| Question Number | Scheme | Marks |
|---|---|---|
| **4. (a)** | [$W$ = weight of a package delivered to Susie $W \sim N(510, 45^2)$] | |
| | $P(W < 450) = P\left(Z < \frac{450-510}{45}\right)$ or $P(Z < -1.3333)$ | M1 |
| | $= 1 - 0.9082$ | M1 |
| | $= 0.0918$ **[0.0912~0.0918]** | A1 |
| | | (3) |
| **(b)** | [$P(W > d) = 0.05$ implies] $\frac{d-510}{45} = 1.6449$ | M1B1 |
| | $d = 584.0205\ldots$ awrt **584** | A1 |
| | | (3) |
| **(c)** | [$P(W > 450 \mid W <$ "584.02…") =] $\frac{P(450 < W < \text{"584.02..."})}{P(W < \text{"584.02..."})}$ | M1 |
| | $= \frac{0.95 - \text{"0.0918"}}{0.95}$ or $\frac{\text{"0.9082"} - 0.05}{0.95}$ | M1A1 |
| | $= 0.903368\ldots$ awrt **0.904** or **0.903** | A1 |
| | | (4) |
| **(d)** | $\left(\frac{19}{20}\right)^4 \times \frac{1}{20} \times 5$ | M1dM1 |
| | $= 0.203626\ldots$ awrt **0.204** | A1 |
| | | (3) |
| | | **[13]** |

| | Notes |
|---|---|
| | **Correct answer only in (a), (c) or (d) scores all the marks for that part** |
| **(a)** | 1st M1 for standardising 450 with 510 and 45 (allow $\pm$)<br>2nd M1 for $1 - p$ (where $0.90 < p < 0.99$)<br>A1 for answer in the range 0.0912 to 0.0918 inclusive (calc. 0.09121133…) |
| **(b)** | M1 for standardising their letter $d$ with 510 and 45 and setting equal to $z$ value $1 < \lvert z \rvert < 2$<br>B1 for use of $z = \pm 1.6449$ or better (calc 1.644853626…)<br>A1 for awrt 584 (calc 584.0184…) |
| **Ans only** | [ awrt 584.02 scores 3/3 584 scores M1B0A1] |
| **(c)** | 1st M1 for a correct ratio of probability expressions ft their answer to (b) where (b) > 450<br>2nd M1 for numerator of awrt 0.95 – their answer to (a)<br>1st A1 for a correct denominator of awrt 0.95 (dep on M1M1)<br>NB a correct ratio of probabilities will score the 1st 3 marks<br>2nd A1 for awrt 0.904 or awrt 0.903 |
| **(d)** | 1st M1 for $k\,p^4(1-p)$ for any positive integer $k$ and any probability $p$ (allow $k = 1$)<br>2nd dM1 for $k = 5$<br>A1 for awrt 0.204 |