Instructions: Show all work. Answers without work will not receive credit. Give exact values. Decimal answers will not receive full credit unless you are specifically asked to round. Your answers should include units when solving word problems.

1. a. Use the equation for the area of a circle to determine the area of a circular patio 30 feet across. Round your answer to two decimal places. (8 points)

$$A = \pi r^2$$

$$A = 15^2 * \pi = 706.86 \; ft^2$$

Use π key from calculator not 3.14.

b. If each brick measures 0.5 square feet, how many bricks are needed to complete the patio? Round your answer up to the next whole numbers of bricks. (8 points)

$$706.86 / .05 =$$
$$1413.72$$

or   1414   bricks

2. Solve the equations for the indicated variable. (8 points each)
   a. $5x - 9y = 72$, for y.

$$\frac{-9y}{-9} = \frac{72 - 5x}{-9} \Rightarrow \boxed{y = \frac{5}{9}x - 8}$$

b. $A = \frac{1}{2}h(k + p)$, for p.
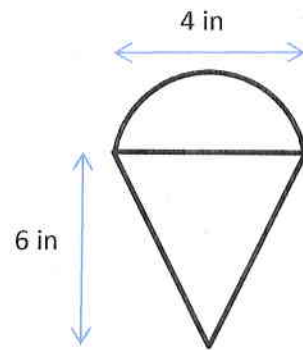
$$2A = h(k+p) \Rightarrow 2A = hk + hp$$

$$\frac{2A - hk}{h} = \frac{hp}{h}$$

$$\boxed{p = \frac{2A - hk}{h}} \quad or \quad \boxed{p = \frac{2A}{h} - k}$$

3. Find the area of the shape. [Hint: break into simpler shapes.] (12 points)

4 in

6 in

$4 = \text{diameter}$
$= 2 \text{ radius}$
$r = 2$

$A_{Triangle} = \frac{1}{2} bh = \frac{1}{2} 4 * 6 = 12$

$\frac{A_{circle}}{2} = \frac{\pi r^2}{2} = \frac{\pi (2)^2}{2} = 2\pi$

$A_{TOTAL} = 12 + 2\pi \approx 18.28 \text{ in}^2$

4. Translate the following statements into algebraic expressions. Do not solve. (7 points each)
   a. Three times the sum of a number and two is the same as twice the number and ten.

   $3(x+2) = 2x + 10$

   b. The difference of five times a number and six is the same as the quotient of that number and four.

   $5x - 6 = \frac{x}{4}$

5. An 86-inch length of ribbon is to be cut into three pieces. The longest is to be 12 inches longer than the shortest piece, and the third piece is twice as long as the shortest piece. Find the length of the ribbon. (12 points)

Shortest piece #1: $x = 18.5$ in
    Piece #2: $2x = 37$ in
"Longest" Piece #3: $x + 12 = 30.5$ in.

$x + 2x + x + 12 = 86$
$4x = 74$
$x = 18.5$ inches

6. The sum of three consecutive odd integers is 105. Find the integers. (12 points)

$$n + (n+2) + (n+4) = 105$$
$$3n + 6 = 105$$
$$3n = 99$$

$$n = 33$$
$$n+2 = 35$$
$$n+4 = 37$$

7. If the sales tax on an item is 8% and the price after tax is \$55.89, what was the price to the nearest penny before tax? (12 points)

$$X + .08X = 55.89$$
$$1.08X = 55.89$$

$$X = \frac{55.89}{1.08} \approx \$51.75$$

8. Consider a triangle. The first angle is 6° more than the second angle. And the third angle is 34° less than the second angle. Draw the triangle with the angles labels and then solve for the sizes of the three angles. (12 points)
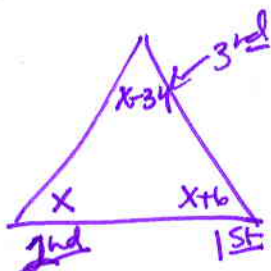
$$(X-34) + X + (X+6) = 180$$
$$3X - 28 = 180$$
$$3X = 208$$
$$X = 69\tfrac{1}{3}°$$
$$X+6 = 75\tfrac{1}{3}°$$
$$X-34 = 35\tfrac{1}{3}°$$

9. Two cyclists leave a city at the same time, one going north and one going south. The southbound cyclist bikes at 8 mph faster than the northbound cyclist. After 4 hours, they are 72 miles apart. How fast is each cyclist riding? (12 points)

$$\begin{array}{cccc} & \text{rate} & \text{time} & \text{distance} \\ N & r+8 & 4 & \\ S & r & 4 & \end{array}$$

$$Sum = 72$$

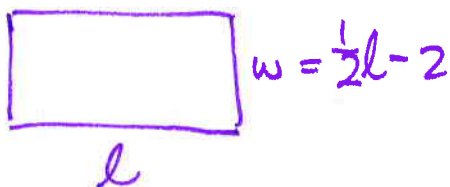$$4(r+8) + 4r = 72$$

$$4r + 32 + 4r = 72$$
$$8r + 32 = 72$$
$$8r = 40$$
$$r = 5$$

Northbound rate = 13 mph
Southbound rate = 5 mph

10. The width of a rectangle is 2 inches less than half the length. Find the length and the width of the rectangle if the perimeter of the rectangle is 38 inches. (12 points)

$$w = \tfrac{1}{2}l - 2$$

$$l$$

$$P = 38 = 2(\tfrac{1}{2}l - 2) + 2l$$

$$l - 4 + 2l = 38$$
$$3l = 42$$
$$l = 14$$
$$w = 5$$

11. Below are two problems from the last exam that many students missed. Here's a second chance at them. (5 points each)

a. Simplify: $\frac{1}{2}(2x - 4) - \frac{2}{3}(9x + 9)$

$$x - 2 - 6x - 6 = -5x - 8$$

b. Given the set of real numbers
$$\left\{-14, \frac{3}{5}, 1.72, |-7|, 0, \sqrt{6}, 3, \frac{1}{\pi}, 4^5, \frac{\sqrt{144}}{3}, 0.\overline{33}, -12.121121112\ldots, 35000\right\},$$ state the numbers in the set that belong to the types of numbers below:

i. Irrational Numbers
$$\left\{\sqrt{6}, \frac{1}{\pi}, -12.121121112\right\}$$

ii. Integers
$$\left\{-14, |-7|, 0, 3, 45, \frac{\sqrt{144}}{3}, 35,000\right\}$$