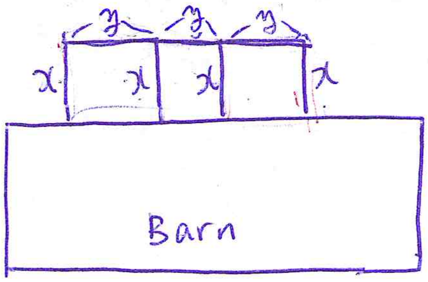
P73 #12



(A) $\rightarrow x \times y = \text{Area}$

(B) $\rightarrow 4x + 3y = 30$ (length of fence = 30m)

(B)' $\rightarrow 3y = 30 - 4x \rightarrow y = \dfrac{30-4x}{3}$

Sub (B)' into (A)

(A) $x \times \left(\dfrac{30-4x}{3}\right) = \text{Area}$

$x \times \left(\dfrac{30-4x}{3}\right) = 0$

When $x = 0$ or

$\dfrac{30}{3} - \dfrac{4x}{3} = 0 \rightarrow 10 - \dfrac{4x}{3} = 0 \rightarrow -\dfrac{4x}{3} = -10$

$-\dfrac{4x}{3} \times -\dfrac{3}{4} = -10 \times -\dfrac{3}{4} \Rightarrow x = \dfrac{30}{4}$

$\therefore$ Two x intercepts are 0 and $\dfrac{30}{4}$

x coordinate of vertex $= \dfrac{\frac{30}{4}}{2} = \dfrac{30}{4 \times 2} = \dfrac{30}{8} = \dfrac{15}{4}$

$= 3.75$

Sub $x = \dfrac{15}{4}$ into (B) $\rightarrow 4\left(\dfrac{15}{4}\right) + 3y = 30 \rightarrow 3y = 30 - 15$

$3y = 15$

$y = 5$

a) $\therefore$ Dimensions, which will maximum area, are

3.75m and 5m

b) Max area $= x \times y = 3.75 \times 5\text{m} = 18.75\text{m}^2$

April 7 P73 #13

#13. Revenue = Unit price × quantity

a) Rev = $(30+x) \times (500-10x)$

Let x represent \$1 increase in ticket price.

a) $F(x)$ = Revenue = $(30+x)(500-10x)$

b) Find x value of vertex = ? what ticket price = ?

Let's find out what are two x intercepts. → Set $F(x) = 0$ or $y = 0$

$0 = (30+x)(500-10x)$

$Y = 0$ when $30+x=0$ or $500-10x=0$

$x = -30$

$-10x = -500$

$x = \frac{-500}{-10} = 50$

coordinate of vertex = $\frac{(50-30)}{2} = \frac{20}{2} = 10$

When $x = 10$ → sub into $F(10) = (30+10)(500-10\times10)$

$= 40 \times 400 = 16000$

∴ When the ticket price is \$40, it will maximize the revenue.

$x = 10$ base price = 30, so $30 + 10 = 40$

c) Maximum revenue = \$16000

P73 # 15 April 7

$\sqrt{x} + \sqrt{x} = 2\sqrt{x}$

$\sqrt{x} \times \sqrt{x} = x$

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

$4x = x^2$

$0 = x^2 - 4x$

$0 = x(x-4)$

$\therefore x = 4, 0$ Since $x > 0$, then $x = 4$ is the only answer.

P49 #8 $x^2 + kx + 9 = 0$

a) two equal roots = one solution $\rightarrow b^2 - 4ac = 0$

$b^2 - 4\ a\ c$

$k^2 - 4(1)(9) = 0$

$k^2 - 36 = 0$

$\sqrt{k^2} = \sqrt{36} \longrightarrow \pm k = \pm 6$

b) two distinct roots = two solutions $\rightarrow b^2 - 4ac > 0$

$k^2 - 4(1)(9) > 0$

$\sqrt{k^2} > \sqrt{36}$

$\pm k > 6 \longrightarrow$ $k > 6$, $-k > 6 \rightarrow k < -6$

$\times -1 \quad \times -1$

$\therefore k > 6, k < -6$

P73 #18 April 7

#18. $ax^2 + bx + c = 0$ (standard) $a = ?,\ b = ?,\ c = ?$

$$(-5 + \sqrt{3})(-5 - \sqrt{3}) = 0$$

$$a[x + (5 + \sqrt{3})][x + (5 - \sqrt{3})] = 0 \rightarrow \text{when } x = -3,\ y = 8$$

Two x intercepts $= -(5 + \sqrt{3}) = -5 - \sqrt{3}$

$-(5 - \sqrt{3}) = -5 + \sqrt{3}$

* Sub $x = -3$, $y = 8$ into equation

$$a[\cancel{x}\,{-3} + (5 + \sqrt{3})][\cancel{x}\,{-3} + (5 - \sqrt{3})] = 8$$

$$a[2 + \sqrt{3}][2 - \sqrt{3}] = 8$$

$$a[4 - 3] = 8$$

$$a[1] = 8$$

$$a = 8$$

$$\therefore 8[x + (5 + \sqrt{3})][x + (5 - \sqrt{3})] = 0$$

$$= 8[x + 5 + \sqrt{3}][x + 5 - \sqrt{3}] = 0$$

$$= 8[x^2 + 5x - \cancel{\sqrt{3}x} + 5x + 25 - \cancel{5\sqrt{3}} + \cancel{\sqrt{3}x} + \cancel{5\sqrt{3}} - 3] = 0$$

$$= 8[x^2 + 10x + 22] = 0$$

$$= 8x^2 + 80x + 176 = 0$$

$\therefore a = 8,\ b = 80,\ c = 176$

P73

#19 2 x intercepts are -2 and 6

$$a(x+2)(x-6) = 0$$

$$y = a(x+2)(x-6) \qquad (3,6)$$

$$6 = a(3+2)(3-6)$$

$$6 = a \cdot 5 \cdot (-3)$$

$$\frac{6}{-15} = \frac{-15a}{-15}$$

$$a = \frac{6}{-15}\,\frac{\div 3}{\div 3} = \frac{2}{-5}$$

a) $\therefore y = -\frac{2}{5}(x+2)(x-6)$

b) Sub $x=2 \rightarrow$ eq

$$y = -\frac{2}{5}(2+2)(2-6)$$

$$y = -\frac{2}{5} \times 4 \times (-4)$$

$$y = -\frac{2}{5} \times -16 = \frac{32}{5}$$

$\therefore$ Max value is $\frac{32}{5}$ or 6.4

P73 #21

#21 a) graph it and vertex = ?] are different.
vertex = ?

b) $g(x) = 3(x-2)(x+2)$ two int are 2, -2

$f(x) = 3x^2 - 4 \longrightarrow 3x^2 - 12$

$= 3(x^2 - \frac{4}{3})$

$\Downarrow$

4

$\therefore$ New $f(x)$ should be $f(x) = 3x^2 - 12$ then the two functions will be the same.

c) $h(x) = 5x^2 - 7$

$= 5(x^2 - \frac{7}{5})$