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<b>1</b> $P(0) = 7/10 \times 6/9 \times 5/8 = 210/720$ $P(1) = 3/10 \times 7/9 \times 6/8 \times 3C1 = 378/720$ $P(2) = 3/10 \times 2/9 \times 7/8 \times 3C2 = 126/720$ $P(3) = 3/10 \times 2/9 \times 1/8 = 6/720 (1/120)$	B1 B1 B1 B1 [4]	Finding $P(0, 1, 2, 3)$ 1 or 2 correct 3 correct All correct															
<b>2</b> $\Sigma x - \Sigma 36 = -60$  $\Sigma x = 24 \times 36 - 60 = 804$  OR $\bar{x} = 36 - 60/24 = 33.5$ $\Sigma x = 33.5 \times 24 = 804$  $\Sigma x^2 - 2.36 \Sigma x + \Sigma 36^2 = 227.6$  $\Sigma x^2 = 27011.76 (27000)$  OR $227.76/24 - (-2.5)^2 = sd^2 = 3.24$ $\Sigma x^2/24 - (33.5)^2 = 3.24$ $\Sigma x^2 = 27011.76 (27000)$	M1  A1 [2]  M1 A1  M1 M1  A1 [3]  M1 M1 A1	Expanding brackets ie mult by 24 and sub 60 Correct answer  Dividing by 24 and sub from 36 Correct answer  Expanding brackets with $36 \Sigma x$ and $\Sigma 36^2$ min $\Sigma x^2 - 2 \times 36 \Sigma x + \Sigma 36^2 = 227.6$ seen Correct answer  $227.76/24 - (\text{their coded mean})^2$ seen $\Sigma x^2/24 - (\bar{x})^2 = \text{their var if +ve seen o.e.}$ Correct answer															
<b>3 (i)</b> $z = -1.036 = \frac{73 - 75}{\sigma}$  $\sigma = 1.93$	B1 M1 A1 [3]	$\pm$ correct z value accept $\pm 1.037$ Equation with 73, 75, $\sigma$ and a z value Rounding to correct answer															
<b>(ii)</b> $P(> 77) = 0.15$ $P(< 3) = P(0, 1, 2)$ $= (0.85)^8 + {}_8C_1(0.15)(0.85)^7 + {}_8C_2(0.15)^2(0.85)^6$ $= 0.895$	M1 M1  A1 [3]	Prob rounding to 0.15 and 0.85 ${}_8C_x p^x (1-p)^{8-x}$ seen any $p, 0 < p < 1$  Correct answer															
<b>4 (i)</b>  <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr><td></td><td>14</td><td>3</td></tr> <tr><td></td><td>15</td><td>3 4 5</td></tr> <tr><td></td><td>16</td><td>1 4 8 8</td></tr> <tr><td></td><td>17</td><td>3 7</td></tr> <tr><td></td><td>18</td><td>5</td></tr> </tbody> </table>  Key:  14 3 represents 14300 dollars		14	3		15	3 4 5		16	1 4 8 8		17	3 7		18	5	B1  B1  B1 [3]	Correct stem  Correct leaves  Key need dollars
	14	3															
	15	3 4 5															
	16	1 4 8 8															
	17	3 7															
	18	5															
<b>(ii)</b> $LQ = 15400$	B1 [1]	Correct answer															
<b>(iii)</b> $5/11 \times 4/10 \times 2/9 \times 3C2 = 4/33 (0.121)$ OR $\frac{5C2 \times 2C1}{11C3}$	B1 B1 B1 [3]	Mult 3 diff fractions or (5C2 or 2C1) seen in num Mult by 3C2 o.e. or correct denom Correct answer															
<b>5 (i)</b> $P(> 1) = 1 - (0.95)^{20} - (0.95)^{19}(0.05) {}_{20}C_1$  $= 0.264$	M1 M1 A1 [3]	Binomial term ${}_{20}C_x (0.05)^x (0.95)^{20-x}$ Correct unsimplified expression Correct answer															

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<p>(ii) Profit 19 or 20 work = <math>450 \times 10 - 480 = 4020</math>  Profit &lt; 19 work = <math>-480</math>  Expected profit = <math>4020 \times (1 - 0.264) - 480 \times 0.264</math>  = <math>\\$2830</math> (<math>\\$2832</math>)  Or <math>-480 + 4500(1 - 0.264) = 2830</math></p>	<p>B1  M1  M1  A1 [4]</p>	<p>4020 seen  Multiplying 4020 by their (i) or their <math>(1 - (i))</math>  Multiplying 480 by <math>[1 - \text{their (i)}]</math> and subtracting  Rounding to correct answer</p>
<p>6 (i) <math>p = 0.2</math>  <math>\mu = 96 \times 0.2 = 19.2</math> <math>\sigma^2 = 96 \times 0.2 \times 0.8 = 15.36</math>  <math>P(&lt; 20) = P(z &lt; \frac{19.5 - 19.2}{\sqrt{15.36}}) = P(z &lt; 0.07654)</math>  = 0.531</p>	<p>B1  M1  M1  M1  A1 [5]</p>	<p><math>96 \times 0.2</math> and <math>96 \times 0.2 \times 0.8</math> seen  standardising must have sq rt  continuity correction either 19.5 or 20.5  correct area (<math>&gt; 0.5</math>)  correct value</p>
<p>(ii) <math>P(OT B) = \frac{0.2 \times 0.6}{0.05 \times 0.3 + 0.2 \times 0.6 + 0.75}</math>  = <math>\frac{0.12}{0.885}</math>  = 0.136 (8/59)</p>	<p>B1  M1  A1  A1 [4]</p>	<p>their <math>0.2 \times (0.6 \text{ or } 0.4)</math> as numerator of a fraction  attempt at <math>P(B)</math> or <math>P(NB)</math> anywhere involving sum of 2 or 3 products  correct unsimplified num or denom of a fraction  correct answer</p>
<p>7 (a) <math>\frac{10!}{5!4!} = 1260</math></p>	<p>M1  A1 [2]</p>	<p><math>10!</math> or <math>{}_{10}P_{10}</math> seen in num or alone or dividing by <math>5! 4!</math> only  Correct final answer</p>
<p>(b) (i) <math>{}_8P_4</math> or <math>{}_8C_4 \times 4!</math>  = 1680</p>	<p>M1  A1 [2]</p>	<p><math>{}_8P_4</math> or <math>{}_8C_4</math> oe seen allow extra multiplication  Correct answer</p>
<p>(ii) <math>6C2 \times 4!</math>  = 360  OR <math>6P4</math> or <math>4 \times 3 \times 6 \times 5 = 360</math></p>	<p>M1  M1  A1 [3]</p>	<p><math>6C2</math> or <math>6P2</math> seen multiplied  Mult by <math>4!</math>  Correct answer  Award full marks</p>
<p>(c) A B C  1 1 7 = <math>9C1 \times 8C1 \times 7C7</math> (oe) <math>\times {}_3C_1 = 216</math>  1 3 5 = <math>9C1 \times 8C3 \times 5C5</math> (oe) <math>\times 3! = 3024</math>  3 3 3 = <math>9C3 \times 6C3 \times 3C3</math> (oe) = 1680  Total = 4920 ways</p>	<p>M1  M1  M1  A1  A1 [5]</p>	<p>Summing at least two options of 1, 1, 7 or 1, 3, 5 or 3, 3, 3  Mult an option by <math>3C1</math> or <math>3!</math> or <math>3C3</math>  Any one of the 2<sup>nd</sup> term being <math>xCy</math> seen mult, fitting with the first (x could be 2, 4, 5, 6 or 8) and corresponding y  Any of unsimplified 72, 504 or 1680 seen  Correct answer</p>