Question Number	Scheme	Marks
1 (a)	$\bar{x} = \frac{58}{40} =$ **<u>1.45</u>**	B1
	$\sigma^2 = \frac{84.829}{40} - 1.45^2$	M1
	$= 0.018225$ = awrt **<u>0.0182</u>**	A1
		(3)
(b)	New mean = **<u>145</u>**	B1ft
	New σ = **<u>13.5</u>**	B1
		(2)
(c)(i)	**Reason** e.g. mean of two extra children is the same as the original mean	M1
	Conclusion the mean is therefore unchanged or = **<u>145</u>**	A1
(ii)	**Reason** e.g. extra children <u>more than 1 sd</u> from mean so increased spread	M1
	Conclusion therefore standard deviation will increase	A1
		(4)
		[9]

Notes

(a)
B1 for a correct mean (accept an exact fraction)
M1 for a correct expression for σ^2 (or s^2) (ft their mean and condone inside square root)
A1 for awrt 0.0182 (NB $s^2 = 0.0186923\ldots$ awrt 0.0187) **Correct ans only** 2/2 [No fraction]

(b)
1st B1ft for new mean = 145 <u>or</u> $100 \times$ their $\bar{x}$
2nd B1 for new s.d. = awrt 13.5 (accept $s = 13.6719\ldots$ or awrt 13.7)

(c)(i)
1st M1 for a suitable reason. May see recalculation e.g. $\frac{"145" \times 40 + 130 + 160}{42}$ (o.e.)
e.g. "both 15 away from the mean" <u>or</u> " both same distance from the mean" <u>or</u> "mean of new values is 145 <u>or</u> the same"
1st A1 for 145 or 1.45 or "no change" but M1 must be seen
[no further comment needed if answer matches their (b) or (a)]

(ii)
2nd M1 for a suitable reason but must have idea that the "gap" (= 15) > 1 st. dev. [ft $\sigma < 15$]
2nd A1 for stating standard deviation will be <u>greater</u> (o.e.) [M1 must be seen]
Calculations (You may see)
e.g. $\Sigma y^2 = 84.829 + 1.3^2 + 1.6^2 = 89.079$ leading to $\sigma = \sqrt{0.01842...} = 0.13575\ldots$ or <u>13.6</u> (cm)
<u>or</u> $\frac{89.079}{42} = 2.1209... > \frac{84.829}{40} = 2.1207...$ but $\frac{\sum x}{n}$ stays the same so σ greater
BUT M0A0 unless we see mention of 15 (cm) or 1.5 (m) being more than 1 sd