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# Chapter 13 Problem Solving Set B

## Bronze:

$$a) \quad q = \frac{1}{2}x^2 + 1$$

$$\frac{1}{2}x^2 - 8 = 0$$

$$\frac{1}{2}(x^2 - 16) = 0$$

$$\frac{1}{2}(x+4)(x-4) = 0$$

$$x = -4 \text{ or } x = 4$$

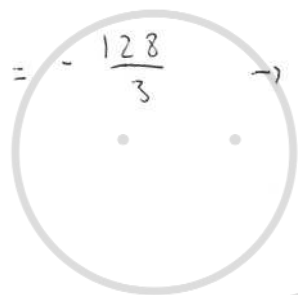
$$\therefore A = (-4, 9)$$

$$B = (4, 9)$$

$$b) \quad \int_{-4}^4 \frac{1}{2}x^2 - 8 \, dx \rightarrow \left[ \frac{\frac{1}{2}x^3}{3} - 8x \right]_{-4}^4 \rightarrow \left[ \frac{1}{6}x^3 - 8x \right]_{-4}^4$$

$$\left[ \frac{1}{6}(4)^3 - 8(4) \right] - \left[ \frac{1}{6}(-4)^3 - 8(-4) \right]$$

$$= -\frac{64}{3} - \left( \frac{64}{3} \right)$$



as we are looking at area,  
area can NOT be negative  
hence

$$\text{Answer} = \frac{128}{3}$$

## Silver:

$$y = 8 - x$$

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

$$x^2 - 4 = 0$$

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

$$x = 2 \quad x = -2$$

when  $x = 2$

$$y = 8 - 2$$

$$y = 6$$

$$(2, 6)$$

↓

B

when  $x = -2$

$$y = 8 - (-2)$$

$$y = 10$$

$$(-2, 10)$$

↓

A

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$$\int_{-2}^2 x^2 - 4 \, dx \rightarrow \left[ \frac{1}{3}x^3 - 4x \right]_{-2}^2$$

$$\left[ \frac{1}{3}(2)^3 - 4(2) \right] - \left[ \frac{1}{3}(-2)^3 - 4(-2) \right]$$

$$= -\frac{16}{3} - \left( \frac{16}{3} \right) = -\frac{32}{3}$$

as we are looking  
at area, area  
can NOT be negative

$$\text{Answer} = \frac{32}{3}$$

