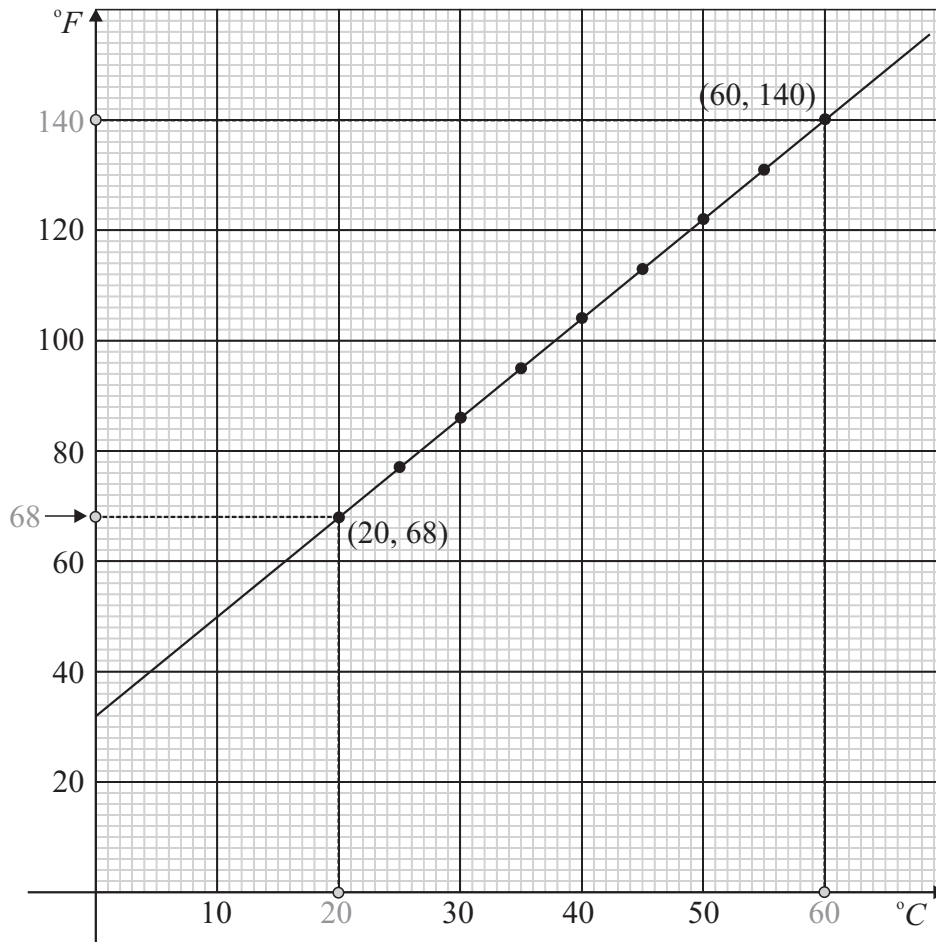


SAMPLE PAPER 3: PAPER 1

QUESTION 8 (50 MARKS)

Question 8 (a)

$^{\circ}\text{C}$	20	25	30	35	40	45	50	55	60
$^{\circ}\text{F}$	68	77	86	95	104	113	122	131	140



Question 8 (b)

Choose two points on the graph: (20, 68) and (60, 140)

$$m = \frac{140 - 68}{60 - 20} = \frac{9}{5}$$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

Equation of line: Point(20, 68), $m = \frac{9}{5}$

$$y - 68 = \frac{9}{5}(x - 20)$$

$y - y_1 = m(x - x_1)$

$$F - 68 = \frac{9}{5}(C - 20)$$

$$F = \frac{9}{5}C - \frac{9}{5}(20) + 68$$

$$F = \frac{9}{5}C - 36 + 68$$

$$\therefore F = \frac{9}{5}C + 32$$

Question 8 (c)

$$F = \frac{9}{5}C + 32$$

$$F - 32 = \frac{9}{5}C$$

$$\therefore C = \frac{5}{9}(F - 32)$$

Question 8 (d)

(i) $F = \frac{9}{5}C + 32$

$$F = \frac{9}{5}(0) + 32 = 32^\circ \text{F}$$

(ii) $F = \frac{9}{5}C + 32$

$$F = \frac{9}{5}(100) + 32 = 180 + 32 = 212^\circ \text{F}$$

(iii) $C = \frac{5}{9}(F - 32)$

$$C = \frac{5}{9}(100 - 32) = \frac{5}{9}(68) \approx 38^\circ \text{C}$$

(iv) $C = \frac{5}{9}(F - 32)$

$$C = \frac{5}{9}(-22 - 32) = \frac{5}{9}(-54) = -30^\circ \text{C}$$

Question 8 (e)

$$F = \frac{9}{5}C + 32$$

$$C = \frac{5}{9}(F - 32)$$

$$F = C \Rightarrow \frac{9}{5}C + 32 = \frac{5}{9}(C - 32)$$

$$\frac{9}{5}C + 32 = \frac{5}{9}C - \frac{160}{9}$$

$$\frac{9}{5}C - \frac{5}{9}C = -\frac{160}{9} - 32$$

$$\frac{56}{45}C = -\frac{448}{9}$$

$$\therefore C = \frac{-448 \times 45}{9 \times 56} = -40^\circ \text{C}$$

$$\therefore -40^\circ \text{C} = -40^\circ \text{F}$$

Question 8 (f) (i)

$$h_1 = 3 \text{ cm}, h_2 = 23 \text{ cm}, h_3 = 17 \text{ cm}$$

$$C = 100 \left(\frac{h_3 - h_1}{h_2 - h_1} \right) = 100 \left(\frac{17 - 3}{23 - 3} \right) = 100 \left(\frac{14}{20} \right) = 70^\circ \text{C}$$

Question 8 (f) (ii)

$$C = \frac{5}{9}(F - 32)$$

$$F = 161^\circ \text{F}: C = \frac{5}{9}(161 - 32) = \frac{215}{3}^\circ \text{C}$$

$$\text{Error} = \frac{215}{3}^\circ \text{C} - 70^\circ \text{C} = \frac{5}{3}^\circ \text{C}$$

$$\% \text{ error} = \frac{\frac{5}{3}}{\frac{215}{3}} \times 100\% = 2.33\%$$
