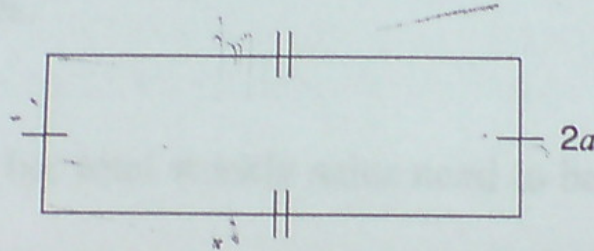**3** A rectangular field has a **perimeter** of $(10a - 6)$ metres and a width of $2a$ metres.

Which expression represents the **length** of this field?
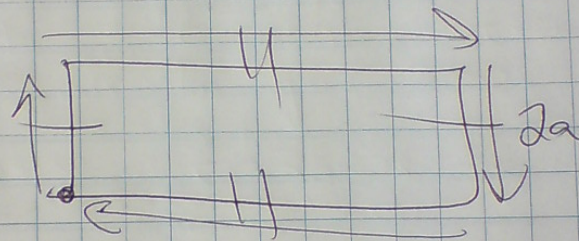
A $8a - 6$

B $12a - 6$

C $3a - 3$

D $3a^2 - 3$

See side work!

$$P = 10a - 6 \quad \text{Given}$$

$$W = 2a$$

$$P = 2l + 2w$$

sub In given data and solve
for the unknown length.

$$10a - 6 = 2l + 2(2a)$$
$$10a - 6 = 2l + 4a$$

$$l = \frac{6a}{2} - \frac{6}{2}$$

$$10a - 4a - 6 = 2l$$

$$\boxed{l = 3a - 3}$$

$$\frac{6a - 6}{2} = \frac{2l}{2}$$
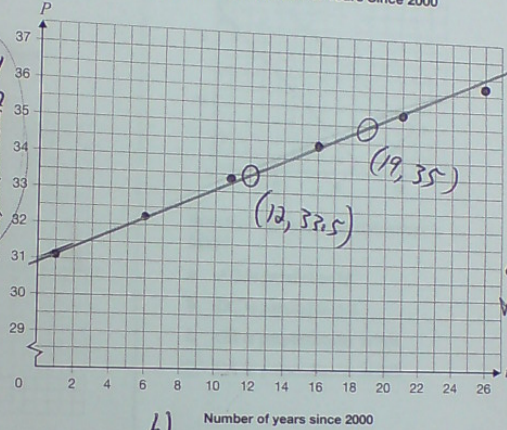
10 **Population Plans**

Alvin is researching the population of Canada. He finds data for the year 2001 and predictions for every 5 years after that, as shown below.

Number of years since 2000, t	Population (in millions), P
1	31.1
6	32.2
11	33.4
16	34.4
21	35.4
26	36.2

$\Delta x = +5$

2036 $x = 36$

Population vs. Number of Years Since 2000

$(19, 35)$

$(12, 33.5)$

line of best fit

a) Determine an algebraic model for Alvin's data, and use it to make a reasonable prediction for the population of Canada in 2036.

Justify your answer.

a)

(S1) $slope = m = \dfrac{35 - 33.5}{19 - 12} = \dfrac{\Delta y}{\Delta x}$

$m = \dfrac{1.5 \times 10}{7 \times 10}$

$\boxed{m = \dfrac{15}{7}}$

(S3) $\boxed{y = \dfrac{15x}{7} - \dfrac{40}{7}}$

(S2) y-Intercept = "b"

$y = \dfrac{15x}{7} + b$

use $(19, 35)$ to solve for "b".

$35 = \dfrac{15(19)}{7} + b$

$7\left(35 = \dfrac{285}{7} + b\right)$

$7(35) = 7\left(\dfrac{285}{7}\right) + 7b$

$245 = 285 + 7b$

$245 - 285 = 7b = -40$

$\dfrac{7b}{7} = \dfrac{-40}{7}$

$\boxed{b = \dfrac{-40}{7}}$

b)

6

q10 part b)

The year 2036 in reference to "t" which is t=0 equals the year 2000.

Therefore, t = 36 is the year 2036.

Sub in x = 36 and solve for y (population in millions)

$$y = \frac{15(36)}{7} - \frac{40}{7}$$

$$y = 77.143 - 5.714 = \boxed{71.43}$$

I predict, based on my model, that the population in 2036 is 71.43 million.

$$\underline{Step 1}$$

9/5) $\qquad m_1 = \frac{1}{2} \qquad m_2 = \text{perpendicular}$

$$\boxed{m_2 = -\frac{2}{1}}$$

$$\underline{Step\ 2}$$

use $y = -\frac{2}{1}x + b$; use $(4, 0)$

and solve for "b".

$$0 = -2(4) + b$$

$$0 = -8 + b$$

$$\boxed{b = +8}$$

15 A line has the following characteristics.

- It is perpendicular to the line $y = \frac{1}{2}x + 3$.
- It passes through the point (4, 0).

What are m, the slope, and b, the y-intercept, of the line?

A $m = \frac{1}{2}$; $b = 0$

B $m = \frac{1}{2}$; $b = 3$

C $m = -2$; $b = 0$

D $m = -2$; $b = 8$

C or D