, below zero, and what does 0 tell us?

Key words

positive	greater than zero, shown to the right of zero on a number line [7]
negative	less than zero, shown to the left of zero on a number line [7]
zero	the middle mark used as a starting point, neither above nor below [7]
opposite	two values facing different ways from the middle, like up and down [1]
credit	money put into an account, written with + [1]
debit	money taken out or owed, written with - [1]

Materials

- whiteboard and markers
- 4 large cards with drawings of a thermometer, ocean surface, bank statement, battery
- Slides 1-12 with projector
- mini-whiteboards and markers for checks

Before the lesson

- Print Worksheet Tasks B-C (pages 2-3), one per student
- Test Slide 6 Video clip 1 (0:00–5:00) for sound and picture
- Set out 4 large cards and markers, make 0 line visible on each

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- printed Worksheet Tasks B-C (pages 2-3), one per student
- Arrange desks for small groups and clear space for voting

Lesson outline

0–8 min **Starter** 8 min · Whole class

Spark curiosity about zero and share what we will learn today.

YOU DO

1. Display Slide 1 and say the hook to the class.
2. Ask students to turn and talk with a partner for 1 minute about the hook.
3. Show Slide 2 objectives and read them in student words.
4. Run Slide 5 vote on which opposite pair to track for a day and tally hands.

STUDENTS DO

1. Listen to the hook and discuss with a partner what zero could mean.
2. Share one idea quickly with the class.
3. Vote for one opposite pair and hear the lesson goals.

Say: If I tell you the number is zero, do you know if that's good, bad, cold, or broke? Zero alone does not tell us enough. Today we will learn what + and - and 0 mean in real life.

Ask: If I say the temperature is 0°F, does that mean there is no temperature? (No. 0°F is a mark on the scale; warmer is + and colder is - [1].) · If an account shows $0, are you rich or in debt? (Neither. $0 means owing nothing and owning nothing.)

Check understanding: Hands up for what 0 needs: a situation. If unsure, repeat hook with money vs temperature.

Support: Offer frame: 0 means ___ so + means ___ and - means ___. **Stretch:** Ask why the same 0 can feel different in temperature and money.

Use: Slides 1-2, 5

8–20 min **Teaching** 12 min · Whole class

Explain how positives, negatives and zero sit on a line.

YOU DO

1. Show Slides 3-4 and model right for positive and left for negative with hand moves.
2. Play Slide 6 Video clip 1 (0:00–5:00) and pause for the three questions on the slide.
3. Show Slide 7 fact about history and connect to why signs matter now.
4. Model two temperature examples on a drawn line with 0°F marked.

STUDENTS DO

1. Point right for positive and left for negative while teacher models.
2. Watch the clip and answer: zero in middle, negatives on left side.
3. Copy the +3 and -4 steps on mini-whiteboards.

Say: Numbers to the right of zero are positive and numbers to the left of zero are negative [7]. Zero itself is neither positive nor negative [7]. Opposite directions need opposite signs, with zero in the middle.

Worked example: +3 means 3°F above zero, step 3 right from 0. -4 means 4°F below zero, step 4 left from 0. Even +10°F is still below freezing because on the Fahrenheit scale water freezes at 32°F [3].

Ask: Where do negative numbers sit compared to zero? (Below zero on the number line, to the left of zero [7].) · How do we write a positive and how do we write a negative? (Positive with + or with no sign, negative always with - [7][5].) · Indian mathematicians wrote the first rules for negatives around when? (Around AD 620 [3].)

Check understanding: All hold up left hand for -4 and right hand for +3; reteach sides if mixed.

Support: Keep a student helper at 0 to point right for positive and left for negative. **Stretch:** Ask what happens to order: is -2 or -5 warmer, and which is more to the right?

Use: Slides 3-4, Slide 6 Video clip 1 (0:00–5:00), Slide 7

20–40 min **Main Activity** 20 min · Groups

Match opposite pairs and explain what zero means each time.

YOU DO

1. Give each small group the 4 cards and show Slide 10 as a reference.
2. Ask groups to decide for each card what counts as 0, what counts as positive one way, and what as negative the other way.
3. Press for the idea that 0 marks a reference point, not nothing.
4. Have each group write one sentence for two cards to share.

STUDENTS DO

1. In groups, sort cards to opposite pairs and label 0, + example and - example.
2. Write one sentence for two cards explaining the zero.
3. Share sentences and compare zeros across groups.

Say: Work through temperature above and below zero, elevation above and below sea level, and credits and debits, since they use positives and negatives together [1]. Positive and negative electric charge is the fourth pair [1]. Tell what 0 means each time.

Worked example: 0 means sea level, +4 feet means 4 feet above, -4 feet means 4 feet below.

Ask: What does 0 mean for the ocean card and for the bank card? (0 feet is sea level between up and down; $0 is no cash held and nothing owed [1].) · What does 0 mean for temperature and for charge? (0°F is the zero mark, warmer is + and colder is -; 0 charge means positives and negatives balance.)

Check understanding: Collect one sentence per group; if 0 is called nothing, ask what is above and below it.

Support: Give a sentence frame and remind the group that zero itself is neither positive nor negative [7].
Stretch: Ask students to give a case where 0 does not mean freezing or empty, such as 0°F on a winter day when water still freezes at 32°F [3].

Use: Slide 10

40–52 min **Practice** 12 min · Pairs

Practice writing signed numbers and marking them on a line.

YOU DO

1. Display Slide 9 task and model the first two numbers on a mini number line.
2. Hand out Worksheet Tasks B-C and set 10 minutes for pairs to complete.
3. Circulate, check signs and zero labels, and prompt partners to say what 0 means.
4. Stop class and confirm answers for the four Slide 9 numbers.

STUDENTS DO

1. Solve Slide 9 numbers with a partner and mark each on a mini number line.
2. Complete Worksheet Tasks B-C showing temperatures, heights, money and charge.
3. Tell partner what 0 means for each answer.

Say: Write + for one direction and - for the opposite direction. Numbers without a sign are taken as positive and numbers with - are negative [5]. Mark each on your mini line and tell your partner what 0 means.

Worked example: 8°F below zero = -8°F. $20 credit = +$20. 15 feet below sea level = -15 feet. $12 owed = -$12. On each line 0 is the reference: 0°F, 0 feet for sea level, $0 for no debt or savings [1].

Ask: How do you show 5 feet below sea level and $12 owed? (-5 feet and -$12, both below or owed side of zero [1].) · How do you show 8°F below zero and $20 credit? (-8°F and +$20.)

Check understanding: Mini-whiteboards up for -8, +20, -15, -12; fix sign errors before plenary.

Support: Use only whole numbers and a number line to track up for credit and down for debit first. **Stretch:** Add +2.5°F above zero and -2.5°F below zero and compare positions.

Use: Slide 9, Worksheet Tasks B-C

52–60 min **Plenary** 8 min · Whole class

Check what zero means and what + and - show.

YOU DO

1. Show Slide 11 mystery and ask where zero is and what is below.
2. Confirm with the slide answer and link back to sea level as 0.
3. Show Slide 12 exit ticket and have all write answers on paper.
4. Collect tickets and restate the big idea in one line.

STUDENTS DO

1. Solve the -150 feet mystery with a partner and state the zero.
2. Complete the exit ticket on their own.
3. Write one question they still have.

Say: Same numbers mean different things in different panels because zero changes. Opposite directions need opposite signs, with zero in the middle. Tell me the sign and tell me the zero.

Worked example: It reads -150 feet. Where is zero and what is below? Zero is sea level, the craft is 150 feet below.

Ask: It reads -150 feet. Where is zero? (Zero is sea level, the craft is 150 feet below.) · Why does +5 mean different things for money and temperature? (Because 0 is different: $0 vs 0°F, so +5 steps from a different start [1].)

Check understanding: Read 3-4 exit tickets aloud; if 0 meanings are weak, revisit Slide 10 tomorrow.

Support: Give prompt: 0 means ___. Positive means ___. Negative means ___. **Stretch:** Ask pairs to explain why 0°F does not mean no temperature, using 32°F freezing [3].

Use: Slides 11-12

Common mistakes

Mistake	How to spot it	How to fix it
Saying -5 is greater than -2 because 5 is greater than 2.	Orders negatives backwards on lines or worksheets.	Greater means more to the right on the line, so -2 is greater than -5 [7].
Saying zero means nothing, no temperature or empty.	Writes 0 = nothing for all contexts.	Treat 0 as the reference mark: 0°F allows colder negatives and water freezes at 32°F [3]; 0 feet is sea level; $0 is no debt or savings [1].
Writing 8 for 8 below zero without a minus sign.	Missing - on temperatures, depths or amounts owed.	Numbers without a sign are taken as positive [5]; below zero and owed need - [7].

Support

- Use sentence frames and pre-marked 0 on lines and cards.
- Limit to whole numbers -5 to +5 before decimals.

Stretch

- Use decimals like +2.5 and -2.5 and explain distance from 0.
- Explain why 0°F is not freezing or empty using 32°F freezing point.

For the LSE or teaching assistant

Stay with target groups during Main Activity to prompt zero sentences; check sign use in Practice Tasks B-C.

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Check for understanding

Question	Answer
8°F below zero is +8 or -8?	-8°F
What does $0 mean for money?	No cash held and nothing owed.
What does 0 feet mean for elevation?	Sea level, between above (+) and below (-).

Homework

Write one + and one - example from home life and one sentence for what 0 means.

Sources

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