

| Question | Scheme | Marks | AOs |
|-------------------|--|--------|------------|
| 5(a) | W = number of scratch cards out of 20 that win, $W \sim B(20, 0.45)$ | B1 | 3.3 |
| | S = number of stores with at least 12 winning cards $S \sim B(8, p)$ | M1 | 3.1b |
| | $p = P(W \geq 12) = 0.130765$ | A1 | 3.4 |
| | $1 - [P(S = 1) + P(S = 0)]$ | M1 | 3.4 |
| | So $P(S \geq 2) = 0.2818 \dots$ | A1 | 1.1b |
| | | (5) | |
| (b) | Number of trials is large and probability of success is close to 0.5 | B1 | 1.2 |
| | | (1) | |
| (c) | $X \sim N(135, 74.25)$ | B1, B1 | 1.1b, 1.1b |
| | $P(X < 122.5) = P\left(Z < \frac{122.5 - 135}{\sqrt{74.25}}\right)$ | M1 | 3.4 |
| | $= 0.0734 \dots$ | A1 | 1.1b |
| | | (4) | |
| (d) | The probability is greater than 0.025 therefore there is insufficient evidence at the 5% significance level to suggest that the proportion is different from 45% | B1 | 2.2b |
| | | (1) | |
| (11 marks) | | | |

Notes:

(a)

B1: may be implied by subsequent working

1st M1: for selection of appropriate model for S

1st A1: for a correct values of the parameter p

2nd A1: for awrt 0.282

(b)

B1: both correct conditions

Accept n is large, $np > 5$ and $n(1 - p) > 5$

(c)

B1: for correct mean

B1: for correct variance

M1: for continuity correction

A1 awrt 0.0734

(d)

B1: for correct statement