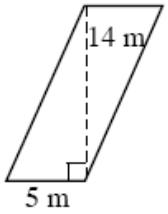
Review & Preview

2-127. Simplify each multiplication problem below.

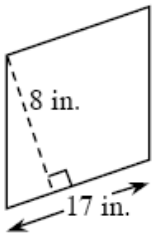
a. $\frac{5}{8} \cdot \frac{2}{3}$ b. $\frac{3}{4} \cdot \frac{2}{5}$

2-128. Find the area of each parallelogram. Show all of your work. Use the Math Notes box if you need help.

a.

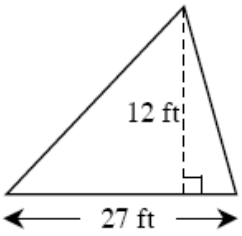


b.

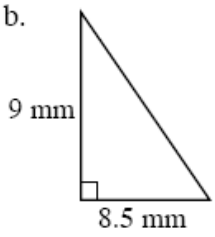


2-129. Find the area of the following triangles. Show all your work.

a.



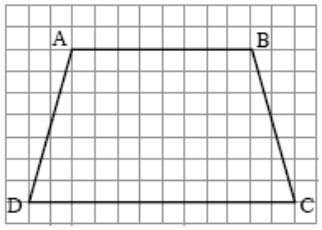
b.



2-130. Simplify the expressions below.

a. $8 - 13 - (-4)$ b. $4 - (-7) + (-2)$ c. $-7 + 3 - 20$

2-131. Copy the trapezoid at right on grid paper.



a. Find the length of the bottom base (segment CD), the length of the top base (segment AB), and the distance between the two bases. Use grid units.

b. Use what you learned about cutting up figures to find the area of the trapezoid.

2-132. Draw a coordinate grid, then plot and connect the following points: $A(-3, 1)$, $B(-1, 3)$, $C(4, 2)$, $D(2, 0)$.

a. What is the shape you created?

b. Reflect the shape across the x-axis. List the coordinates of the new points.

c. Multiply each coordinate of the original shape by three. Graph the dilated shape. What are the new coordinates of the points?

2.3.5 How can I find the area?

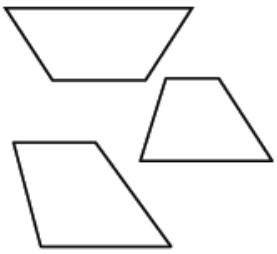
Area of Trapezoids

In this chapter, you have used the process of cutting apart and rearranging shapes to help you find their areas. You have also made some shapes larger to help find their area. In this chapter you have developed several different **strategies** for finding the area of shapes. For example, you have found the sum of the areas of multiple smaller parts, rearranged smaller parts into rectangles to find area, and made shapes bigger in order to find their area. In this lesson you will focus on how to **choose a strategy** to find the area of a new shape: a trapezoid. As you work with your team, practice **visualizing** how each shape can be changed or rearranged. Ask each other these questions:

What **strategy** should we **choose**?

Which lengths are important?

2-133. AREA CHALLENGE — TRAPEZOIDS



So far in this chapter, you have learned how to find the area of an unfamiliar shape by cutting and rearranging pieces to form a parallelogram or rectangle. Will these **strategies** work to find the area of a **trapezoid** (a shape like the ones at right, with four sides and at least one pair of opposite sides that are parallel)?

To investigate how to find the area of this new shape, get a set of three trapezoids from the Lesson 2.3.5A Resource Page.

Your task: Work with your team to identify at least two ways to rearrange a trapezoid into another shape (or set of shapes) for which you could find the area. Then discuss how you could find the area of each original trapezoid. Use the Discussion Points below to get started.

Discussion Points

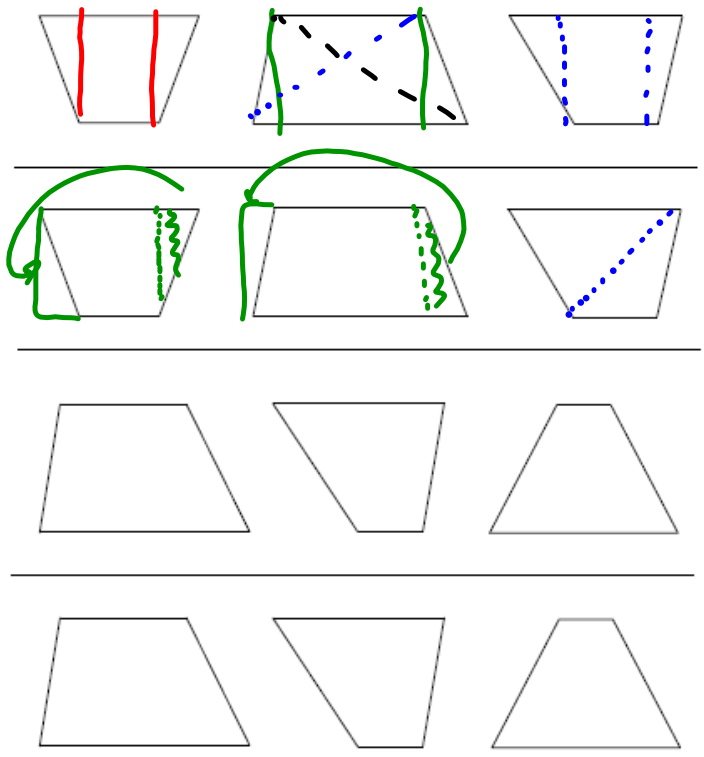
How can we cut and rearrange a trapezoid
into another shape for which you can find the area?

What shapes can we make from two congruent (identical) trapezoids?

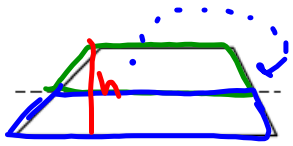
Which lengths are needed to find the area?

How is the area of each original trapezoid related to the area of the other shapes you created?

Lesson 2.3.5A Resource Page

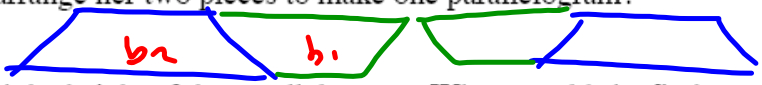


2-134. Sheila thinks she can make a trapezoid into a parallelogram (and then a rectangle). She started by folding her trapezoid so that the two parallel sides lined up. She then cut along the fold line (the dashed line in the picture).



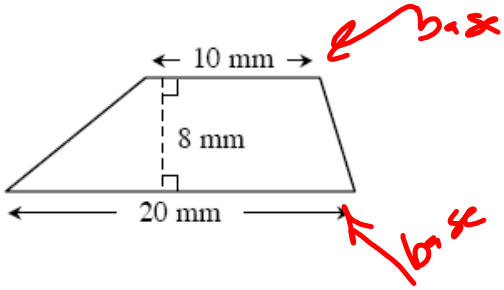
a. Fold and cut one of your trapezoids in the way Sheila did. What two new shapes have you created? two smaller trapezoids

b. How can Sheila rearrange her two pieces to make one parallelogram? Sketch her shape.



c. Locate the base and the height of the parallelogram. Where could she find these lengths on her original trapezoid? $\frac{h}{2}(b_1 + b_2)$

2-135. AREA OF A TRAPEZOID



Dejon's homework tonight includes a problem where he has to find the area of the trapezoid at right.

a. Draw a copy of Dejon's trapezoid on your paper. Then choose a way to form a parallelogram. Sketch the rearrangement on your paper and label the base and height of the parallelogram.

b. Find the lengths on the trapezoid that make the base of the parallelogram. These lengths are called the **bases** of the trapezoid.

10 mm & 20mm

c. Where can you **see** the height of the parallelogram on the trapezoid? What does it measure?

8 mm

d. Find the area of the new parallelogram or rectangle. How is this area related to the area of the trapezoid? Explain how you found your answer.

e. If you have not already done so, find the area of the trapezoid.

d.) & e.) ① Add bases = 10 + 20 = 30

② take that answer times the height

⇒ 30 × 8 = 240

③ divide that answer by 2 ⇒ $\frac{240}{2}$

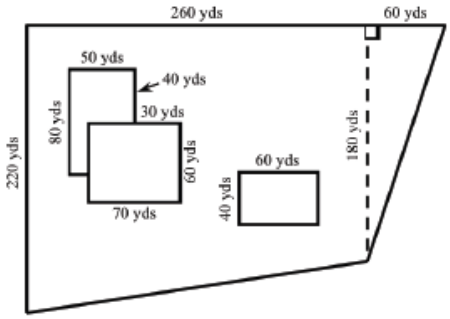
$= 120\ mm^2$

$$\frac{h(b_1 + b_2)}{2}$$

2-136. PARK PROBLEM REVISITED

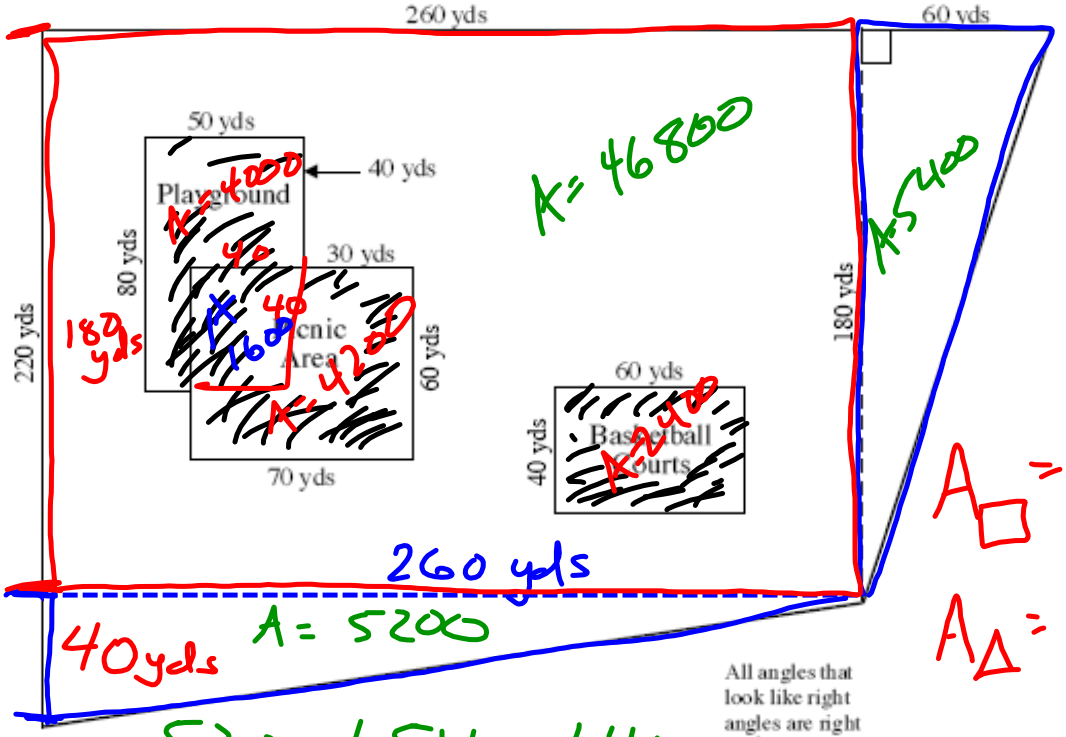
At the beginning of Section 2.2, your team looked at problem 2-90, Planning for the Park. In this park, the city planners are trying to figure out the size of the grassy area that they need to mow so they can determine the mowing costs for their budget.

Using what your team now knows about finding the areas of rectangles, parallelograms, triangles, and trapezoids, and using the Lesson 2.3.5CB Resource Page, calculate the area of the park that will need to be mowed. Assume that all angles that appear to be right angles are right angles. If you have time, find two different ways to find the total area. Be sure to show all of your work so that you can explain your **strategies** to other teams.



Lesson 2.3.5C Resource Page

Planning for the Park



$A = 46800$

$A = 5400$

$A = 4000$

$A = 1600$

$A = 4200$

189 yds

260 yds

40 yds

$A = 5200$

$A_{\square} = b \cdot h$

$A_{\Delta} = \frac{b \cdot h}{2}$

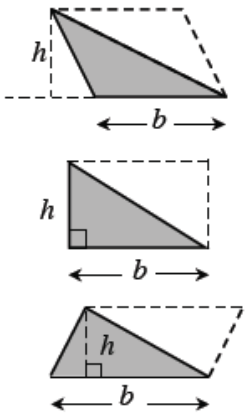
$5200 + 5400 + 46800 + 1600 - 4000 - 2400 - 4200$

METHODS AND MEANINGS

MATH NOTES

Area of a Triangle

Since two copies of the same triangle can be put together along a common side to form a parallelogram with the same base and height as the triangle, then the area of a triangle must equal half the area of the parallelogram with the same base and height.



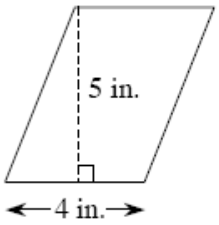
Therefore, if b is the base of a triangle and h is the height of the triangle, we can think of triangles as "half parallelograms" and calculate the area of any triangle:

$$A = \frac{1}{2}bh$$

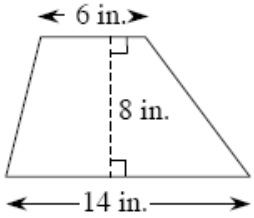
Review & Preview

2-137. Use any of your new **strategies** to find the area of the shapes below. The information in the Math Notes boxes may help. Assume the shape in part (a) is a parallelogram, and the shape in part (b) is a trapezoid.

a.



b.



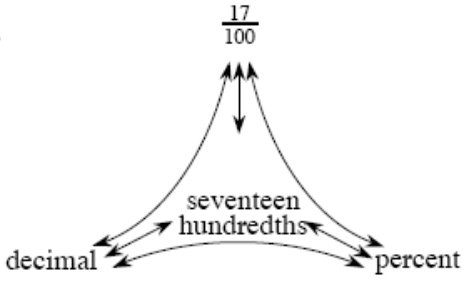
2-138. Carmen is drawing a card from a standard deck of playing cards. What is the probability that:

a. She will draw a heart?

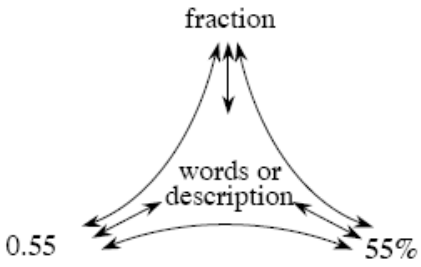
b. She will *not* draw a club?

2-139. Complete the Portions Webs below.

a.



b.



2-140. One-third of a rectangular playground is designed for young children. In that part of the playground, a play structure covers $\frac{2}{5}$ of the children's space.

a. Represent the portion of the playground that is the play structure with a drawing.

b. Represent the problem with multiplication.

c. What fraction of the total playground is the play structure? Show all of your work.

2-141. Christina collected the ages of the players on her softball team. The team ages were: 10, 12, 14, 13, 12, 11, 13, 12, 11, 12, 12, and 13. Christina wants to describe the players' ages in an article for the school newspaper. Since she did not want to list all of the ages, should she use the range or a measure of central tendency (mean, mode, median) to describe them? **Justify** your choice.