NAME _____ DATE _____

Watching the Tides

THINK ABOUT THE MATH

- Numbers with opposite signs are located on opposite sides of zero on the number line.
- The mean is the average of a set of numbers.
- Use a horizontal or vertical number line diagram to show the positions of positive and negative numbers, and to determine the distance between them.
- On a horizontal number line, numbers to the left are less than numbers to the right.

High tides and low tides are affected by the moon's gravitational pull on Earth. Earth rotates 180 degrees every 12 hours. The moon rotates 6 degrees around Earth in the same amount of time. This means that cities along the coast have a high tide approximately every twelve and a half hours. Time between tides is based on a lunar day, not a solar day. As the moon revolves around Earth, we observe the phases of the moon: new moon, full moon, and quarter moon. When the moon is between Earth and the sun or on the opposite side of Earth from the sun, all three are aligned. The combined gravitational force of the sun and the moon, when aligned, create greater differences between high and low tides. That is, high tides are higher and low tides are lower. What we consider the zero point on a tide table is based on the mean low-water level. The following tide table for Astoria, Oregon shows predictions for July 13 and 14, 2015.

Date	Day	Time	Feet	Tide
07/13	Monday	6:27 a.m.	-0.86	low
07/13	Monday	12:42 p.m.	7.1	high
07/13	Monday	6:08 p.m.	2.24	low
07/14	Tuesday	12:09 a.m.	9.04	high
07/14	Tuesday	7:16 a.m.	-1.11	low
07/14	Tuesday	1:32 p.m.	7.39	high
07/14	Tuesday	7:00 p.m.	2.22	low

NAME _____ DATE _____

Problem Solving

Directions: Use page 28 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. What represents zero in this passage? _____

2. Draw a number line diagram. Plot the height of each tide for Astoria, Oregon on the number line.

3. If there are approximately 12 hours and 25 minutes between high tides, when will the next high tide occur?

4. On which day and at which time is low tide the lowest? _____

5. On which day and at which time is high tide the lowest? _____

6. Which day has the greatest difference between high tide and low tide?

NAME _____ DATE _____

Engage

Directions: Use the Internet or other resources to locate a tide table for a coastal city you have visited or would like to visit.

1. Create a table to show the differences over several days between low and high tides for that location.

2. What patterns in the tides do you notice? _____

3. What similarities and differences do you notice between the tide table for that location and the sample tide table in this passage?

Answer Key

Seeing Double (pages 7–9)

Problem Solving: 1. 4:1,000 **2.** 23:1,000 **3.** $\frac{4}{1,000} = \frac{1}{250}$; 250 students; $\frac{23}{1,000} = \frac{1}{x}$, so about 43 students **4.** $\frac{8}{100} < \frac{14}{100}$; There is a higher rate of left-handedness among twins than the rest of the population. **5.** three possibilities: boy/boy, boy/girl, girl/girl; equal chances of each occurring, so $\frac{1}{3}$ chance of each combination **6.** about 2; 0

Engage: Answers will vary.

Giant Grass (pages 10–12)

Problem Solving: 1.

Day	Height (inches)
1	12
2	24
3	36
4	48
5	60
6	72

2. 84" tall; 168" tall

3.

Day	Height (inches)	Height (feet)
1	18	1.5
2	36	3
3	54	4.5
4	72	6
5	90	7.5
6	108	9
7	126	10.5

4. 2.5 inches:35 feet

Engage: 1. Answers will vary. **2.** Answers will vary but may include stabilizes soil, erosion control, edible, useful for building and making things. **3.** Answers will vary but may include difficulty maintaining a boundary for the bamboo grove or incorrect growing conditions for particular species. **4.** Answers will vary but might include sustainable source of biofuel, creates its own ecosystem that provides food and shelter for certain organisms, erosion control. **5.** Answers will vary.

Harvest Party (pages 13–15)

Problem Solving: 1. $\frac{0.5}{1.5} = \frac{5}{15} = \frac{1}{3}$ **2.** 3 T. egg + $\frac{1}{2}$ c. milk + $\frac{1}{4}$ c. oil + 1 T. orange juice = $\frac{3}{4}$ c. + 4 T. = $\frac{3}{4}$ c. + $\frac{1}{4}$ c. = 1 c. liquid; $1\frac{1}{2}$ c. flour + $\frac{1}{2}$ c. sugar + 2 tsp. baking powder + $\frac{1}{2}$ tsp. salt + $\frac{1}{3}$ c. cranberries = $2\frac{1}{3}$ c. + $2\frac{1}{2}$ t. ≈ 2 c. dry ingredients **3.** 1:2; one cup liquids to 2 cups dry ingredients, or one to two; Answers will vary but may include that the ratio gives the muffins the correct consistency. **4.** Answers will vary but might include more sugar would taste more like cake and less sugar would taste more like bread, or less flour wouldn't have the right texture.

Engage: 1. $1\frac{1}{2}$ T. egg (you'd have to stir the egg and measure the liquid), $\frac{1}{4}$ c. milk, $\frac{1}{8}$ c. or 2 T. oil, $\frac{3}{4}$ c. flour, $\frac{1}{4}$ c. sugar, 1 tsp. baking powder, $\frac{1}{4}$ tsp. salt, $\frac{1}{6}$ c. dried cranberries, $\frac{1}{2}$ T. orange juice, $\frac{1}{2}$ T. orange zest, $\frac{1}{8}$ c. or 2 T. mini chocolate chips **2.** 1:2 or $\frac{1}{2}$ **3.** They would multiply by 3; 1:3 **4.** $\frac{1}{3}$ cup × 3 = 1 cup **5.** Answers will vary but might include amount of liquid to dry ingredients for consistency and texture, ratio of sugar to other ingredients for taste and consistency, ratio of salt to other ingredients for taste, etc.

Call of the Wild (pages 16–18)

Problem Solving: 1. 40 miles/1 day **2.** 40 × 14 = 560 miles **3.** 3 miles per day **4.** 60 miles ÷ 6 hours = 10 miles per hour **5.** $\frac{1}{10}$ of an hour, or 6 minutes

Engage: 1. $\frac{700 \text{ lb.}}{14 \text{ sacks}}$ = 50 lb./1 sack **2.** $\frac{\$5{,}000}{5 \text{ dogs}}$ = $1,000 per dog **3.** $\frac{1{,}150 \text{ mi.}}{17 \text{ days}} \approx 67.65$ miles/day **4.** $\frac{5{,}000 \text{ mi.}}{26 \text{ months}} \approx 192$ miles/month

Black Friday (pages 19–21)

Problem Solving: 1. \$4.57 ÷ 22 = a, a = \$0.21/sticker

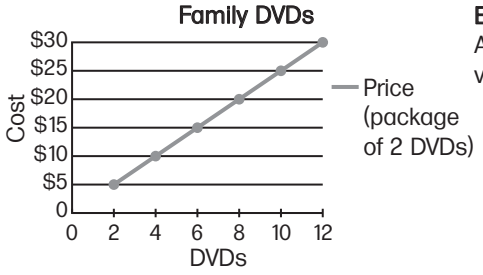
2. \$14.97 ÷ 3 = c, c = \$4.99/shirt

3.

Number of DVDs	Cost	Ordered Pair
2	\$ 5.00	(2, 5)
4	\$ 10.00	(4, 10)
6	\$ 15.00	(6, 15)
8	\$ 20.00	(8, 20)
10	\$ 25.00	(10, 25)
12	\$ 30.00	(12, 30)

\$2.50; \$25; 5 packages

4. (2, 5) (4, 10) (6, 15) (8, 20) (10, 25) (12, 30)



Engage: Answers will vary.

Maritime Lingo (pages 22–24)

Problem Solving: 1. 1 knot = $\frac{1 \text{ nautical mile}}{1 \text{ hour}} = \frac{6{,}076 \text{ ft.}}{1 \text{ hour}}$, $\frac{6{,}076 \text{ ft.}}{1 \text{ hour}} \div \frac{5{,}280 \text{ ft.}}{1 \text{ mi.}} = \frac{1.15 \text{ mi.}}{1 \text{ hour}}$; conversion factor: $\frac{1.15 \text{ mph}}{1 \text{ knot}}$ **2.** 8 knots × $\frac{1.15 \text{ mph}}{1 \text{ knot}}$ ≈ 9 mph **3.** 69 mi. ÷ $\frac{9 \text{ mi.}}{1 \text{ hour}} \approx 8$ hours **4.** 11 knots × $\frac{1.15 \text{ mph}}{1 \text{ knot}}$ = 12.65 mph **5.** 20 mph ÷ $\frac{1.15 \text{ mph}}{1 \text{ knot}} \approx 17$ knots **6.** 10 knots × $\frac{1.15 \text{ mph}}{1 \text{ knot}}$ = 11.5 mph

7.

Knots	MPH
4	4.6
8.7	10
10	11.5
15	17.25

8. 1 hour = 60 minutes; $\frac{4 \text{ minutes}}{1 \text{ degree}} = \frac{60 \text{ minutes}}{x \text{ degrees}}$ x = 15 degrees of longitude; 52° + 15° = 67° W longitude

Engage: 1. Answers will vary but may include clear skies for navigation, good winds, a fine tall ship, to hear the gulls cry. **2.** Answers will vary but could include gray mist at dawn, white clouds (fair weather), wind for sails. **3.** the tides, the gypsy life, the marine life **4.** Answers will vary. **5.** Answers will vary.

A Dream Come True (pages 25–27)

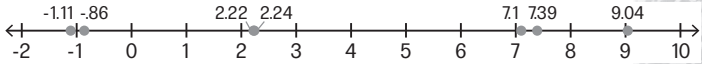
Problem Solving: 1. $1\frac{1}{6} \times w = \frac{2}{3}$, $w = \frac{4}{7}$ mi. **2.** l = 6,160 ft., $w \approx 3{,}017.1$ ft., A = 18,585,336 ft.^{2} **3.** $\frac{2}{3} \times 640 = 426\frac{2}{3}$ acres **4.** $\frac{2}{3} \div 2 = \frac{2}{6} = 0.333$ mi.^{2} **5.** $\frac{1}{8} \times \frac{2}{3} = \frac{1}{12}$ mi.^{2} **6.** 1,200.25 = 40.125 × w, $w \approx 29.9$ ft.

Engage: Answers will vary.

Watching the Tides (pages 28–30)

Problem Solving: 1. the mean (average) low-water level

2.



3. Wednesday at 1:57 a.m. **4.** Tuesday at 7:16 a.m. **5.** Monday at 12:42 p.m. **6.** Tuesday between early morning high tide and morning low tide

Engage: Answers will vary.