

Representation of Data 1 MS

Q1.

<p>2 (i) $133/n + 25 = 28.325$ $n = 40$ $3762/40 - 3.325^2 = 82.99$ standard deviation = 9.11</p>	M1 A1 M1 A1	[4]	Equation involving 133, 25 and 28.325 Correct answer for n Using coded mean in variance formula Correct answer
<p>(ii) $82.99 = \frac{\sum x^2}{40} - 28.325^2$ $\sum x^2 = (82.99 + 28.325^2) \times 40$ $= 35412$ (35400) OR $\sum (x - 25)^2 = \sum x^2 - 50\sum x + 40 \times 25^2$ $\sum x^2 = 3762 + 50 \times 1133 + 25000$ $= 35412$</p>	M1 A1 M1 A1	[2]	Using uncoded material in variance formula Correct answer Expanding and substituting for $\sum x$ Correct answer

Q2.

<p>4 (i) History: lowest 27, highest 57, LQ = 33 med = 39 UQ = 50</p> <div style="text-align: center;"> </div>	M1	[1]	Attempt to find history quartiles and median by putting in order or stem and leaf (can be implied if the answer is reasonable) Correct history median and quartiles Uniform scale and labels Correct history graph ft their quartiles line not through box Correct physics graph
<p>(ii) Physics marks are more spread out than History marks</p>	B1	[1]	Any sensible comment

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Q3.

<p>4 (i) 45 – 50 g</p> <p>(ii) LQ in 40 – 45 UQ in 50 – 60 Smallest IQ range could be 5 Largest IQ range could be 20</p> <p>(iii) 50</p> <p>(iv) freqs 0, 20, 30, 50, 60, 50, 10 fd 0, 2, 3, 10, 12, 5, 1</p>	<p>B1 [1]</p> <p>M1</p> <p>A1 [2]</p> <p>B1 [1]</p> <p>M1</p> <p>B1</p> <p>B1</p> <p>A1 [4]</p>	<p>Considering groups containing LQ and UQ (can be implied)</p> <p>Correct answer</p> <p>Attempt at frequencies and fd</p> <p>Correct labels and scales with a histogram-type shape</p> <p>Correct bar widths starting at 20</p> <p>Correct heights of bars</p>

Q4.

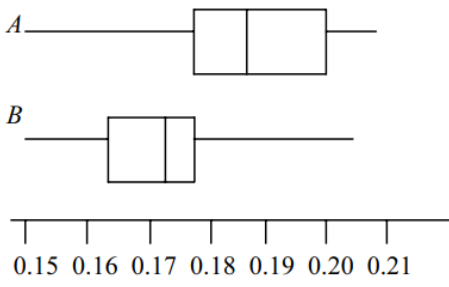
<p>5 (i) LQ = 15, Median = 18, UQ = 26</p>	<p>B1</p> <p>B1</p> <p>B1√</p> <p>B1√</p> <p>[4]</p>	<p>LQ = 15, Median = 18, and UQ = 26</p> <p>Linear scale and labels</p> <p>Quartiles and median box, ft on their values, but $M - LQ < UQ - M$</p> <p>Whiskers from 5 to LQ and UQ to 80, ft on their values</p>
<p>(ii) most (3/4) are earning less than 26K, not many earning high salaries, etc</p>	<p>B1 [1]</p>	<p>Any sensible answer</p>
<p>(iii) (a) IQ range = 11 high outlier is above $26 + 1.5 \times 11$ = 42500 euros</p>	<p>B1</p> <p>M1</p> <p>A1 [3]</p>	<p>IQR = 11</p> <p>Their UQ + $1.5 \times$ their IQ range</p> <p>Correct answer</p>
<p>(b) Low outlier is below $15 - 1.5 \times 11 = -1.5$</p>	<p>B1√</p> <p>[1]</p>	<p>Correct reason, must involve subtraction, ft on their LQ and $1.5 \times$ their IQR</p>

Q5.

<p>1 $\bar{x} = 4.3$</p> $sd = \sqrt{\left(\frac{8287.5}{150} - 4.3^2\right)} = \sqrt{36.76} = 6.063$ $\Sigma(x - \bar{x})^2 = 150 \times 6.063^2$ $= 5514 (5510)$	<p>B1</p> <p>M1</p> <p>M1</p> <p>A1 [4]</p>	<p>4.3 or 645/150 or 18.49 seen</p> <p>Subst in correct formula to find sd or var or expand $\Sigma(x - \bar{x})^2$ correctly and substitute</p> <p>Mult by 150</p> <p>Answer rounding to 5510</p>
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Q6.

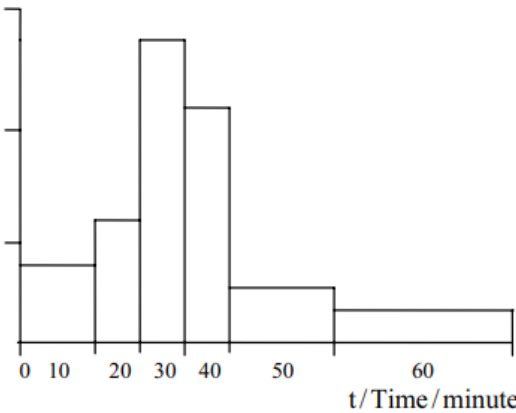
<p>4 (i) A: median = 0.186, IQ range = 0.198 – 0.179 = 0.019</p> <p>(ii) </p>	<p>B1 M1 A1ft [3] B1ft</p> <p>B1</p> <p>B1 [3]</p>	<p>Subt LQ from their UQ Correct IQ range ft dp in wrong place 2 correct boxes ft (i) OK if superimposed</p> <p>2 pairs correct whiskers lines up to box not inside</p> <p>Correct uniform scale from at least 0.15 to 0.21 seen. No scale no marks (ii) unless perfect A and B with all 10 values shown</p>
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Q7.

<p>2 (i) $72/n + 100 = 104.8$ or $72 + 100n = 104.8n$ $n = 15$</p> <p>(ii) $sd^2 = 499.2/15 - (72/15)^2 = 10.24$ $sd^2 = \sum(x-104.8)^2 / 15 -$ $(\sum(x-104.8)/15)^2$ $\sum(x-104.8)^2 = 153.6 (154)$</p> <p>[OR₁ $\sum(x-100)^2 - 2 \times 4.8 \times \sum(x-100)$ $+ 15 \times 4.8^2$ $= 153.6 (154)$</p> <p>[OR₂ $\sum x^2 = \sum(x-100)^2 + 200 \times \sum x -$ 150000 $\sum(x-104.8)^2 = \sum x^2 - 209.6 \sum x +$ 15×104.8^2 $= 153.6 (154)$</p>	<p>M1 A1 [2] M1 M1 A1 [3]</p>	<p>$72/n$ or $100n$ and $104.8n$ seen or implied correct answer</p> <p>numerical use of a correct sd/variance formula, their n numerical use of different correct sd/var formula, their n correct final answer</p> <p>numerical 1st and 2nd terms numerical 3rd term correct final answer]</p> <p>numerical use of a correct expansion to find $\sum x^2$ numerical use of a correct expansion for $\sum(x-104.8)^2$ correct final answer]</p>
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Q8.

<p>3 (i) median in 15–20 mins, UQ in 25–40 mins</p>	B1		
	B1	[2]	
<p>(ii) fd 1.9, 2.4, 5.6, 4.4, 1.2, 0.65 or Scaled freq 9.5, 12, 28, 22, 6, 3.25</p> 	M1		Attempt at fd or scaled freq [f/(attempt at cw)]
	A1		Correct heights seen on diagram
	B1		Correct bar widths visually no gaps
	B1	[4]	Labels (time/ mins and fd or freq per 5 min) and correct bar ends