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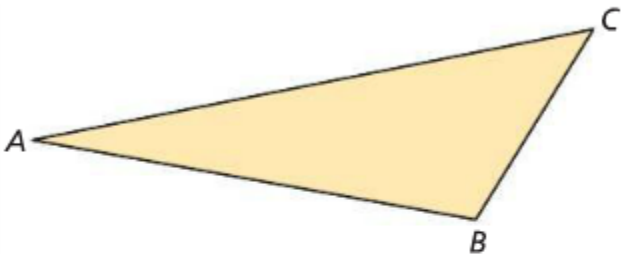
8. Make a second copy of the trapezoid you used for Problem 5 in Lesson 3.1. Dissect it so that the pieces form a triangle.

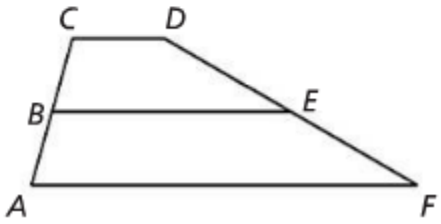
9. Use a dissection argument. Show that $\triangle ABC$ is scissors-congruent to a right triangle.



10. Cut a square into a rectangle that has a base congruent to one of the square's diagonals. Describe your steps.

11. **Take It Further** Start with an isosceles triangle with two sides of length s. Dissect it into two parts that you can rearrange to form a new isosceles triangle with two sides of length s. Are the two isosceles triangles congruent? Explain.

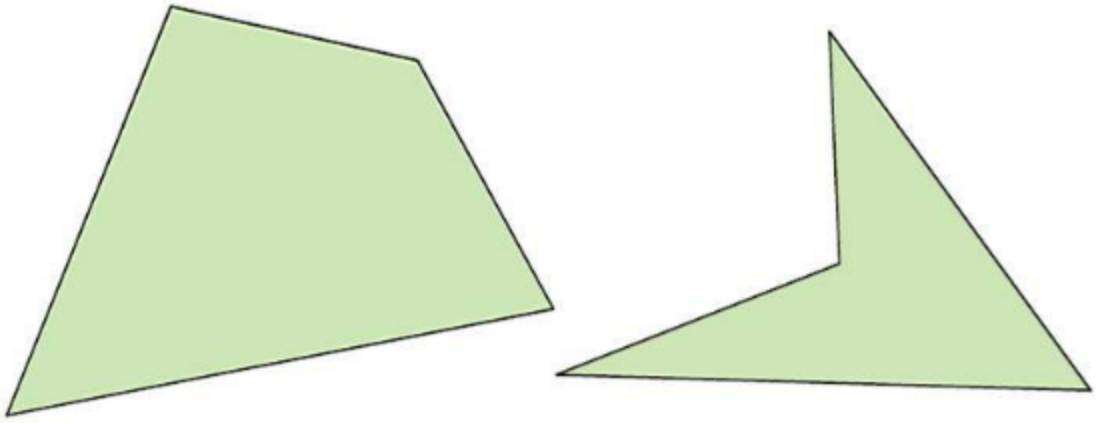
12. **Standardized Test Prep** $ACDF$ is a trapezoid. B is the midpoint of $\overline{AC}$, and E is the midpoint of $\overline{DF}$. CD is 1.00 m. BE is 2.75 m. What is AF?



A. 1.875 m **B.** 3.75 m

C. 4.50 m **D.** 5.50 m

13. **Take It Further** Can you dissect any quadrilateral into a rectangle? Trace each figure. Then try to cut and rearrange it into a rectangle.



14. **Take It Further** If you suspect that two shapes have unequal areas, how could you show that one has greater area than the other?

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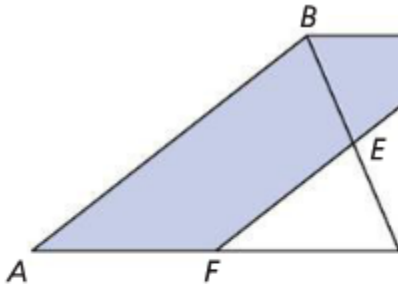
On Your Own

4. **Standardized Test Prep** In $\triangle ABC$, E and F are midpoints. The area of $\triangle ABC$ is 30 cm^2. What is the area of parallelogram $ABIF$?



A. 15 cm^2 **B.** 20 cm^2 **C.** 30 cm^2 **D.** 60 cm^2

5. Write an algorithm for tying your shoelace. Be precise. Do not leave out any steps.

6. Write an algorithm for multiplying a three-digit number by a two-digit number.

Assume you know how to multiply two one-digit numbers.

7. Write final versions of dissection algorithms for the three dissections (See Exercise 1.) Be as clear as possible.

a. Dissect a parallelogram into a rectangle.

b. Dissect a triangle into a rectangle.

c. Dissect a trapezoid into a rectangle.

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5. Write an algorithm for dissecting a parallelogram into a triangle.

6. Justify each step you used in the dissection of the parallelogram into a triangle.

7. Write an algorithm for dissecting a triangle that is isosceles (but not equilateral) and rearranging it into a scalene triangle.

8. Justify each step you can use in the dissection of an isosceles triangle into a scalene triangle.

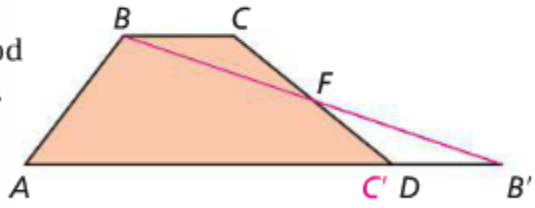
9. Suppose that Jane has an algorithm for dissecting a trapezoid into a rectangle. Explain how you could use Jane's steps to dissect a rectangle into a trapezoid.

10. Use your algorithms for dissecting a trapezoid into a rectangle and dissecting a rectangle into a nonrectangular parallelogram. Describe an algorithm for dissecting a trapezoid into a nonrectangular parallelogram.

11. Use your algorithms for dissecting a trapezoid into a rectangle and dissecting a triangle into a rectangle. Describe an algorithm for dissecting a trapezoid into a triangle.

12. The diagram suggests Noriko's method for cutting a trapezoid into a triangle.

Answer the questions to help her justify her method.



a. What point on $\overline{CD}$ does she need to find so that $\overline{CF}$ matches with $\overline{DF}$?

b. Will the edge from B to B' be straight? How do you know?

c. Will the edge from A to B' be straight? How do you know?

13. **Standardized Test Prep** What can you conclude from Noriko's method for dissection in Exercise 12?

A. area of $\triangle ABB'$ + area of $\triangle BCF$ + area of $\triangle FDB$ = area of $\triangle BCD$

B. area of $\triangle ABB'$ = area of $ABCD$

C. area of $\triangle BCF$ + area of $ABFD$ − area of $\triangle FB'D$ = area $ABCD$

D. area of $\triangle BCF$ + area of $ABFD$ − area of $\triangle FB'D$ = area $\triangle ABB'$

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5. One side of a triangle has length 12.
   a. How long is the segment that joins the midpoints of the other two sides?
   b. How long would the segment joining the midpoints be if the side of the triangle had length 10? Length 18? Length 19?

6. A kite has diagonals with lengths 5 and 8. You form an inner quadrilateral by joining the midpoints of the kite's sides. What is the perimeter of the inner quadrilateral? Describe its angles.

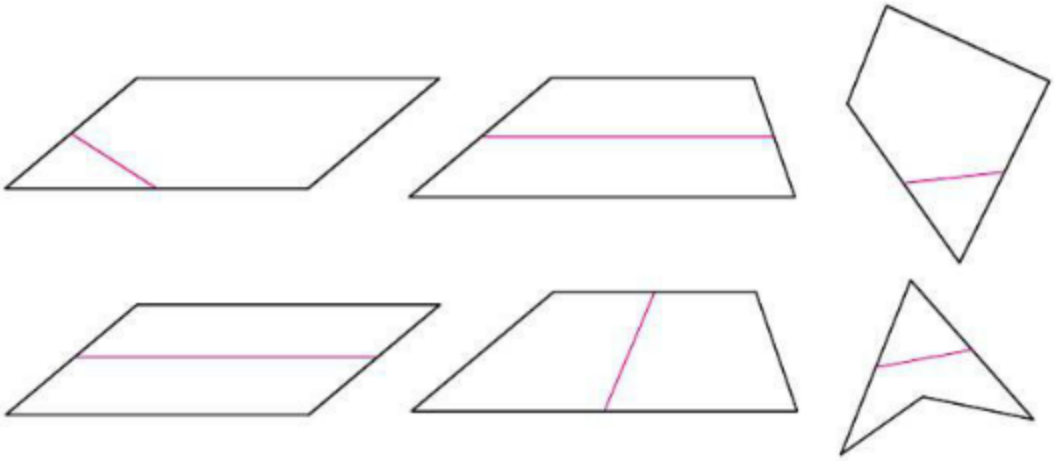
7. The diagonals of a quadrilateral measure 12 and 8. You form an inner quadrilateral by joining the midpoints of the sides of the given quadrilateral. What is the perimeter of the inner quadrilateral?

8. What kind of quadrilateral do you get when you connect the midpoints of a kite? You may want to use geometry software to experiment.

9. Standardized Test Prep The lengths of the diagonals of a quadrilateral are 30 cm and 40 cm. What is the perimeter of the polygon you get when you connect the midpoints of the adjacent sides of this quadrilateral?

A. 25 cm **B.** 50 cm **C.** 70 cm **D.** 100 cm

10. Take It Further You can generalize the idea of a midline (a segment joining midpoints of two sides of a triangle) to quadrilaterals. Here are some possible midlines for quadrilaterals.



Experiment with the possible meanings of *midline* for a quadrilateral. Can you find any relationship between a midline and the sides of a quadrilateral? Between a midline and a diagonal? Answer the following questions.

a. How do you define *midline* for a quadrilateral? Does it join any two midpoints? Two opposite midpoints? Two consecutive midpoints?

b. With what kinds of quadrilaterals did you experiment?

c. What did you find? Are there any special properties of a midline of a quadrilateral? Can you make any conjectures?