

Mark Scheme 4732  
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Note: “(3 sfs)” means “answer which rounds to ... to 3 sfs”. If correct ans seen to  $\geq 3$ sfs, ISW for later rounding

<p><b>1</b> (i) <math>\Sigma d^2</math>  <math>= 14</math>  <math>1 - \frac{6 \times \text{their } 14}{5 \times (25 - 1)}</math>  <math>= 0.3</math></p>	<p>M1 A1  M1 A1</p>	<p>Subtr &amp; squ 5 pairs &amp; add  dep 1<sup>st</sup>M1 .....  <math>S_{xy} = 48 - \frac{15 \times 15}{5} \quad \{ = 3 \}</math>  <math>S_{xx} = 55 - \frac{15^2}{5} \quad \{ = 10 \}</math>  <math>S_{yy} = 55 - \frac{15^2}{5} \quad \{ = 10 \}</math>                      their <math>\frac{S_{xy}}{\sqrt{(S_{xx}S_{yy})}}</math> M1dep = 0.3 A1</p>
<p>(ii) Reverse rankings attempted 2 5 3 4 1</p>	<p>M1 A1</p>	<p>3 correct T &amp; I to make <math>\Sigma d^2 = 40</math>: 2 mks or 0 mks</p>
<b>6</b>		
<p><b>2</b> (i) (a) Geo(0.14) stated in (a) or (b)   <math>(0.86)^4 \times 0.14</math>  <math>= 0.0766</math> (3 sfs)</p>	<p>B1  M1 A1</p>	<p>or <math>0.86^n \times 0.14</math> or <math>0.14^n \times 0.86</math> in (a) or <math>\geq M1</math> in (b) or Geo(0.86) stated in (a) or (b)  No wking: 0.077: B1M1A0</p>
<p>(b) <math>1 - 0.86^7</math> or <math>0.14 + 0.86 \times 0.14 \dots + 0.86^6 \times 0.14</math>  <math>= 0.652</math> (3 sfs)</p>	<p>M2  A1</p>	<p><math>1 - 0.86^8</math> : M1 +8<sup>th</sup> term (<math>r = 7</math> or <math>0</math>) or 1 missing term: M1</p>
<p>(ii) <math>1/0.14</math>  <math>= {}^{50}/_7</math> or 7.14 (3 sfs)</p>	<p>M1 A1</p>	<p>2</p>
<b>8</b>		
<p><b>3</b> (i) (a) B(16, 0.35) stated   <math>1 - 0.8406</math>   <math>= 0.159</math> (3 sfs)</p>	<p>B1  M1  A1</p>	<p>Or implied by use of tables or <math>0.35^a \times 0.65^b</math> (<math>a+b = 16</math>) in (a) or (b) Allow <math>1 - 0.9329</math> or <math>0.0671</math> Or complete method using formula, <math>P(r = 8-16</math> or <math>9-16)</math> or <math>1 - P(r = 0-7</math> or <math>0-8)</math></p>
<p>(b) <math>0.9771 - 0.1339</math>   <math>= 0.843</math> (3 sfs)</p>	<p>M1  A1</p>	<p>Allow <math>0.9771 - 0.2892</math> Or complete method using formula (<math>r = 4-9</math>)</p>
<p>(ii) <math>{}^{16}C_6(0.38)^6(0.62)^{10}</math>   <math>= 0.202</math> (3 sfs)</p>	<p>M2  A1</p>	<p>Absent or incorr coeff : M1 or <math>{}^{16}C_6(0.38)^{10}(0.62)^6</math>: M1</p>
<b>8</b>		
<p><b>4</b> (i) Correct subst in <math>\geq</math> two <math>S</math> formulae   <math display="block">\frac{14464.1 - \frac{265 \times 274.6}{5}}{\sqrt{\left(14176.54 - \frac{265^2}{5}\right)\left(15162.22 - \frac{274.6^2}{5}\right)}}</math>  <math>= -0.868</math> (3 sfs)</p>	<p>M1  M1  A1</p>	<p>Any correct version  or  <math display="block">\frac{14464.1 - 5 \times 53 \times 54.92}{\sqrt{(14176.54 - 5 \times 53^2)(15162.22 - 5 \times 54.92^2)}}</math>                      or fully correct method with <math>(x - \bar{x})^2</math> etc</p>
<p>(ii) No difference oe</p>	<p>B1</p>	<p>1 Or slightly diff or more acc because of rounding errors when mult by 2.54 oe  Not just “more accurate”</p>
<p>(iii) Choose <math>y</math> on <math>x</math> stated</p>	<p>B1ind</p>	<p>or implied, eg by <math>S_{xy}/S_{xx}</math> or <math>y = ax + b</math></p>

$\frac{14464.1 - \frac{265 \times 274.6}{5}}{14176.54 - \frac{265^2}{5}} \quad \text{or } -0.682$ $y - \frac{274.6}{5} = (\text{their } -0.682)(x - \frac{265}{5})$ $y = 91(.1) - 0.68(2) x$ <p>49.9 (3sfs) or 50</p>	<p>M1</p> <p>M1ind A1</p> <p>A1</p> <p style="text-align: right;">5</p>	<p>If state <math>x</math> on <math>y</math>, but wking is <math>y</math> on <math>x</math>: B1</p> <p>or their <math>\frac{-89.7}{131.54}</math> seen or <math>\frac{14464.1 - 5 \times 53 \times 54.92}{14176.54 - 5 \times 53^2}</math></p> <p>or correct subst into a correct formula <math>\frac{S_{xy}}{S_{xx}}</math></p> <p>or <math>a = \frac{274.6}{5} - (\text{their } -0.682) \times \frac{265}{5}</math></p> <p>Simplif to 3 terms. Coeffs to <math>\geq 2</math> sfs</p> <p>cao</p> <p>Use of <math>x</math> on <math>y</math>: equiv M mks as above</p>
<b>9</b>		
<p><b>5</b> (i) Read at 300 or 300.25 and 900 or 900.75 44.5 to 45.5 and 69 to 69.9 IQR 23.5 to 25.4</p>	<p>M1 A1 A1</p> <p style="text-align: right;">3</p>	<p>or 44-46 and 68-70 incl.</p> <p>dep A1 Must look back, see method. No wking, ans in range: M1A1A1</p>
<p>(ii) 0.6 or 60% CF 720 63 to 64</p>	<p>M1 M1 A1</p> <p style="text-align: right;">3</p>	<p>Seen or implied Seen or implied</p> <p>55.5 to 56: SC B1</p>
<p>(iii) 1200 – 860 = 340</p>	<p>M1 A1</p> <p style="text-align: right;">2</p>	<p>Allow 1200 – (850 to 890) 310 to 350</p>
<p>(iv) 340/1200 <math>0.283^5</math> = 0.00183</p>	<p>M1 M1dep A1</p> <p style="text-align: right;">3</p>	<p>their (iii)/1200 [their (iii)/1200]<sup>5</sup> exactly Allow 0.00114 to 0.00212 <math>\geq 2</math> sfs</p>
<p>(v) Incorrect reason or ambiguity: BOB0. Otherwise: Too low, or should be 26 or 27 or 2 or 3 higher</p>	<p>B2</p> <p style="text-align: right;">2</p>	<p><math>{}^{340}C_5 / {}^{1200}C_5</math> M1</p> <p>eg IQR = 55–35 = 20 or IQR = value &gt;27</p> <p>or new info' implies straight line: B1 or originally, majority in range 35 – 55 are at top of</p> <p style="text-align: right;">this range: B1</p>
<b>13</b>		
<p><b>6</b> (i) <math>a = \frac{4}{5}, b = \frac{1}{5}</math> <math>c = \frac{1}{4}, d = \frac{3}{4}</math> <math>e = \frac{3}{4}, f = \frac{1}{4}</math></p>	<p>B1 B1B1 B1</p> <p style="text-align: right;">4</p>	<p>Or : B1 { ie: <math>a, b</math> : B1 B1 { another pair : B1B1 B1B1 { third pair : B1</p>
<p>(ii) <math>\frac{1}{2}x^{\frac{4}{5}}x^{\frac{1}{2}} + \frac{1}{2}x^{\frac{1}{5}}x^{\frac{1}{4}} + \frac{1}{2}x^{\frac{3}{5}}x^{\frac{3}{4}}</math>  = <math>\frac{9}{20}</math> (AG) with no errors seen</p>	<p>M2 A1</p> <p style="text-align: right;">3</p>	<p>M1: one correct product (M2 needs +) ft their values for M mks only</p>
<p>(iii) <math>\frac{1}{10} + \frac{9}{20} + k + \frac{1}{5} = 1</math> oe or <math>\frac{1}{2}x^{\frac{1}{5}}x^{\frac{3}{4}} + \frac{1}{2}x^{\frac{3}{5}}x^{\frac{1}{4}} + \frac{1}{2}x^{\frac{2}{5}}x^{\frac{1}{2}}</math> <math>k = \frac{1}{4}</math> oe</p>	<p>M1 A1</p> <p style="text-align: right;">2</p>	<p>ft their values for M mk only</p>
<p>(iv) <math>\sum xp(x)</math> = <math>1 \frac{3}{4}</math> oe</p> <p><math>\sum x^2p(x)</math> [= <math>3 \frac{17}{20}</math>] <math>\sum x^2p(x) - (\text{their } \mu)^2</math> 63/80 or 0.788 (3 sfs)</p>	<p>M1 A1</p> <p>M1 M1ind A1</p> <p style="text-align: right;">5</p>	<p>Allow omit 1st term only. Not ISW, eg <math>\div 4</math> cao</p> <p>Allow omit 1st term only. Not ISW, eg <math>\div 4</math> Subtract (their <math>\mu</math>)<sup>2</sup>, if result +ve Follow their <math>k</math> for M mks only</p> <p><math>\Sigma(x - \mu)^2p(x)</math>: Single consistent pair: M1 Rest correct : M1</p>
<b>14</b>		

<p>7 (i) <math>{}^{18}C_7</math> or <math>\frac{18!}{(11! \times 7!)}</math>  <math>= 31824</math></p>	<p>M1 A1</p>	<p>2 cao</p>
<p>(ii) <math>{}^5C_2 \times {}^6C_2 \times {}^7C_3</math> or 5250  <math>\div 31824</math>  <math>= 875/5304</math> or <math>5250/31824</math> oe  or 0.165 (3 sfs)</p>	<p>M2 M1 A1</p>	<p>4 M1: 1 correct <math>{}^nC_r</math> or mult any three <math>{}^nC_r</math>s  Divide by their (i). Indep  If cancelled, must be clear have <math>\div 31824</math>  <hr/> <math>\frac{5 \times 4 \times 6 \times 5 \times 7 \times 6 \times 5 \times 7!}{18 \times 17 \times 16 \times 15 \times 14 \times 13 \times 12 \times 2!^2 \times 3!}</math>  Correct 7 fractions mult: M1  x 7!: M1 }  <math>\div (2!^2 \times 3!)</math>: M1 } both dep any 7 fracts mult</p>
<p>(iii) 5 from W &amp; 2 from (G + H)  <math>{}^7C_5 \times {}^{11}C_2</math> or 1155  <math>\div 31824</math>  <math>= 385/10608</math> or <math>1155/31824</math> oe  or 0.0363 (3 sfs)</p>	<p>M1 M1 M1 A1</p>	<p>4 Seen or implied, eg by combs or list  Divide by their (i). Indep  <hr/> <math>\frac{7 \times 6 \times 5 \times 4 \times 3 \times 11 \times 10 \times 7!}{18 \times 17 \times 16 \times 15 \times 14 \times 13 \times 12 \times 5! \times 2!}</math>  Correct 7 fractions mult: M1  x 7!: M1 }  <math>\div (5! \times 2!)</math>: M1 } both dep any 7 fracts mult</p>
<p>(iv) (2, 2, 3) or (2, 3, 2) or (3, 2, 2)  <math>{}^5C_2 \times {}^6C_2 \times {}^7C_3 + {}^5C_2 \times {}^6C_3 \times {}^7C_2</math>  <math>+ {}^5C_3 \times {}^6C_2 \times {}^7C_2</math>  (÷ 31824)  <math>= 175/442</math> or <math>12600/31824</math> oe  or 0.396 (3 sfs)</p>	<p>M1 M2 A1</p>	<p>4 Any one. Seen or implied eg by combs  M1: one correct product.  NOT <math>{}^5C_2 \times {}^6C_2 \times {}^7C_2</math>  (No mk for ÷ 31824)  Equiv method; ((ii) + etc) can imply M mks  <hr/> <math>\frac{5 \times 4 \times 6 \times 5 \times 7 \times 6 \times 7!}{18 \times 17 \times 16 \times 15 \times 14 \times 13 \times 2!^2 \times 3!}</math>  Correct 6 fractions mult: M1  x 7!: M1 }  <math>\div (2!^2 \times 3!)</math>: M1 } both dep any 6 fracts mult  Complement method:  Triple with total 7, incl at least one 0 or 1  or (0, 7) or (1, 6) seen or implied: M1  One correct prod seen, eg <math>{}^5C_0 \times {}^6C_2 \times {}^7C_5</math> M1  Full correct method, incl "1 – " M1</p>
	<p>14</p>	