# Problem Solving
## Practice Cards
### Grade 5

## Contents



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# Correlation to the Math Standards

| Standard | Card No. |
|---|---|
| **Operations and Algebraic Thinking** | |
| Use parentheses, brackets, or braces in numerical expressions. (5.OA.1) | 1, 4, 6, 7, 8, 11, 16, 17 |
| Write simple expressions and interpret them without evaluating them. (5.OA.2) | 2, 3, 15, 20 |
| Generate two numerical patterns using two given rules. (5.OA.3) | 5, 9, 10, 12, 13, 14, 18, 19 |
| **Number and Operations in Base Ten** | |
| Recognize that in a multi-digit whole number, a digit in one place represents ten times as much asit represents in the place to its right, and 1/10 of what it represents in the place to its left. (5.NBT.1) | 1, 5, 20 |
| Explain patterns in the number of zeros and placement of the decimal point when multiplying or dividing by powers of 10. (5.NBT.2) | 2, 3, 7, 12, 15 |
| Read, write, and compare decimals to thousandths. (5.NBT.3) | 4, 8, 9, 14 |
| Use place-value understanding to round decimals to any place. (5.NBT.4) | 9, 17 |
| Fluently multiply multi-digit whole numbers using the standard algorithm. (5.NBT.5) | 10, 13, 19 |
| Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors. (5.NBT.6) | 6, 11 |
| Add, subtract, multiply, and divide decimals to hundredths. (5.NBT.7) | 16, 18 |
| **Number and Operations – Fractions** | |
| Add and subtract fractions with unlike denominators. (5.NF.1) | 3, 7, 10 |
| Solve word problems involving addition and subtraction of fractions. (5.NF.2) | 1, 5, 11 |
| Interpret a fraction as division of the numerator by the denominator. (5.NF.3) | 2, 4 |
| Multiply a fraction or a whole number by a fraction. (5.NF.4) | 5, 8, 9, 12, 13 |
| Interpret multiplication as scaling (resizing). (5.NF.5) | 14, 15 |
| Solve problems involving multiplication of fractions and mixed numbers using a visual model. (5.NF.6) | 16, 17 |
| Divide unit fractions by whole numbers and whole numbers by unit fractions. (5.NF.7) | 6, 18, 19, 20 |

| Measurement and Data | |
|---|---|
| Convert among different-sized standard measurement units within a given measurement system. (5.MD.1) | 1, 7, 10, 11, 12, 13, 15, 18, 19 |
| Use operations on fractions to solve problems involving information presented in line plots. (5.MD.2) | 4, 20 |
| Understand concepts of volume measurement. (5.MD.3) | 2, 16 |
| Measure volume by counting unit cubes. (5.MD.4) | 2, 5 |
| Relate volume to the operations of multiplication and addition. (5.MD.5) | 3, 5, 6, 8, 9, 14, 17 |
| **Geometry** | |
| Use axes to define a coordinate system, and locate a given point in the coordinate plane by using an ordered pair of numbers, called coordinates. (5.G.1) | 1, 10, 12, 13, 16 |
| Graph points in the first quadrant of the coordinate plane. (5.G.2) | 2, 11, 17 |
| Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. (5.G.3) | 1, 3, 4, 9, 15, 18 |
| Classify two-dimensional figures in a hierarchy based on properties. (5.G.4) | 1, 3, 4, 6, 7, 8, 9, 14, 19, 20 |

# Getting Started with the *Problem-Solving Practice Cards*

Congratulations on your purchase of the **Problem-Solving Practice Cards!**

Designed for rigor and carefully aligned to the Math Standards, these activity cards build student confidence in problem solving as the cards progress from strategies and procedures to a deep understanding of math concepts.

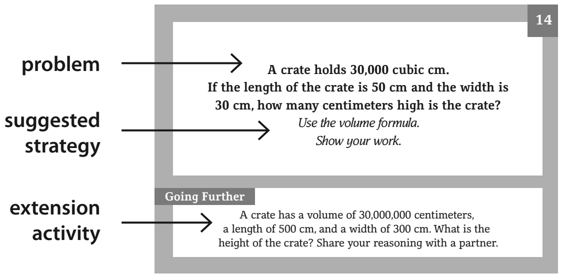
This box contains:

- 100 problem-solving cards, 20 cards for each of the five domains of the current math standards.
- This teacher guide, which includes the "Getting Started" pages and a complete answer key.

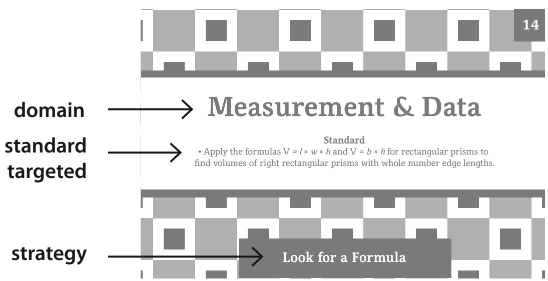
Featuring classroom-tested problems, each card suggests a specific problem-solving strategy to be used, such as:

- drawing a picture,
- using a model, or
- writing and solving an equation.

Each card includes a "Going Further" activity, which may involve work with a partner or further exploration of the concept by students working on their own.




The back of each card includes card number, domain, targeted mathematical standard, and suggested strategy for solving the problem.




The engaging problems on these cards will improve students' abilities as they learn to effectively use a variety of problem-solving strategies.

## A Research-Based Approach to Problem Solving

The ability to problem solve is foundational to students' mathematical development. The first mathematical practice standard outlined in the Common Core State Standards addresses problem solving:

"Make sense of problems and persevere in solving them."

A well-designed and rigorous problem is one that asks students to:

1. Define the problem. (Make sure students understand what the question is asking.)
2. Identify what information is given and what is missing.
3. Ask questions that will lead to reasonable assumptions. (Discussion of ideas and approaches with a partner is helpful.)
4. For younger students: Use concrete objects or pictures to help conceptualize and solve the problem.
5. Identify possible solutions.
6. Evaluate possible solutions and determine the answer.
7. Check the answer using a different method. (Ask yourself: "Does this make sense?")

Finally, research emphasizes the importance of practice. Repeated practice in problem solving helps students build confidence as well as competence.

## How to Use the Problem-Solving Practice Cards in Your Classroom

The Problem-Solving Practice Cards incorporate current research on the role of problem solving in mathematics learning. With 20 cards per domain and five domains per grade level, the cards give students experience in solving a wide variety of problems, either on their own or with a partner. The problems require more than just a quick answer. Students are asked to draw a picture or use a model, write and solve an equation, look for a pattern, work backwards, use direct reasoning, and more. In many cases, students are asked to justify their solution by explaining their thought processes in writing or verbally to a partner.

These problem-solving cards can be used as a unit review for the end of the week, or after the class has been given instruction on that particular topic. The cards can also be used prior to teaching a topic, as a gauge to determine how well the class understands a particular skill or skills.

The cards can be used as a whole-class, small-group, or partner activity. There is no one right way to use the cards, but should be dictated by the needs of the class or individual students as they pertain to a particular concept or subject area.

A strategy is suggested on each card, but students should have leeway to use a different strategy if it is more natural to them. The emphasis should always be on student initiative and creative problem solving rather than rote learning.

To use the cards most effectively, it is helpful to have these materials and manipulatives on hand:

- Pencil and plain paper for drawing
- Graph paper
- Ruler
- Place-value disks or base-ten blocks
- Base-ten place-value frame
- Base-ten decimal frame
- Fraction circles and fraction strips
- Hundred chart
- Geoboard

The cards are numbered and color-coded by domain for easy sorting at the end of an activity.

# Answers

**Grade 5: Operations and Algebraic Thinking**

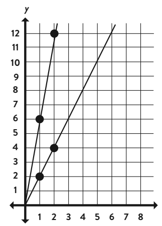
1. 27; GF: Answers may vary.

2. $2(8 + 7) \div 5 = 6$;
   GF: $2 \times 8 + 7 \div 5$; No; The value of $2 \times 8 + 7 \div 5$ is 17 2/5. Order of operations dictates that when the parentheses are in the expression, I perform the operation inside them, 8 + 7, first; but in the expression without parentheses, I start with multiplication and division from left to right, so the addition is the last operation I perform, making the values of the expressions different.

3. $(2 + 3) \times 4 = 20$; GF: $2 + 3 \times 4$; No, the value is 14.

4. 30; $10 \times 100$ is 1,000, and 1,000 divided by 1,000 is 1, so the value is 30. GF: Answers may vary.

5. 3 times greater; $\times 2$, $\times 6$; GF:




   The *y*-values increase more quickly in the second graph, so it looks steeper.

6. $(12 - 2) \times 5 = 50$; GF: $12 - 6 \div 3 \times 5 = 12 - 2 \times 5 = 12 - 10 = 2$

7. 40; GF: Jonathan performed the addition inside the parentheses before the division inside the parentheses. So he found the value of the expression inside parentheses as 5, when it should be 7.

8. 3; GF: No, parentheses are not needed. The fraction bar is a grouping symbol, and the order of operations is sufficient to evaluate the numerator.

9. 

| In | Out |
|---|---|
| 1 | 4 |
| 2 | 5 |
| 3 | 6 |

   , $n + 3$; 18; No, I can find the output value by using the rule.

10. Yes; 14; 14; 14; GF: Answers will vary.

11. B; A. $14 + 6 \div 2 = 14 + 3 = 17$; $8 + (3 + 3) \div 2 = 7$; $8 + 6 \div 2 = 11$; GF: A. $(14 + 6) \div 2 = 10$, C. $(8 + 3 + 3) \div 2 = 7$

12. The rule for Output 1 is "× 5"; the rule for Output 2 is "× 10"; Output 2 is twice Output 1; GF: Output 1 is 50; Output 2 is 100.

13. 32 small disks; 8 large disks; $\times 8$, $\times 2$; GF: The number of small disks is 4 times the number of large disks.

**14.** 2.5 more miles; "× 1.5" and "× 2";

| Day | Abby | Piper |
|---|---|---|
| 1 | 1.5 | 2 |
| 2 | 3 | 4 |
| 3 | 4.5 | 6 |
| 4 | 6 | 8 |
| 5 | 7.5 | 10 |

; GF: Piper runs 1 1/3 times the number of miles Abby runs.

**15.** 2 × (3 + 9) ÷ 6 = 4; GF: Answers may vary.

**16.** The first step is to add 5 + 4; GF: 3 + 7 × [(5 + 4) ÷ 3] – 7 = 3 + 7 × [9 ÷ 3] – 7 = 3 + 7 × 3 – 7 = 3 + 21 – 7 = 24 – 7 = 17

**17.** 3 × (6 – 4) × 2; GF: (3 × 6 – 4) × 2

**18.** 70 cakes and 2,800 cookies; × 10, × 400;

| Day | Cakes | Cookies |
|---|---|---|
| 1 | 10 | 400 |
| 2 | 20 | 800 |
| 3 | 30 | 1200 |
| 4 | 40 | 1600 |
| 5 | 50 | 2000 |
| 6 | 60 | 2400 |
| 7 | 70 | 2800 |

; GF: number of cookies = 40 × number of cakes

**19.**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Emma | 0 | 2 | 4 | 6 | 8 | 10 | 12 |
| Olivia | 0 | 6 | 12 | 18 | 24 | 30 | 36 |

; Olivia's values are 3 times Emma's; GF: 66

**20.** 8 × (3 + 2) ÷ (2 × 2) = 10; The word *quantity* tell me that the expression is in parentheses, so I evaluate it first. It is important because it tells me the order of operations to use; GF: Answers may vary.

## Grade 5: Number and Operations in Base Ten

**1.** 65 × 103; GF: 65 × 105; 650 × 104

**2.** 102; 77 ÷ 100 = 0.77; GF: 103

**3.** 103; 0.04 × 1000 = 40; GF: 104

**4.** >; GF: Answers will vary. Sample answer: 325,333 < 326,444

**5.** 800,000, 80, and 0.008; GF: 10,000 times

**6.** $523; 8368 ÷ 16 = 523; GF: I checked whether the solution was reasonable with place value: 8000 ÷ 10 = 800 and 8000 ÷ 20 = 400, so my solution seems reasonable.

**7.** 452.6; GF: Answers may vary.

**8.** 400 + 60 + 8 + 0.2 + 0.03 + 0.003; GF: four hundred sixty-eight and two hundred thirty-three thousandths

**9.** 674.58; GF: 675

**10.** 2,240 books; $n = 140 \times 16$; $n = 2240$; GF: Answers will vary.

**11.** About 22 crackers; 2,200 ÷ 100 = 22; GF: 2,240 ÷ 98 = 22 R 84; less than 1 cracker different

**12.** 224; GF: Answers may vary.

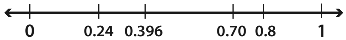
**13.** 173,740;

| | 300 | 60 | 5 |
|---|---|---|---|
| 400 | 120,000 | 24,000 | 2,000 |
| 70 | 21,000 | 4,200 | 350 |
| 6 | 1,800 | 360 | 30 |

120,000
24,000
2,000
21,000
4,200
350
1,800
360
30
173,740 ;

GF: Answers may vary.

**14.** 0.24, 0.396, 0.70, 0.8;

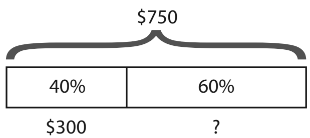



;

GF: 0.8, 0.70, 0.396, 0.24

**15.** 0.6; When I divide 6,000 by 104, I am dividing 6 × 103 by 104, which simplifies to 6 divided by 10, so the answer is 0.6; GF: Answers may vary.

**16.** $450;




$750 × 0.40 = $300
$750 – $300 = $450

;

750 – 300 = 450; GF: Answers will vary.

**17.** 105.9; The number in the tenths place is 8, so I round up to 105.9; GF: 106.0

**18.** 377 bags; 7.25 × 52 = 377; GF: The weight and cost of each bag is not needed to solve the problem.

**19.** 1,056 seedlings; 120 + 56 = 176 trays; 176 × 6 = 1,056 seedlings; GF: Answers may vary.

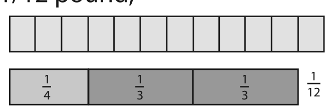
**20.** 120 eggs at the first market; 50 eggs at the second market; Answers will vary: sample answer:

| 1st mkt | 2nd mkt | Total |
|---|---|---|
| 50 | 15 | 65 |
| 80 | 30 | 110 |
| 100 | 40 | 140 |
| 120 | 50 | 170 |

; GF: Sample answer: I tried values for the number of eggs at the first market and used the expression *f* ÷ 2 – 10 to find the values for the number of eggs at the second market. Then I added the two values to find the total. I kept trying values until the total equaled 170.

## Grade 5: Number and Operations – Fractions

**1.** 1/12 pound;



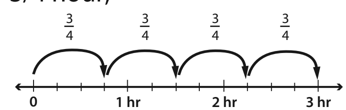

;

3/12 + 8/12 + *n* = 1; *n* = 1/12; GF: Answers may vary.

**2.** 7/8; picture of 7 sandwiches divided into 8 shares and labeled (each share is 7/8 of a sandwich); GF: Answers will vary.

**3.** 7/10; 4/10 + 3/10 = 7/10; GF: I had to change 2/5 to 4/10 so I could add like denominators.

**4.** 3/4 hour;




;

GF: 3 ÷ 4; The fraction bar in a fraction represents division.

**5.** 3; 3/4 + 3/4 + 3/4 + 3/4 = 12/4 = 3; GF: 4 × 3/4 = 12/4 = 3

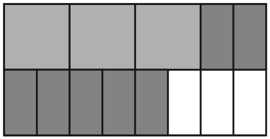
**6.** 64; 8 ÷ 1/8 = 64/1 = 64; GF: Answers may vary.

**7.** 11/12 of the pizza; 3/4 + 1/6 = 9/12 + 2/12 = 11/12; GF: 1/12

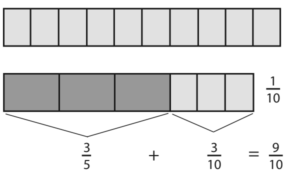
**8.** 7/5; 1 2/5; GF: Answers will vary.

**9.** 1/8(3 + 4) = 1/8(7) = 7/8;

GF: Answers will vary.

**10.** 13/16; ;
3/8 + 7/16 = 13/16; GF: Answers will vary.

**11.** 9/10; 1/10;




;
3/5 + 3/10 = 6/10 + 3/10 = 9/10; 10/10 – 9/10 = 1/10; GF: Answers may vary.

**12.** 3; 4 × 3/4 = 12/4 = 3; GF: Answers will vary.

**13.** 9/16; I multiplied 3/4 × 3/4 to get the fraction of the square that is shaded both ways; GF: Yes; the area of the part that is shaded both ways is *l* × *w* = 3 × 3 = 9, and the area of the largest square is *l* × *w* = 4 × 4 = 16, so the fraction I'm looking for is 9/16.

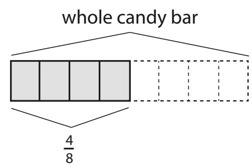
**14.** True; Sample answer: 8 × 3/4 = 6; GF: Answers will vary.

**15.** True; Sample answer: 6 × 1 1/3 = 8; GF: Answers will vary.

**16.** 4 fish; 2/5 × 10 = 20/5 = 4; GF: 6 fish; Sample solutions: 10 – 4 = 6 or 5/5 – 2/5 = 3/5 or 10 × 3/5 = 30/5 = 6

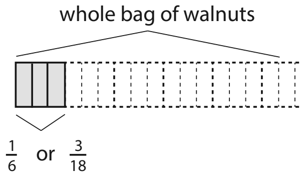
**17.** 2 × 3/4 = 6 1/2 square meters; GF: Yes, *A* = *l* × *w*.

**18.** 1/8;




;
1/4 × 1/2 = 1/8 or 1/2 ÷ 4 = 1/8; GF: 3/16; 1/4 × 3/4 = 3/16 or 3/4 ÷ 4 = 3/16

**19.** 1/18;




;
1/3 × 1/6 = 1/18 or 1/6 ÷ 3 = 1/18; GF: Answers will vary.

**20.** 20 servings; 5 ÷ 1/4 = 20 or 5 ÷ 1/4 = 20/1 = 20; GF: Answers may vary.

**Grade 5: Measurement and Data**

**1.** 3000; GF: L × 1000 = mL; mL ÷ 1000 = L

**2.** 100; GF: Answers will vary.

**3.** 10 cm; *l* × *w* × *h* = *V*; 20 × w × 30 = 6000; *w* = 10; GF: Answers may vary.

**4.** 12 inches; multiplication and then addition; GF: Answers may vary.

**5.** 15 cubic centimeters; *V* = *l* × *w* × *h*; *V* = 1 × 3 × 5 = 15; GF: Answers will vary.

**6.** 171 cubic centimeters; First I need to find each volume. Then I need to add those volumes together; $3 \times 3 \times 9 = 81$; $2 \times 5 \times 9 = 90$; $81 + 90 = 171$; GF: Answers may vary.

**7.** 1540 meters; GF: No; Answers will vary. Sample answer: Millimeters is too small a unit of measurement to measure a rope. Even a short length of rope will probably measure a very large number of millimeters.

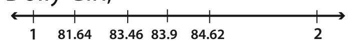
**8.** True; $6 \times 6 \times 1 = 36$; $36 \times 1 \times 1 = 36$; Both prisms have a volume of 36 cubic units; GF: Answers will vary.

**9.** 25 sugar cubes; $6n = 150$ or $150/6 = n$; $n = 25$; GF: Answers may vary.

**10.** 11 feet 3 inches; Sample answers: $S = 3(2.5) = 7.5$; $L = 1/2 \times 2.5 = 1.25$; $T = 2.5 + 7.5 + 1.25 = 11.25$; or $S = 3 \times 30 = 90$ in.; $L = 1/2 \times 30 = 15$ in.; $30 + 90 + 15 = 135$ in. or 11 ft 3 in.; GF: Answers may vary.

**11.** 10 m 35 cm; GF: No; I can work in meters: Andrew jumped 3.75 meters, Nick jumped 2.5 meters, and Cooper jumped 4.1 meters, so all I need to do is add the three decimals.

**12.** Dolly Girl;

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GF: Each horse's finish time rounds to 1 minute.

**13.** 1/2 liter; $6 \div 12 = 1/2$; GF: 1/2 liter $\times$ 100 centiliters per liter = 50 centiliters

**14.** 20 centimeters; $V = l \times w \times h$; $30{,}000 = 50 \times 30 \times h$; $h = 20$; GF: 200 cm; $30{,}000{,}000 = 500 \times 300 \times h$; $h = 200$

**15.** 40 pints; 5 gallons $\times$ 8 pints = 40 pints; GF: 3/4 gallon

**16.** Sample answer: Each cube is 1 cubic unit and there are 5 cubes altogether, so the volume is 5 cubic units. GF: Answers will vary.

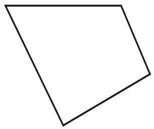
**17.** 34 cubic centimeters; Answers will vary; sample answer: I divided the figure into 4 rectangular solids and computed the volume of each one, then added the 4 volumes together. GF: This figure is not a rectangular solid, so the volume formula won't work.

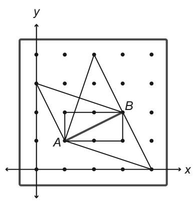
**18.** 128 cakes; 8 gallons $\times$ 16 cups per gallon = 128 cups; GF: 120 cakes ($30{,}000 \div 250 = 120$)

**19.** 300 cm; 75 mm; 41,000 cm; 4200 m; 3 m $\times$ 100 cm per m = 300 cm; 7.5 cm $\times$ 10 mm per cm = 75 mm; 410 m $\times$ 100 cm per m = 41,000 cm; 4.2 km $\times$ 1000 m per km = 4200 m; GF: Yes; all the conversion factors are powers of 10.

**20.** 23 hours; $2/4 + 2 + 6/4 + 4 + 5 + 3 + 7 = 8/4 + 21 = 2 + 21 = 23$; GF: 1 hour

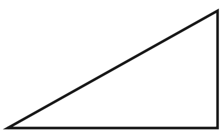
## Grade 5: Geometry

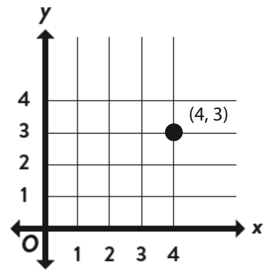
1. C; GF: No; Not all quadrilaterals have two sets of parallel and equal-length sides; Sample drawing: 

2. 5; 

GF: Answers may vary.

3. False; GF: Answers will vary.

4. C;  ; GF: The measures of the angles inside a triangle must add to 180°. A right triangle can only have one 90° angle; the other two angles add to 90°, so they must both be acute. It is impossible for a right triangle to have an obtuse angle. An equilateral triangle must have three equal sides as well as three equal angles. The sides of a right triangle can be different lengths.

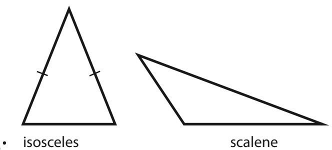
5. (4, 3); 

; GF: Answers may vary.

6. D;  ; GF: parallelograms, parallelograms

7. Yes; GF: Answers will vary. Sample answers: trapezoid, kite, triangle.

8. False; A kite has two pairs of equal-length sides that are adjacent to each other but not necessarily parallel. In a rhombus, all sides must be of equal length, and opposite sides must be parallel; GF: Answers will vary. Sample T-F statement: A trapezoid and a parallelogram both have four sides, so a trapezoid is a parallelogram.

9. B; 

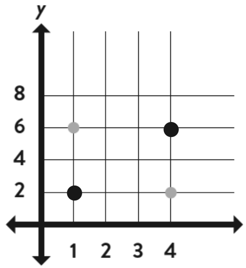
; GF: Answers will vary.

10. B; (4, 2); GF: Answers may vary.

11. \$50; (10, 50); He earns \$5 for each hour he works, so he earns \$5 × 10 = \$50 for 10 hours of work; GF: \$75; Use the rule "× 5."

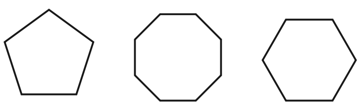
12. A; GF: (7, 7)

13. (1, 2) or (4, 6);

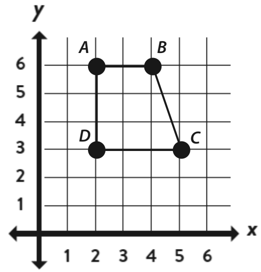



;
GF: (1, 2) or (4, 6)

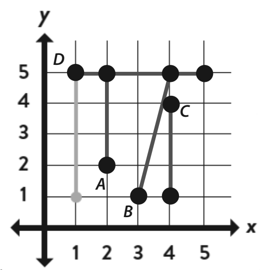
**14.** D; *Congruent* means having the same measure; in a regular polygon, all sides are congruent and all angles are congruent; GF: Sample answer:



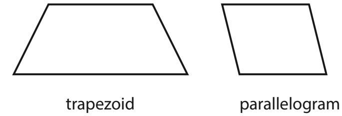
**15.** True; A rhombus has four congruent sides, but its angles do not have to be 90°. A rectangle is a parallelogram with four right angles. So a rhombus is not a rectangle; GF: Answers may vary. Sample answer: "A rhombus is a parallelogram, a quadrilateral, and a rectangle."

**16.** 


;
*AB* and *DC* are parallel; *AD* is perpendicular to both *AB* and *DC*; trapezoid; GF: Answers will vary.

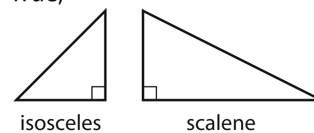
**17.** A and C; 


;
GF: Yes: the first line segment is vertical—the *x*-coordinates of its points are the same. So I can pick answers with *x*-coordinates that are the same to find more vertical segments.

**18.** 


;
A parallelogram has two sets of opposite sides that are parallel; a trapezoid has only one set of parallel sides; GF: Yes; A rhombus is a special kite in which all sides have equal length.

**19.** True;




;
GF: No; Since the measures of the angles inside a triangle add up to 180° and one of the three angles has to measure 90°, the other two angles must be acute.

**20.** Regular polygons; All these figures have all sides the same length, which makes them regular polygons; GF: Answers will vary.