57a. $B(-3, 2n-5)$

(3/4 pt)

Since $y_B = 2n-5$ & $x_B = -3$

then as n varies x_B remains constant.

Thus. B moves on a st. line of equation $x = -3$ parallel to y-axis

b) $\vec{CE}$ | $x_{\vec{CE}} = x_E - x_C = -4$ $\quad \vec{CE}(-4, -8)$

$y_{\vec{CE}} = y_E - y_C = -8$

$\vec{CB}$ | $x_{\vec{CB}} = x_B - x_C = -3 - 3 = -6$

$y_{\vec{CB}} = y_B - y_C = 2n - 5 - 8 = 2n - 13.$

c) Since, pts C, E & B are collinear. (given)

Then, $\frac{x_{\vec{CB}}}{x_{\vec{CE}}} = \frac{y_{\vec{CB}}}{y_{\vec{CE}}}$

$\frac{-6}{-4} = \frac{2n-13}{-8}$

$2n - 13 = -12$

$2n = 1$

$\boxed{n = \frac{1}{2}}$.

Part-B: i) figure (1/2 pt)

$PD = 4x - 16$ $\quad \boxed{x > 4}$

$PQ = 3x - 12.$

ii) Area of $PDQ = \frac{\text{Base} \times \text{height}}{2}$.

$= \frac{DP \times PQ}{2}$

$A(x) = \frac{(4x-16)(3x-12)}{2} = \frac{4(x-4)3(x-4)}{2}$.

$\boxed{A(x) = 6(x-4)^2}$ cm^2.

(1 pt)