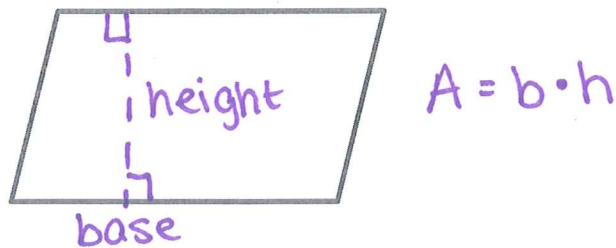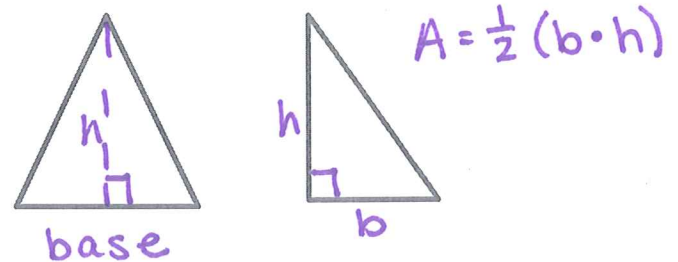# Recalling Area- Notes

When finding the area of a polygon, the units must be included and they must be _squared_ _units_.   *You must have your units!*
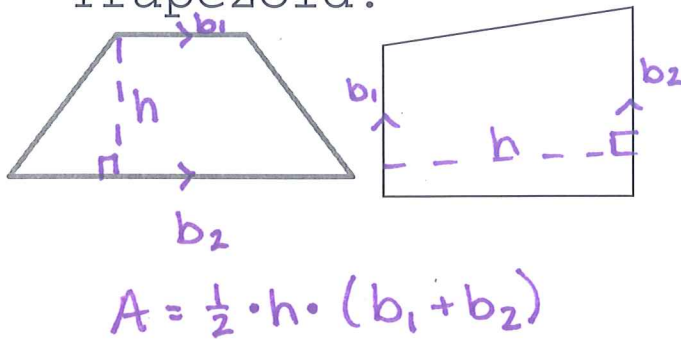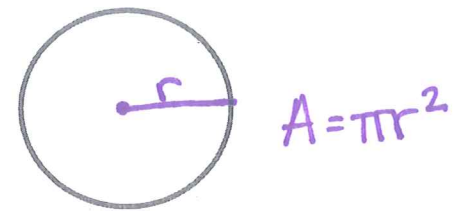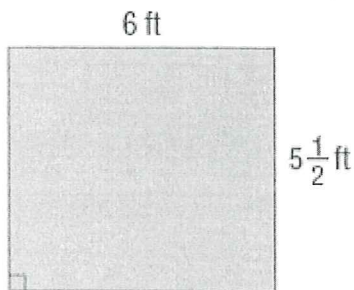
Let's look at some formulas!

Parallelogram:

height

base

$A = b \cdot h$

Triangle:

h

base

h

b

$A = \frac{1}{2}(b \cdot h)$

Trapezoid:

b_1

h

b_2

b_1

h

b_2

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

Circle:

r

$A = \pi r^2$

Examples: Find the area of the following figures.
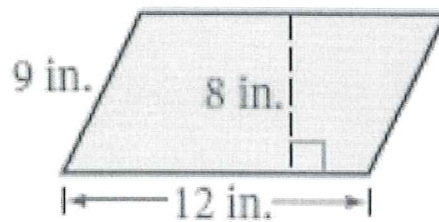
6 ft

$5\frac{1}{2}$ ft

Rectangle
$A = b \cdot h$
$= (6)(5.5)$
$= \boxed{33 \text{ ft}^2}$
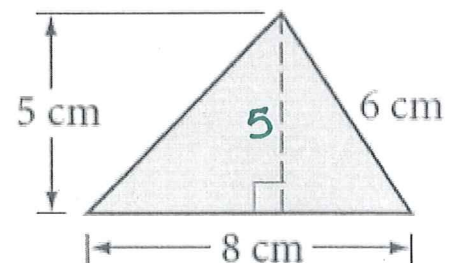
9 in.   8 in.

12 in.

Parallelogram
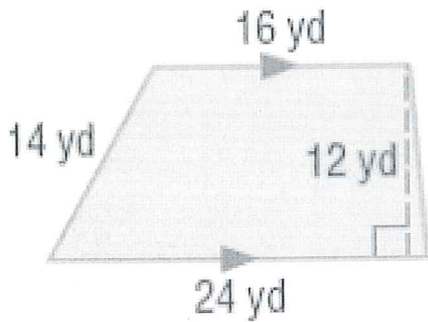$A = b \cdot h$
$= (12)(8)$
$= \boxed{96 \text{ in}^2}$

5 cm   5   6 cm

8 cm

Triangle
$A = \frac{1}{2}(b \cdot h)$
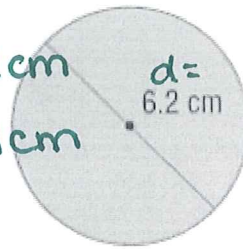$= \frac{1}{2}(8 \cdot 5)$
$= \frac{1}{2}(40)$
$= \boxed{20 \text{ cm}^2}$

16 yd (top of trapezoid)

14 yd (left side) **12 yd** (right side)

24 yd (bottom)

Trapezoid

$$A = \frac{1}{2}h(b_1 + b_2)$$
$$= \frac{1}{2}(12)(16 + 24)$$
$$= \frac{1}{2}(12)(40)$$
$$= \frac{1}{2}(480) \quad = \boxed{240 \, yd^2}$$

$d = 6.2\,cm$ $d = 6.2\,cm$
$r = 3.1\,cm$

Keep everything in terms of pi

Circle

$$A = \pi r^2$$
$$= \pi (3.1)^2$$
$$= \boxed{9.61\pi \, cm^2}$$

INTERIOR DESIGN The Bessos are planning to have new carpet installed in their guest bedroom, family room, and hallway. Find the number of square yards of carpet they should order if all rooms are rectangular.

←20 ft→ ←25 ft→ ←25 ft→

| | Guest Bedroom | Family Room | Kitchen |
22 ft

3 ft

15 ft | Entry | Hall |

Guest Bedroom: $A = (22)(20) = 440 \, ft^2$

Family Room: $A = (22)(25) = 550 \, ft^2$

Hallway: $A = (25)(3) = 75 \, ft^2$

conversions:
$3 \, ft = 1 \, yd$

$9 \, ft^2 = 1 \, yd^2$
(I just squared both sides)

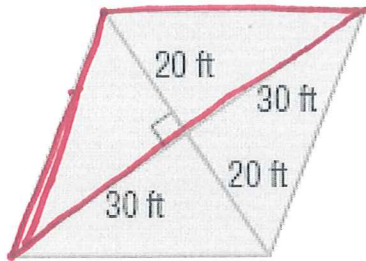Total Square Feet: $440 + 550 + 75 = 1065 \, ft^2$

— now convert to Total Square Yards —

Total Square Yards: $\frac{1065}{9} = \boxed{118.\overline{3} \, yd^2}$

Area: Missing Sides + Recall of Special Right Triangles Notes

Find the area of the following figures.

These are called composites — we will look closer at them soon!

1.

20 ft
30 ft
20 ft
30 ft

$A = \frac{1}{2}(60)(20)$

but there are 2 $\triangle$s w/ height = 20 + base = 60

# of figures

$A = 2\left(\frac{1}{2}(60)(20)\right)$

$= 2(600)$

$= \boxed{1200 \text{ ft}^2}$

2.

6 in. 4 in.
18 in.
21 in.

$A = \frac{1}{2}(21)(6)$
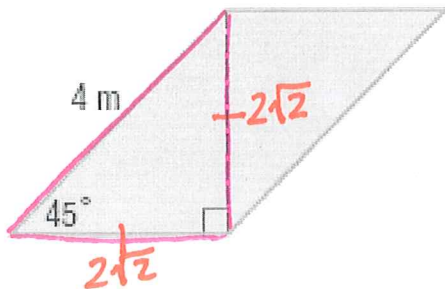
$= \frac{1}{2}(126) = 63 \text{ in}^2$

$A = \frac{1}{2}(18)(4)$

$= \frac{1}{2}(72) = 36 \text{ in}^2$

Total Area $= 63 + 36$

$= \boxed{99 \text{ in}^2}$

Find the area.   (Use special right triangles)

3. **45-45-90 $\triangle$**
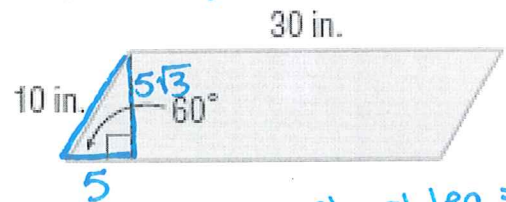
4 m
$-2\sqrt{2}$
45°
$2\sqrt{2}$

$leg = \frac{4}{2} \cdot \sqrt{2} = 2\sqrt{2}$

$A = b \cdot h$

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

$= \boxed{8 \text{ m}^2}$

4. **30-60-90 $\triangle$**

30 in.
10 in. $5\sqrt{3}$
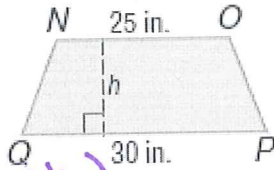60°
5

short leg = 5
long leg = $5\sqrt{3}$

$A = b \cdot h$

$= (30)(5\sqrt{3})$

$= \boxed{150\sqrt{3} \text{ in}^2}$

Find a missing length.

5. Trapezoid *NOPQ* has an area of 302.5 square inches. Find the height of *NOPQ*.

N 25 in. O

h

Q 30 in. P

$A = \frac{1}{2} h (b_1 + b_2)$
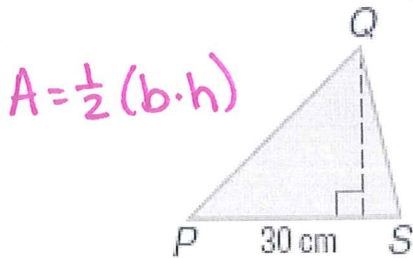
$302.5 = \frac{1}{2} \cdot h (25 + 30)$

$302.5 = \frac{1}{2} \cdot h (55)$

$302.5 = 27.5 h$

$\boxed{h = 11 \text{ in.}}$

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

If *HJ* is 16.5 feet, find *GK*.

H 16.5 ft J

8.7 ft $A = 188.35 \text{ ft}^2$

G K

$188.35 = \frac{1}{2} (8.7)(16.5 + b_2)$

$376.7 = 143.55 + 8.7 b$

$233.15 = 8.7 b$

$\boxed{b = 26.8 \text{ ft}}$

7. Find the height.

Q

$A = 300 \text{ cm}^2$

P 30 cm S

$A = \frac{1}{2} (b \cdot h)$

$300 = \frac{1}{2} (30) h$

$300 = 15 h$

$\boxed{h = 20 \text{ cm}}$

8. Rhombus *RSTU* has an area of 675 square meters. Find *SU*.

R S

15 m

15 m

U T

$A = 2\left(\frac{1}{2} b \cdot h\right)$

$675 = 2\left(\frac{1}{2} \cdot b \cdot 15\right)$

$675 = 15 b$

$b = 45 \Rightarrow \boxed{SU = 45 \text{ m}}$

9. STAINED GLASS This stained glass window is composed of 8 congruent trapezoidal shapes. The total area of the design is 72 square feet. Each trapezoid has bases of 3 and 6 feet. Find the height of each trapezoid.

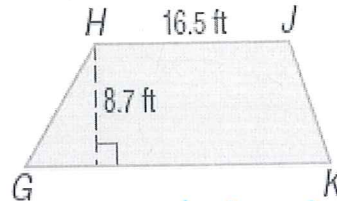Area of each trapezoid: $\frac{72}{8} = 9 \text{ ft}^2$

$9 = \frac{1}{2} h (3 + 6)$

$9 = \frac{1}{2} h (9)$

$9 = 4.5 h$

$\boxed{h = 2 \text{ ft}}$