

STATISTICS 1 (A) TEST PAPER 9 : ANSWERS AND MARK SCHEME

1. (a) A mathematical representation which statistically describes or predicts the behaviour of a real-life situation B2
- (b) An improved mathematical formulation of the problem which aims to represent the reality more closely. B2 4
2. (a) $(n^2 - 1)/12 = 24$ $n = 17$ $E(X) = 9$ M1 A1 A1
- (b) $P(3 \leq X < 8.5) = P(X = 3, 4, 5, 6, 7 \text{ or } 8) = \frac{6}{17}$ M1 M1 A1 6
3. (a) $P(Z > \frac{100-\mu}{12.6}) = 0.0764$ $\frac{100-\mu}{12.6} = 1.43$ $\mu = 82.0$ M1 A1 M1 A1
- (b) $P(75 < R < 80) = P(-0.55 < Z < -0.16)$ M1 A1
- $= 0.436 - 0.291 = 0.145$ M1 A1 A1 9
4. (a) 10 (b) 10 - 15 has area 9.6 cm^2 , so 2.5 visitors : 1 cm^2 B1; M1
- so $36 \text{ cm}^2 = 90$ visitors $62 + x + y = 90$ $x + y = 28$ M1 A1 A1
- Also $\frac{x}{2.5} = 10 \times \frac{y}{10}$ so $x = 2.5y$ Hence $x = 20, y = 8$ M1 A1 A1
- (c) Freq. densities 1.5, 4.8, 4, 1.3, 1, 0.4 Histogram drawn B2 B3 13
5. (a) $4p + 13q + 4.7 = 6.7$ $4p + 13q = 2$ M1 A1
- $p + 2q + 0.6 = 1$ $p + 2q = 0.4$ M1 A1
- Solve: $p = 0.24, q = 0.08$ M1 A1 A1
- (b) $E(2X + a) = 2E(X) + a = 13.4 + a$ $a = -13.4$ M1 A1 A1
- (c) $E(X^2) = 48.54$ $\text{Var}(X) = 48.54 - 6.7^2 = 3.65$ M1 A1 A1 13
6. (a) $\sum x = 495, \sum y = 431$ B1 B1
- (b) $S_{xx} = 1850.5, S_{yy} = 1656.5$ $y - 43.1 = 0.895(x - 49.5)$ B1 B1 M1
- $y = 0.895x - 1.21$ A1 A1
- (c) (i) 57, (ii) 3 (ii) less reliable - outside range of given values M1 A1 A1 B1
- (d) $r = \sqrt{(0.895 \times 0.921)} = 0.908$ Quite good + ve correlation M1 M1 A1 B1 15
7. (a) Let $P(\text{younger child is a boy, given elder is a boy}) = p$
- $\frac{5}{12}p + \frac{7}{12} \times \frac{3}{4} = \frac{9}{16}$ $\frac{5}{12}p = \frac{1}{8}$ $p = \frac{3}{10}$ M1 A1 A1
- $P(B, B) = \frac{5}{12} \times \frac{3}{10} = \frac{1}{8}$ M1 A1
- (b) $P(B, G \text{ or } G, B) = \frac{5}{12} \times \frac{7}{10} + \frac{7}{12} \times \frac{3}{4} = \frac{35}{48}$ or 0.729 M1 A1 A1
- (c) $P(B, G \text{ or } G, B \mid \text{at least 1 girl}) = \frac{35}{48} \div \frac{7}{8} = \frac{5}{6}$ M1 M1 A1
- (d) $\frac{1}{8} \times \frac{1}{8} \times \frac{7}{8} \times 3 = \frac{21}{512}$ or 0.0410 M1 A1 A1
- (e) Assumed independence B1 15