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

1. (a) $3x$ corresponds to 24 cm^2, so $5x$ corresponds to 40 cm^2 — M1 A1
   Width = 2 cm, so height = 20 cm — M1 A1
   (b) Area = $19x = 19 \times 8 = 152$ cm^2 — M1 A1 A1 — 7

2. (a) $P(B) = 0{\cdot}12 \div 0{\cdot}4 = 0{\cdot}3$ (b) $P(A \cup B) = 0{\cdot}7 - 0{\cdot}12 = 0{\cdot}58$ — M1 A1; M1 A1
   (c) $P(A' \cap B) = 0{\cdot}3 - 0{\cdot}12 = 0{\cdot}18$ (d) $P(A \mid B') = P(A) = 0{\cdot}4$ — M1 A1; B1 — 7

3. (a) Mean = $(10 + (-7)) \div 2 = 1.5$ — M1 A1
   $\text{Var}(X) = \text{Var}(X + 8) = (18^2 - 1)/12 = 26\frac{11}{12}$ or 26·9 — M1 M1 A1
   (b) $P(X > 7) = \frac{3}{18} = \frac{1}{6}$ — M1 A1
   (c) 7 consecutive integers centred on 0 are –3 to 3, so $x = 3$ — M1 A1 — 9

4. (a) Median = 56·5 Mean = $1600 \div 30 = 53\frac{1}{3}$ — B1 B1
   Var = $102400/30 - (1600/30)^2 = 568{\cdot}89$, so s.d. = 23·9 — M1 A1 A1
   (b) Median = 65·2, mean = $62\frac{2}{3}$, variance = $0{\cdot}8 \times 23{\cdot}9 = 19{\cdot}1$ — B1 B1 M1 A1 — 9

5. (a) Scatter graph showing moderate positive correlation — B5
   (b) 7 or 8 — M1 A1
   (c) $\sum x = 91$, $\sum y = 104$ — B1
   $S_{xx} = 80{\cdot}89$, $S_{yy} = 62{\cdot}22$, $S_{xy} = 54{\cdot}44$ $r = 0{\cdot}767$ — M1 A1 A1
   which confirms the moderate positive correlation — B1 — 12

6. (a)

z	0	1	2	3
$P(Z = z)$	$\frac{3}{8}$	$\frac{33}{80}$	$\frac{7}{40}$	$\frac{3}{80}$

   — M1 A1 A1 A1 A1
   (b) $E(Z) = \frac{7}{8}$ — M1 M1 A1
   (c) (i) $E(Z^2) = \frac{29}{20}$ (ii) $\text{Var}(Z) = \frac{29}{20} - \frac{49}{64} = \frac{219}{320}$ or 0·684 — M1 A1 M1 A1
   (d) $\text{Var}(3Z - 4) = \text{Var}(3Z) = 9\,\text{Var}(Z) = 6\frac{51}{320}$ or 6·16 — M1 A1 — 14

7. (a) $P(X > 4.5) = 0{\cdot}625$, so $P(Z > \frac{-0{\cdot}7}{\sigma}) = 0{\cdot}625$ — M1 A1
   $\frac{-0{\cdot}7}{\sigma} = -0{\cdot}32$ $\sigma = 2{\cdot}1875 \approx 2{\cdot}2$ — M1 A1 A1
   (b) $P(4 < X < 7) = P(-0{\cdot}55 < Z < 0{\cdot}82)$ — M1 A1
   $= 0{\cdot}794 - (1 - 0{\cdot}709) = 0{\cdot}503$, i.e. 50·3% — M1 A1
   (c) $P(X < 5) = P(Z < -0{\cdot}091) = 1 - 0{\cdot}536 = 0{\cdot}464$ — M1 A1
   so assuming independence, probability = $0{\cdot}464^2 = 0{\cdot}215$ — B1 A1
   (d) (i) unchanged at 5·2 — B1
   (ii) decreases, as average deviation from mean is less — B2
   Not normal as shape of curve changes, and $P(X = 5{\cdot}2) > 0$ — B1 — 17