

Mathematics 6

A Problem-Centered Course

520 problems in 130 spiral sets

Problems first. Ideas built through conjecture, representation, discussion, and revision.

Tower School

To the Student

This is not a textbook that explains a method and then asks you to imitate it. The problems are the course. Bring a serious first attempt, a diagram or representation when useful, and questions worth discussing. A complete solution communicates why an answer is reasonable, not only what the answer is.

Most class meetings use one four-problem set. Some problems are quick; others deserve sustained discussion or a return visit. Include units, label representations, and state assumptions. Keep unfinished work: an organized attempt is valuable evidence of thinking.

A productive routine

1. Read all four problems before choosing where to begin.
2. Record attempts and useful mistakes.
3. Compare words, tables, graphs, equations, and diagrams.
4. Revise after discussion while keeping earlier thinking visible.
5. Expect more than one valid response when asked to create or critique.

How this book fits your course

Keep this compilation in your binder as a year-long source of problems. Your teacher may assign a complete set, select one problem for discussion, or invite you to explore it when time allows. Problem-Solving Labs are separate, longer investigations built around a carefully chosen mathematical arc.

Phase 1: Whole-number reasoning

Ideas are mixed intentionally. Look for connections and reuse earlier results.

Set 1

1. A recipe needs $\frac{5}{4}$ cup per batch. How much is needed for 5 batches? Give an exact answer.
2. A polygon has angles or sides arranged with one line of symmetry. Draw two possible examples and one non-example.
3. Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers.
4. A runner travels 8 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion.

Set 2

5. A class has a ratio of 5 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total.
6. Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 3 is a relevant value, and solve or analyze it.
7. A circle has radius 11 cm. Find its circumference and area in terms of π , then estimate using 3.14.
8. A recipe needs $\frac{5}{4}$ cup per batch. How much is needed for 5 batches? Give an exact answer. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 3

9. The expression $4(x + 7)$ can be rewritten another way. Use an area model to explain the equivalence.
10. A runner travels 8 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 3 is a relevant value, and solve or analyze it.
11. Compare $\frac{2}{7}$ and $\frac{3}{9}$ without converting both to decimals. Explain your method.
12. A school packs 302 markers equally into 6 bins. How many go in each bin and what remains? Explain what the remainder means.

Set 4

13. A floor plan uses 1 cm to represent 8 feet. A room is 8 cm by 10 cm on the plan. Find its actual dimensions and area.
14. Order -3.5 , -3 , 0, and 5 from least to greatest. Use distance from zero in your explanation.
15. For the data 4, 9, 8, 16, 18, find the mean, median, and range. Which statistic changes most if the largest value doubles?

16. Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect.

Set 5

17. Order -6.5 , -6 , 0 , and 2 from least to greatest. Use distance from zero in your explanation.
18. A school packs 119 markers equally into 3 bins. How many go in each bin and what remains? Explain what the remainder means.
19. Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it.
20. Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space.

Set 6

21. For the data 6, 10, 8, 16, 15, find the mean, median, and range. Which statistic changes most if the largest value doubles?
22. Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it. Then create one related example in which 3 is a relevant value, and solve or analyze it.
23. Estimate $6780 + 2009$, then calculate exactly. How close was the estimate and why?
24. A submarine at -20 meters rises 16 meters. Represent the motion with an equation and a number-line diagram.

Set 7

25. Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 3 is a relevant value, and solve or analyze it.
26. Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 3 is a relevant value, and solve or analyze it.
27. A submarine at -50 meters rises 16 meters. Represent the motion with an equation and a number-line diagram.
28. A circle has radius 11 cm. Find its circumference and area in terms of π , then estimate using 3.14. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 8

29. Estimate $5537 + 1148$, then calculate exactly. How close was the estimate and why?
30. Find $\frac{4}{8} + \frac{3}{8}$. Explain why the denominator does not change.
31. A runner travels 6 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion.
32. Write and simplify an expression for the perimeter of a rectangle with sides $x + 2$ and $x + 8$.

Set 9

- 33.** Create two different fractions with sum $\frac{8}{13}$. Prove both sums.
- 34.** A floor plan uses 1 cm to represent 8 feet. A room is 6 cm by 10 cm on the plan. Find its actual dimensions and area.
- 35.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it.
- 36.** A drink uses 7 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies.

Set 10

- 37.** A runner travels 6 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 38.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 39.** A rectangle measures 3 cm by 8 cm. A second rectangle has the same area but a different whole-number side length. Find one possibility and compare perimeters.
- 40.** Create two different fractions with sum $\frac{8}{13}$. Prove both sums. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Phase 2: Fractions as quantities

Ideas are mixed intentionally. Look for connections and reuse earlier results.

Set 11

41. Plot $(-5, 6)$, $(5, 6)$, and $(5, -6)$. Describe the reflections connecting the points.
42. Write and simplify an expression for the perimeter of a rectangle with sides $x + 4$ and $x + 8$.
43. A drink uses 7 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 3 is a relevant value, and solve or analyze it.
44. Compare $\frac{2}{7}$ and $\frac{3}{9}$ without converting both to decimals. Explain your method. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 12

45. Order -3.5 , -3 , 0 , and 3 from least to greatest. Use distance from zero in your explanation.
46. For the data 7, 11, 8, 14, 18, find the mean, median, and range. Which statistic changes most if the largest value doubles?
47. Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 4 is a relevant value, and solve or analyze it.
48. Estimate $5311 + 2870$, then calculate exactly. How close was the estimate and why?

Set 13

49. For the data 8, 8, 8, 14, 12, find the mean, median, and range. Which statistic changes most if the largest value doubles?
50. A trail is $\frac{3}{5}$ mile long. A walker completes $\frac{3}{3}$ of it. How far did the walker go? Draw a model.
51. A rectangle measures 4 cm by 10 cm. A second rectangle has the same area but a different whole-number side length. Find one possibility and compare perimeters.
52. Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 4 is a relevant value, and solve or analyze it.

Set 14

- 53.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 54.** A circle has radius 7 cm. Find its circumference and area in terms of π , then estimate using 3.14.
- 55.** A recipe needs $\frac{5}{4}$ cup per batch. How much is needed for 7 batches? Give an exact answer.
- 56.** A survey of 34 students finds 18 prefer option A. Describe one conclusion the survey supports and one it does not.

Set 15

- 57.** Estimate $5537+2870$, then calculate exactly. How close was the estimate and why?
- 58.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 59.** A survey of 30 students finds 18 prefer option A. Describe one conclusion the survey supports and one it does not.
- 60.** Order -6.5 , -6 , 0 , and -2 from least to greatest. Use distance from zero in your explanation.

Set 16

- 61.** Place $\frac{6}{8}$, 0.8 , and $\frac{8}{11}$ on a number line. Explain the order.
- 62.** A runner travels 4 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion.
- 63.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 4$ and $x + 8$. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 64.** A box measures 6 cm by 6 cm by 5 cm. Find its volume and sketch a net that could be used to find surface area.

Set 17

- 65.** A runner travels 4 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 66.** Order -3.5 , -3 , 0 , and 1 from least to greatest. Use distance from zero in your explanation.
- 67.** A school packs 488 markers equally into 9 bins. How many go in each bin and what remains? Explain what the remainder means.
- 68.** Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it. Then create one related example in which 4 is a relevant value, and solve or analyze it.

Set 18

- 69.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 5$ and $x + 5$.
- 70.** A school packs 92 markers equally into 3 bins. How many go in each bin and what remains? Explain what the remainder means.
- 71.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly.
- 72.** A class has a ratio of 7 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total.

Set 19

- 73.** A triangular prism has a triangular base with base 6 cm and height 6 cm; its length is 2 cm. Find its volume and explain the layers.
- 74.** Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 75.** A class has a ratio of 7 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 76.** A recipe needs $\frac{5}{4}$ cup per batch. How much is needed for 5 batches? Give an exact answer. Then create one related example in which 4 is a relevant value, and solve or analyze it.

Set 20

- 77.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 78.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 79.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 6 is a relevant value, and solve or analyze it.
- 80.** Without completing every multiplication, decide which is larger: 35×15 or 38×12 . Justify.

Phase 3: Ratios and rates

Ideas are mixed intentionally. Look for connections and reuse earlier results.

Set 21

81. Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 6 is a relevant value, and solve or analyze it.
82. A class has a ratio of 7 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 4 is a relevant value, and solve or analyze it.
83. A submarine at -80 meters rises 32 meters. Represent the motion with an equation and a number-line diagram.
84. Without completing every multiplication, decide which is larger: 44×9 or 47×6 . Justify.

Set 22

85. Estimate $5537 + 2009$, then calculate exactly. How close was the estimate and why?
86. A submarine at -20 meters rises 32 meters. Represent the motion with an equation and a number-line diagram.
87. A runner travels 10 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion.
88. Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 4 is a relevant value, and solve or analyze it.

Set 23

89. Find $\frac{4}{8} + \frac{3}{8}$. Explain why the denominator does not change. Then create one related example in which 3 is a relevant value, and solve or analyze it.
90. Without completing every multiplication, decide which is larger: 33×15 or 36×12 . Justify.
91. Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 5 is a relevant value, and solve or analyze it.
92. For the data 4, 12, 8, 10, 12, find the mean, median, and range. Which statistic changes most if the largest value doubles?

Set 24

- 93.** A runner travels 10 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 94.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 6$ and $x + 8$.
- 95.** Plot $(-6, 4)$, $(6, 4)$, and $(6, -4)$. Describe the reflections connecting the points.
- 96.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 4 is a relevant value, and solve or analyze it.

Set 25

- 97.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 3$ and $x + 2$.
- 98.** For the data 6, 6, 8, 10, 18, find the mean, median, and range. Which statistic changes most if the largest value doubles?
- 99.** Create two different fractions with sum $\frac{8}{13}$. Prove both sums. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 100.** A floor plan uses 1 cm to represent 10 feet. A room is 6 cm by 12 cm on the plan. Find its actual dimensions and area.

Set 26

- 101.** A circle has radius 3 cm. Find its circumference and area in terms of π , then estimate using 3.14.
- 102.** A recipe needs $\frac{5}{4}$ cup per batch. How much is needed for 5 batches? Give an exact answer. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 103.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 104.** The expression $3(x + 7)$ can be rewritten another way. Use an area model to explain the equivalence.

Set 27

- 105.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 106.** A triangular prism has a triangular base with base 7 cm and height 6 cm; its length is 6 cm. Find its volume and explain the layers.
- 107.** The expression $7(x + 1)$ can be rewritten another way. Use an area model to explain the equivalence.

- 108.** A runner travels 8 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 4 is a relevant value, and solve or analyze it.

Set 28

- 109.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 6 is a relevant value, and solve or analyze it.
- 110.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 7 is a relevant value, and solve or analyze it.
- 111.** Without completing every multiplication, decide which is larger: 48×15 or 51×12 . Justify.
- 112.** Compare $\frac{2}{4}$ and $\frac{3}{6}$ without converting both to decimals. Explain your method.

Set 29

- 113.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 8 is a relevant value, and solve or analyze it.
- 114.** A runner travels 8 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 115.** Order -9.5 , -9 , 0 , and -1 from least to greatest. Use distance from zero in your explanation.
- 116.** A school packs 194 markers equally into 6 bins. How many go in each bin and what remains? Explain what the remainder means.

Set 30

- 117.** Without completing every multiplication, decide which is larger: 37×12 or 40×9 . Justify.
- 118.** Order -3.5 , -3 , 0 , and 5 from least to greatest. Use distance from zero in your explanation. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 119.** A drink uses 9 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies.
- 120.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 7 is a relevant value, and solve or analyze it.

Phase 4: Expressions and equivalence

Ideas are mixed intentionally. Look for connections and reuse earlier results.

Set 31

- 121.** A runner travels 8 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 6 is a relevant value, and solve or analyze it.
- 122.** Find $\frac{4}{8} + \frac{3}{8}$. Explain why the denominator does not change. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 123.** A school packs 164 markers equally into 3 bins. How many go in each bin and what remains? Explain what the remainder means.
- 124.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 8 is a relevant value, and solve or analyze it.

Set 32

- 125.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 8$ and $x + 8$.
- 126.** A floor plan uses 1 cm to represent 6 feet. A room is 10 cm by 8 cm on the plan. Find its actual dimensions and area.
- 127.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 6 is a relevant value, and solve or analyze it.
- 128.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 7 is a relevant value, and solve or analyze it.

Set 33

- 129.** A polygon has angles or sides arranged with one line of symmetry. Draw two possible examples and one non-example. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 130.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 9 is a relevant value, and solve or analyze it.
- 131.** A class has a ratio of 3 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total.
- 132.** A submarine at -50 meters rises 16 meters. Represent the motion with an equation and a number-line diagram. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 34

- 133.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 7 is a relevant value, and solve or analyze it.
- 134.** A class has a ratio of 3 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 135.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 9 is a relevant value, and solve or analyze it.
- 136.** A polygon has angles or sides arranged with one line of symmetry. Draw two possible examples and one non-example. Then create one related example in which 4 is a relevant value, and solve or analyze it.

Set 35

- 137.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 8 is a relevant value, and solve or analyze it.
- 138.** A submarine at -20 meters rises 16 meters. Represent the motion with an equation and a number-line diagram. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 139.** A triangular prism has a triangular base with base 8 cm and height 6 cm; its length is 4 cm. Find its volume and explain the layers.
- 140.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 7$ and $x + 2$.

Set 36

- 141.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 10 is a relevant value, and solve or analyze it.
- 142.** Without completing every multiplication, decide which is larger: 24×15 or 27×12 . Justify.
- 143.** Find $\frac{4}{9} + \frac{5}{9}$. Explain why the denominator does not change.
- 144.** A drink uses 7 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 4 is a relevant value, and solve or analyze it.

Set 37

- 145.** Without completing every multiplication, decide which is larger: 37×9 or 40×6 . Justify.
- 146.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 8$ and $x + 8$. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 147.** For the data 4, 11, 8, 14, 15, find the mean, median, and range. Which statistic changes most if the largest value doubles?
- 148.** Place $\frac{6}{9}$, 0.6, and $\frac{8}{12}$ on a number line. Explain the order.

Set 38

- 149.** A recipe needs $\frac{5}{4}$ cup per batch. How much is needed for 7 batches? Give an exact answer. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 150.** For the data 5, 8, 8, 14, 18, find the mean, median, and range. Which statistic changes most if the largest value doubles?
- 151.** Write an inequality for a ride that requires height at least 53 inches. Give three values that satisfy it.
- 152.** Estimate $3277 + 2870$, then calculate exactly. How close was the estimate and why?

Set 39

- 153.** A drink uses 7 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 154.** Write $\frac{7}{12}$ as a decimal to the nearest hundredth and as a percent. Which form is most useful in a comparison?
- 155.** Estimate $4746 + 1148$, then calculate exactly. How close was the estimate and why?
- 156.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 11 is a relevant value, and solve or analyze it.

Set 40

- 157.** Write an inequality for a ride that requires height at least 53 inches. Give three values that satisfy it. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 158.** A box measures 7 cm by 10 cm by 2 cm. Find its volume and sketch a net that could be used to find surface area.
- 159.** A submarine at -20 meters rises 40 meters. Represent the motion with an equation and a number-line diagram.

- 160.** A survey of 42 students finds 18 prefer option A. Describe one conclusion the survey supports and one it does not.

Phase 5: The coordinate plane

Ideas are mixed intentionally. Look for connections and reuse earlier results.

Set 41

- 161.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 8 is a relevant value, and solve or analyze it.
- 162.** Estimate $3051+2870$, then calculate exactly. How close was the estimate and why?
- 163.** The expression $3(x+4)$ can be rewritten another way. Use an area model to explain the equivalence.
- 164.** A survey of 42 students finds 18 prefer option A. Describe one conclusion the survey supports and one it does not. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 42

- 165.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 9 is a relevant value, and solve or analyze it.
- 166.** The expression $7(x+7)$ can be rewritten another way. Use an area model to explain the equivalence.
- 167.** Without completing every multiplication, decide which is larger: 48×9 or 51×6 . Justify.
- 168.** Order -9.5 , -9 , 0 , and -5 from least to greatest. Use distance from zero in your explanation.

Set 43

- 169.** Which does not belong: $\frac{1}{2}$, 0.5 , 50% , and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 12 is a relevant value, and solve or analyze it.
- 170.** A survey of 34 students finds 18 prefer option A. Describe one conclusion the survey supports and one it does not. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 171.** Order -3.5 , -3 , 0 , and 1 from least to greatest. Use distance from zero in your explanation. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 172.** A triangular prism has a triangular base with base 9 cm and height 6 cm; its length is 2 cm. Find its volume and explain the layers.

Set 44

- 173.** Without completing every multiplication, decide which is larger: 37×15 or 40×12 . Justify.
- 174.** Place $\frac{6}{9}$, 0.2, and $\frac{8}{12}$ on a number line. Explain the order.
- 175.** A drink uses 5 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies.
- 176.** Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it. Then create one related example in which 6 is a relevant value, and solve or analyze it.

Set 45

- 177.** A trail is $\frac{3}{7}$ mile long. A walker completes $\frac{3}{3}$ of it. How far did the walker go? Draw a model.
- 178.** A rectangle measures 6 cm by 6 cm. A second rectangle has the same area but a different whole-number side length. Find one possibility and compare perimeters.
- 179.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 10 is a relevant value, and solve or analyze it.
- 180.** A class has a ratio of 7 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 5 is a relevant value, and solve or analyze it.

Set 46

- 181.** A drink uses 5 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 182.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 11 is a relevant value, and solve or analyze it.
- 183.** A polygon has angles or sides arranged with one line of symmetry. Draw two possible examples and one non-example. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 184.** A trail is $\frac{3}{7}$ mile long. A walker completes $\frac{3}{3}$ of it. How far did the walker go? Draw a model. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 47

- 185.** Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it. Then create one related example in which 7 is a relevant value, and solve or analyze it.
- 186.** A class has a ratio of 7 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 6 is a relevant value, and solve or analyze it.

- 187.** Write $\frac{7}{12}$ as a decimal to the nearest hundredth and as a percent. Which form is most useful in a comparison? Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 188.** Without completing every multiplication, decide which is larger: 26×9 or 29×6 . Justify.

Set 48

- 189.** Plot $(-7, 8)$, $(7, 8)$, and $(7, -8)$. Describe the reflections connecting the points.
- 190.** A submarine at -20 meters rises 32 meters. Represent the motion with an equation and a number-line diagram. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 191.** A survey of 40 students finds 12 prefer option A. Describe one conclusion the survey supports and one it does not.
- 192.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 6 is a relevant value, and solve or analyze it.

Set 49

- 193.** A submarine at -50 meters rises 32 meters. Represent the motion with an equation and a number-line diagram.
- 194.** Without completing every multiplication, decide which is larger: 52×15 or 55×12 . Justify.
- 195.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 6$ and $x + 5$.
- 196.** For the data 7, 9, 8, 10, 12, find the mean, median, and range. Which statistic changes most if the largest value doubles?

Set 50

- 197.** A survey of 32 students finds 12 prefer option A. Describe one conclusion the survey supports and one it does not.
- 198.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 3$ and $x + 8$.
- 199.** A school packs 218 markers equally into 6 bins. How many go in each bin and what remains? Explain what the remainder means.
- 200.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 9 is a relevant value, and solve or analyze it.

Phase 6: Area, surface area, and volume

Ideas are mixed intentionally. Look for connections and reuse earlier results.

Set 51

- 201.** Without completing every multiplication, decide which is larger: 37×12 or 40×9 . Justify. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 202.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 7 is a relevant value, and solve or analyze it.
- 203.** For the data 8, 7, 8, 10, 18, find the mean, median, and range. Which statistic changes most if the largest value doubles?
- 204.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 10 is a relevant value, and solve or analyze it.

Set 52

- 205.** Create two different fractions with sum $\frac{8}{14}$. Prove both sums.
- 206.** A drink uses 3 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies.
- 207.** Write an inequality for a ride that requires height at least 53 inches. Give three values that satisfy it. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 208.** Plot $(-4, 6)$, $(4, 6)$, and $(4, -6)$. Describe the reflections connecting the points.

Set 53

- 209.** A drink uses 3 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 210.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 11 is a relevant value, and solve or analyze it.
- 211.** Estimate $4746 + 2009$, then calculate exactly. How close was the estimate and why?
- 212.** The expression $8(x + 1)$ can be rewritten another way. Use an area model to explain the equivalence.

Set 54

- 213.** Write an inequality for a ride that requires height at least 53 inches. Give three values that satisfy it. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 214.** Estimate $6215+2870$, then calculate exactly. How close was the estimate and why?
- 215.** A submarine at -50 meters rises 24 meters. Represent the motion with an equation and a number-line diagram.
- 216.** A runner travels 8 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 7 is a relevant value, and solve or analyze it.

Set 55

- 217.** A box measures 4 cm by 6 cm by 2 cm. Find its volume and sketch a net that could be used to find surface area.
- 218.** The expression $2(x + 7)$ can be rewritten another way. Use an area model to explain the equivalence.
- 219.** A runner travels 8 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 8 is a relevant value, and solve or analyze it.
- 220.** Write $\frac{7}{12}$ as a decimal to the nearest hundredth and as a percent. Which form is most useful in a comparison? Then create one related example in which 4 is a relevant value, and solve or analyze it.

Set 56

- 221.** A submarine at -20 meters rises 24 meters. Represent the motion with an equation and a number-line diagram.
- 222.** A survey of 38 students finds 18 prefer option A. Describe one conclusion the survey supports and one it does not.
- 223.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 8 is a relevant value, and solve or analyze it.
- 224.** A school packs 542 markers equally into 9 bins. How many go in each bin and what remains? Explain what the remainder means.

Set 57

- 225.** A survey of 34 students finds 18 prefer option A. Describe one conclusion the survey supports and one it does not. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 226.** Create two different fractions with sum $\frac{8}{10}$. Prove both sums.
- 227.** A floor plan uses 1 cm to represent 3 feet. A room is 10 cm by 5 cm on the plan. Find its actual dimensions and area.

- 228.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 12 is a relevant value, and solve or analyze it.

Set 58

- 229.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 9 is a relevant value, and solve or analyze it.
- 230.** A polygon has angles or sides arranged with one line of symmetry. Draw two possible examples and one non-example. Then create one related example in which 6 is a relevant value, and solve or analyze it.
- 231.** A trail is $\frac{3}{8}$ mile long. A walker completes $\frac{5}{3}$ of it. How far did the walker go? Draw a model.
- 232.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 10 is a relevant value, and solve or analyze it.

Set 59

- 233.** A school packs 227 markers equally into 9 bins. How many go in each bin and what remains? Explain what the remainder means.
- 234.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 13 is a relevant value, and solve or analyze it.
- 235.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 11 is a relevant value, and solve or analyze it.
- 236.** A submarine at -50 meters rises 16 meters. Represent the motion with an equation and a number-line diagram. Then create one related example in which 4 is a relevant value, and solve or analyze it.

Set 60

- 237.** Find $\frac{4}{6} + \frac{5}{6}$. Explain why the denominator does not change.
- 238.** A class has a ratio of 3 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 239.** The expression $2(x+7)$ can be rewritten another way. Use an area model to explain the equivalence. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 240.** A triangular prism has a triangular base with base 5 cm and height 6 cm; its length is 4 cm. Find its volume and explain the layers.

Phase 7: Integers and distance

Ideas are mixed intentionally. Look for connections and reuse earlier results.

Set 61

- 241.** Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it. Then create one related example in which 8 is a relevant value, and solve or analyze it.
- 242.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 12 is a relevant value, and solve or analyze it.
- 243.** A trail is $\frac{3}{7}$ mile long. A walker completes $\frac{3}{3}$ of it. How far did the walker go? Draw a model. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 244.** A rectangle measures 8 cm by 6 cm. A second rectangle has the same area but a different whole-number side length. Find one possibility and compare perimeters.

Set 62

- 245.** A triangular prism has a triangular base with base 10 cm and height 4 cm; its length is 6 cm. Find its volume and explain the layers.
- 246.** Write $\frac{7}{12}$ as a decimal to the nearest hundredth and as a percent. Which form is most useful in a comparison? Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 247.** A survey of 44 students finds 12 prefer option A. Describe one conclusion the survey supports and one it does not.
- 248.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 5$ and $x + 5$. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 63

- 249.** A submarine at -80 meters rises 16 meters. Represent the motion with an equation and a number-line diagram.
- 250.** A box measures 5 cm by 6 cm by 2 cm. Find its volume and sketch a net that could be used to find surface area.
- 251.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 2$ and $x + 8$. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 252.** A drink uses 7 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 6 is a relevant value, and solve or analyze it.

Set 64

- 253.** A survey of 36 students finds 12 prefer option A. Describe one conclusion the survey supports and one it does not.
- 254.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 10 is a relevant value, and solve or analyze it.
- 255.** A school packs 326 markers equally into 9 bins. How many go in each bin and what remains? Explain what the remainder means.
- 256.** Find $\frac{4}{10} + \frac{3}{10}$. Explain why the denominator does not change.

Set 65

- 257.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 11 is a relevant value, and solve or analyze it.
- 258.** A drink uses 7 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 7 is a relevant value, and solve or analyze it.
- 259.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 12 is a relevant value, and solve or analyze it.
- 260.** Estimate $6441+1148$, then calculate exactly. How close was the estimate and why?

Set 66

- 261.** A school packs 152 markers equally into 6 bins. How many go in each bin and what remains? Explain what the remainder means.
- 262.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 13 is a relevant value, and solve or analyze it.
- 263.** A class has a ratio of 9 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total.
- 264.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 13 is a relevant value, and solve or analyze it.

Set 67

- 265.** Compare $\frac{2}{6}$ and $\frac{3}{8}$ without converting both to decimals. Explain your method.
- 266.** Estimate $5198+2870$, then calculate exactly. How close was the estimate and why?
- 267.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 14 is a relevant value, and solve or analyze it.
- 268.** A survey of 30 students finds 18 prefer option A. Describe one conclusion the survey supports and one it does not. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 68

- 269.** A class has a ratio of 9 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 270.** The expression $4(x+7)$ can be rewritten another way. Use an area model to explain the equivalence. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 271.** A box measures 5 cm by 4 cm by 3 cm. Find its volume and sketch a net that could be used to find surface area.
- 272.** Order -9.5 , -9 , 0 , and -5 from least to greatest. Use distance from zero in your explanation. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 69

- 273.** The expression $8(x+1)$ can be rewritten another way. Use an area model to explain the equivalence. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 274.** A survey of 42 students finds 18 prefer option A. Describe one conclusion the survey supports and one it does not. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 275.** Place $\frac{6}{11}$, 0.2, and $\frac{8}{14}$ on a number line. Explain the order.
- 276.** Plot $(-9,6)$, $(9,6)$, and $(9,-6)$. Describe the reflections connecting the points.

Set 70

- 277.** A polygon has angles or sides arranged with one line of symmetry. Draw two possible examples and one non-example. Then create one related example in which 7 is a relevant value, and solve or analyze it.
- 278.** A trail is $\frac{3}{9}$ mile long. A walker completes $\frac{3}{3}$ of it. How far did the walker go? Draw a model.
- 279.** For the data 4, 6, 8, 12, 12, find the mean, median, and range. Which statistic changes most if the largest value doubles?

- 280.** Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it. Then create one related example in which 9 is a relevant value, and solve or analyze it.

Phase 8: Data and distributions

Ideas are mixed intentionally. Look for connections and reuse earlier results.

Set 71

- 281.** A survey of 38 students finds 18 prefer option A. Describe one conclusion the survey supports and one it does not. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 282.** Order -9.5 , -9 , 0 , and -5 from least to greatest. Use distance from zero in your explanation. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 283.** A box measures 6 cm by 6 cm by 2 cm. Find its volume and sketch a net that could be used to find surface area.
- 284.** Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it. Then create one related example in which 10 is a relevant value, and solve or analyze it.

Set 72

- 285.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 12 is a relevant value, and solve or analyze it.
- 286.** A school packs 443 markers equally into 9 bins. How many go in each bin and what remains? Explain what the remainder means.
- 287.** Place $\frac{6}{10}$, 0.4 , and $\frac{8}{13}$ on a number line. Explain the order.
- 288.** A class has a ratio of 7 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 7 is a relevant value, and solve or analyze it.

Set 73

- 289.** A school packs 77 markers equally into 3 bins. How many go in each bin and what remains? Explain what the remainder means.
- 290.** Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it. Then create one related example in which 11 is a relevant value, and solve or analyze it.
- 291.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 13 is a relevant value, and solve or analyze it.
- 292.** Create two different fractions with sum $\frac{8}{10}$. Prove both sums. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 74

- 293.** Write $\frac{7}{13}$ as a decimal to the nearest hundredth and as a percent. Which form is most useful in a comparison?
- 294.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 14 is a relevant value, and solve or analyze it.
- 295.** The expression $5(x + 1)$ can be rewritten another way. Use an area model to explain the equivalence.
- 296.** Without completing every multiplication, decide which is larger: 54×12 or 57×9 . Justify.

Set 75

- 297.** A class has a ratio of 7 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 8 is a relevant value, and solve or analyze it.
- 298.** Compare $\frac{2}{6}$ and $\frac{3}{8}$ without converting both to decimals. Explain your method. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 299.** Without completing every multiplication, decide which is larger: 30×15 or 33×12 . Justify.
- 300.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 13 is a relevant value, and solve or analyze it.

Set 76

- 301.** The expression $6(x + 7)$ can be rewritten another way. Use an area model to explain the equivalence.
- 302.** Plot $(-5, 10)$, $(5, 10)$, and $(5, -10)$. Describe the reflections connecting the points.
- 303.** Order -9.5 , -9 , 0 , and 1 from least to greatest. Use distance from zero in your explanation.
- 304.** For the data 5, 7, 8, 10, 15, find the mean, median, and range. Which statistic changes most if the largest value doubles?

Set 77

- 305.** A rectangle measures 8 cm by 10 cm. A second rectangle has the same area but a different whole-number side length. Find one possibility and compare perimeters.
- 306.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 14 is a relevant value, and solve or analyze it.
- 307.** A drink uses 3 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 4 is a relevant value, and solve or analyze it.

- 308.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 14 is a relevant value, and solve or analyze it.

Set 78

- 309.** Order -6.5 , -6 , 0 , and 4 from least to greatest. Use distance from zero in your explanation.
- 310.** A drink uses 3 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 311.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 14 is a relevant value, and solve or analyze it.
- 312.** A rectangle measures 4 cm by 6 cm. A second rectangle has the same area but a different whole-number side length. Find one possibility and compare perimeters.

Set 79

- 313.** For the data 8, 12, 8, 10, 15, find the mean, median, and range. Which statistic changes most if the largest value doubles?
- 314.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 15 is a relevant value, and solve or analyze it.
- 315.** A circle has radius 7 cm. Find its circumference and area in terms of π , then estimate using 3.14. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 316.** The expression $5(x+1)$ can be rewritten another way. Use an area model to explain the equivalence. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 80

- 317.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 15 is a relevant value, and solve or analyze it.
- 318.** Estimate $4181+2870$, then calculate exactly. How close was the estimate and why?
- 319.** Compare $\frac{2}{7}$ and $\frac{3}{9}$ without converting both to decimals. Explain your method. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 320.** A runner travels 8 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 9 is a relevant value, and solve or analyze it.

Phase 9: Probability and simulation

Ideas are mixed intentionally. Look for connections and reuse earlier results.

Set 81

- 321.** A recipe needs $\frac{5}{4}$ cup per batch. How much is needed for 5 batches? Give an exact answer. Then create one related example in which 6 is a relevant value, and solve or analyze it.
- 322.** A polygon has angles or sides arranged with one line of symmetry. Draw two possible examples and one non-example. Then create one related example in which 8 is a relevant value, and solve or analyze it.
- 323.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 15 is a relevant value, and solve or analyze it.
- 324.** A runner travels 8 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 10 is a relevant value, and solve or analyze it.

Set 82

- 325.** A class has a ratio of 5 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 326.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 16 is a relevant value, and solve or analyze it.
- 327.** A circle has radius 8 cm. Find its circumference and area in terms of π , then estimate using 3.14.
- 328.** A recipe needs $\frac{5}{4}$ cup per batch. How much is needed for 5 batches? Give an exact answer. Then create one related example in which 7 is a relevant value, and solve or analyze it.

Set 83

- 329.** The expression $4(x + 4)$ can be rewritten another way. Use an area model to explain the equivalence.
- 330.** A runner travels 8 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 11 is a relevant value, and solve or analyze it.
- 331.** Compare $\frac{2}{6}$ and $\frac{3}{8}$ without converting both to decimals. Explain your method. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 332.** A school packs 155 markers equally into 3 bins. How many go in each bin and what remains? Explain what the remainder means.

Set 84

- 333.** A floor plan uses 1 cm to represent 5 feet. A room is 8 cm by 7 cm on the plan. Find its actual dimensions and area.
- 334.** Order -9.5 , -9 , 0 , and -1 from least to greatest. Use distance from zero in your explanation. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 335.** For the data 8, 9, 8, 16, 15, find the mean, median, and range. Which statistic changes most if the largest value doubles?
- 336.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 16 is a relevant value, and solve or analyze it.

Set 85

- 337.** Order -3.5 , -3 , 0 , and 5 from least to greatest. Use distance from zero in your explanation. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 338.** A school packs 362 markers equally into 9 bins. How many go in each bin and what remains? Explain what the remainder means.
- 339.** Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it. Then create one related example in which 12 is a relevant value, and solve or analyze it.
- 340.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 15 is a relevant value, and solve or analyze it.

Set 86

- 341.** For the data 5, 10, 8, 16, 12, find the mean, median, and range. Which statistic changes most if the largest value doubles?
- 342.** Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it. Then create one related example in which 13 is a relevant value, and solve or analyze it.
- 343.** Estimate $2712+1148$, then calculate exactly. How close was the estimate and why?
- 344.** A submarine at -80 meters rises 16 meters. Represent the motion with an equation and a number-line diagram. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 87

- 345.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 17 is a relevant value, and solve or analyze it.
- 346.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 16 is a relevant value, and solve or analyze it.

- 347.** A submarine at -20 meters rises 16 meters. Represent the motion with an equation and a number-line diagram. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 348.** A circle has radius 8 cm. Find its circumference and area in terms of π , then estimate using 3.14. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 88

- 349.** Estimate $5650+2870$, then calculate exactly. How close was the estimate and why?
- 350.** Find $\frac{4}{7} + \frac{3}{7}$. Explain why the denominator does not change.
- 351.** A runner travels 6 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 352.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 2$ and $x + 5$.

Set 89

- 353.** Create two different fractions with sum $\frac{8}{12}$. Prove both sums.
- 354.** A floor plan uses 1 cm to represent 5 feet. A room is 6 cm by 7 cm on the plan. Find its actual dimensions and area.
- 355.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 15 is a relevant value, and solve or analyze it.
- 356.** A drink uses 7 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 8 is a relevant value, and solve or analyze it.

Set 90

- 357.** A runner travels 6 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 358.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 16 is a relevant value, and solve or analyze it.
- 359.** A rectangle measures 9 cm by 8 cm. A second rectangle has the same area but a different whole-number side length. Find one possibility and compare perimeters.
- 360.** Create two different fractions with sum $\frac{8}{12}$. Prove both sums. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Phase 10: Patterns and relationships

Ideas are mixed intentionally. Look for connections and reuse earlier results.

Set 91

- 361.** Plot $(-11, 6)$, $(11, 6)$, and $(11, -6)$. Describe the reflections connecting the points.
- 362.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 4$ and $x + 5$.
- 363.** A drink uses 7 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 9 is a relevant value, and solve or analyze it.
- 364.** Compare $\frac{2}{6}$ and $\frac{3}{8}$ without converting both to decimals. Explain your method. Then create one related example in which 5 is a relevant value, and solve or analyze it.

Set 92

- 365.** Order -9.5 , -9 , 0 , and -3 from least to greatest. Use distance from zero in your explanation.
- 366.** For the data 6, 11, 8, 14, 15, find the mean, median, and range. Which statistic changes most if the largest value doubles?
- 367.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 18 is a relevant value, and solve or analyze it.
- 368.** Estimate $5424 + 2009$, then calculate exactly. How close was the estimate and why?

Set 93

- 369.** For the data 7, 8, 8, 14, 18, find the mean, median, and range. Which statistic changes most if the largest value doubles?
- 370.** A trail is $\frac{3}{9}$ mile long. A walker completes $\frac{3}{3}$ of it. How far did the walker go? Draw a model. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 371.** A rectangle measures 10 cm by 10 cm. A second rectangle has the same area but a different whole-number side length. Find one possibility and compare perimeters.
- 372.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 17 is a relevant value, and solve or analyze it.

Set 94

- 373.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 19 is a relevant value, and solve or analyze it.
- 374.** A circle has radius 4 cm. Find its circumference and area in terms of π , then estimate using 3.14.
- 375.** A recipe needs $\frac{5}{4}$ cup per batch. How much is needed for 7 batches? Give an exact answer. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 376.** A survey of 38 students finds 18 prefer option A. Describe one conclusion the survey supports and one it does not. Then create one related example in which 4 is a relevant value, and solve or analyze it.

Set 95

- 377.** Estimate $5650+2009$, then calculate exactly. How close was the estimate and why?
- 378.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 18 is a relevant value, and solve or analyze it.
- 379.** A survey of 34 students finds 18 prefer option A. Describe one conclusion the survey supports and one it does not. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 380.** Order -3.5 , -3 , 0, and 1 from least to greatest. Use distance from zero in your explanation. Then create one related example in which 4 is a relevant value, and solve or analyze it.

Set 96

- 381.** Place $\frac{6}{12}$, 0.8, and $\frac{8}{15}$ on a number line. Explain the order.
- 382.** A runner travels 4 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 383.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 4$ and $x + 5$. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 384.** A box measures 3 cm by 6 cm by 4 cm. Find its volume and sketch a net that could be used to find surface area.

Set 97

- 385.** A runner travels 4 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 386.** Order -9.5 , -9 , 0, and -5 from least to greatest. Use distance from zero in your explanation. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 387.** A school packs 332 markers equally into 6 bins. How many go in each bin and what remains? Explain what the remainder means.

- 388.** Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it. Then create one related example in which 14 is a relevant value, and solve or analyze it.

Set 98

- 389.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 5$ and $x + 2$.
- 390.** A school packs 281 markers equally into 9 bins. How many go in each bin and what remains? Explain what the remainder means.
- 391.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 16 is a relevant value, and solve or analyze it.
- 392.** A class has a ratio of 7 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 9 is a relevant value, and solve or analyze it.

Set 99

- 393.** A triangular prism has a triangular base with base 3 cm and height 6 cm; its length is 2 cm. Find its volume and explain the layers.
- 394.** Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it. Then create one related example in which 15 is a relevant value, and solve or analyze it.
- 395.** A class has a ratio of 7 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 10 is a relevant value, and solve or analyze it.
- 396.** A recipe needs $\frac{5}{4}$ cup per batch. How much is needed for 5 batches? Give an exact answer. Then create one related example in which 8 is a relevant value, and solve or analyze it.

Set 100

- 397.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 17 is a relevant value, and solve or analyze it.
- 398.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 17 is a relevant value, and solve or analyze it.
- 399.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 19 is a relevant value, and solve or analyze it.
- 400.** Without completing every multiplication, decide which is larger: 36×12 or 39×9 . Justify.

Phase 11: Modeling and critique

Ideas are mixed intentionally. Look for connections and reuse earlier results.

Set 101

- 401.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 20 is a relevant value, and solve or analyze it.
- 402.** A class has a ratio of 7 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 11 is a relevant value, and solve or analyze it.
- 403.** A submarine at -50 meters rises 32 meters. Represent the motion with an equation and a number-line diagram. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 404.** Without completing every multiplication, decide which is larger: 45×15 or 48×12 . Justify.

Set 102

- 405.** Estimate $5650 + 1148$, then calculate exactly. How close was the estimate and why?
- 406.** A submarine at -80 meters rises 32 meters. Represent the motion with an equation and a number-line diagram. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 407.** A runner travels 10 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 408.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 17 is a relevant value, and solve or analyze it.

Set 103

- 409.** Find $\frac{4}{7} + \frac{3}{7}$. Explain why the denominator does not change. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 410.** Without completing every multiplication, decide which is larger: 34×12 or 37×9 . Justify.
- 411.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 18 is a relevant value, and solve or analyze it.
- 412.** For the data 8, 12, 8, 10, 18, find the mean, median, and range. Which statistic changes most if the largest value doubles?

Set 104

- 413.** A runner travels 10 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 414.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 6$ and $x + 5$. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 415.** Plot $(-3, 4)$, $(3, 4)$, and $(3, -4)$. Describe the reflections connecting the points.
- 416.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 18 is a relevant value, and solve or analyze it.

Set 105

- 417.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 3$ and $x + 8$. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 418.** For the data 5, 6, 8, 10, 15, find the mean, median, and range. Which statistic changes most if the largest value doubles?
- 419.** Create two different fractions with sum $\frac{8}{12}$. Prove both sums. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 420.** A floor plan uses 1 cm to represent 7 feet. A room is 6 cm by 9 cm on the plan. Find its actual dimensions and area.

Set 106

- 421.** A circle has radius 9 cm. Find its circumference and area in terms of π , then estimate using 3.14.
- 422.** A recipe needs $\frac{5}{4}$ cup per batch. How much is needed for 5 batches? Give an exact answer. Then create one related example in which 9 is a relevant value, and solve or analyze it.
- 423.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 18 is a relevant value, and solve or analyze it.
- 424.** The expression $3(x + 4)$ can be rewritten another way. Use an area model to explain the equivalence. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 107

- 425.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 19 is a relevant value, and solve or analyze it.
- 426.** A triangular prism has a triangular base with base 4 cm and height 6 cm; its length is 6 cm. Find its volume and explain the layers.

- 427.** The expression $7(x + 7)$ can be rewritten another way. Use an area model to explain the equivalence. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 428.** A runner travels 8 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 12 is a relevant value, and solve or analyze it.

Set 108

- 429.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 19 is a relevant value, and solve or analyze it.
- 430.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 20 is a relevant value, and solve or analyze it.
- 431.** Without completing every multiplication, decide which is larger: 49×12 or 52×9 . Justify.
- 432.** Compare $\frac{2}{8}$ and $\frac{3}{10}$ without converting both to decimals. Explain your method.

Set 109

- 433.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 21 is a relevant value, and solve or analyze it.
- 434.** A runner travels 8 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 13 is a relevant value, and solve or analyze it.
- 435.** Order -6.5 , -6 , 0 , and 2 from least to greatest. Use distance from zero in your explanation. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 436.** A school packs 101 markers equally into 3 bins. How many go in each bin and what remains? Explain what the remainder means.

Set 110

- 437.** Without completing every multiplication, decide which is larger: 38×9 or 41×6 . Justify.
- 438.** Order -9.5 , -9 , 0 , and -1 from least to greatest. Use distance from zero in your explanation. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 439.** A drink uses 9 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 440.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 21 is a relevant value, and solve or analyze it.

Phase 12: Multi-step investigations

Ideas are mixed intentionally. Look for connections and reuse earlier results.

Set 111

- 441.** A runner travels 8 miles in 40 minutes. Find the unit rate in miles per hour and explain the conversion. Then create one related example in which 14 is a relevant value, and solve or analyze it.
- 442.** Find $\frac{4}{7} + \frac{3}{7}$. Explain why the denominator does not change. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 443.** A school packs 497 markers equally into 9 bins. How many go in each bin and what remains? Explain what the remainder means.
- 444.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 22 is a relevant value, and solve or analyze it.

Set 112

- 445.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 8$ and $x + 5$.
- 446.** A floor plan uses 1 cm to represent 3 feet. A room is 10 cm by 5 cm on the plan. Find its actual dimensions and area. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 447.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 20 is a relevant value, and solve or analyze it.
- 448.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 20 is a relevant value, and solve or analyze it.

Set 113

- 449.** A polygon has angles or sides arranged with one line of symmetry. Draw two possible examples and one non-example. Then create one related example in which 9 is a relevant value, and solve or analyze it.
- 450.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 23 is a relevant value, and solve or analyze it.
- 451.** A class has a ratio of 3 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 452.** A submarine at -20 meters rises 16 meters. Represent the motion with an equation and a number-line diagram. Then create one related example in which 5 is a relevant value, and solve or analyze it.

Set 114

- 453.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 21 is a relevant value, and solve or analyze it.
- 454.** A class has a ratio of 3 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 6 is a relevant value, and solve or analyze it.
- 455.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 22 is a relevant value, and solve or analyze it.
- 456.** A polygon has angles or sides arranged with one line of symmetry. Draw two possible examples and one non-example. Then create one related example in which 10 is a relevant value, and solve or analyze it.

Set 115

- 457.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 21 is a relevant value, and solve or analyze it.
- 458.** A submarine at -80 meters rises 16 meters. Represent the motion with an equation and a number-line diagram. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 459.** A triangular prism has a triangular base with base 5 cm and height 6 cm; its length is 4 cm. Find its volume and explain the layers. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 460.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 7$ and $x + 8$.

Set 116

- 461.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 23 is a relevant value, and solve or analyze it.
- 462.** Without completing every multiplication, decide which is larger: 25×12 or 28×9 . Justify.
- 463.** Find $\frac{4}{8} + \frac{5}{8}$. Explain why the denominator does not change.
- 464.** A drink uses 7 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 10 is a relevant value, and solve or analyze it.

Set 117

- 465.** Without completing every multiplication, decide which is larger: 38×15 or 41×12 . Justify.
- 466.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 8$ and $x + 5$. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 467.** For the data 8, 11, 8, 14, 12, find the mean, median, and range. Which statistic changes most if the largest value doubles?
- 468.** Place $\frac{6}{8}$, 0.6, and $\frac{8}{11}$ on a number line. Explain the order.

Set 118

- 469.** A recipe needs $\frac{5}{4}$ cup per batch. How much is needed for 7 batches? Give an exact answer. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 470.** For the data 4, 8, 8, 14, 15, find the mean, median, and range. Which statistic changes most if the largest value doubles?
- 471.** Write an inequality for a ride that requires height at least 53 inches. Give three values that satisfy it. Then create one related example in which 6 is a relevant value, and solve or analyze it.
- 472.** Estimate $3390 + 2009$, then calculate exactly. How close was the estimate and why?

Set 119

- 473.** A drink uses 7 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 11 is a relevant value, and solve or analyze it.
- 474.** Write $\frac{7}{11}$ as a decimal to the nearest hundredth and as a percent. Which form is most useful in a comparison?
- 475.** Estimate $4859 + 2870$, then calculate exactly. How close was the estimate and why?
- 476.** Which does not belong: $\frac{1}{2}$, 0.5, 50%, and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 24 is a relevant value, and solve or analyze it.

Set 120

- 477.** Write an inequality for a ride that requires height at least 53 inches. Give three values that satisfy it. Then create one related example in which 7 is a relevant value, and solve or analyze it.
- 478.** A box measures 4 cm by 10 cm by 6 cm. Find its volume and sketch a net that could be used to find surface area.
- 479.** A submarine at -80 meters rises 40 meters. Represent the motion with an equation and a number-line diagram.

- 480.** A survey of 46 students finds 18 prefer option A. Describe one conclusion the survey supports and one it does not.

Phase 13: Synthesis and creation

Ideas are mixed intentionally. Look for connections and reuse earlier results.

Set 121

- 481.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 22 is a relevant value, and solve or analyze it.
- 482.** Estimate $3164 + 2009$, then calculate exactly. How close was the estimate and why?
- 483.** The expression $3(x + 1)$ can be rewritten another way. Use an area model to explain the equivalence.
- 484.** A survey of 46 students finds 18 prefer option A. Describe one conclusion the survey supports and one it does not. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 122

- 485.** Two number cubes are rolled. Is a sum of 6 or a sum of 8 more likely? Build an organized sample space. Then create one related example in which 22 is a relevant value, and solve or analyze it.
- 486.** The expression $7(x + 4)$ can be rewritten another way. Use an area model to explain the equivalence.
- 487.** Without completing every multiplication, decide which is larger: 49×15 or 52×12 . Justify.
- 488.** Order -6.5 , -6 , 0 , and -2 from least to greatest. Use distance from zero in your explanation. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 123

- 489.** Which does not belong: $\frac{1}{2}$, 0.5 , 50% , and $\frac{5}{100}$? Give at least two defensible answers. Then create one related example in which 25 is a relevant value, and solve or analyze it.
- 490.** A survey of 38 students finds 18 prefer option A. Describe one conclusion the survey supports and one it does not. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 491.** Order -9.5 , -9 , 0 , and -5 from least to greatest. Use distance from zero in your explanation. Then create one related example in which 6 is a relevant value, and solve or analyze it.
- 492.** A triangular prism has a triangular base with base 6 cm and height 6 cm; its length is 2 cm. Find its volume and explain the layers. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 124

- 493.** Without completing every multiplication, decide which is larger: 38×12 or 41×9 . Justify.
- 494.** Place $\frac{6}{8}$, 0.2, and $\frac{8}{11}$ on a number line. Explain the order.
- 495.** A drink uses 5 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 496.** Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it. Then create one related example in which 16 is a relevant value, and solve or analyze it.

Set 125

- 497.** A trail is $\frac{3}{6}$ mile long. A walker completes $\frac{3}{3}$ of it. How far did the walker go? Draw a model.
- 498.** A rectangle measures 3 cm by 6 cm. A second rectangle has the same area but a different whole-number side length. Find one possibility and compare perimeters.
- 499.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 24 is a relevant value, and solve or analyze it.
- 500.** A class has a ratio of 7 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 12 is a relevant value, and solve or analyze it.

Set 126

- 501.** A drink uses 5 cups of water for 2 cups of concentrate. How much water is needed for 7 cups of concentrate? Show two strategies. Then create one related example in which 5 is a relevant value, and solve or analyze it.
- 502.** Revise one earlier problem by changing a condition so it has more than one solution. Describe the effect. Then create one related example in which 25 is a relevant value, and solve or analyze it.
- 503.** A polygon has angles or sides arranged with one line of symmetry. Draw two possible examples and one non-example. Then create one related example in which 11 is a relevant value, and solve or analyze it.
- 504.** A trail is $\frac{3}{6}$ mile long. A walker completes $\frac{3}{3}$ of it. How far did the walker go? Draw a model. Then create one related example in which 3 is a relevant value, and solve or analyze it.

Set 127

- 505.** Write an inequality for a ride that requires height at least 59 inches. Give three values that satisfy it. Then create one related example in which 17 is a relevant value, and solve or analyze it.
- 506.** A class has a ratio of 7 blue folders to 6 green folders. Give two possible class totals and explain why the ratio alone does not determine the total. Then create one related example in which 13 is a relevant value, and solve or analyze it.
- 507.** Write $\frac{7}{11}$ as a decimal to the nearest hundredth and as a percent. Which form is most useful in a comparison? Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 508.** Without completing every multiplication, decide which is larger: 27×15 or 30×12 . Justify.

Set 128

- 509.** Plot $(-4, 8)$, $(4, 8)$, and $(4, -8)$. Describe the reflections connecting the points.
- 510.** A submarine at -80 meters rises 32 meters. Represent the motion with an equation and a number-line diagram. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 511.** A survey of 44 students finds 12 prefer option A. Describe one conclusion the survey supports and one it does not. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 512.** Choose a real quantity that is measured with a fraction or decimal. Pose and solve a comparison problem about it. Then create one related example in which 19 is a relevant value, and solve or analyze it.

Set 129

- 513.** A submarine at -20 meters rises 32 meters. Represent the motion with an equation and a number-line diagram. Then create one related example in which 4 is a relevant value, and solve or analyze it.
- 514.** Without completing every multiplication, decide which is larger: 53×12 or 56×9 . Justify.
- 515.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 6$ and $x + 2$.
- 516.** For the data 6, 9, 8, 10, 18, find the mean, median, and range. Which statistic changes most if the largest value doubles?

Set 130

- 517.** A survey of 36 students finds 12 prefer option A. Describe one conclusion the survey supports and one it does not. Then create one related example in which 3 is a relevant value, and solve or analyze it.
- 518.** Write and simplify an expression for the perimeter of a rectangle with sides $x + 3$ and $x + 5$.
- 519.** A school packs 113 markers equally into 3 bins. How many go in each bin and what remains? Explain what the remainder means.

- 520.** A student claims that the number farther from zero is always greater. Give an example that disproves the claim and rewrite it correctly. Then create one related example in which 23 is a relevant value, and solve or analyze it.

Capstone Invitations

1. Connect one problem to a table, graph, equation, or diagram and explain what each representation contributes.
2. Choose a claim suggested by an earlier problem. Decide whether it is always, sometimes, or never true.
3. Create two problems with the same mathematical structure but different stories.
4. Revise an earlier solution into a polished explanation for a classmate.
5. Design and solve a problem that connects at least two major course ideas.

An original Tower School resource inspired by the problem-centered tradition described by Phillips Exeter Academy. This is not an Exeter problem set.