

LC 2017: PAPER 1

QUESTION 9 (55 MARKS)

Male: $m(x) = 2 \cdot 3x + 65 \cdot 53$

Female: $f(x) = 2 \cdot 5x + 54 \cdot 13$

Question 9 (a)

$x = 47 \cdot 54: m(47 \cdot 54) = 2 \cdot 3(47 \cdot 54) + 65 \cdot 53 = 174 \cdot 87 \text{ cm}$

$x = 47 \cdot 54: f(47 \cdot 54) = 2 \cdot 5(47 \cdot 54) + 54 \cdot 13 = 172 \cdot 98 \text{ cm}$

Question 9 (b)

$m(x) = 184 \Rightarrow 2 \cdot 3x + 65 \cdot 53 = 184$

$2 \cdot 3x = 184 - 65 \cdot 53$

$2 \cdot 3x = 118 \cdot 47$

$x = \frac{118 \cdot 47}{2 \cdot 3} = 51 \cdot 51 \text{ cm}$

Question 9 (c)

True height = 171 cm

$m(44 \cdot 2) = 2 \cdot 3(44 \cdot 2) + 65 \cdot 53 = 167 \cdot 19 \text{ cm}$

$\% \text{ error} = \frac{|171 - 167 \cdot 19|}{171} \times 100\% = 2 \cdot 23\%$

Question 9 (d)

$m(x) = f(x) \Rightarrow 2 \cdot 3x + 65 \cdot 53 = 2 \cdot 5x + 54 \cdot 13$

$65 \cdot 53 - 54 \cdot 13 = 2 \cdot 5x - 2 \cdot 3x$

$11 \cdot 4 = 0 \cdot 2x$

$x = \frac{11 \cdot 4}{0 \cdot 2} = 57 \text{ cm (Length of femur)}$

$m(57) = 2 \cdot 3(57) + 65 \cdot 53 = 196 \cdot 63 \text{ cm (Height)}$

Question 9 (e)

$$P = \frac{M}{h^3}$$

(i) $h = 1 \cdot 60 \text{ m}, M = 72 \cdot 5 \text{ kg}: P = \frac{72 \cdot 5 \text{ kg}}{(1 \cdot 60 \text{ m})^3} = 17 \cdot 7 \text{ kg/m}^3$

(ii) $P = \frac{M}{h^3} \Rightarrow h^3 = \frac{M}{P} \Rightarrow h = \sqrt[3]{\frac{M}{P}}$

(iii) $P = 13, M = 67 \cdot 5 \text{ kg}: h = \sqrt[3]{\frac{67 \cdot 5}{13}} = 1 \cdot 73 \text{ m}$