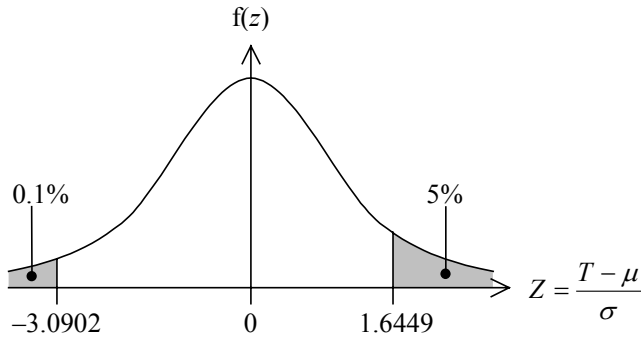
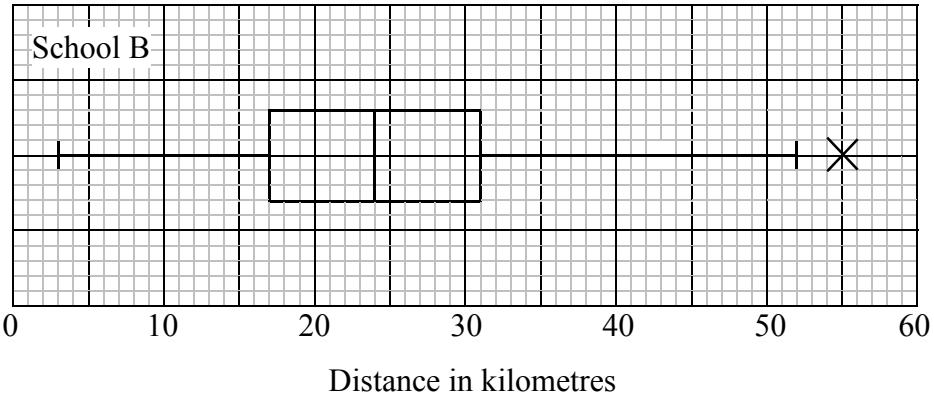


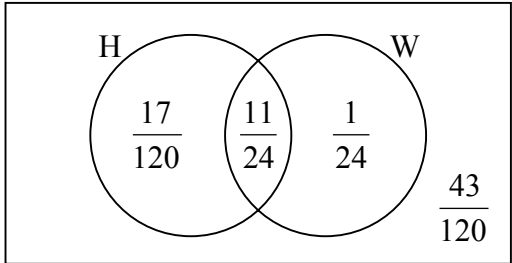
Question Number	Scheme	Marks
1.	(a) A statistical process devised to describe or make predictions about the expected behaviour of a real-world problem. (b) (i) The number showing on the uppermost side of a die after it has been rolled. (ii) The height of adult males.	B1 B1 (2) B1 B1 (2) (4 marks)
2.	 $P(T > 55) = 0.05$ $\therefore P\left(Z > \frac{55 - \mu}{\sigma}\right) = 0.05$ $\Rightarrow \frac{55 - \mu}{\sigma} = 1.6449$ $P(T < 10) = 0.001$ $\therefore P\left(Z < \frac{10 - \mu}{\sigma}\right) = 0.001$ $\Rightarrow \frac{10 - \mu}{\sigma} = -3.0902$ $\therefore 55 - \mu = 1.6449\sigma$ $10 - \mu = -3.0902\sigma$ $\therefore \mu = 39.368$ $\sigma = 9.5035$	1.6449 B1 Standardising M1 Completely correct A1 –3.0902 B1 Standardising M1 Completely correct A1 Attempt to solve M1 $\mu = 39.4$ A1 $\sigma = 9.50$ A1 (9 marks)

Question Number	Scheme	Marks
3.	(a) $k(1 + 2 + 3 + 4 + 5) = 1$	Use of $\sum P(X = x) = 1$ M1 A1
	$\Rightarrow k = \frac{1}{15} \quad *$	A1 (3)
	(b) $E(X) = \frac{1}{15} \{1 + 2 \times 2 + \dots + 5 \times 5\}$	Use of $E(X) = \sum xP(X = x)$ M1 A1
	$= 15$	A1
	$\therefore E(2X + 3) = 2E(X) + 3$	M1
	$= \frac{31}{3}$	A1 ft (5)
	(c) $E(X^2) = \frac{1}{15} \{1 + 2^2 \times 2 + \dots + 5^2 \times 5\}$	Use of $E(X^2) = \sum x^2 P(X = x)$ M1
	$= 15$	A1
	$\text{Var}(X) = 15 - \left(\frac{11}{3}\right)^2$	Use of $\text{Var}(X) = E(X^2) - [E(X)]^2$ M1
	$= \frac{14}{9}$	A1
	$\text{Var}(2X - 4) = 4 \text{Var}(X)$	Use of $\text{Var}(aX) = a^2 \text{Var}(X)$ M1
	$= \frac{56}{9}$	A1 ft (6)
		(14 marks)

Question Number	Scheme	Marks
4.		
(a)	$b = \frac{15 \times 484 - 143 \times 391}{15 \times 2413 - (143)^2}$ $= -3.0899$ $a = \frac{391}{15} - (-3.0899)\left(\frac{143}{15}\right)$ $= 55.5237$ $\therefore y = 55.52 - 3.09x$ $\therefore h - 100 = 55.52 - 3.09(s - 20)$ $\therefore h = 217.32 - 3.09s$	M1 A1 AWRT -3.09 A1 M1 A1 AWRT 55.5 A1 B1 ft M1 A1 ft AWRT 217; 3.09 A1 (10)
(b)	For every extra revolution/minute the life of the drill is reduced by 3 hours.	B1 B1 (2)
(c)	$s = 30 \Rightarrow h = 124.6$	AWRT 125 M1 A1 ft (2)
		(14 marks)

Question Number	Scheme	Marks
5.	(a) Advantages: Uses central 50% of the data Not affected by extreme values (outliers) Provide an alternative measure of spread to the variance/standard deviation, i.e. IQR/STQR Disadvantages: Not always a simple calculation, e.g. interpolation for a grouped frequency distribution Different measures of calculation – no single argued method Does not use all the data directly Any 4 sensible comments – at least one advantage and one disadvantage	B1 B1 B1 B1 (4)
	(b) Indicates maximum/minimum observations and possible outliers Indicates relative positions of the quartiles Indicates skewness When plotted on the same scale enables comparisons of distributions Any 4 sensible comments	B1 B1 B1 (3)
	(c) $Q_1 - 1.5(Q_3 - Q_1) = -4 \Rightarrow$ no outlier below lower quartile $Q_2 + 1.5(Q_3 - Q_1) = 52 \Rightarrow$ an outlier (55) above upper quartile	B1 B1
		
	Same scale and label $Q_1, Q_2, Q_3, 3, 52$ 55 <i>continued over...</i>	B1 B1 B1 (3)

Question Number	Scheme	Marks
5. (d)	A: $Q_3 - Q_2 = 10$; $Q_2 - Q_1 = 10 \Rightarrow$ symmetrical B: $Q_3 - Q_2 = 7$; $Q_2 - Q_1 = 7 \Rightarrow$ symmetrical Median B (24) > Median A (22) $\Rightarrow$ on average teachers in B travel slightly further to school than those in A Range of B is greater than that of A 25% of teachers in A travel 12 km or less compared with 25% of teachers in B who travel 17 km or less 50% of teachers in A travel between 12 km and 32 km as compared with 17 km and 31 km for B Any 4 sensible comments	both distributions are symmetrical B1 B1 B1 B1 (4) (16 marks)

Question Number	Scheme	Marks
6.	$P(H \cap W) = P(H W)P(W)$	M1
(a)	$= \frac{11}{12} \times \frac{1}{2} = \frac{11}{24} \quad *$	A1 (2)
(b)		Diagram M1 $H \cap W'$ M1 A1 $H' \cap W$ A1 $H \cap W$ B1 (5)
(c)	$P(\text{only one has a degree}) = \frac{17}{120} + \frac{1}{24} = \frac{11}{60}$	M1 A1 (2)
(d)	$P(\text{neither has a degree}) = 1 - \left\{ \frac{17}{120} + \frac{11}{24} + \frac{1}{24} \right\}$ $= \frac{43}{120}$	M1 A1 A1 (3)
(e)	Possibilities $-(HW')(H'W); (H'W)(HW'); (HW)(H'W'); (H'W')(HW)$	Any one B1
	$\therefore P(\text{only 1 H or 1 W}) = \left(2 \times \frac{17}{120} \times \frac{1}{24} \right) + \left(2 \times \frac{11}{24} \times \frac{43}{120} \right)$ $= \frac{49}{144}$	All correct B1 $2 \times \frac{17}{120} \times \frac{1}{24}$ B1 ft $2 \times \frac{11}{24} \times \frac{43}{120}$ B1 ft Adding their probabilities M1 $\frac{49}{144}$ A1 (6)
		(18 marks)