3-4-5 Parallelograms, Trapezoids and Triangles
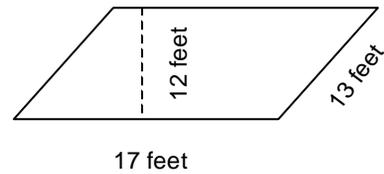
A parallelogram has two sets of parallel lines. The perimeter
is the lengths of the four sides added.
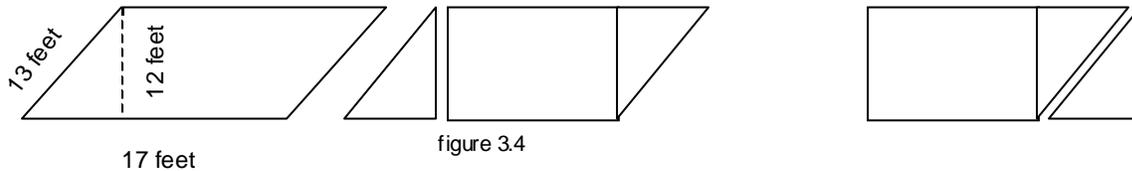P=2b+2s where b is base and s is the slanted height. Notice
the 12 feet is not needed to find perimeter.

$P=2(17)+2(13)=34+26=60$ feet.

The formula for area is A=bh where b is the base and h is the height. $A=(17)(12)=204$ ft^2.
To see the formula visually, cut the end triangle off and move it to the other side as in figure 3.4 The
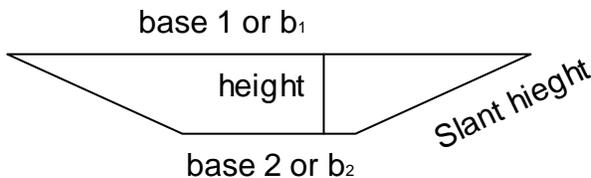
figure 3.4

resulting rectangle has the same area as the parallelogram. To find the area of a rectangle multiply
the base times the height.

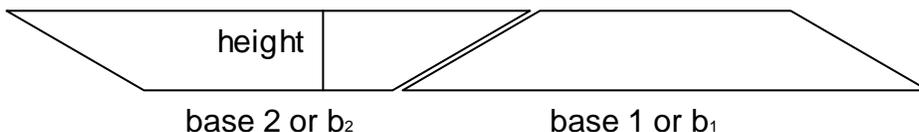Practice: Find the area and perimeter of the following.

a)
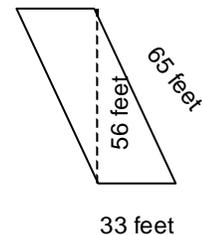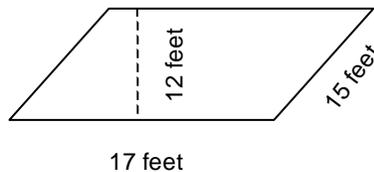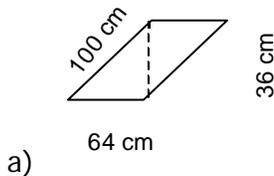
Trapezoids have one set of parallel lines and one set of lines that are not parallel.

base 1 or b$_1$

height   Slant hieght
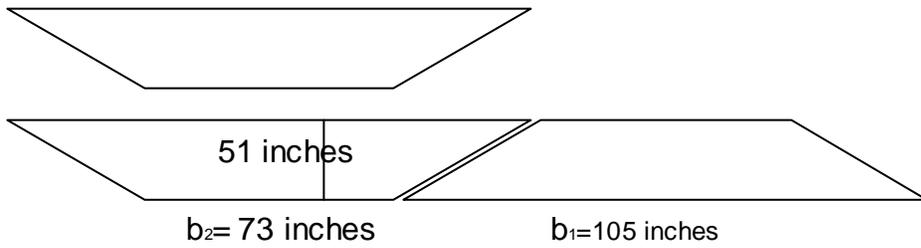
base 2 or b$_2$

The parallel lines are the bases. The height is
perpendicular between the bases.
The slant heights may be the same or they
may be different.

To find the perimeter, add all four sides.
$P= b_1+b_2+s_1+s_2$

To see how the formula for area works, visualize two of the same trapezoids put together as shown.
Notice a parallelogram with twice the area of the desired trapezoid. The area of the trapezoid is ½ the
area of the parallelogram with height the same as that of the trapezoid, and a base that is the sum of
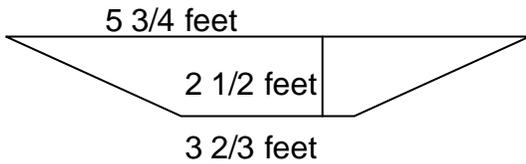the two bases of the trapezoid.

height

base 2 or b$_2$ base 1 or b$_1$

1

$$A = \tfrac{1}{2}h(b_1 + b_2)$$
$$A = \tfrac{1}{2}(51)(105 + 73)$$

51 inches

$$A = \tfrac{1}{2}(51)(178)$$

b_2= 73 inches b_1=105 inches

$$A = \tfrac{1}{2}(51)(178)$$
$$A = 4539 in^2$$

5 3/4 feet

2 1/2 feet

3 2/3 feet

Example:
Fill in the formula.
Parenthesis first.
Get common denominators.

Add.
Make fractions improper.
Multiply numerators and denominators.
Simplify

$$A = \tfrac{1}{2}h(b_1 + b_2)$$
$$A = \tfrac{1}{2}\left(2\tfrac{1}{2}\right)\left(5\tfrac{3}{4} + 3\tfrac{2}{3}\right)$$
$$A = \tfrac{1}{2}\left(2\tfrac{1}{2}\right)\left(5\tfrac{9}{12} + 3\tfrac{8}{12}\right)$$
$$A = \tfrac{1}{2}\left(2\tfrac{1}{2}\right)\left(8\tfrac{17}{12}\right)$$
$$A = \tfrac{1}{2}\left(2\tfrac{1}{2}\right)\left(9\tfrac{5}{12}\right)$$
$$A = \tfrac{1}{2}\left(\tfrac{5}{2}\right)\left(\tfrac{113}{12}\right)$$
$$A = \tfrac{565}{48} = 11\tfrac{37}{48}$$

Practice: Find the area of the following.
b)

8 cm

2 cm

3 cm

5.6 cm

2 cm

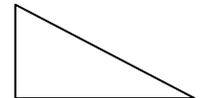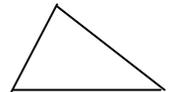3.08 cm

2/3 in

1/2 in

3/4 in
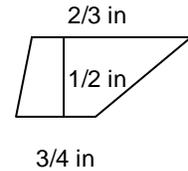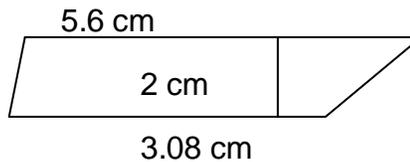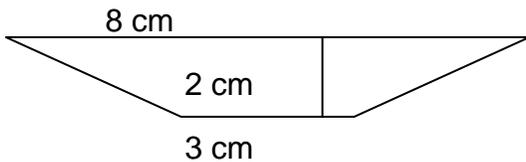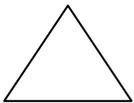
Triangles

Equilateral triangles have three equal sides and three equal angles.

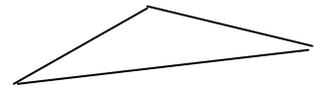**Right** triangle has one right angle. They can be isosceles or scalene.

Isosceles triangles have two equal sides and two equal angles.

All angle are less than ninety degrees in **acute** triangles.

Scalene triangles have three different length sides.

Obtuse triangles have one angle greater than ninety degrees.

To find the perimeter of a triangle add all three sides. P= a+b+c where a, b and c are the lengths of the sides.

The area of a triangle is A= ½ bh where b is the base and h is the height perpendicular to the base.

To illustrate why the area formula works, make a parallelogram out of two identical triangles.

The height and base of the parallelogram is the same as that of the triangle. The area of the parallelogram is base times height and is twice the desired area of the triangle.
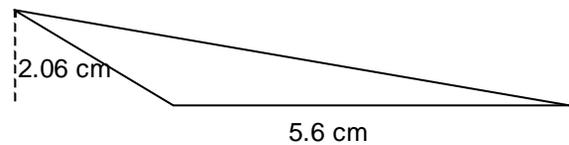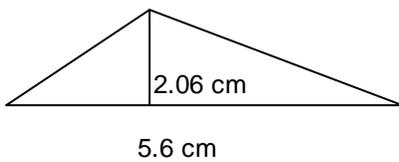
h=2cm

b=5cm
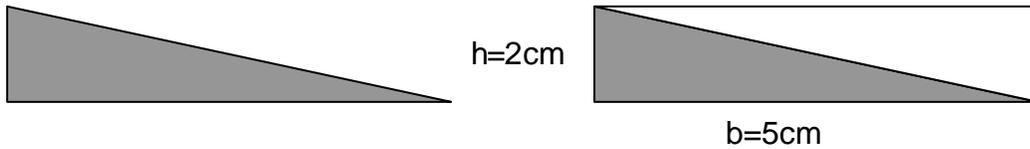
The area of the triangle is half the area of the parallelogram. A=bh=(2)(5)=10cm^2 so the area of the triangle is 5cm^2

h=1.2 in

b=0.8 in

h=4 in

b= 3 3/4 in
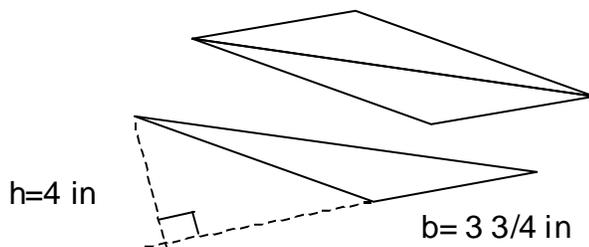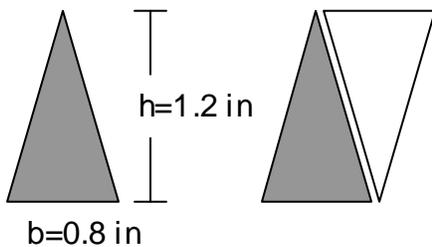
A=½bh =½(0.8)(1.2)=0.48 in^2 The height must be perpendicular to the base. A=½(4)(3 ¾)=7 ½ in^2

Practice: Find the area of the following
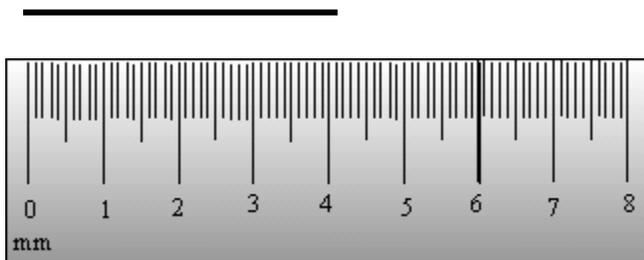
c)

2.06 cm

5.6 cm

2.06 cm

5.6 cm

Practice: Use a centimeter ruler to measure each side and the perpendicular height of these shapes to find the area and perimeter.
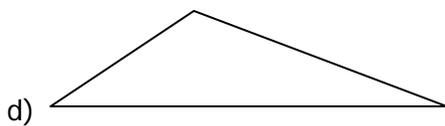
d)

The line is 4.2 cm. Start the ruler at zero. The tiny spaces between the larger numbered lines are millimeters. They are one tenth of a centimeter. Notice the line is 4 whole centimeters and two tenths of centimeter.

0 1 2 3 4 5 6 7 8

mm

3