Edexcel GCE

Statistics S1

Silver Level S2

(Mark Scheme)

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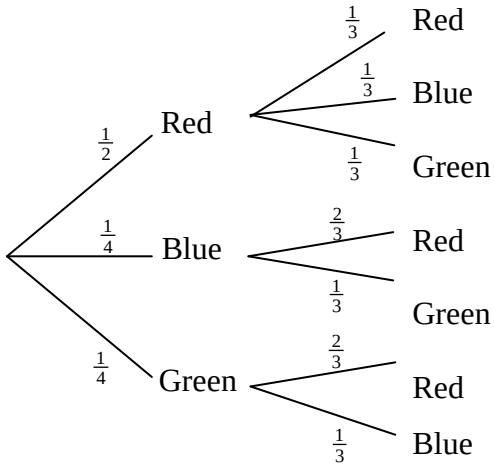
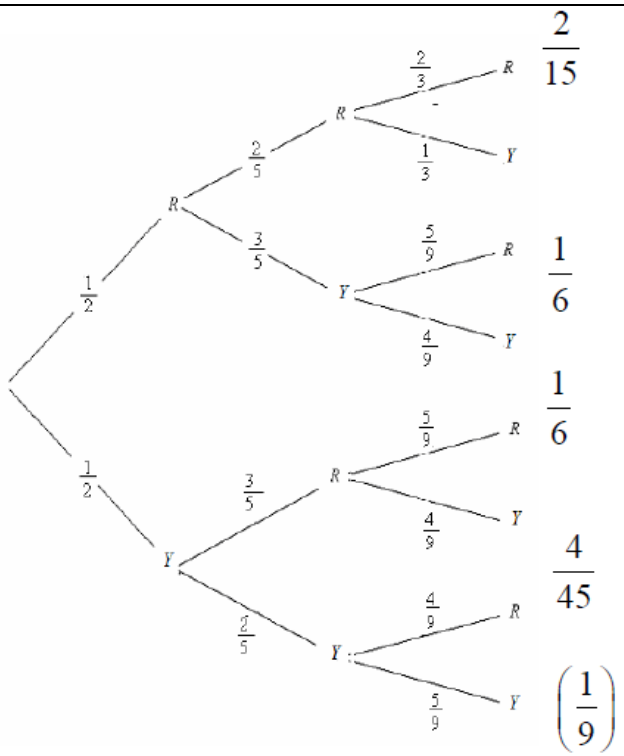
Question Number	Scheme	Marks
1. (a)		M1 A1 A1 (3)
(b)	P(Blue bead and a green bead) $=\left(\frac{1}{4}\times\frac{1}{3}\right)+\left(\frac{1}{4}\times\frac{1}{3}\right)=\frac{1}{6}$ (o.e.)	M1 A1 (2) **[11]**
2. (a)	mean is $\frac{2757}{12}$, = 229.75 awrt 230	M1, A1
	sd is $\sqrt{\frac{724961}{12}-(229.75)^2}$, = 87.34045 awrt 87.3	M1, A1 (4)
(b)	Ordered list is: 125, 160, 169, 171, 175, 186, 210, 243, 250, 258, 390, 420	
	$Q_2 = \frac{1}{2}(186 + 210) = 198$	B1
	$Q_1 = \frac{1}{2}(169 + 171) = 170$	B1
	$Q_3 = \frac{1}{2}(250 + 258) = 254$	B1 (3)
(c)	$Q_3 + 1.5(Q_3 - Q_1) = 254 + 1.5(254 - 170), = 380$ Accept awrt (370-392)	M1, A1
	Patients *F* (420) and *B* (390) are outliers.	B1ftB1ft (4)
(d)	$\frac{Q_1 - 2Q_2 + Q_3}{Q_3 - Q_1} = \frac{170 - 2\times198 + 254}{254 - 170}$, = 0.3 awrt 0.33	M1, A1
	Positive skew.	A1ft (3) **[14]**

Question Number	Scheme	Marks
3. (a)	$a = \underline{0.1}$	B1
	[F(3) = F(2) + P(Y =3) =(0.5 + 0.3)]	
	$d = \underline{0.8}$	B1
	b = F(2) - a = 0.5 - 0.1 or $a + b = 0.5$	M1
	$b = \underline{0.4}$	A1
	c = 1 - F(3) or 1 - ($a + b$ + 0.3) or $a + b + c = 0.7$	
	$c = \underline{0.2}$	A1
		(5)
(b)	P($3Y + 2 \geq 8$) = P($Y \geq 2$) or 1 - P($Y \leq 1$)	M1
	$= b + 0.3 + c$ or $1 - a$ $= \underline{0.9}$	A1ft
		(2) **[7]**
4. (a)	B, W or T, W [accept $B \cup T, W$ or $B \cap T, W$]	B1
	Since there is no overlap between the events or cannot happen together (o.e.)	B1
		(2)
(b)	e.g. $P(B) = \frac{9}{25}$, $P(T) = \frac{8}{25}$, $P(B \cap T) = \frac{5}{25}$	M1
	$P(B \cap T) \neq P(B) \times P(T)$ [$0.2 \neq 0.36 \times 0.32 = 0.1152$ o.e.]	M1
	So B and T are not independent	A1cso
		(3)
(c)	[P(W) =] $\frac{7}{25}$ or 0.28	B1
		(1)
(d)	[P($B \cap T$) =] $\frac{5}{25}$ or $\frac{1}{5}$ or 0.2	B1
		(1)
(e)	[P($T \mid B$) =] $\frac{P(T \cap B)}{P(B)} = \frac{\text{"(d)"}}{(5+4)/25}$	M1
	$= \frac{5}{9}$ or $0.\dot{5}$	A1
		(2) **[9]**

<table>
<tr><th>Question Number</th><th>Scheme</th><th>Marks</th></tr>
<tr><td>5. (a)</td><td>$b = \dfrac{59.99}{33.381}$</td><td>M1</td></tr>
<tr><td></td><td>$= 1.79713\ldots..$ 1.8 or awrt 1.80</td><td>A1</td></tr>
<tr><td></td><td>$a = 32.7 - 1.79713\ldots \times 51.83$</td><td>M1</td></tr>
<tr><td></td><td>$= -60.44525\ldots$ awrt –60</td><td>A1</td></tr>
<tr><td></td><td>$w = -60.445251\ldots + 1.79713\ldots l$ l and w required and awrt 2sf</td><td>A1ft
(5)</td></tr>
<tr><td>(b)</td><td>$w = -60.445251\ldots + 1.79713\ldots \times 60$</td><td>M1</td></tr>
<tr><td></td><td>$= 47.3825\ldots$ In range 47.3 – 47.6 inclusive</td><td>A1
(2)</td></tr>
<tr><td>(c)</td><td>It is extrapolating so (may be) unreliable.</td><td>B1 B1
(2)
[9]</td></tr>
<tr><td>6. (a)</td><td>$k + 2k + 3k + 4k = 1$ or $10k = 1$</td><td></td></tr>
<tr><td></td><td>$k = 0.1$ (*)</td><td>B1cso
(1)</td></tr>
<tr><td>(b)</td><td>$E(X) = 1 \times 0.1 + 2 \times 0.2 + 3 \times 0.3 + 4 \times 0.4 = 3$</td><td>M1 A1
(2)</td></tr>
<tr><td>(c)</td><td>$E(X^2) = 1 \times 0.1 + 4 \times 0.2 + 9 \times 0.3 + 16 \times 0.4 = 10$</td><td>M1 A1
(2)</td></tr>
<tr><td>(d)</td><td>$\text{Var}(X) = 10 - 9 (=1)$</td><td>M1</td></tr>
<tr><td></td><td>$\text{Var}(2 - 5X) = 5^2\text{Var}(X) = 25$</td><td>M1 A1
(3)</td></tr>
<tr><td>(e)</td><td>$P(1,3) + P(2,2) = 2 \times 0.1 \times 0.3 + 0.2 \times 0.2 = 0.1$ (*)</td><td>M1
A1cso
(2)</td></tr>
<tr><td>(f)</td><td><table><tr><td>$X_1 + X_2$</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr><tr><td>p</td><td>0.01</td><td>0.04</td><td>0.1</td><td>0.2</td><td>0.25</td><td>0.24</td><td>0.16</td></tr></table></td><td>B1 B1
(2)</td></tr>
<tr><td>(g)</td><td>$P(2) + P(3) = 0.05$</td><td>M1A1
(2)
[14]</td></tr>
</table>

Question Number	Scheme	Marks
7. (a)	 $\frac{2}{15}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{4}{45}$ $\left(\frac{1}{9}\right)$ both $\frac{2}{3},\frac{1}{3}$ $\frac{4}{9}$ both $\frac{3}{5},\frac{2}{5}$ all three of $\frac{4}{9},\frac{4}{9},\frac{5}{9}$	B1 B1 B1 B1 (4)
(b)	$P(A) = P(RR) + P(YY) = \frac{1}{2}\times\frac{2}{5}+\frac{1}{2}\times"\frac{2}{5}" = \frac{2}{5}$	B1 M1 A1 (3)
(c)	$P(B) = P(RRR) + P(RYR) + P(YRR) + P(YYR)$ $\left(\frac{1}{2}\times\frac{2}{5}\times"\frac{2}{3}"\right)+\left(\frac{1}{2}\times\frac{3}{5}\times\frac{5}{9}\right)+\left(\frac{1}{2}\times"\frac{3}{5}"\times\frac{5}{9}\right)+\left(\frac{1}{2}\times"\frac{2}{5}"\times"\frac{4}{9}"\right) = \frac{5}{9}$ (*)	M1 A1cso (3)
(d)	$P(A\cap B) = P(RRR) + P(YYR)$ $\left(\frac{1}{2}\times\frac{2}{5}\times\frac{2}{3}\right)+\left(\frac{1}{2}\times\frac{2}{5}\times\frac{4}{9}\right) = \frac{2}{9}$ (*)	M1 A1cso (2)
(e)	$P(A\cup B) = P(A)+P(B)-P(A\cap B)$ $= "\frac{2}{5}"+\frac{5}{9}-\frac{2}{9} = \frac{11}{15}$	(2)
(f)	$\frac{P(RRR)}{P(RRR)+P(YYY)} = \frac{\frac{1}{2}\times\frac{2}{5}\times\frac{2}{3}}{\left(\frac{1}{2}\times\frac{2}{5}\times\frac{2}{3}\right)+\left(\frac{1}{2}\times\frac{2}{5}\times\frac{5}{9}\right)} = \frac{6}{11}$	M1 A1ft A1cao (3) **[17]**

Statistics for S1 Practice Paper Silver Level S2

Qu	Max Score	Modal score	Mean %	Mean score for students achieving grade: ALL	A*	A	B	C	D	E	U
1	5		76	3.78		4.44	3.65	3.06	2.72	2.28	1.53
2	14		71	10.00		11.92	10.10	8.94	7.93	6.86	5.07
3	7		67	4.66	6.78	6.43	5.45	4.53	3.68	3.05	2.09
4	9		64	5.75	8.44	7.91	6.66	5.62	4.68	3.92	2.93
5	9		68	6.16		7.87	6.80	6.17	5.53	4.89	3.08
6	14		60	8.43	12.50	11.13	8.56	7.25	6.24	5.12	3.28
7	17		59	10.02	14.74	13.28	10.00	7.84	6.33	5.46	3.42
	75		**65**	**48.80**		**62.98**	**51.22**	**43.41**	**37.11**	**31.58**	**21.40**