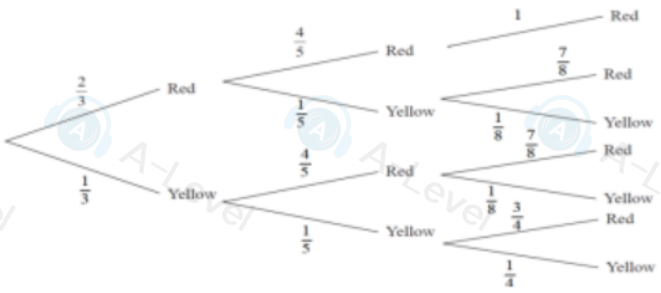
Question Number	Scheme	Marks
4. (a)		B1 B1 B1 (3)
(b)	[Cases *RYY* or *YRY* or *YYR*] Prob $= \frac{2}{3}\times\frac{1}{5}\times\frac{1}{8} + \frac{1}{3}\times\frac{4}{5}\times\frac{1}{8} + \frac{1}{3}\times\frac{1}{5}\times\frac{6}{8}$	M1 A1ft
	$[=\frac{1}{120}(2+4+6)$ or $(0.0166...+0.033...+0.05)] = \frac{12}{120}$ or $\underline{\underline{\frac{1}{10}}}$ (*)	A1*cso (3)
(c)	[P(*RYY* | *RYY* or *YRY* or *YYR*) =] $\frac{"\frac{2}{3}\times\frac{1}{5}\times\frac{1}{8}"}{\frac{1}{10}}$	M1
	$= \underline{\underline{\frac{1}{6}}}$	A1 (2)
(d)	x: 0 | 1 | 2 | 3 P($X=x$): $\frac{64}{120}$ or $\frac{8}{15}$ | $\frac{42}{120}$ or $\frac{7}{20}$ | $\left[\frac{1}{10}\right]$ | $\frac{2}{120}$ or $\frac{1}{60}$	B1 M1 A1 (3)
(e)	[E(X) =] $\frac{1}{120}(0 + "42" + "2\times12" + "3\times2")$	M1
	$= \frac{72}{120}$ or $\underline{\mathbf{0.6}}$	A1 (2) **[13]**

Question Number	Scheme	Marks
3 (a)	Width = **2.5 (cm)**	B1
	1.5 cm^2 for freq of 5 so $6\times1.5=9$ cm^2 for freq of 30 or fd $=\frac{5}{3}\ w\times h=9$	M1
	So $h=9\div2.5$ or $6\div\frac{5}{3}$ = **3.6 (cm)**	A1
		(3)
(b)	$Q_2=[12]+\frac{16}{25}\times3$ allow use of $(n+1)$ giving $[12]+\frac{16.5}{25}\times3$	M1
	$=13.92=$ awrt **13.9**	A1
		(2)
(c)(i)	$\sum fx=5\times6.5+13\times9+16\times11+25\times13.5+30\times17.5+11\times24=1452$	M1
	$\bar{x}=14.52=$ awrt **14.5**	A1
		(2)
(ii)	$\sum fx^2=6.5^2\times5+9^2\times13+11^2\times16+13.5^2\times25+17.5^2\times30+24^2\times11=23\,280$	M1
	$\sigma_x=\sqrt{\frac{"23\,280"}{100}-("14.52")^2}$ or $\sqrt{21.9696}$	M1
	$\sigma_x=4.687\ldots=$ awrt **4.69**	A1
		(3)
(d)	$\frac{1}{2}\times13+16+25+30+\frac{1}{4}\times11$	M1
	So proportion is 80.25 % or 0.8025 awrt **0.803**	A1
		(2)
(e)	Profit $=2.2\times"0.8025"+0.8\times\frac{0.75\times11}{100}-1.2\times"\left(1-\left[0.8025+\frac{0.75\times11}{100}\right]\right)"$	M1
	$=1.6935$ awrt **1.7 (p)**	A1 (2)

Question Number	Scheme	Marks
3 (a)	$1-p$, $\frac{7}{8}$ and $\frac{9}{10}$ in the correct place on tree diagram	B1
		(1)
(b)	$\frac{1}{8}p+\frac{1}{10}(1-p)=0.11$	M1 A1ft
	$p=\frac{2}{5}$	A1
		(3)
(c)	$'\frac{2}{5}'\times\frac{1}{8}=\frac{1}{20}$	M1 A1ft
		(2)
(d)	$\mathrm{P}(\mathrm{Y12}\mid R)=\frac{'\frac{2}{5}'\times\frac{7}{8}}{1-0.11}$ or $\mathrm{P}(\mathrm{Y12}\mid R)=\frac{'\frac{2}{5}'\times\frac{7}{8}}{'\frac{2}{5}'\times\frac{7}{8}+'\frac{3}{5}'\times\frac{9}{10}}$	M1
	$=\frac{35}{89}$	A1
		(2)
	Notes	**Total 8**

Question	Scheme	
2(a)	$\left[\sum x_B =\right] 54\times 45 - 24\times 47 \left[=1302\right]$ or $\frac{24\times 47 + 30b}{54} = 45$	M1
	$\left[\bar{x} =\right] \frac{54\times 45 - 24\times 47}{30} = 43.4$ *	A1*
		(2)
(b)	$\sqrt{\frac{66876+73826}{54} - 45^2} =$ or $\sqrt{\frac{(66876+73826) - \frac{2430^2}{54}}{54}}$	M1
	24.095…. awrt 24.1	A1
		(2)
(c)(i)	No effect as e.g. adding 2 to each does not change the variance	B1
(ii)	Increase as e.g. the total mark will increase	B1
(iii)	Decrease as e.g. the mean mark of class *B* is closer to the mean mark of class *A*	B1
		(3)

Qu	Scheme		Marks
3(a)	$\left[\bar{x} =\right] \frac{3711}{81} \left[=45.814...\right]$	$\left[\sum l =\right] 3711 + 81\times 600 \left[=52311\right]$	M1
	$\left[\bar{l} =\right]$ "45.814..." + 600	$\left[\bar{l} =\right] \frac{"52311"}{81}$	M1
	$\left[\bar{l} =\right] 645.81...$ **awrt 646**		A1
			(3)
(b)	$\left[\sigma_x^{\,2} =\right] \frac{475181}{81} - \left(\frac{3711}{81}\right)^2 \left[=3767\right]$	$\left[\mathrm{Var}(L) =\right] \frac{34088381}{81} - \left(\frac{"52311"}{81}\right)^2$	M1
	$= 3767.43... \Rightarrow \sigma_l^{\,2} = 3767.43...$	$= 3767.43\ldots$ **awrt 3770**	A1
			(2)
(c)	40		B1cao
			(1)
(d)	IQR = 5400 – 3800 [= 1600]		M1
	5400 + 1.5 × "1600" [= 7800] or 3800 – 1.5 × "1600" [= 1400]		M1
	7800 > 7700 and 1400 < 1600 therefore there are no outliers		A1
			(3)
	Notes		**Total 9**

3(a)	Width = 2.5 (cm)	B1
	Height = $\left(\frac{35}{15}\times 6\right)\div$"2.5" or $\frac{4}{5}\times 7$ or $6\text{cm}^2 = 15$ (logs) or $14\text{cm}^2 = 35$ (logs) oe	M1
	= 5.6 (cm)	A1
		(3)
(b)	Median $= [20] + \frac{25}{35}\times 5$ allow $[20] + \frac{25.5}{35}\times 5$	M1
	= 23.57... allow 23.64.... awrt 23.6	A1
		(2)
(c)	19 + 35 + 8 (= 62*) **or** 88 – 3 – 15 – 8 (= 62*)	B1cso*
		(1)
(d)	P(4 logs fit) $= \left(\frac{62}{88}\right)\times\left(\frac{61}{87}\right)\times\left(\frac{60}{86}\right)\times\left(\frac{59}{85}\right)$	M1
	= 0.23922.... awrt 0.239	A1
		(2)
(e)(i)	mean of $y = \frac{924}{88}[= 10.5]$	M1
	mean of $w =$ ("10.5" + 255) × 2	M1
	= 531	A1
		(3)
(ii)	variance of $y = \frac{12862}{88} - (\text{"10.5"})^2 [= 35.909...]$	M1
	variance of $w =$ "35.909" × 4 or "35.909" ÷ 0.5^2	M1
	= 143.636... awrt 144	A1
		(3)

Question Number	Scheme	Marks
7. **(a)**	$[\text{P}(M \mid L) =] \ \frac{\text{P}(M \cap L)}{\text{P}(L)} = \frac{\frac{3}{5}\times\frac{1}{5}}{\frac{3}{10}}$	M1
	$= \underline{\mathbf{0.40}}$ (o.e)	A1
		(2)
(b)	$x = [\text{P}(L \mid F)] = \frac{\text{P}(L \cap F)}{\text{P}(F)} = \frac{\frac{3}{10} - \frac{3}{5}\times\frac{1}{5}}{1 - \frac{3}{5}}$ or $\frac{3}{5}\times\frac{1}{5} + \left(1 - \frac{3}{5}\right)\times x = \frac{3}{10}$	M1
	$x = \frac{0.3 - 0.12}{0.40}$ or $0.4x = 0.3 - 0.12$	M1
	$x = \underline{\mathbf{0.45}}$ (o.e.)	A1
		(3)
(c)	$[\text{P}(M \cap R)] = 0.6 - \text{P}(M \cap L)$ or $0.6\times(1 - 0.2)$	M1
	= **0.48** (o.e.)	A1
		(2)
(d)	P(one is left handed and the other right handed) $= 2\times\frac{3}{10}\times\frac{7}{10}, = \frac{21}{50}$ or **0.42**	M1, A1
		(2)
		Total 9

Question Number	Scheme	Marks
2.	$1.5\times12 = 18$ 20 people represented by 18 (cm^2) or 1 person is represented by 0.9 (cm^2) $x = \dfrac{20\times94.5}{18}$ oe = 105 (people)	M1 M1 A1cao (3) **Total 3**

Question Number	Scheme	Marks
3 (i) (a)	$w = 0.15$	B1
	$x = 0.7 - 0.15 = 0.55$	B1
	$y = 0.65 - 0.55 = 0.1$	B1
	$z = 1 - 0.15 - 0.55 - 0.1 = 0.2$	B1 (4)
(b)	'0.15'+'0.1'='0.25'	B1ft (1)
(c)	$[\mathrm{P}(C)\times\mathrm{P}(O)] = \text{'0.65'}\times\text{'0.7'} \neq \text{'0.55'}[=\mathrm{P}(C\cap O)]$ or $[\mathrm{P}(C\mid O) =]\dfrac{\text{'0.55'}}{\text{'0.7'}} \neq \text{'0.65'}[=\mathrm{P}(C)]$ oe	M1
	'0.455' ≠ '0.55' or '0.7857'... ≠ '0.65' [So not independent]*	A1* (2)
3 (ii) (a)	$\left[P(F\cup H) = \dfrac{2}{7}+\dfrac{1}{4} = \right]\dfrac{15}{28}$	B1 (1)
(b)	$\dfrac{5}{8} = \dfrac{2}{7} + \mathrm{P}(G) - \dfrac{2}{7}\mathrm{P}(G)$	M1
	$\mathrm{P}(G) = \dfrac{\frac{5}{8}-\frac{2}{7}}{1-\frac{2}{7}} = \dfrac{19}{56}\div\dfrac{5}{7}$	dM1
	$\mathrm{P}(G) = \dfrac{19}{40}$	A1 (3)
(c)	$\left[P(F\cap G) = \dfrac{2}{7}\times\text{'}\dfrac{19}{40}\text{'} = \right]\dfrac{19}{140}$	B1ft (1)
	Notes	**Total 12**