

**Upper and Lower Bounds Past Paper Answers GCSE Edexcel - Calculator**

1.

	17.7(014...)	3	B1 for 7.75 or 7.85 or 5.15 or 5.25 or 62.5 or 63.5 M1 for $\frac{1}{2} \times 7.75 \times 5.15 \times \sin 62.5$ A1 for 17.7(0140994...)
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2.

Question	Working	Answer	Mark	Notes
(a)		4.25	1	B1 cao
(b)		7.20-7.21	3	B1 4.35 or 0.35 M1 for $4.35 + \frac{1}{0.35}$ A1 7.2(0)-7.21 or $\frac{1009}{140}$ from a correct method seen

3.

	Yes, average speed could have been as high as 80.622...	5	B1 for 4535 or 4534.999... or 202.5 M1 for 4535 (oe) $\div$ 202.5 M1 for $\times 3600$ and $\div 1000$ A1 for 80.622... C1 (dep on first M1) for correct conclusion from their calculations
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4.

Answer	Mark	Notes
0.229 because the LB and UB agree to that number of figures	5	B1 for 3.465 or 3.475 or 3.474999... B1 for 8.1315 or 8.1325 or 8.132499...  M1 for $\frac{\sqrt{3.475}}{8.1315}$ as UB <b>OR</b> $\frac{\sqrt{3.465}}{8.1325}$ as LB  C1 (dep on all previous marks) for 0.2292... and 0.2288... both values must clearly come from working with correct values  C1 for 0.229 from 0.2292... and 0.2288... <b>and</b> 'both LB and UB round to 0.229'

5.

$\frac{528}{167}$	3	B1 for 37.55 or 37.65 or 11.25 or 11.35 or 8.35 or 8.45 M1 for $\frac{37.65 - 11.25}{8.35}$ for $\frac{v_{ub} - u_{lb}}{t_{lb}}$ where $37.6 < v_{ub} \leq 37.65$ and $11.25 \leq u_{lb} < 11.3$ and $8.35 \leq t_{ub} < 8.4$ A1 for answer in range 3.16 to 3.162 from correct working
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6.

29.25	3	<p>B1 for one of 14.5, 13.5, 8.75, 8.65</p> <p>M1 for "<math>v_{UB}</math>" – "<math>u_{LB}</math>"                      where <math>14 &lt; "v_{UB}" \leq 14.5</math> and <math>8.65 \leq "u_{LB}" &lt; 8.7</math>                      A1 for 29.25 from correct working</p>
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7.

Working	Answer	Mark	Notes
$\frac{232.5}{202.5} \times 60$	68.9	4	<p>M1 for 232.5 or 237.5 or 197.5(=3.29... hours) or 202.5 (= 3.375 hours)</p> <p>M1 for correct conversion of "upper bound of time" from minutes to hours, (202.5 to 205) ÷ 60</p> <p>M1 for "lower bound of distance" ÷ "upper bound of time" (230 to 232.5) ÷ (3.375 to 3.41(6...))</p> <p>A1 for 68.8 to 69 from correct working</p> <p>OR</p> <p>M1 for 232.5 or 237.5 or 197.5(=3.29... hours) or 202.5 (= 3.375 hours)</p> <p>M1 for "lower bound of distance" ÷ "upper bound of time" (230 to 232.5) ÷ (202.5 to 205)</p> <p>M1 for correct conversion of "lower bound of speed" from miles per minute to miles per hour, ((1.12(1...)) to 1.14(8...)) × 60</p> <p>A1 for 68.8 to 69 from correct working</p>

8.

<p>d: UB = 54.5 (or 54.499), LB = 53.5</p> <p>C: UB = 170.5 (or 170.499), LB = 169.5</p> <p><math>170.5 \div 53.5</math></p> <p><math>169.5 \div 54.5</math></p>	<p>3.19</p> <p>3.11..</p>	4	<p>B1 for any one correct bound quoted</p> <p>M1 for <math>170.5 \div 53.5</math> or <math>169.5 \div 54.5</math></p> <p>A1 for UB = answer in range 3.18 to 3.19 from correct working</p> <p>A1 for LB = 3.11.. from correct working</p>
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