

Answers:

(1) Mean,  $\mu = \frac{4+6+7+9+11}{5} = 7.4$

$$\begin{aligned}\text{Standard deviation, } \sigma &= \sqrt{\frac{(4-7.4)^2+(6-7.4)^2+(7-7.4)^2+(9-7.4)^2+(11-7.4)^2}{5}} \\ &= \sqrt{\frac{11.56+1.96+0.16+2.56+12.96}{5}} \\ &= \sqrt{5.84} = 2.42\end{aligned}$$

When each number is increased by 2, new set of numbers are 6, 8, 9, 11, 13

Mean,  $\mu = \frac{6+8+9+11+13}{5} = 9.4$

$$\begin{aligned}\text{Standard deviation, } \sigma &= \sqrt{\frac{(6-9.4)^2+(8-9.4)^2+(9-9.4)^2+(11-9.4)^2+(13-9.4)^2}{5}} \\ &= \sqrt{\frac{11.56+1.96+0.16+2.56+12.96}{5}} \\ &= \sqrt{5.84} = 2.42\end{aligned}$$

When each number is increased by 2, the mean is increased by 2 but the standard deviation remained unchanged.

(2) Mass ( $x$ )	$20 \leq x \leq 22$	$23 \leq x \leq 25$	$26 \leq x \leq 28$	$29 \leq x \leq 31$	$32 \leq x \leq 34$
Frequency( $f$ )	3	6	11	8	2
$fx$	$3 \times 21 = 63$	144	297	240	66
$fx^2$	$3 \times 21^2 = 1323$	3456	8019	7200	2178

$$\begin{aligned}\text{Mean, } \mu &= \frac{\sum fx}{\sum f} = \frac{63+144+297+240+66}{30} \\ &= 27.0 \text{ grams}\end{aligned}$$

$$\begin{aligned}\text{Standard deviation, } \sigma &= \sqrt{\frac{\sum fx^2}{\sum f} - \mu^2} \\ &= \sqrt{\frac{1323+3456+8019+7200+2178}{30} - (27.0)^2} \\ &= \sqrt{\frac{22176}{30} - 729} \\ &= \sqrt{739.2 - 729} = 3.2 \text{ grams}\end{aligned}$$