



<b>2 (i)</b>	$\text{Mean} = \frac{3026}{56} = 54.0$ $S_{xx} = 178890 - \frac{3026^2}{56} = 15378$ $s = \sqrt{\frac{15378}{55}} = 16.7$	B1 for mean  M1 for attempt at $S_{xx}$  A1 CAO	<b>3</b>
<b>(ii)</b>	$\bar{x} + 2s = 54.0 + 2 \times 16.7 = 87.4$ So 93 is an outlier	M1 for their $\bar{x} + 2 \times$ their $s$ A1 FT for 87.4 and comment	<b>2</b>
<b>(iii)</b>	New mean = $1.2 \times 54.0 - 10 = 54.8$ New $s = 1.2 \times 16.7 = 20.1$	B1 FT M1A1 FT	<b>3</b>
		<b>TOTAL</b>	<b>8</b>

<b>3 (i)</b>	Either $P(\text{all 4 correct}) = \frac{4}{7} \times \frac{3}{6} \times \frac{2}{5} \times \frac{1}{4} = \frac{1}{35}$ or $P(\text{all 4 correct}) = \frac{1}{{}^7C_4} = \frac{1}{35}$	M1 for fractions, or ${}^7C_4$ seen  A1 <b>NB answer given</b>	<b>2</b>
<b>(ii)</b>	$E(X) = 1 \times \frac{4}{35} + 2 \times \frac{18}{35} + 3 \times \frac{12}{35} + 4 \times \frac{1}{35} = \frac{80}{35} = 2\frac{2}{7} = 2.29$ $E(X^2) = 1 \times \frac{4}{35} + 4 \times \frac{18}{35} + 9 \times \frac{12}{35} + 16 \times \frac{1}{35} = \frac{200}{35} = 5.714$ $\text{Var}(X) = \frac{200}{35} - \left(\frac{80}{35}\right)^2 = \frac{24}{49} = 0.490 \text{ (to 3 s.f.)}$	M1 for $\sum rp$ (at least 3 terms correct)  A1 CAO  M1 for $\sum x^2 p$ (at least 3 terms correct)  M1dep for – their $E(X)^2$  A1 FT their $E(X)$ provided $\text{Var}(X) > 0$	<b>5</b>
		<b>TOTAL</b>	<b>7</b>

<b>4</b> <b>(i)</b>	<table border="1"> <tr> <td><math>r</math></td> <td>1</td> <td>2</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><math>P(X=r)</math></td> <td><math>k</math></td> <td><math>3k</math></td> <td><math>5k</math></td> <td><math>7k</math></td> <td><math>9k</math></td> <td><math>11k</math></td> </tr> </table>	$r$	1	2					$P(X=r)$	$k$	$3k$	$5k$	$7k$	$9k$	$11k$	B1 for $3k, 5k, 7k, 9k$	<b>3</b>
	$r$	1	2														
$P(X=r)$	$k$	$3k$	$5k$	$7k$	$9k$	$11k$											
$36k = 1$ , so $k = \frac{1}{36}$	M1 for sum of six multiples of $k = 1$ A1 CAO <b>MUST BE FRACTION IN SIMPLEST FORM</b>																
<b>(ii)</b>	$E(X) = 1 \times \frac{1}{36} + 2 \times \frac{3}{36} + 3 \times \frac{5}{36} + 4 \times \frac{7}{36} + 5 \times \frac{9}{36} + 6 \times \frac{11}{36} = \frac{161}{36} = 4.47$	M1 for $\sum rp$ A1 CAO	<b>2</b>														
<b>(iii)</b>	$P(X=16) = 6 \times \left(\frac{1}{6}\right)^3$  $= \frac{6}{216} = \frac{1}{36}$	M1 for $6 \times$ M1 indep for $\left(\frac{1}{6}\right)^3$  A1 CAO	<b>3</b>														
		<b>TOTAL</b>	<b>8</b>														

<b>5</b> <b>(i)</b>	$P(X=1) = 7k, P(X=2) = 12k, P(X=3) = 15k, P(X=4) = 16k$ $50k = 1$ so $k = 1/50$	M1 for addition of four multiples of $k$  A1 <b>ANSWER GIVEN</b>	<b>2</b>
<b>(ii)</b>	$E(X) = 1 \times 7k + 2 \times 12k + 3 \times 15k + 4 \times 16k = 140k = 2.8$ OR $E(X) = 1 \times \frac{7}{50} + 2 \times \frac{12}{50} + 3 \times \frac{15}{50} + 4 \times \frac{16}{50} = \frac{140}{50} = 2.8$ oe  $\text{Var}(X) = 1 \times 7k + 4 \times 12k + 9 \times 15k + 16 \times 16k - 7.84 = 1.08$ OR $\text{Var}(X) = 1 \times \frac{7}{50} + 4 \times \frac{12}{50} + 9 \times \frac{15}{50} + 16 \times \frac{16}{50} - 7.84$ $= 8.92 - 7.84 = 1.08$	M1 for $\sum xp$ (at least 3 terms correct) A1 CAO  M1 $\sum x^2p$ (at least 3 terms correct) M1 dep for – their $E(X)^2$ NB provided $\text{Var}(X) >$ A1 FT their $E(X)$	<b>5</b>
		<b>TOTAL</b>	<b>7</b>