

Solutions

- 1
- (a)
- Uses linear interpolation in the median class: $160 + \left(\frac{13}{15} \times 10\right)$. (M1)
 - Gives the estimated median height as 169 cm to 3 significant figures. (A1)
- (b)
- Uses class midpoints to calculate $\sum fx = 145(7) + 155(10) + 165(15) + 175(19) + 190(9) = 10075$. (M1)
 - Calculates $\frac{10075}{60} = 168$ cm to 3 significant figures. (A1)
- (c)
- Uses the class midpoints to obtain $\sum fx^2 = 1702575$ and applies $\sigma = \sqrt{\frac{\sum fx^2}{n} - \left(\frac{\sum fx}{n}\right)^2}$. (M1)
 - Gives the estimated standard deviation as 13.4 cm to 3 significant figures. (A1)

(Total for question 1 is 6 marks)

- 2
- (a)
- Uses linear interpolation in the median class: $10 + \frac{15}{19} \times 5$. (M1)
 - Gives the estimated median coded time as 13.9 minutes to 3 significant figures. (A1)
- (b)
- Uses class midpoints to obtain $\sum fx = 815$ and $\sum fx^2 = 16475$, then applies the grouped-data standard deviation formula. (M1)
 - Gives the estimated standard deviation as 7.99 minutes to 3 significant figures. (A1)
- (c)
- Rearranges the coding formula to $t = 2x + 20$ and applies it to the median. (M1)
 - Calculates the median as $2(13.9) + 20 = 47.9$ minutes to 3 significant figures. (A1)
 - Multiplies the coded standard deviation by 2 to obtain $2(7.99) = 16.0$ minutes to 3 significant figures. (B1)

(Total for question 2 is 7 marks)

3

- (a)
- Uses class boundaries and linear interpolation: $19.5 + \frac{27}{41} \times 10$. (M1)
 - Gives the estimate as 26.1 miles to 3 significant figures. (A1)
- (b)
- Uses $\bar{x} = \frac{\sum fx}{n} = \frac{2651}{100}$. (M1)
 - Gives the estimated mean as 26.51 miles. (A1)
- (c)
- Applies $\sigma = \sqrt{\frac{80434.25}{100} - \left(\frac{2651}{100}\right)^2}$. (M1)
 - Gives the estimated standard deviation as 10.1 miles to 3 significant figures. (A1)

(Total for question 3 is 6 marks)

4

- (a)
- Calculates $\sum x = 551.8$ and divides by 12. (M1)
 - Gives the mean as 46.0 seconds to 3 significant figures. (A1)
- (b)
- Uses $\sum x^2 = 25380.38$ and applies $\sigma = \sqrt{\frac{25380.38}{12} - \left(\frac{551.8}{12}\right)^2}$. (M1)
 - Gives the standard deviation as 0.751 seconds to 3 significant figures. (A1)
- (c)
- Gives the median as 45.9 seconds. (B1)
 - Gives the lower quartile as 45.4 seconds. (B1)
 - Gives the upper quartile as 46.3 seconds. (B1)

(Total for question 4 is 7 marks)
