TEACHER COPY

3242

Geometry Area and Volume Formula Sheet

Area of a Rectangle/Square	$A = lw$ $\quad A = s^2$
Area of a Triangle	$A = \frac{1}{2}bh$
Area of a Parallelogram	$A = bh$
Area of a Trapezoid	$A = \frac{1}{2}h(b_1 + b_2)$
Area of a Rhombus or Kite	$A = \frac{1}{2}d_1d_2$
Area of an Equilateral Triangle	$A = \frac{s^2\sqrt{3}}{4}$
Area of a Regular Polygon	$A = \frac{1}{2}asn$
Area of a Circle	$A = \pi r^2$
Circumference of a Circle	$C = \pi d = 2\pi r$
Surface Area of Prisms:	$SA = 2B + ph$
Surface Area of Cylinders:	$SA = 2\pi r^2 + 2\pi rh$
Volume of a Prism/Cylinder	$V = Bh$
Surface Area/Volume of Pyramid	$SA = B + \frac{1}{2}Pl$ $\quad V = \frac{1}{3}Bh$
Arc Length of a Circle	Arc Length = (arc angle/360)$2\pi r$
Sector Area of a Circle	Sector Area = (arc angle/360)πr^2
Surface Area/Volume of a Sphere	$SA = 4\pi r^2$ $\quad V = \frac{4}{3}\pi r^3$

Geometry 3242
Units and Area Calculations

Name: _____ Date: _____ Period: ____

1. How many square inches are in one square foot? Include a sketch of a square foot below.

2. How many square feet are in one square yard?

3. How many square inches are in one square yard?

4. How many square inches are in 16 square feet?

5. How many square feet are in 64 square yards?

6. How many square inches are in 22 square yards?

7. Find out how many square feet are in a square that has a diagonal that is 16 yards long. Include a sketch.

8. Find out how many square inches are in a rectangle that has a length of 36 feet and a diagonal of 39 feet. Include a sketch.

Geometry 3242
Sections 11.1 and 11.2
Areas of Basic Geometric Shapes

Name: _____ Date: _____ Period: _____

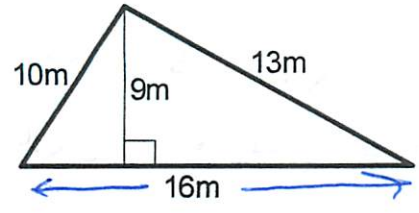
1. Write down the area equations of the following figures:

a) Rhombus $A = \frac{1}{2} d_1 d_2$

b) Trapezoid $A = \frac{1}{2} h(b_1 + b_2)$

c) Parallelogram $A = bh$

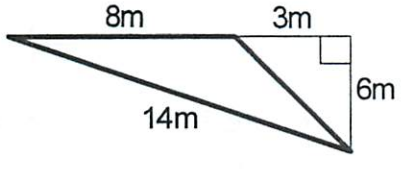
2. Find the area of the following two triangles:



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

$A = \frac{1}{2}(16)(9)$

A = $72m^2$



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

$A = \frac{1}{2}(8)(6)$

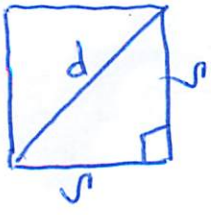
A = $24m^2$

3. Find the height of a rectangle that has an area of 240 in^2 and a length of 18 inches. $A = lw$

$240 = 18w$

h = 13.3in

4. Find the length of the side of a square that has an area of 169 ft^2. Then find the length of the diagonal in simplified radical form.



$A = s^2$

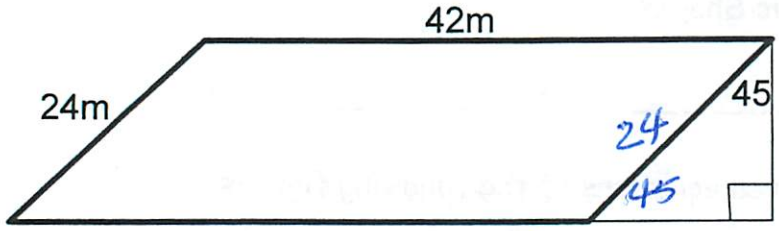
$169 = s^2$

$s = 13$

s = 13 Ft d = 18.4Ft

$d = \sqrt{13^2 + 13^2} = 18.4$

5. Find the area of the following parallelogram. Keep in simplified radical form.



$A = bh = (42)(12\sqrt{2})$

A = $504\sqrt{2}\ m^2$

6. Find the length of the base of a triangle that has an area of 168 ft^2 and a height of 14 ft.

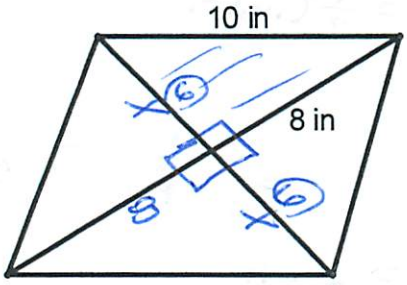
$A = \frac{1}{2}bh$

$168 = \frac{1}{2}(14)b \rightarrow 168 = 7b$

$b = 24$

b = 24 FT

7. Find the area of the following rhombus.



$x = \sqrt{10^2 - 8^2} = 6$

$A = \frac{1}{2}d_1 d_2 = \frac{1}{2}(16)(12)$

A = $96\ in^2$

8. What is the length of the long diagonal of a kite that has an area of 468 mm^2 and a short diagonal that is 26 mm long.

$A = \frac{1}{2}d_1 d_2$

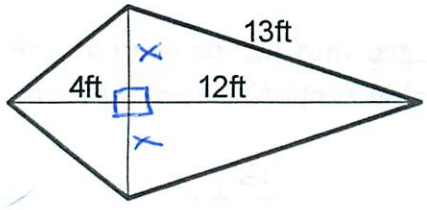
$468 = \frac{1}{2}(26)(d_2) \rightarrow 468 = 13d_2$

$d_2 = 36$

Long diagonal = 36mm

9. Find the area of the kite depicted below:

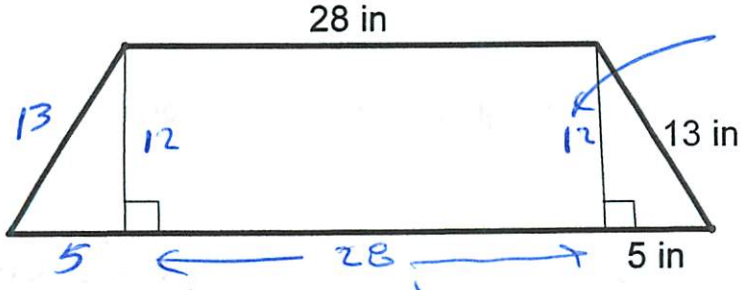
$x = \sqrt{13^2 - 12^2} = 5$



$A = \frac{1}{2}d_1 d_2 = \frac{1}{2}(16)(10)$

A = $80\ ft^2$

10. Find the area of the following isosceles trapezoid.



$h = \sqrt{13^2 - 5^2} = 12$

$A = \frac{1}{2}(12)(38 + 28)$

A = 396 in²

11. Find the length of a base of a trapezoid that has an area of 200 in² with a height of 8 inches and a base measuring 28 inches.

$A = \frac{1}{2}h(b_1 + b_2)$

$200 = \frac{1}{2}(8)(b_1 + 28)$

$200 = 4(b_1 + 28)$

$50 = b_1 + 28$

$b_1 = 22$

b = 22 in

12. Find the height of a parallelogram that has an area of 280 cm² and a base of 20 cm.

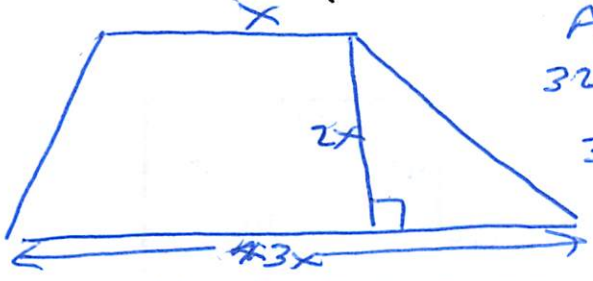
$A = bh$

$280 = 20h$

$h = 14$

h = 14 cm

13. Find the length of both bases and the height of a trapezoid that has an area of 324 in² with the long base being 3 times the length of the shorter base and the height being twice the length of the shorter base (include a sketch below).



$A = \frac{1}{2}h(b_1 + b_2)$

$324 = \frac{1}{2}(2x)(4x)$

$324 = 4x^2$

$81 = x^2$ $\quad x = 9$

$b_1 = 9$ in

$b_2 = 27$ in

$h = 18$ in

14. Find the length of the diagonal of a rectangle that has an area of 364 m² and a height of 14m (provide a sketch).

$A = lw$

$364 = 14l$

$l = 26$

$d = \sqrt{14^2 + 26^2} = 29.5$

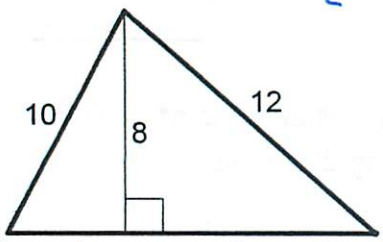
Diagonal = 29.5m

Geometry 3242
Basic Area Problems

Find the area of each of the figures depicted below.

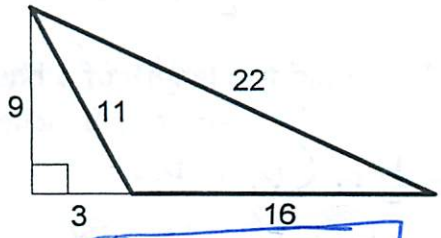
1.

$A = \frac{1}{2}(13)(8)$



$A = 52$ UNITS^2

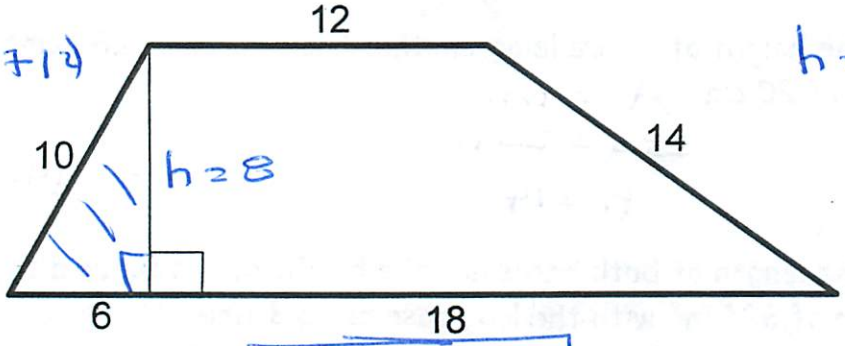
$A = \frac{1}{2}(16)(9)$



$A = 72$ UNITS^2

2. Trapezoid

$A = \frac{1}{2}(8)(24+14)$

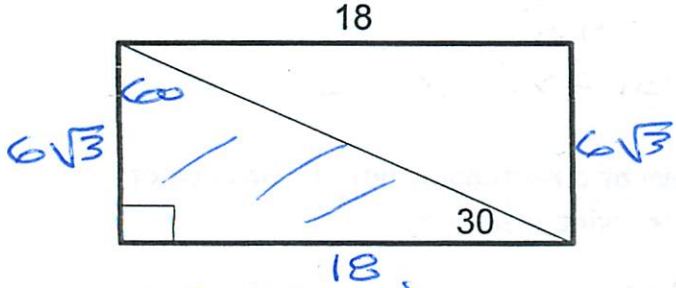


$h = \sqrt{10^2 - 6^2}$

$h = 8$

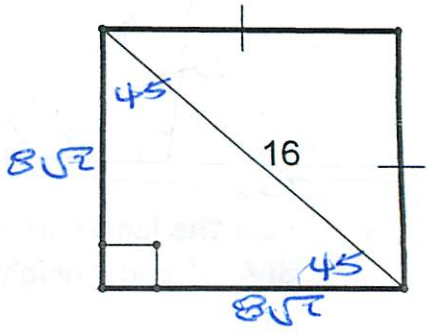
$A = 144$ UNITS^2

3.



$A = (18)(6\sqrt{3})$

$A = 108\sqrt{3}$ UNITS^2



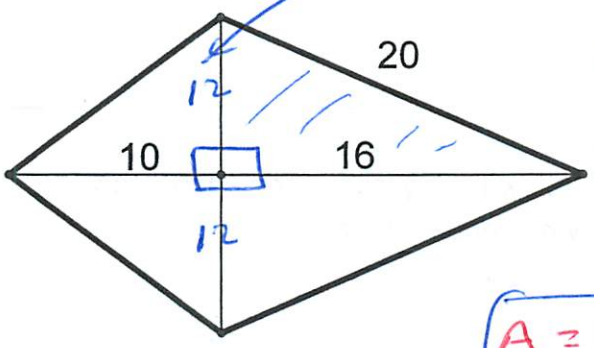
$A = 128$ UNITS^2

$A = (8\sqrt{2})(8\sqrt{2})$

$A = 128$

(6)

4. Kite



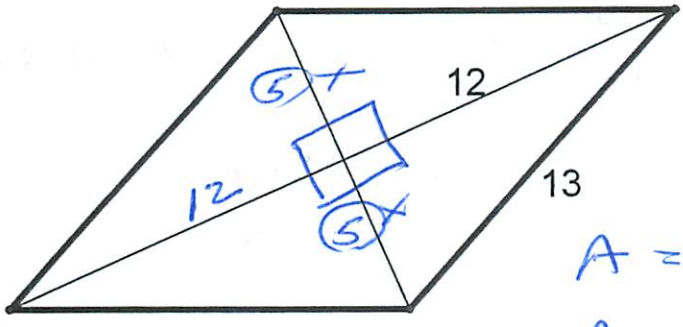
$\sqrt{20^2 - 16^2} = 12$

$A = \frac{1}{2} d_1 d_2$

$A = \frac{1}{2}(24)(26)$

$A = 312$ units^2

5. Rhombus



$x = \sqrt{13^2 - 12^2}$

$x = 5$

$A = \frac{1}{2} d_1 d_2$

$A = \frac{1}{2}(10)(24)$

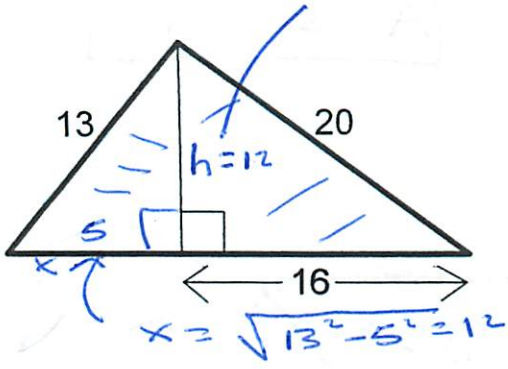
$A = 120$ units^2

Geometry 3242
Chapter 8 Area Problems

Name: _____ Date: _____ Period: _____

Find the area for each of the following figures. For each problem, write down the equation, show work and include proper units.

1. $h = \sqrt{20^2 - 16^2} = 12$



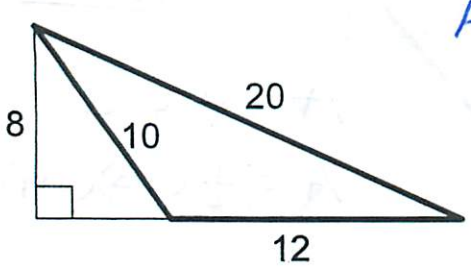
$x = \sqrt{13^2 - 5^2} = 12$

$A = \frac{1}{2}(21)(12)$

$A = 126$

A = 126 u²

2.



$A = \frac{1}{2}(12)(8)$

$A = 48$

A = 48 UNIT²

3. A triangle has an area of 176 m² with a base of 16 m. Find its height.

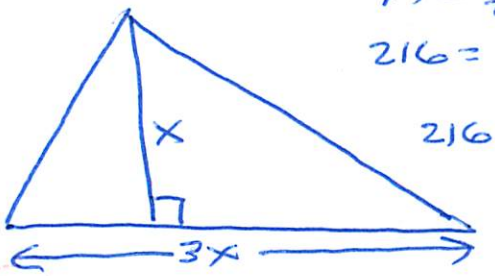
$A = \frac{1}{2}bh$

$176 = \frac{1}{2}(16)h$ → $176 = 8h$

$h = 22$

h = 22mm

4. A triangle has an area of 216 in² and its base is 3 times as long as its height. Find the triangle's base and height (provide a sketch also).



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

$216 = \frac{1}{2}(3x)(x)$

$216 = \frac{1}{2}3x^2$

$432 = 3x^2$

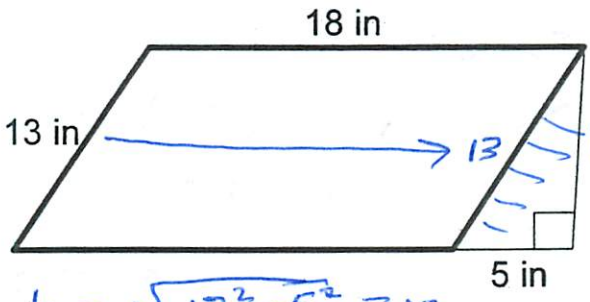
$144 = x^2$

$x = 12$

h = 12IN

b = 36IN

5. Find the area of the parallelogram depicted below:



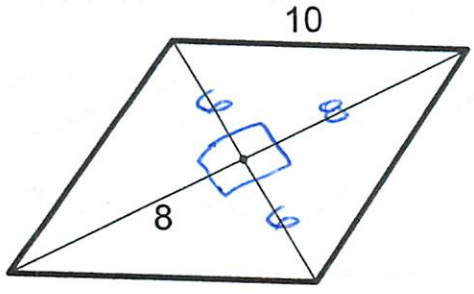
$A = bh$

$A = (18)(12)$

$h = \sqrt{13^2 - 5^2} = 12$

A = $A = 216\ in^2$

6. Find the area of the rhombus depicted below.



$A = \frac{1}{2} d_1 d_2$

$A = \frac{1}{2}(12)(16)$

$A = 96$

A = $96\ units^2$

7. Find the length of the short diagonal of a rhombus that has an area of 192 ft^2 and a long diagonal of 24 feet.

$A = \frac{1}{2} d_1 d_2$

$192 = \frac{1}{2}(24) d_2$

$192 = 12 d_2 \rightarrow d_2 = 16$

Diagonal = 16ft

8. Find the height of a trapezoid that has an area of 345 cm^2 and two bases that measure 18 cm and 28 cm. Include a sketch.

$A = \frac{1}{2} h (b_1 + b_2)$

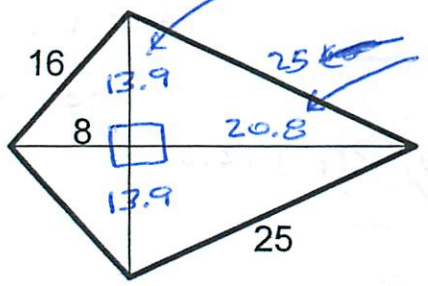
$345 = \frac{1}{2} h (46)$

$345 = 23h$

$h = 15$

h = 15cm

9. Find the area of the following kite.



$\sqrt{16^2-8^2} = 13.9$

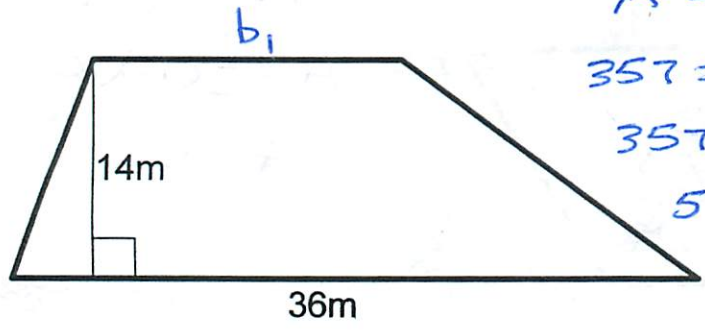
$\sqrt{25^2-13.9^2}$

$A = \frac{1}{2}(28.8)(27.8)$

$A = 400.3$

A = 400.3 UNITS^2

10. The following trapezoid has an area of 357 m^2. Find the length of its top base.



$A = \frac{1}{2}h(b_1 + b_2)$

$357 = \frac{1}{2}(14)(36 + b_1)$

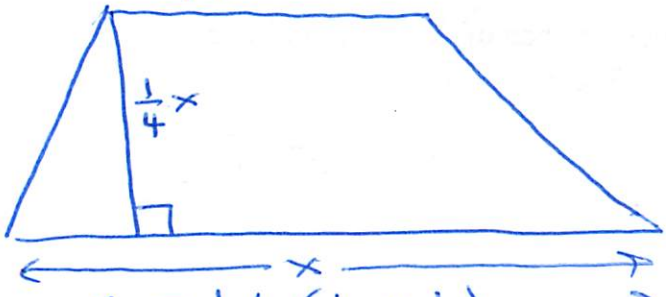
$357 = 7(36 + b_1)$

$51 = b_1 + 36$

$b_1 = 15$

b_1 h = 15m

11. A trapezoid has an area of 171.5 ft^2. Base 1 is $\frac{3}{4}$ the length of Base 2. The height is 1/3 the length of Base 1. Find the length of all three dimensions of this trapezoid. Include a sketch below.



B_1 = 21 FT

B_2 = 28 FT

h = 7 FT

$A = \frac{1}{2}h(b_1 + b_2)$

$171.5 = \frac{1}{2}(\frac{1}{4}x)(\frac{7}{4}x)$

$171.5 = \frac{7}{32}x$

MULTIPLY BOTH SIDES BY $\frac{32}{7}$ (RECIPROCAL)

$784 = x^2$

$x = 28$

GEOMETRY
Area Word Problems

Name: _____ Date: _____

For each of the following problems, draw a figure based on the description, show all formulas and calculations and fill in your answer in the blank space provided.

1. A trapezoid has an area of 75 square inches and its two bases are 8 and 17 inches long. Find the height of the trapezoid.

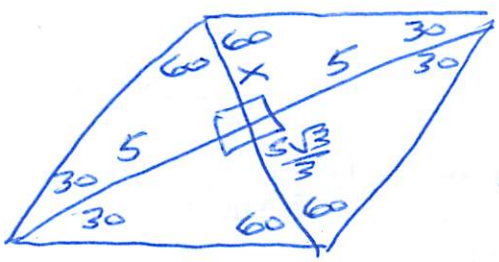
$A = \frac{1}{2}h(b_1 + b_2)$

$75 = \frac{1}{2}h(25)$

$75 = 12.5h$ $\quad h = 6$ IN

h = 6 IN

2. A rhombus has an angle measure of 120 degrees, and its longer diagonal has a length of 10 inches. Find the area of the rhombus.



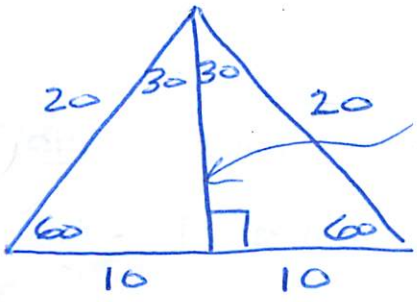
$X = \frac{5}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{5\sqrt{3}}{3}$

$A = \frac{1}{2}d_1 d_2$

$A = \frac{1}{2}(10)\left(\frac{10\sqrt{3}}{3}\right) = \frac{50\sqrt{3}}{3}$

Area = $\frac{50\sqrt{3}}{3} = 28.9$ IN²

3. Find the area of an equilateral triangle whose perimeter is 60 centimeters.



$A = \frac{s^2\sqrt{3}}{4} = \frac{20^2\sqrt{3}}{4} = \frac{400\sqrt{3}}{4} = 100\sqrt{3}$

or

$h = 10\sqrt{3}$

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

$A = \frac{1}{2}(20)(10\sqrt{3}) = 100\sqrt{3}$

Area = $100\sqrt{3}$ cm²

4. A trapezoid has an area of 126 square feet, a height of 9 feet, and one base of 13 feet. Find the length of the second base.

$A = \frac{1}{2} h (b_1 + b_2)$

$126 = \frac{1}{2}(9)(b_1 + 13)$

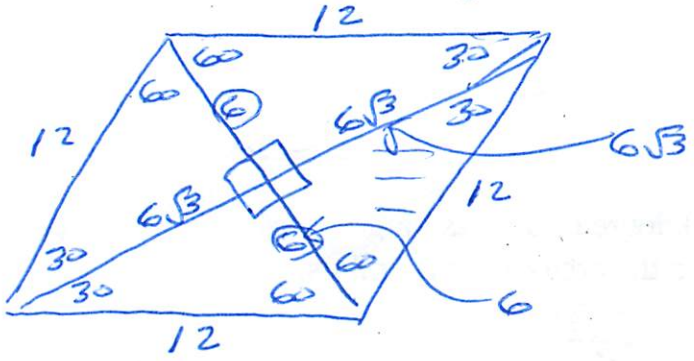
$252 = 9(b_1 + 13)$

$28 = b_1 + 13$

$b_1 = 15$

Base = 15 Ft

5. A rhombus has side lengths of 12 inches each and an angle measure of 120 degrees. Find the area of the rhombus.



$A = \frac{1}{2} d_1 d_2$

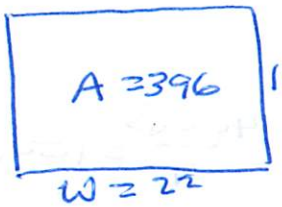
$A = \frac{1}{2}(12)(12\sqrt{3})$

$A = 72\sqrt{3}$

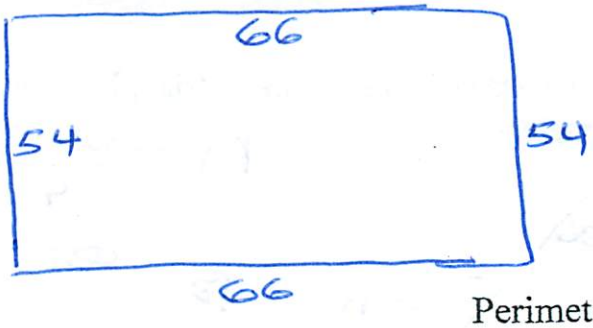
Area = $72\sqrt{3}$ in²

6. If the area of a rectangle is 396 square inches and its height is 18 inches, what is the perimeter and the area of another rectangle whose height and base are triple the length of this rectangle?

(1)



3x →



$W = \frac{396}{18} = 22$

Perimeter = 240 in

Area = 3564 in²

Geometry 3242
WS on Areas of Figures

Name: ______________________________ Date: ________________

1) Find the area of a trapezoid that has a height of 12 feet and two bases that measure 16 feet and 24 feet.

$A = \frac{1}{2}(12)(40)$

Area = $240\,ft^2$

2) Find the length of the missing base of a trapezoid if its area is $480\ m^2$ and its height is 16 meters and one of its bases is 20 meters.

$A = \frac{1}{2}h(b_1 + b_2)$

Base = 40m

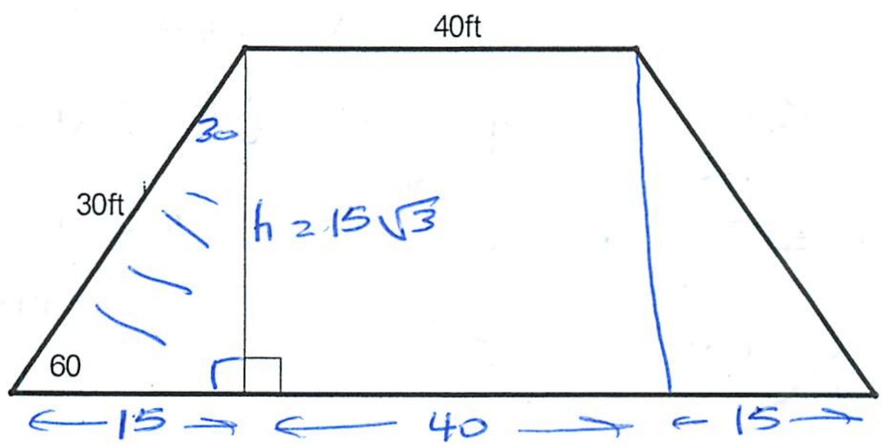
$480 = \frac{1}{2}(16)(b_1 + 20)$

$480 = 8(b_1 + 20)$

$60 = b_1 + 20$

$b_1 = 40$

3) Find the area of the following isosceles trapezoid. Give the answer in both radical form and in exact decimal form to one decimal place.



$A = \frac{1}{2}(15\sqrt{3})(70 + 40)$

$A = 7.5(\sqrt{3})(110)$

$A = 825\sqrt{3} = 1429$

Area = ~~$712.5\sqrt{3}\,ft^2$~~ $825\sqrt{3}\,ft^2$

Area = ~~$1234\,ft^2$~~ $1429\,ft^2$

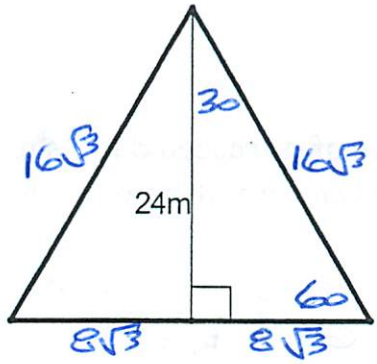
4) If the area of a rhombus is 640 in^2 and one of its diagonals is 24 inches find the length of the other diagonal.

$A = \frac{1}{2} d_1 d_2$

$640 = \frac{1}{2}(24) d_2$

$d_2 = 53.3$ in

5) Find the perimeter and the area of the following equilateral triangle. Keep your answers in radical form.



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

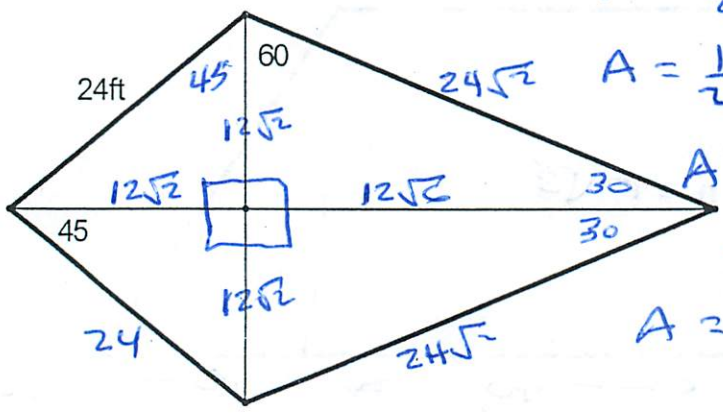
$A = \frac{1}{2}(16\sqrt{3})(24)$

$A = 192\sqrt{3}$ m^2

Perimeter = $48\sqrt{3}$ m

Area = $192\sqrt{3}$ m^2

6) Calculate the perimeter and the area of the following kite. Keep your answer in radical form.



$A = \frac{1}{2} d_1 d_2$

$A = \frac{1}{2}(24\sqrt{2})(12\sqrt{2} + 12\sqrt{6})$

$A = (12\sqrt{2})(12\sqrt{2} + 12\sqrt{6})$

$288 + 144\sqrt{12}$

$A = 288 + 288\sqrt{3}$

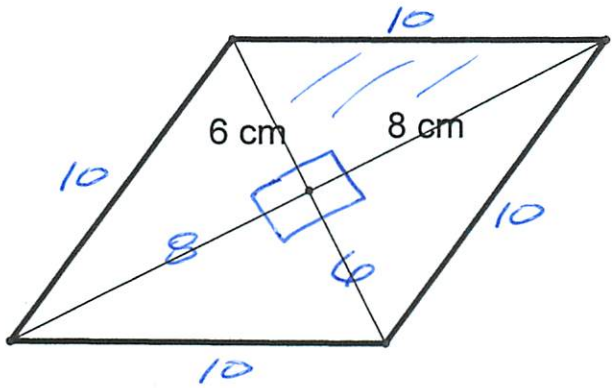
Perimeter = $48 + 48\sqrt{2}$

Area = $288 + 288\sqrt{3}$

7) How many square feet are in 10 square yards?

Geometry 3244
Additional Area Problems

1) Find the perimeter and the area of the following rhombus:

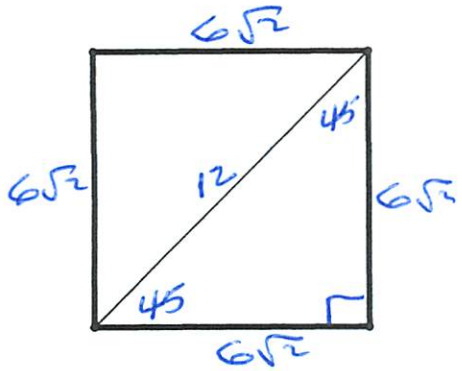


$A = \frac{1}{2} d_1 d_2$

$A = \frac{1}{2}(12)(16)$

P = 40 cm A = 96 cm²

2) Find the perimeter and area of the following square that has a diagonal length of 12 feet.

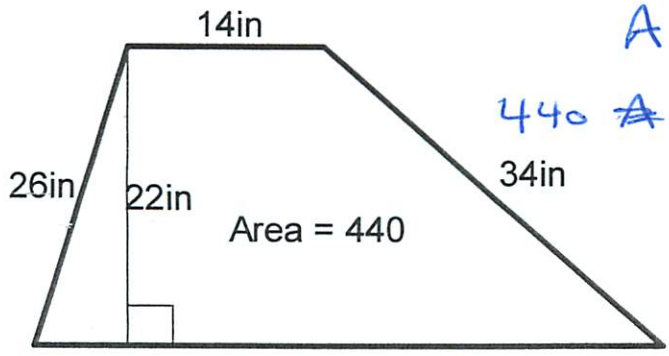


$A = lw$

$A = (6\sqrt{2})(6\sqrt{2}) = 72$

P = $24\sqrt{2}$ FT A = 72 FT²

3) Find the length of the bottom base of the following trapezoid.



$A = \frac{1}{2} h (b_1 + b_2)$

$440 = \frac{1}{2}(22)(b_1 + 14)$

$880 = 11(b_1 + 14)$

$80 = 14 + b_2$ $b_2 =$

b = 66 IN