STATISTICS 1 (A) TEST PAPER 7 : ANSWERS AND MARK SCHEME

1. $\sum x = 12 \times 13 = 156$ B1

   $(\sum x^2)/12 - 13^2 = 10{\cdot}2$ $\sum x^2 = 2150{\cdot}4$ M1 A1

   For whole set, $\sum x = 320$, $\sum x^2 = 4522{\cdot}4$ Mean = 13·3 M1 A1

   Variance $= 4522{\cdot}4 \div 24 - 13{\cdot}3^2 = 10{\cdot}7$ M1 A1 A1 8

2. (a) $P(A) \times P(B) = \frac{3}{8} \neq \frac{7}{20}$, so not independent M1 A1

   (b) $P(A \cap B') = \frac{3}{5} - \frac{7}{20} = \frac{1}{4}$ M1 A1

   (c) $P(C \mid A) = P(A \cap C) / P(A)$ $P(A \cap C) = \frac{1}{5}$ $P((A \cap C)') = \frac{4}{5}$ M1 A1 A1

   (d) $P(A \cup C) = \frac{2}{5} + P(C)$ $P(C) = \frac{7}{10} - \frac{2}{5} = \frac{3}{10}$ M1 A1

   $P(A \mid C) = \frac{1}{5} \div \frac{3}{10} = \frac{2}{3}$ M1 A1 11

3. (a) $Q_1 \approx 20 + \frac{3}{20} \times 5 = 20{\cdot}75$ $Q_2 \approx 25 + \frac{10}{18} \times 5 = 27{\cdot}8$ M1 A1 M1 A1

   $Q_3 \approx 30 + \frac{19}{20} \times 10 = 39{\cdot}5$ M1 A1

   (b) Box plot drawn (c) Positively skewed B4 B1

   (d) Freq. densities 1·6, 1·6, 4, 3·6, 2, 0·7, 0·4 Ratio 1 : 10 M1 A1 13

4. (a) $P(X < 30) = 0{\cdot}11$ $\frac{30-\mu}{\sigma} = -1{\cdot}23$ $30 - \mu = -1{\cdot}23\sigma$ M1 A1 A1

   $P(X > 90) = 0{\cdot}4$ $\frac{90-\mu}{\sigma} = 0{\cdot}25$ $90 - \mu = 0{\cdot}25\sigma$ M1 A1 A1

   $1{\cdot}48\sigma = 60$ $\sigma = 40{\cdot}5$, $\mu = 79{\cdot}9$ M1 A1 A1

   (b) $P(X > 100) = P(Z > (100 - 79{\cdot}9)/40{\cdot}5) = P(Z > 0{\cdot}50)$ M1 A1

   $= 1 - 0{\cdot}692 = 0{\cdot}308$, so would expect 308 M1 A1 13

5. (a) $p = 0{\cdot}4$ $2q = 0{\cdot}3$ $q = 0{\cdot}15$ B1 B1

   (b) Using sample space or otherwise, M1

   (i) P(sum = 5) = 0·03 + 0·06 + 0·2 = 0·29 M1 A1

   (ii) P(sum < 4) = 0·04 + 0·1 + 0·08 = 0·22 M1 A1

   (c) Assumed independence. One is not likely to affect the other B1 B1

   (d) 2(0·04) + 3(0·18) + 4(0·31) + 5(0·29) + 6(0·12) + 7(0·06) = 4·45 M1 M1 A1 A1 13

6. (a) $\sum t = \sum x + 80 = 122{\cdot}4$ Mean time = 122·4 ÷ 8 = 15·3 s M1 A1

   $\sum p = \sum y + 1200 = 1760$ Mean price = £1760 ÷ 8 = £220 M1 A1

   (b) $\text{Var}(T) = \text{Var}(X + 10) = \text{Var}(X) = 314{\cdot}5 \div 8 - 5{\cdot}3^2 = 11{\cdot}2$ M1 A1 A1

   (c) y on x: $y - 70 = \frac{8(1592) - 424 \times 560}{8(314{\cdot}5) - 424^2}(x - 5{\cdot}3)$ M1 M1 A1 A1

   $y = -15{\cdot}3x + 151{\cdot}2$ $p - 150 = -15{\cdot}3(t - 10) + 151{\cdot}2$ A1 M1 A1

   $p = -15{\cdot}3t + 454$ M1 A1

   (d) £281 A1 17