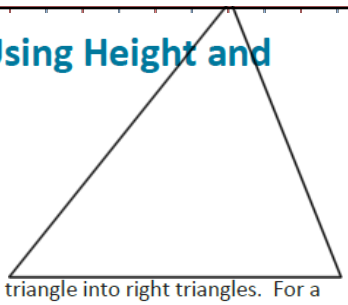
Lesson 3: The Area of Acute Triangles Using Height and Base



Student Outcomes

- Students show the area formula for a triangular region by decomposing a triangle into right triangles. For a given triangle, the height of the triangle is the length of the altitude. The length of the base is either called the length base or, more commonly, the base.
- Students understand that the height of the triangle is the perpendicular segment from a vertex of a triangle to the line containing the opposite side. The opposite side is called the base. Students understand that any side of a triangle can be considered a base and that the choice of base determines the height.

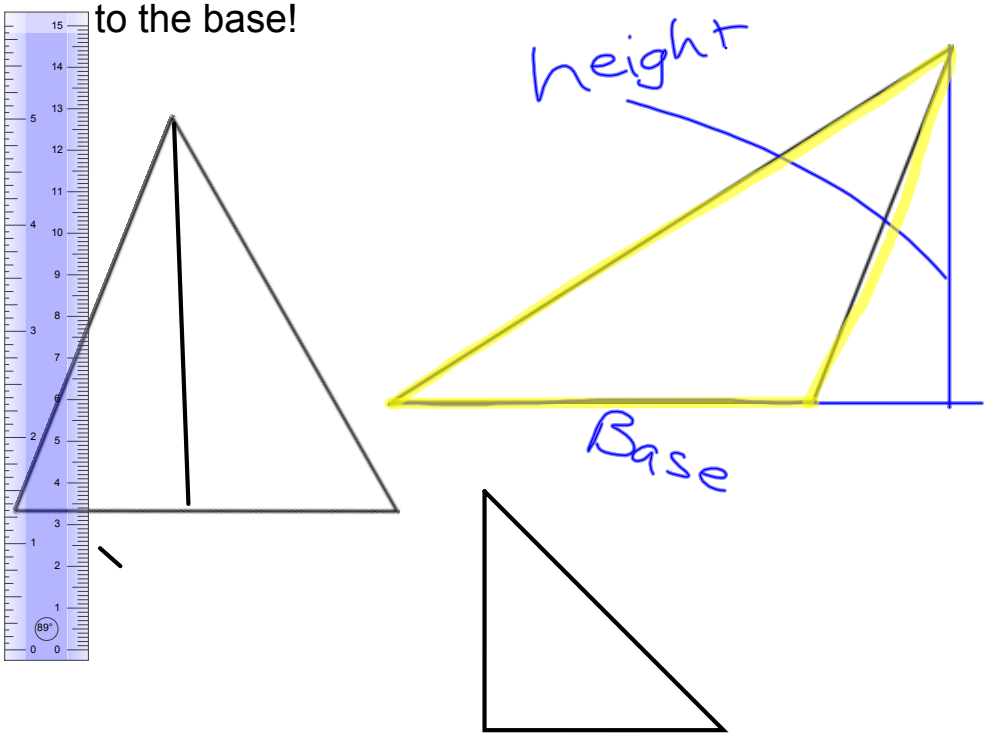
Lesson 4: The Area of Obtuse Triangles Using Height and Base

Student Outcomes

- Students construct the altitude for three different cases: an altitude that is a side of a right angle, an altitude that lies over the base, and an altitude that is outside the triangle.
- Students deconstruct triangles to justify that the area of a triangle is exactly one half the area of a parallelogram.

Apr 2-5:34 AM

Turn to the end of lesson 3 and let's practice finding the height or altitude on some triangles.
*Reminder=Make sure your line is perpendicular to the base!

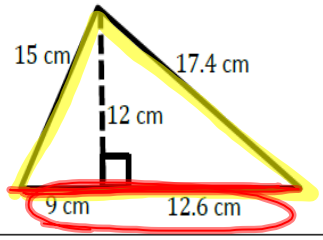
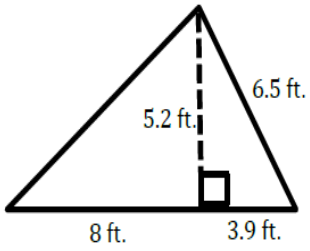


Apr 2-6:03 AM

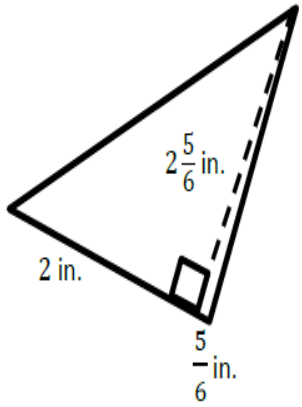
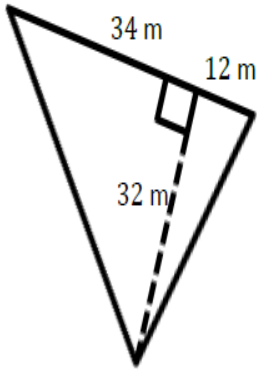
Classwork

Exercises

1. Work with a partner on the exercises below. Determine if the area formula $A = \frac{1}{2}bh$ is always correct. You may use a calculator, but be sure to record your work on your paper as well.

	Area of Two Right Triangles	Area of Entire Triangle
		$A = \frac{1}{2}bh$ $A = \frac{1}{2}(21.6)(12)$ $A = 129.6\ cm^2$
		$A = \frac{1}{2}bh$ $A = \frac{1}{2}(11.9)(5.2)$ $A = 30.94\ ft^2$

Apr 2-6:06 AM

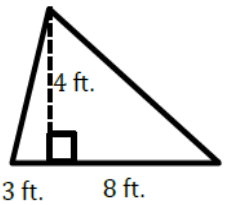
		
		

Apr 2-6:07 AM

2. Can we use the formula $A = \frac{1}{2} \times base \times height$ to calculate the area of triangles that are not right triangles? Explain your thinking.

3. Examine the given triangle and expression.

$$\frac{1}{2}(11 \text{ ft.})(4 \text{ ft.})$$



Explain what each part of the expression represents according to the triangle.

4. Joe found the area of a triangle by writing $A = \frac{1}{2}(11 \text{ in.})(4 \text{ in.})$, while Kaitlyn found the area by writing $A = \frac{1}{2}(3 \text{ in.})(4 \text{ in.}) + \frac{1}{2}(8 \text{ in.})(4 \text{ in.})$. Explain how each student approached the problem.

Apr 2-6:07 AM

5. The triangle below has an area of 4.76 sq. in. If the base is 3.4 in., let h be the height in inches.

a. Explain how the equation $4.76 \text{ in}^2 = \frac{1}{2}(3.4 \text{ in.})(h)$ represents the situation.

Solve Algebraicly

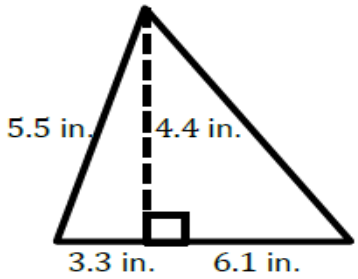
b. Solve the equation.

Apr 2-6:08 AM

Problem Set

Calculate the area of each shape below. Figures are not drawn to scale.

1.



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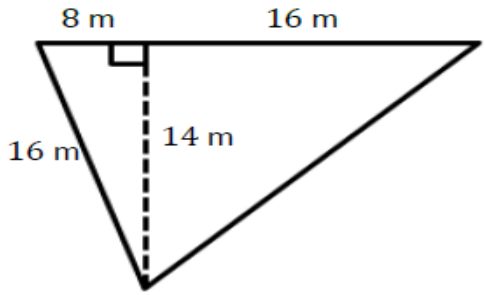

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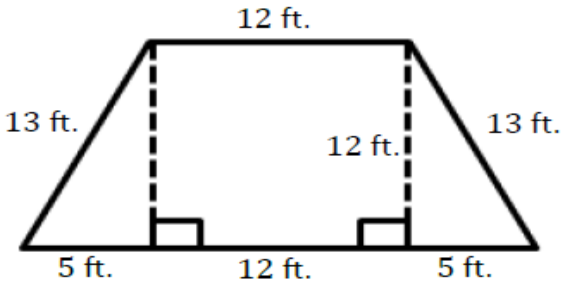
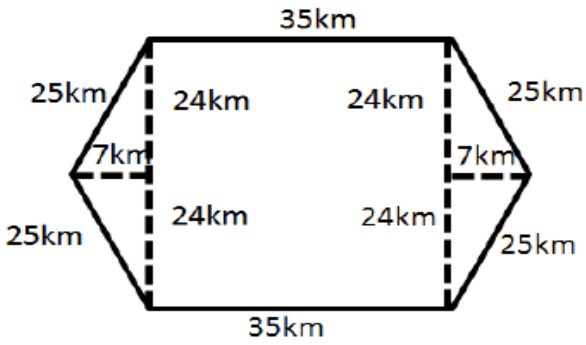
3.



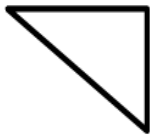
4.



Apr 2-6:09 AM

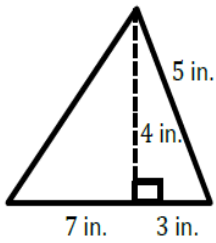
5. Immanuel is building a fence to make an enclosed play area for his dog. The enclosed area will be in the shape of a triangle with a base of 48 in. and an altitude of 32 in. How much space does the dog have to play?

6. Chauncey is building a storage bench for his son's playroom. The storage bench will fit into the corner and then go along the wall to form a triangle. Chauncey wants to buy a cover for the bench.



If the storage bench is $2\frac{1}{2}$ ft. along one wall and $4\frac{1}{4}$ ft. along the other wall, how big will the cover have to be in order to cover the entire bench?

7. Examine the triangle to the right.



a. Write an expression to show how you would calculate the area.

b. Identify each part of your expression as it relates to the triangle.

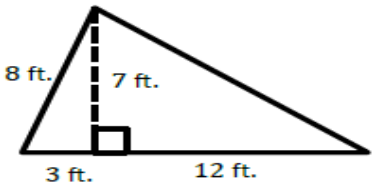
8. A triangular room has an area of $32\frac{1}{2}$ sq. m. If the height is $7\frac{1}{2}$ m, write an equation to determine the length of the base, b, in meters. Then solve the equation.

Apr 2-6:09 AM

Exit Ticket

Calculate the area of each triangle using two different methods. Figures are not drawn to scale.

1.



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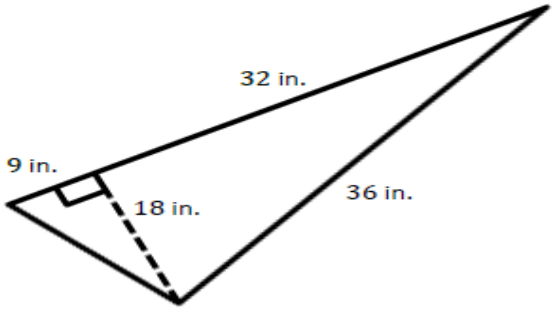

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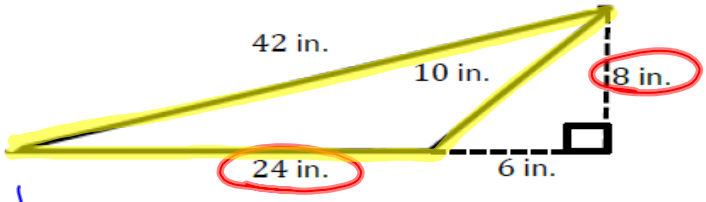
Exercises

Calculate the area of each triangle. Figures are not drawn to scale.

6.

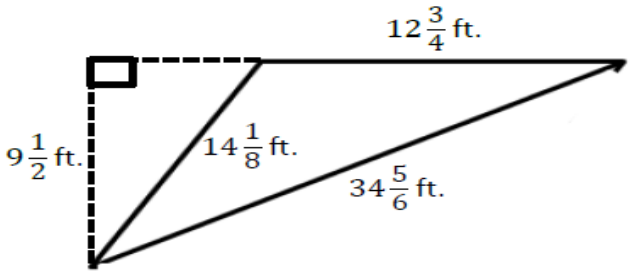


$A = \frac{1}{2}bh$

$A = \frac{1}{2}(24)(8)$

$A = 96 in^2$

7.



Apr 2-6:11 AM

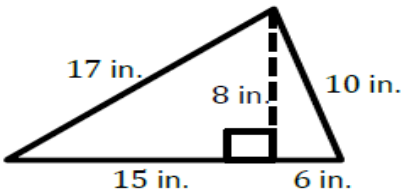
8. Draw three triangles (acute, right, and obtuse) that have the same area. Explain how you know they have the same area.

Apr 2-6:12 AM

Problem Set

Calculate the area of each triangle below. Figures are not drawn to scale.

1.



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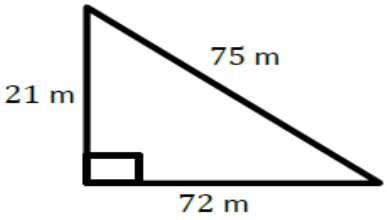

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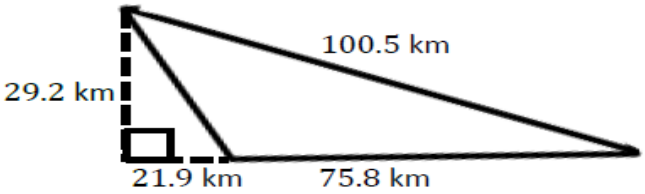

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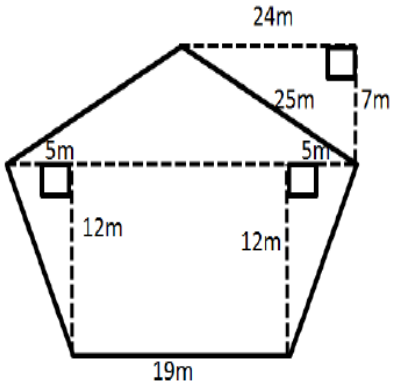
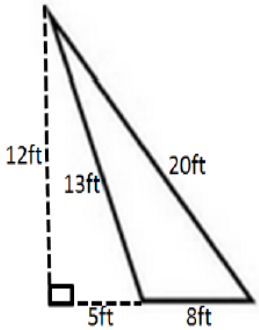
4.



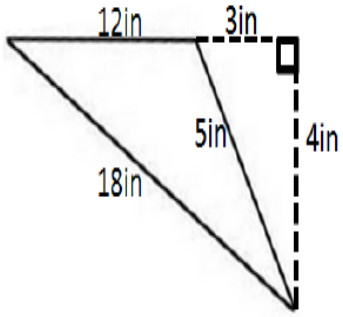
5. The Anderson's were going on a long sailing trip during the summer. However, one of the sails on their sailboat ripped, and they have to replace it. The sail is pictured below.

If the sailboat sales on are sail for $2 a square foot, how much will the new sale cost?



Apr 2-6:13 AM

6. Darnell and Donovan are both trying to calculate the area of an obtuse triangle. Examine their calculations below.

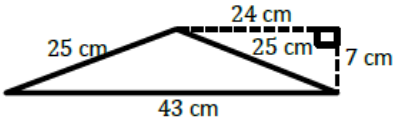


Darnell's Work	Donovan's Work
$A = \frac{1}{2} \times 3 \text{ in.} \times 4 \text{ in.}$ $A = 6 \text{ in}^2$	$A = \frac{1}{2} \times 12 \text{ in.} \times 4 \text{ in.}$ $A = 24 \text{ in}^2$

Which student calculated the area correctly? Explain why the other student is not correct.

Apr 2-6:13 AM

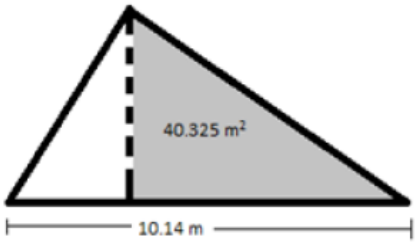
7. Russell calculated the area of the triangle below. His work is shown.



$$A = \frac{1}{2} \times 43 \text{ cm} \times 7 \text{ cm}$$
$$A = 150.5 \text{ cm}^2$$

Although Russell was told his work is correct, he had a hard time explaining why it is correct. Help Russell explain why is calculations are correct.

8. The larger triangle below has a base of 10.14 m; the gray triangle has an area of 40.325 m^2.



a. Determine the area of the larger triangle if it has a height of 12.2 m.

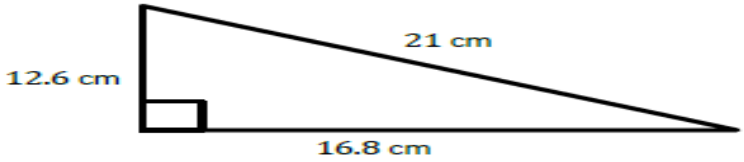
b. Let A be the area of the unshaded (white) triangle in square meters. Write and solve an equation to determine the value of A, using the areas of the larger triangle and the gray triangle.

Apr 2-6:14 AM

Exit Ticket

Find the area of each triangle. Figures are not drawn to scale.

1.



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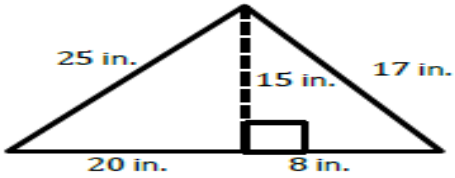

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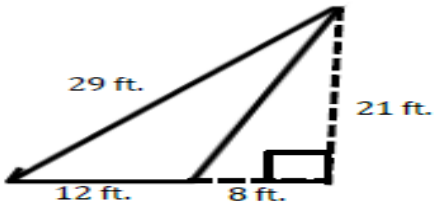

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