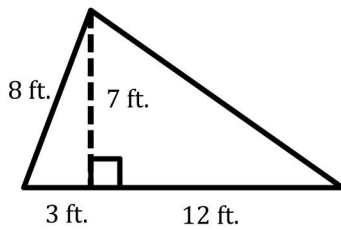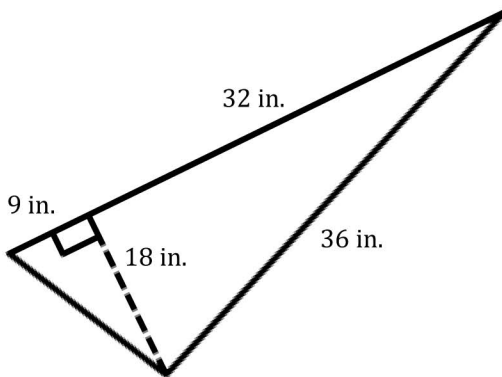Name _____    Date _____

# The Area of Acute Triangles Using Height and Base

Calculate the area of each triangle using two different methods.  Figures are not drawn to scale.
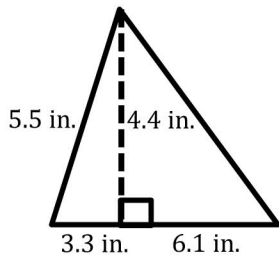
1.
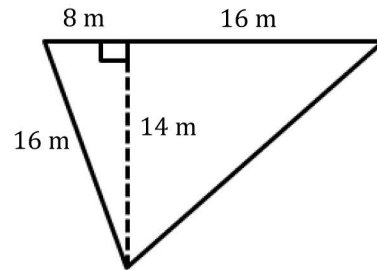


8 ft.    7 ft.

3 ft.    12 ft.

2.



32 in.

9 in.

18 in.    36 in.

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

1.



5.5 in.    4.4 in.

3.3 in.    6.1 in.

2.    8 m    16 m



16 m    14 m

3.

12 ft.

13 ft.    12 ft.    13 ft.

5 ft.    12 ft.    5 ft.

4.

35km

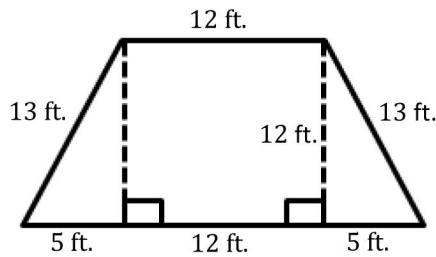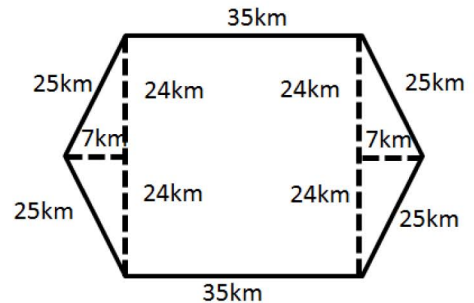25km    24km    24km    25km

7km    7km

25km    24km    24km    25km

35km

4.    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?

5.    Chauncey is building a storage bench for his son's playroom.  The storage bench will fit into the corner and against two walls to form a triangle.  Chauncey wants to buy a cover for the bench.
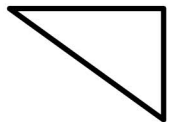
If the storage bench is $2\frac{1}{2}$ ft. along one wall and $4\frac{1}{4}$ ft. along the other wall, how big will the cover have to be in order to cover the entire bench?

6.    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.

5 in.

4 in.

7 in.    3 in.
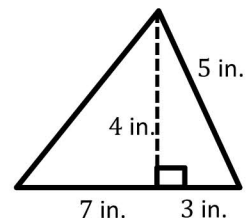
7.    A triangular room has an area of $32\frac{1}{2}$ sq. m.  If the height is $7\frac{1}{2}$ m, write an equation to determine the length of the base, $b$, in meters.  Then solve the equation.

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

**1.**



8 ft.   7 ft.

3 ft.   12 ft.
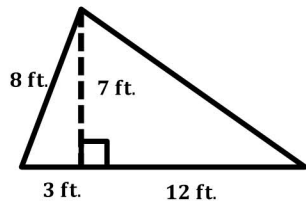
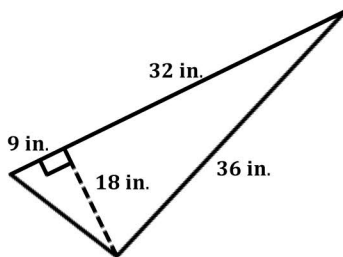$A = \dfrac{1}{2}(3 \text{ ft.})(7 \text{ ft.}) = 10.5 \text{ ft}^2$

$A = \dfrac{1}{2}(12 \text{ ft.})(7 \text{ ft.}) = 42 \text{ ft}^2$

$A = 10.5 \text{ ft}^2 + 42 \text{ ft}^2 = 52.5 \text{ ft}^2$

*OR*

$A = \dfrac{1}{2}(15 \text{ ft.})(7 \text{ ft.}) = 52.5 \text{ ft}^2$

**2.**



32 in.

9 in.

18 in.   36 in.

$A = \dfrac{1}{2}(9 \text{ in.})(18 \text{ in.}) = 81 \text{ in}^2$

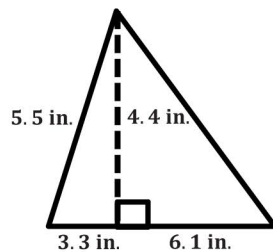$A = \dfrac{1}{2}(32 \text{ in.})(18 \text{ in.}) = 288 \text{ in}^2$

$A = 81 \text{ in}^2 + 288 \text{ in}^2 = 369 \text{ in}^2$

*OR*

$A = \dfrac{1}{2}(41 \text{ in.})(18 \text{ in.}) = 369 \text{ in}^2$

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

**1.**



5.5 in.   4.4 in.

3.3 in.   6.1 in.

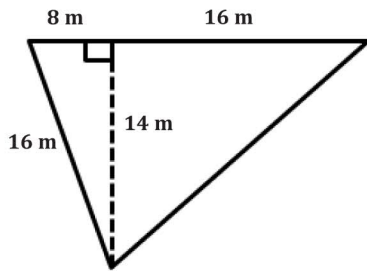$A = \dfrac{1}{2}(3.3 \text{ in.})(4.4 \text{ in.}) = 7.26 \text{ in}^2$

$A = \dfrac{1}{2}(6.1 \text{ in.})(4.4 \text{ in.}) = 13.42 \text{ in}^\text{s}$

$A = 7.26 \text{ in}^2 + 13.42 \text{ in}^2 = 20.68 \text{ in}^2$

*OR*

$A = \dfrac{1}{2}(9.4 \text{ in.})(4.4 \text{ in.}) = 20.68 \text{ in}^2$

**2.**



8 m    16 m

16 m    14 m

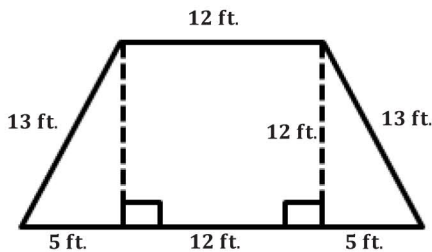$$A = \frac{1}{2}(8\text{ m})(14\text{ m}) = 56\text{ m}^2$$

$$A = \frac{1}{2}(16\text{ m})(14\text{ m}) = 112\text{ m}^2$$

$$A = 56\text{ m}^2 + 112\text{ m}^2 = 168\text{ m}^2$$

*OR*

$$A = \frac{1}{2}(24\text{ m})(14\text{ m}) = 168\text{ m}^2$$

**3.**

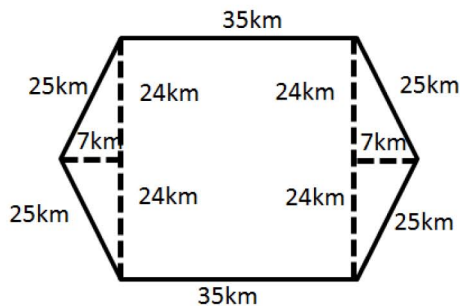

12 ft.

13 ft.    12 ft.    13 ft.

5 ft.    12 ft.    5 ft.

$$A = \frac{1}{2}(5\text{ ft.})(12\text{ ft.}) = 30\text{ ft}^2$$

$$A = (12\text{ ft.})(12\text{ ft.}) = 144\text{ ft}^2$$

$$A = \frac{1}{2}(5\text{ ft.})(12\text{ ft.}) = 30\text{ ft}^2$$

$$A = 30\text{ ft}^2 + 144\text{ ft}^2 + 30\text{ ft}^2 = 204\text{ ft}^2$$

**4.**



35km

25km    24km    24km    25km

7km    7km

25km    24km    24km    25km

35km

$$A = \frac{1}{2}(48\text{ km})(7\text{ km}) = 168\text{ km}^2$$

$$A = 35\text{ km}(48\text{ km}) = 1680\text{ km}^2$$

$$A = \frac{1}{2}(48\text{ km})(7\text{ km}) = 168\text{ km}^2$$

$$A = 168\text{ km}^2 + 1680\text{ km}^2 + 168\text{ km}^2 = 2016\text{ km}^2$$

**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?

$$A = \frac{1}{2}bh = \frac{1}{2}(48\text{ in.})(32\text{ in.}) = 768\text{ in}^2$$

*The dog will have $768\text{ in}^2$ to play.*

**6.** Chauncey is building a storage bench for his son's playroom. The storage bench will fit into the corner and against two walls 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 to cover the entire bench?



$$A = \frac{1}{2}\left(2\frac{1}{2}\text{ ft.}\right)\left(4\frac{1}{4}\text{ ft.}\right) = \frac{1}{2}\left(\frac{5}{2}\text{ ft.}\right)\left(\frac{17}{4}\text{ ft.}\right) = \frac{85}{16}\text{ ft}^2 = 5\frac{5}{16}\text{ ft}^2$$

*Chauncey would have to buy a cover that has an area of $5\frac{5}{16}$ $\text{ft}^2$ to cover the entire bench.*
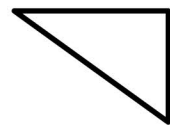
7. **Examine the triangle to the right.**

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

    $$\frac{1}{2}(7 \text{ in.})(4 \text{ in.}) + \frac{1}{2}(3 \text{ in.})(4 \text{ in.}) \quad \text{or} \quad \frac{1}{2}(10 \text{ in.})(4 \text{ in.})$$

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

    *If students wrote the first expression, then $7$ in. and $3$ in. represent the two parts of the base, and $4$ in. is the height, or the altitude, of the triangle.*

    *If students wrote the second expression, then $10$ in. represents the base because $7$ in. $+ 3$ in. $= 10$ in., and $4$ in. represents the height, or the altitude, of the triangle.*
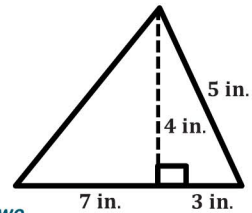
8. A triangular room has an area of $32\frac{1}{2}$ sq. m. If the height is $7\frac{1}{2}$ m, write an equation to determine the length of the base, $b$, in meters. Then solve the equation.

$$32\frac{1}{2} \text{ m}^2 = \frac{1}{2}b\left(7\frac{1}{2} \text{ m}\right)$$

$$32\frac{1}{2} \text{ m}^2 = \left(\frac{15}{4} \text{ m}\right)b$$

$$32\frac{1}{2} \text{ m}^2 \div \frac{15}{4} \text{ m} = \left(\frac{15}{4} \text{ m}\right)b \div \frac{15}{4} \text{ m}$$

$$\frac{26}{3} \text{ m} = b$$

$$8\frac{2}{3} \text{ m} = b$$