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

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

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

    For whole set, $\sum x = 320$, $\sum x^2 = 4522 \cdot 4$ Mean $= 13 \cdot 3$ **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) $P(C \mid A) = P(A \cap C) / P(A) \qquad P(A \cap C) = \frac{1}{5} \quad P((A \cap C)') = \frac{4}{5}$ **M1 A1 A1**

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

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

3. (a) $Q_1 \approx 20 + \frac{3}{20} \times 5 = 20 \cdot 75 \qquad Q_2 \approx 25 + \frac{10}{18} \times 5 = 27 \cdot 8$ **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 $1 \cdot 6$, $1 \cdot 6$, 4, $3 \cdot 6$, 2, $0 \cdot 7$, $0 \cdot 4$ Ratio $1 : 10$ **M1 A1**   **13**

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

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

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

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

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

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

    (b) Using sample space or otherwise, **M1**

       (i) $P(\text{sum} = 5) = 0 \cdot 03 + 0 \cdot 06 + 0 \cdot 2 = 0 \cdot 29$ **M1 A1**

       (ii) $P(\text{sum} < 4) = 0 \cdot 04 + 0 \cdot 1 + 0 \cdot 08 = 0 \cdot 22$ **M1 A1**

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

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

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

    $\quad \sum p = \sum y + 1200 = 1760$ Mean price $= £1760 \div 8 = £220$ **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: $\quad y - 70 = \frac{8(1592) - 42 \cdot 4 \times 560}{8(314 \cdot 5) - 424^2}(x - 5 \cdot 3)$ **M1 M1 A1 A1**

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

    $\quad p = -15 \cdot 3t + 454$ **M1 A1**

    (d) £281 **A1**   **17**

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