Question 1:

Solve the following equations

1. $2x + 4 = 12$

   Solution.

$$2x + 4 = 12$$
$$2x = 12 - 4$$
$$2x = 8$$
$$x = 4$$

2. $2x^2 + 3x + 6 = 12$

   Solution.

$$2x^2 + 3x + 6 = 12$$
$$2x^2 + 3x + 6 - 12 = 0$$
$$2x^2 + 3x - 6 = 0$$
$$x = \frac{-3 \pm \sqrt{(3)^2 - 4(2)(-6)}}{2(2)} \qquad \text{(Quadratic Formula)}$$
$$x = \frac{-3 \pm \sqrt{57}}{4}$$
$$\implies x = \frac{-3 + \sqrt{57}}{4}, \frac{-3 - \sqrt{57}}{4}$$
$$\text{(OR in decimal)} x = -2.6375, 1.137$$

3. $\sin(30) \cdot \cos(60) = \frac{3}{x}$

   Solution.

$$\sin(30) \cdot \cos(60) = \frac{3}{x}$$
$$(\frac{1}{2}) \cdot (\frac{1}{2}) = \frac{3}{x}$$
$$\frac{1}{4} = \frac{3}{x}$$
$$x = 12$$

4. $10x^2 - 20x + 12 = 8x^2 + 16x + 4$

Solution.

$$10x^2 - 20x - 12 = 8x^2 + 16x + 4$$
$$10x^2 - 8x^2 - 20x - 16x + 12 - 4 = 0$$
$$2x^2 - 36x + 8 = 0$$
$$2(x^2 - 18x + 4) = 0$$
$$x^2 - 18x + 4 = 0$$
$$x = \frac{-(-18) \pm \sqrt{(-18)^2 - 4(1)(4)}}{2(1)}$$
$$x = \frac{18 \pm \sqrt{240}}{2}$$
$$\implies x = \frac{18 + \sqrt{308}}{2}, \frac{18 - \sqrt{308}}{2}$$
$$(\text{OR in decimal}) x = 0.2250, 17.775$$

Question 2:

Each question below will ask you to solve for a given variable.

1. Solve for a

$$F = ma$$

Solution.

$$a = \frac{F}{m}$$

2. Solve for T

$$PV = NRT$$

Solution.

$$PV = NRT$$
$$T = \frac{PV}{NR}$$

3. Solve for t

$$d = \left(\frac{v_f + v_i}{2}\right)t$$

Solution.

$$d = \left(\frac{v_f + v_i}{2}\right)t$$
$$d = \frac{(v_f + v_i)t}{2}$$
$$2d = (v_f + v_i)t$$
$$t = \frac{2d}{v_f + v_i}$$

4. Solve for a

$$\Delta d = v_i t + \frac{1}{2} a t^2$$

Solution.

$$\Delta d = v_i t + \frac{1}{2} a t^2$$
$$\Delta d - v_i t = \frac{1}{2} a t^2$$
$$2(\Delta d - v_i t) = a t^2$$
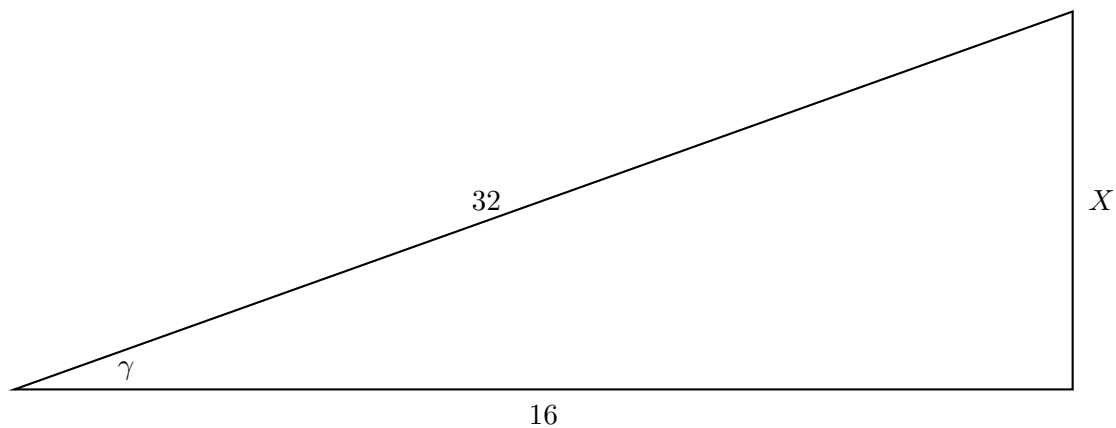$$a = \frac{2(\Delta d - v_i t)}{t^2}$$

5. Solve for v_f

$$v_f^2 = v_i^2 + 2a\Delta d$$

Solution.

$$v_f = \pm\sqrt{v_i^2 + 2a\Delta d} \qquad\qquad (\pm \text{ IMPORTANT})$$

Question 2:

Determine the length of the unkown side X for the triangle below

Solution.

We proceed with the Pythagorean Theorem,
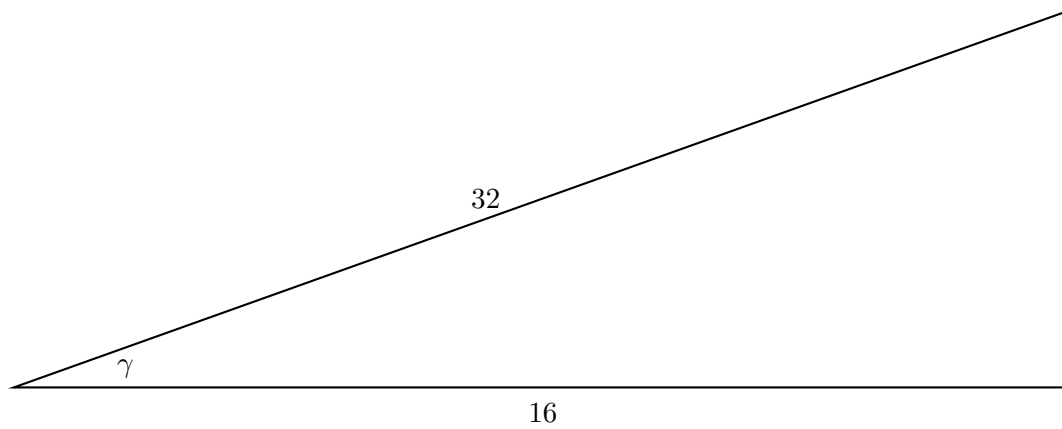
$$X^2 + 16^2 = 32^2$$
$$X^2 = 32^2 - 16^2$$
$$X^2 = 768$$
$$X = +\sqrt{768} \qquad \text{(Negative side is illogical)}$$

Question 3:

Determine the angle γ

Solution.

$$\cos(\gamma) = \frac{16}{32}$$
$$\cos(\gamma) = \frac{1}{2}$$
$$\implies \gamma = 60$$