

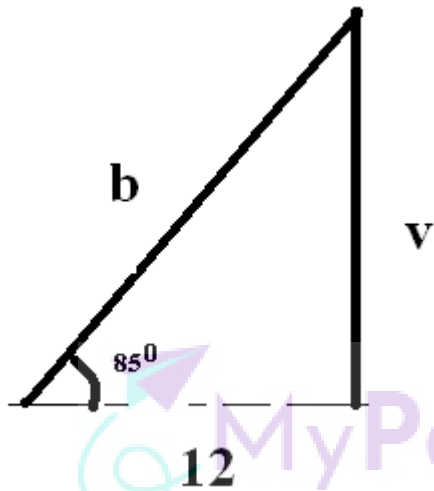
Problem #1

$$f(x) = 3a^2 + 8x - 4;$$

$f(x+h) = 3a^2 + 8(x+h) - 4$; (x) has been substituted by (x+h).

$$D = \frac{f(x+h) - f(x)}{h} = \frac{3a^2 + 8(x+h) - 4 - (3a^2 + 8x - 4)}{h} =$$

$$= \frac{3a^2 + 8x + 8h - 4 - 3a^2 - 8x + 4}{h} = \frac{8h}{h} = 8$$

Problem #2

Vertical portion (v):

$$\tan(85) = v/12$$

$$v = 12 \cdot \tan(85) = 12 \cdot 11.43 = 137.16 \text{ feet}$$

Hypotenuse (b):

$$\cos(85) = 12/b$$

$$b = 12 / \cos(85) = 12 / 0.087 = 137.93 \text{ feet}$$

Total height:

$$S = v + b = 137.16 + 137.93 = 275.09 \text{ feet}$$

Problem #3

$$y = 3x^2 + 7x - 8$$

(y) has been equated to 0:

$$0 = 3x^2 + 7x - 8;$$

$$x = \frac{-7 \pm \sqrt{7^2 - 4 \cdot 3 \cdot (-8)}}{2 \cdot 3} = \frac{-7 \pm \sqrt{49 + 96}}{6} = \frac{-7 \pm \sqrt{145}}{6}$$

$$1. x = \frac{-7 - \sqrt{145}}{6} = -3.174;$$

$$2. x = \frac{-7 + \sqrt{145}}{6} = 0.840;$$

Vertex

$$x_v = \frac{-(7)}{2(3)} = -\frac{7}{6} = -1.167;$$

$$y_v = 3\left(-\frac{7}{6}\right)^2 + 7\left(-\frac{7}{6}\right) - 8 =$$

$$= -\frac{3(49)}{36} - \frac{49}{6} - 8 = \frac{-147 - 294 - 288}{36} = -\frac{729}{36} = -20.25$$

Vertex: (-1.167 ; -20.25)

