

GCE

Edexcel GCE

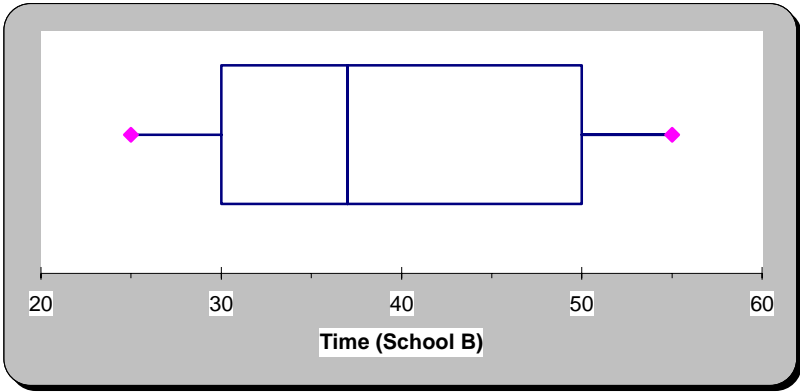
Statistics S1 (6683)

June 2006

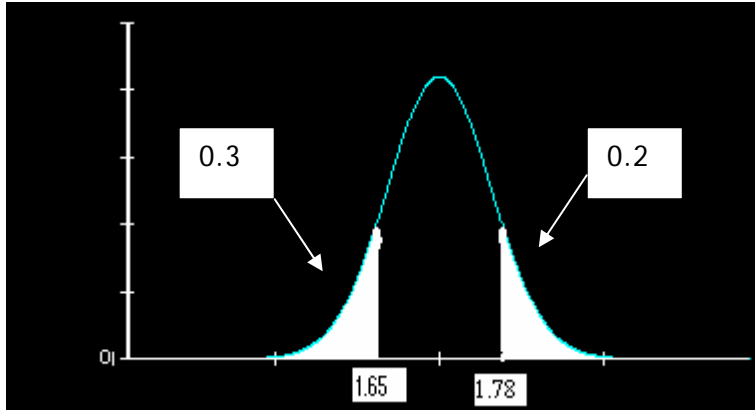
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Mark Scheme  
(Results)

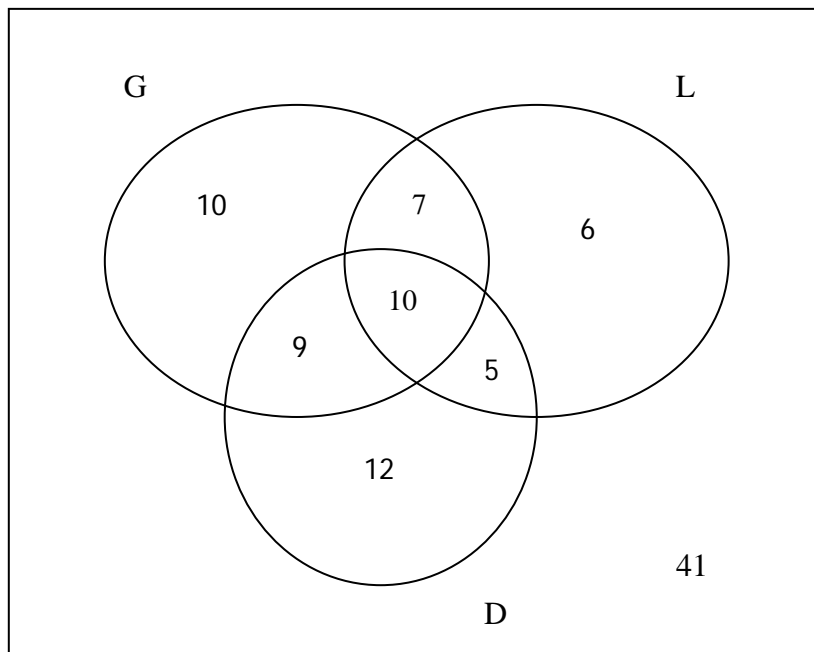
**June 2006  
6683 Statistics S1  
Mark Scheme**

Question Number	Scheme	Marks
1(a)	Indicates max / median / min / upper quartile/ lower quartile (2 or more) Indicates outliers (or equivalent description) Illustrates skewness (or equivalent description e.g. shape)                      Any 3 rows Allows comparisons Indicates range / IQR / spread	B1 B1 B1 (3)
(b)(i) (ii)	37 (minutes) Upper quartile or $Q_3$ or third quartile or 75 <sup>th</sup> percentile or $P_{75}$	B1 B1 (2)
(c)	Outlier s How to calculate correctly ‘Observations that are very different from the other observations and need to be treated with caution’ These two children probably walked / took a lot longer	Any 2 B1 B1 (2)
(d)	 <p style="text-align: right;">Box &amp; median &amp; whiskers Sensible scale 30, 37, 50 25, 55</p>	M1 B1 B1 B1 (4)
(e)	Children from school A generally took less time                      Any correct 4 lines 50% of B $\leq$ 37 mins, 75% of A < 37 mins (similarly for 30) Median/Q1/Q3 of A < median/Q1/Q3 of B (1 or more) A has outliers, (B does not) Both positive skew IQR of A < IQR of B, range of A > range of B	B1 B1 B1 B1 (4) <b>Total 15</b>

Question Number	Scheme	Marks
2. (a)	$P(\text{both longer than 24.5}) = \frac{11}{55} \times \frac{10}{54} = \frac{1}{27} \text{ or } 0.\dot{0}3\dot{7} \text{ or } 0.037$ <p style="text-align: right;">2 fracs x w/o rep. awrt 0.037</p>	<p><b>M1A1</b></p> <p style="text-align: right;">(2)</p>
(b)	<p>Estimate of mean time spent on their conversations is</p> $\bar{x} = \frac{1060}{55} = 19\frac{3}{11} \text{ or } 19.\dot{2}\dot{7} \text{ or } 19.3$ <p style="text-align: right;">1060/total, awrt 19.3 or 19mins 16s</p>	<p><b>M1A1</b></p> <p style="text-align: right;">(2)</p>
(c)	$\frac{1060 + \sum fy}{80} = 21$ <p style="text-align: right;">21x80=1680</p> $\sum fy = 620$ <p style="text-align: right;">Subtracting 'their 1060'</p> $\therefore \bar{y} = \frac{620}{25} = 24.8$ <p style="text-align: right;">Dividing their 620 by 25</p>	<p><b>B1</b></p> <p><b>M1</b></p> <p><b>M1A1</b></p> <p style="text-align: right;">(4)</p>
(d)	<p>Increase in mean value. Length of conversations increased considerably during 25 weeks relative to 55 weeks</p> <p style="text-align: right;">context - ft only from <b>comment</b> above</p>	<p><b>B1</b></p> <p><b>B1</b> ∫</p> <p style="text-align: right;">(2)</p> <p style="text-align: right;"><b>Total 10</b></p>
3. (a)	$\sum x = \sum t = 337.1, \quad \sum y = 16.28$ <p style="text-align: right;">Can be implied</p> $S_{xy} = 757.467 - \frac{337.1 \times 16.28}{8} = 71.4685$ <p style="text-align: right;">either method, awrt 71.5</p> $S_{xx} = 15965.01 - \frac{337.1^2}{8} = 1760.45875$ <p style="text-align: right;">awrt 1760</p>	<p><b>B1, B1</b></p> <p><b>M1A1</b></p> <p><b>A1</b></p> <p style="text-align: right;">(5)</p>
(b)	$b = \frac{71.4685}{1760.45875} = 0.04059652$ <p style="text-align: right;">/ correct way up, awrt 0.0406</p>	<p><b>M1A1</b></p>
	$a = \frac{16.28}{8} - b \times \frac{337.1}{8} = 0.324364$ <p style="text-align: right;">using correct formula, awrt 0.324</p> $y = 0.324 + 0.0406x$ <p style="text-align: right;">3 sf or better but award for copying from above</p>	<p><b>M1A1</b></p> <p><b>A1</b> ∫</p> <p style="text-align: right;">(5)</p>
(c)	<p>At <math>t = 40</math>, <math>x = 40</math>, <math>y = 1.948</math>, <math>l = 2461.948</math></p> <p style="text-align: right;">sub <math>x=40</math>, awrt 1.95, awrt 2461.95</p>	<p><b>M1A1A1</b> ∫</p> <p style="text-align: right;">(3)</p>
(d)	$l - 2460 = 0.324 + 0.0406t$ $l = 2460.324 + 0.0406t$ <p style="text-align: right;">LHS required awrt 2460.32, f.t. their 0.0406, / and t</p>	<p><b>M1</b></p> <p style="text-align: right;">(2)</p>
(e)	<p>At <math>t = 90</math>, <math>l = 2463.978</math></p> <p style="text-align: right;">awrt 2464</p>	<p><b>B1</b></p> <p style="text-align: right;">(1)</p>
(f)	<p>90°C outside range of data unlikely to be reliable</p>	<p><b>B1</b></p>

<p>4 (a)</p> <p>(b)</p> <p>M1A1 ∫</p> <p>(c)</p>	<p><math>E(X) = 3;</math></p> <p><math>Var(X) = \frac{25-1}{12} = 2</math> **AG**</p> <p><math>Var(X) = 1^2 \times \frac{1}{5} + 2^2 \times \frac{1}{5} + 3^2 \times \frac{1}{5} \dots - 3^2 = 11 - 9 = 2</math> **AG**</p> <p>Accept (55/5)-9 as minimum evidence.</p> <p><math>E(3X - 2) = 3E(X) - 2 = 7</math></p> <p><math>Var(4 - 3x) = 3^2 Var(X) = 18</math></p>	<p>B1</p> <p>M1A1</p> <p>(3)</p> <p>(2)</p> <p>M1A1</p> <p>(2)</p> <p>Total 7</p>
<p>5(a)</p> <p>(b)</p> <p>(c)</p>	<div style="text-align: center;">  </div> <p>2 separate sketches OK.      Bell Shape 1.78 &amp; 0.2 1.65 &amp; 0.3</p> <p>Accept clear alternatives to 0.3: 0.7/0.5/0.2</p> <p><math>\frac{1.78 - \mu}{\sigma} = 0.8416 \Rightarrow 1.78 - \mu = 0.8416\sigma</math>      either for method 0.8416</p> <p><math>\frac{1.65 - \mu}{\sigma} = -0.5244 \Rightarrow 1.65 - \mu = -0.5244\sigma</math>      (-)0.5244</p> <p>Solving gives <math>\mu = 1.70, \sigma = 0.095</math>      N.B. awrt 0.84, 0.52 B1B0 awrt 1.7, 0.095 cao</p> <p><math>P(\text{height} \geq 1.74) = 1 - P(\text{height} &lt; 1.74)</math>      'one minus'</p> <p><math>= 1 - P\left(Z &lt; \frac{1.74 - 1.70}{0.095}\right)</math>      standardise with their mu and sigma</p> <p><math>= 1 - P(Z &lt; 0.42) = 0.3372</math>      awrt 0.337</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>(3)</p> <p>M1</p> <p>B1</p> <p>B1</p> <p>M1A1A1</p> <p>(6)</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>(3)</p> <p>Total 12</p>

6.(a)



3 closed curves that intersect  
 Subtract at either stage  
 9,7,5  
 10,6,12  
 41 & box

(b)  $P(\overline{G}, \overline{LH}, \overline{D}) = \frac{10}{100} = \frac{1}{10}$

(c)  $P(\overline{G}, \overline{LH}, D) = \frac{41}{100}$

(d)  $P(\text{Only two attributes}) = \frac{9+7+5}{100} = \frac{21}{100}$

(e)  $P(G | LH \& DH) = \frac{P(G \& LH \& DH)}{P(LH \& DH)} = \frac{\frac{10}{100}}{\frac{15}{100}} = \frac{10}{15} = \frac{2}{3}$  awrt 0.667

N.B. Assumption of independence M0

**M1**  
**M1**  
**A1**  
**A1**  
**A1**  
**(6)**

**B1** ∫  
**(1)**

**B1** ∫  
**(1)**

**M1A1** ∫  
**(2)**

**M1A1** ∫ **A1**

**(3)**  
**Total 13**