NAME _____   DATE _____

Hitting the Trail

Jessica inspected each compartment of her backpack, checking her gear one final time. "Have I forgotten anything important?"

Laughing, Zachary said, "If you have, don't worry; I've probably got it covered." He hoisted his backpack to his shoulders and cinched up the waist belt. Then he hefted Jessica's pack and held it so she could wiggle into the shoulder straps.

"Mom, Dad, are you ready? Let's hit the trail!" Jessica loved backpacking with her family, but her dream trip was to hike the Pacific Crest Trail. She'd heard the 2,650-mile trail was grueling and required meticulous planning, but she hoped to hike at least part of it when she was older.

The hike they were taking today had a trailhead less than two hundred miles from where they lived. Dad said this would be a trial run, to become accustomed to hiking with packs. They would do several of these shorter treks through the winter to prepare for longer hikes next season. After a two-hour drive to their destination, they arrived at the trailhead in Death Valley National Park.

"I hope we brought plenty of water!" Zachary exclaimed. "Here in the desert it will be mandatory to stay hydrated."

Jess gave him a playful punch in the arm. Zach always did like to show off his huge vocabulary. "It's practically winter," she reassured him. "Today's temperature isn't supposed to reach 80 degrees."

Zach pretended he was dying of thirst as he staggered out of the SUV and mopped his brow. "A true heat wave. Do you think we'll survive?"

After helping Mom into her pack, Dad shouldered his and grabbed his walking stick. He prodded Zach with it and told him to lead out.

THINK ABOUT THE MATH

- Numbers to the right of zero on a number line are positive and numbers to the left are negative.

- A number line continues infinitely in both directions, with numbers becoming greater as they get further away from zero to the right and numbers becoming less as they get further away from zero on the left.

- Use a number line to compare and find the distance between elevations.

NAME _____ DATE _____

Problem Solving   **Directions:** Use page 31 to answer these questions. First, skim the paragraphs to find information that might help you solve the problem. Remember to show your thinking as you do the math!

1 That day, Jessica's family started at the Badwater Basin trailhead in Death Valley. The elevation at the trailhead was −253 ft. The trail reached −282 ft. within the first tenth of a mile. Use a number line to find the change in elevation.

Did they gain or lose elevation? _____

Write a comparison statement to show the two different elevations. _____

2 The following summer, Jessica's family hiked $\frac{1}{3}$ of the Appalachian Trail. The total trail was 2,180 miles long. To the nearest hundredth of a mile, how far did they hike?

They made the trip in 30 days. How far did they hike each day, to the nearest hundredth of a mile?

3 If her family hiked 20 miles per day, how many days would it take them to hike $\frac{1}{2}$ of the Appalachian Trail?

4 Several years later, Jessica had the opportunity to hike the Pacific Crest Trail with a group. They wanted to make the trip in 120 days. To the nearest whole mile, how far would they have to hike each day?

How much farther was Jessica's hike on the Pacific Crest Trail than the hike she made on the Appalachian Trail with her family?

5 The highest elevation point along the Pacific Crest Trail is 13,153 ft. in California. The lowest point is 180 ft. at the Oregon/Washington border. What is the difference in elevation?

Is the lowest point above or below sea level? Explain. _____

_____

_____

NAME _____   DATE _____

> **Engage**   **Directions:** Research to learn more about well-known hiking trails in your area or in a place you'd like to visit. Some helpful websites are listed below:

- *http://adventure.nationalgeographic.com/adventure/trips/best-trails/*
- *http://www.wta.org/hiking-info/basics/backpacking/first-backpack-trips-for-kids-1*
- *http://www.pcta.org/discover-the-trail/backcountry-basics/hiking-and-backpacking-with-kids/*

1 What is the length of the trail you researched? _____

At a hiking speed of 8 miles per day, how many days would it take to hike the entire trail?

2 If you planned a 5-day hiking trip with family, what length of trail would you want to hike?

_____

How many miles would you plan to hike each day? _____

3 What preparations would you need to make for the trip? _____

_____

_____

What kind of equipment might you need? _____

_____

_____

4 At least one site suggests an average cost of $1.50 per mile. At this rate, how much would you expect your planned hike to cost?

5 Write an informative paragraph describing the hike you would like to take.

_____

_____

_____

_____

Hitting the Trail (pages 31–33)

Problem Solving: **1.** 29 feet; lose; −253 > −282 **2.** $\frac{1}{3}$ of 2,180 = $\frac{1}{3}$ × 2,180 ≈ 726.67 miles; 726.67 ÷ 30 ≈ 24.22 miles/day **3.** $\frac{1}{2}$ of 2,180 = 1,090 miles; 1,090 ÷ 20 miles/day = $54\frac{1}{2}$ days **4.** 2,650 ÷ 120 ≈ 22 miles/day; 2,650 − 726.67 = 1,923.33 miles farther **5.** 13,153 − 180 = 12,973 ft. difference; 180 ft. is not described as a negative number, or below sea level, so it must be above sea level.
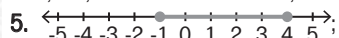
Engage: Answers will vary.

Paleontology: Digging for Dinosaurs (pages 34–36)

Problem Solving: **1.** 42: 1, 2, 3, 6, 7, 14, 21, 42; 36: 1, 2, 3, 4, 6, 9, 12, 18, 36; They can use a grid box 6 feet wide. **2.** 36: 1, 2, 3, 4, 6, 9, 12, 18, 36; 50: 1, 2, 5, 10, 25, 50; They can use a grid box 2 meters long. **3.** $\frac{5}{8}$ × w = $\frac{1}{4}$; w = $\frac{2}{5}$ mi. **4.** 2: 2, 4, 6, 8, 10; 5: 5, 10, 15, 20; On the 10th day he will visit both dig sites. **5.** 2,841 ft. difference in elevation

Engage: Answers will vary.

Ocean Depths (pages 37–39)

Problem Solving: **1.** 70% **2.** −1 **3.** Plotted point on number line should be at −2.65. **4.** 2.65 × 5,280 feet/mile = 13,992 feet; 13,992 feet ÷ 3.28 ≈ 4,265.9 meters

5. ⟵┼─┼─┼─●─┼─┼─┼─┼─┼─●─┼─⟶ ; range = 5 **6.** Answers will vary.
    -5 -4 -3 -2 -1 0 1 2 3 4 5

Engage: Answers will vary.

The Cartesian Plane (pages 40–42)

Problem Solving: Answers will vary.

Engage: Answers will vary.

Polar Vortex (pages 43–45)

Problem Solving: **1.** −2 < 3 < 29 **2.** January 6; January 5; 31°F difference **3.** above zero; by 3 degrees **4.** −22 < −14 **5.** January 6

Engage: Answers will vary.

Mapping Public Transit (pages 46–48)

Problem Solving: **1.** Verify points on grid for accuracy. **2.** 8° × 69 mi./degree = 552 mi. **3.–4.** Answers will vary based on coordinate plane drawn.

Engage: **1.–2.** Answers will vary. **3.** *Possible answer:* Public transit maps help people plan which routes are the best to take to reach a particular destination. **4.** Answers will vary.

Exponential Earthquakes (pages 49–51)

Problem Solving: **1.** 10^9 **2.** 10^4 = 10 × 10 × 10 × 10 = 10,000 microns **3.** 10^6 − 10^4 = (10 × 10 × 10 × 10 × 10 × 10) − (10 × 10 × 10 × 10) = 1,000,000 − 10,000 = 990,000 microns **4.** t = 18,045 − 9,833; t = 8,212

Engage: **1.** *Possible answer:* Safe places include under sturdy furniture that would protect you from falling debris, or against an interior wall. **2.** *Possible answer:* (1.) Drop to the ground. (2.) Cover your head and neck and/or crawl to a nearby safe place for cover. (3.) Hold on to a sturdy structure. **3.** Answers will vary. **4.** *Possible answers:* water, medications, non-perishable food items, battery-operated radio **5.** Answers will vary.

Thousands of Books! (pages 52–54)

Problem Solving: **1.** g = 818,524 − 67,054; g = 751,470 books **2.** 3; The library in the state's capital has a collection that is *three times* the size of the collection at Sofia's local library. **3.** $2r$ − 6; 130 computers; 198 computers **4.** t = 2c + 5; 2c; t, 2c, and 5; t = 41 branches

Engage: Computed answers will vary, but expressions should be written as the following: **1.** n + 50 **2.** 3n + 62 **3.** c ÷ b **4.** n − c **5.** n − 75
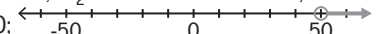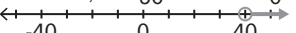
Small Town U.S.A.: Tallulah Falls, Georgia (pages 55–57)

Problem Solving: **1.** 6 mi.² **2.** 2 **3.** 2(w + 3) = 2w + 6 **4.** 262 + a + b = 600 ft. **5.** $\frac{1}{4}n$ = $\frac{1}{2}$; n = 2 mi.

Engage: **1.** It was founded on the basis of tourism—people wanted to come and see the falls; then the railroad came through the area, making it more accessible. **2.** The power company harnessed the falls to produce electricity, which changed the scenic nature of the area, and therefore detracted from the tourist attraction. The railroad increased tourist visits. **3.** The power company agreed to increase overall flow of water by a bit, and they also provide scheduled "water release" days for recreation and aesthetic purposes. **4.** Answers will vary. **5.** Answers will vary.

Chicago's Pedway (pages 58–60)

Problem Solving: **1.** let c = current year: c − 1951 **2.** 8 blocks **3.** 9 blocks = 1.125 mi.; A = 1.125 × 0.75 ≈ 0.84 mi.² **4.** n = number of miles; $6\frac{1}{2}$ ÷ 8 blocks/mile = n; n ≈ .81 mile

Engage: **1.** b > 50; ⟵┼─┼─┼─┼─┼─┼─⊕─⟶
    -50   0   50
2. b > 40; ⟵┼─┼─┼─⊕─┼─┼─⟶ **3.** t = 138(10) + 70;
    -40   0   40
t = 1,450 ft.

Fourth of July: Fireworks! (pages 61–63)

Problem Solving: **1.** d = the difference in attendance; 60,000 − 35,000 = d; d = 25,000 people **2.** x = number of tickets sold; 5x = 250,000; x = 50,000 tickets; divided both sides of the equation by 5—inverse operation for multiplication; 5(50,000) = 250,000 **3.** h = height of other shells; h ≤ $\frac{1}{2}$ (1,000); h ≤ 500; any value 500 or less **4.** 4n + 5

Engage: **1.** height and angle of the firework **2.** They calculate the height and angle carefully so debris from the explosion does not fall on the crowd. **3.** Answers will vary but may include how it is illegal or too expensive for individuals to purchase fireworks; people enjoy the novelty and dramatic, mysterious nature of explosions. **4.** a chemical reaction, lighting a fuse **5.** Answers will vary.

Fuel Cell Vehicles (pages 64–66)

Problem Solving: **1.** 75,000 + m = 150,000; m = 75,000 miles **2.** 231 ÷ 5.67 = g; g ≈ 41 gallons **3.** 4.4 ÷ 11 = t; t = 0.4 hours = 24 minutes **4.** p = 286 − 79; p = 207 mph

Engage: **1.** Answers will vary but might include cost and limited distribution of hydrogen. **2.** Hydrogen is a gas. When its atoms are combined with oxygen, it forms water. Its negatively charged electrons can be used to produce electricity. **3.** Answers will vary; accept all reasonable answers. **4.** no greenhouse gas emissions; reduced dependence on other types of fuel **5.** Answers will vary.