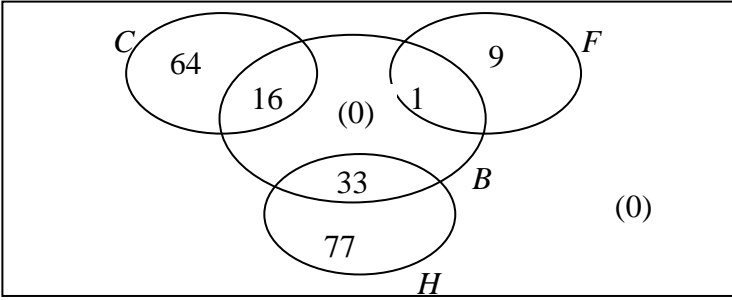


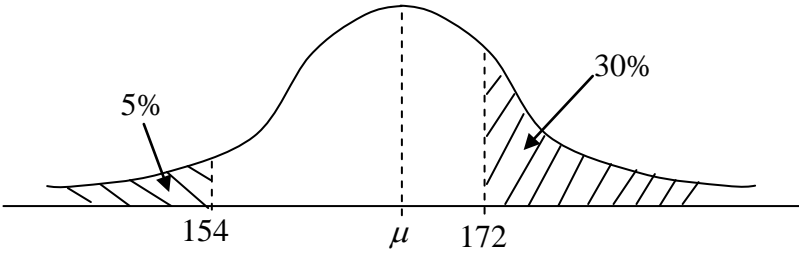
Edexcel GCE
Statistics S1
Silver Level S3
(Mark Scheme)

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Question Number	Scheme	Marks
1. (a)	$r = \frac{S_{xy}}{\sqrt{S_{xx}S_{yy}}} = \frac{-808.917}{\sqrt{113573 \times 8.657}}$ $= -0.81579\dots$	M1 A1 (2)
(b)	Houses are <u>cheaper</u> further away from the station or equivalent statement	B1 (1)
(c)	-0.816	B1f (1) [4]
2. (a)	$\frac{23 - \mu}{5} = "1.40" \quad (\text{o.e.})$ $\underline{\mu = 16}$	awrt ± 1.40 B1 M1A1ft (or awrt 16.0) A1 (4)
(b)	<u>0.4192</u>	B1 (1) [5]
3. (a)	$2a + \frac{2}{5} + \frac{1}{10} = 1 \quad (\text{or equivalent})$ $\underline{a = \frac{1}{4} \text{ or } 0.25}$	M1 A1 (2)
(b)	$E(X) = \underline{1}$	B1 (1)
(c)	$E(X^2) = 1 \times \frac{1}{5} + 1 \times \frac{1}{10} + 4 \times \frac{1}{4} + 9 \times \frac{1}{5} \quad (= 3.1)$ $\text{Var}(X) = 3.1 - 1^2, \quad = \underline{2.1 \text{ or } \frac{21}{10} \text{ oe}}$	M1 M1 A1 (3)
(d)	$\text{Var}(Y) = (-2)^2 \text{Var}(X), \quad = \underline{8.4 \text{ or } \frac{42}{5} \text{ oe}}$	M1 A1 (2)
(e)	$X \geq Y$ when $X = 3$ or 2 , so probability = $"\frac{1}{4}" + \frac{1}{5}$ $= \underline{\frac{9}{20} \text{ oe}}$	M1 A1ft A1 (3) [11]

Question Number	Scheme	Marks
<p>4. (a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p> <p>(e)</p>	$\frac{35 + 75}{200} = 0.55$ $\frac{200 - 2}{200} = 0.99$ $[P(W C)] = \frac{P(W \cap C)}{P(C)} = \frac{30/200}{80/200} = \frac{30}{80} = 0.375$  <p>Allow diagrams with intersections between F, C and H provided these are marked with 0. If their diagram indicates extra empty regions do not treat a blank as 0.</p>	<p>M1 A1 (2)</p> <p>M1 A1 (2)</p> <p>M1 A1 (2)</p> <p>M1 B1 B1 B1 (4)</p> <p>M1 A1 (2) [12]</p>

Question Number	Scheme	Marks
<p>5. (a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p> <p>(e)</p>	$\frac{2+3}{\text{their total}} = \frac{5}{\text{their total}} = \frac{1}{6} \quad (** \text{ given answer} **)$ $\frac{4+2+5+3}{\text{total}}, = \frac{14}{30} \text{ or } \frac{7}{15} \text{ or } 0.4\dot{6}$ $P(A \cap C) = 0$ $P(C \text{reads at least one magazine}) = \frac{6+3}{20} = \frac{9}{20}$ $P(B) = \frac{10}{30} = \frac{1}{3}, \quad P(C) = \frac{9}{30} = \frac{3}{10}, \quad P(B \cap C) = \frac{3}{30} = \frac{1}{10}$ $\text{or } P(B C) = \frac{3}{9}$ $P(B) \times P(C) = \frac{1}{3} \times \frac{3}{10} = \frac{1}{10} = P(B \cap C) \quad \text{or } P(B C) = \frac{3}{9} = \frac{1}{3} = P(B)$ <p>So yes they are statistically independent</p>	<p>M1 A1cso (2)</p> <p>M1 A1 (2)</p> <p>B1 (1)</p> <p>M1 A1 (2)</p> <p>M1</p> <p>M1</p> <p>A1cso (3) [10]</p>
<p>6. (a)</p> <p>(b)</p> <p>(c)</p>	$[P(B) = 0.4, P(A) = p + 0.1 \text{ so}] \quad 0.4 \times (p + 0.1) = 0.1$ <p>or $0.4 \times P(A) = 0.1$</p> $p = \frac{1}{4} - 0.1 \quad \quad \quad \underline{p = 0.15}$ $\frac{5}{11} = \left[\frac{P(B \cap C)}{P(C)} = \right] \frac{0.2}{0.2+q} \quad \text{or} \quad \frac{5}{11} = \frac{0.2}{P(C)}$ $11 \times 0.2 = 5 \times (0.2 + q)$ $\quad \quad \quad \underline{q = 0.24}$ $r = 0.6 - (p + q) \quad \quad \text{i.e. } \underline{r = 0.21}$ $\left[\frac{P((A \cup C) \cap B)}{P(B)} \right] = \frac{0.3}{0.4}$ $= \underline{0.75}$	<p>M1</p> <p>M1A1 (3)</p> <p>M1</p> <p>dM1</p> <p>A1</p> <p>A1ft (4)</p> <p>M1</p> <p>A1 (2) [9]</p>

Question Number	Scheme	Marks
7. (a)	 <p style="text-align: center;">bell shaped, must have inflexions 154,172 on axis 5% and 30%</p>	<p>B1 B1 B1 (3)</p>
(b)	$P(X < 154) = 0.05$	M1
	$\frac{154 - \mu}{\sigma} = -1.6449$ or $\frac{\mu - 154}{\sigma} = 1.6449$	B1
	$\mu = 154 + 1.6449\sigma$ **given**	A1 cso (3)
(c)	$172 - \mu = 0.5244\sigma$ or $\frac{172 - \mu}{\sigma} = 0.5244$	B1
	(allow $z = 0.52$ or better here but must be in an equation)	
	Solving gives $\sigma = 8.2976075$ (awrt 8.30) and $\mu = 167.64873$ (awrt 168)	M1 A1 A1 (4)
(d)	$P(\text{Taller than 160cm}) = P\left(Z > \frac{160 - \mu}{\sigma}\right)$	M1
	$= P(Z < 0.9217994)$	B1
	$= 0.8212$	A1
	awrt 0.82	(3) [13]

Question Number	Scheme	Marks		
8. (a)	Let the random variable X be the lifetime in hours of bulb			
	$P(X < 830) = P\left(Z < \frac{\pm(830 - 850)}{50}\right)$	Standardising with 850 and 50	M1	
	$= P(Z < -0.4)$			
	$= 1 - P(Z < 0.4)$	Using 1-(probability>0.5)	M1	
	$= 1 - 0.6554$			
	$= 0.3446 \text{ or } 0.344578 \text{ by calculator}$	awrt 0.345	A1	
			(3)	
	(b)	0.3446×500	Their (a) x 500	M1
		$= 172.3$	Accept 172.3 or 172 or 173	A1
	(c)	Standardise with 860 and σ		
	and equate to z value $\frac{\pm(818 - 860)}{\sigma} = z$ value		M1	
	$\frac{818 - 860}{\sigma} = -0.84(16) \text{ or } \frac{860 - 818}{\sigma} = 0.84(16)$			
	or $\frac{902 - 860}{\sigma} = 0.84(16)$ or equiv.		A1	
		$\pm 0.8416(2)$	B1	
	$\sigma = 49.9$	50 or awrt 49.9	A1	
			(4)	
(d)	Company Y as the <u>mean</u> is greater for Y .	both	B1	
	They have (approximately) the same <u>standard deviation</u> or <u>sd</u>		B1	
			(2)	
			[11]	

Statistics for S1 Practice Paper Silver Level S3

Qu	Max Score	Modal score	Mean %	Mean score for students achieving grade:							
				ALL	A*	A	B	C	D	E	U
1	4		69	2.76		3.40	3.00	2.68	2.47	2.26	1.80
2	5		69	3.43	4.93	4.79	4.28	3.60	2.84	1.99	0.92
3	11		58	6.39	9.72	8.57	7.27	6.43	5.57	4.54	2.61
4	12	12	58	6.99	10.73	10.05	8.08	6.86	5.84	5.03	3.61
5	10		58	5.82	8.81	7.94	6.27	5.38	4.66	4.12	3.38
6	9		80	7.16	8.75	8.40	7.55	6.30	4.88	3.74	1.85
7	13		55	7.14		10.10	7.67	5.47	4.08	2.94	1.43
8	11		53	5.80		8.73	6.95	5.63	4.31	3.01	1.37
	75		61	45.49		61.98	51.07	42.35	34.65	27.63	16.97