

12	(a)		$n = 50; \quad a = \frac{5}{6}, b = \frac{1}{6}; \quad \text{or } a = \frac{1}{6}, b = \frac{5}{6},$	B1 [1]	or $\left(\frac{5}{6} + \frac{1}{6}\right)^{50}$ or $\left(\frac{1}{6} + \frac{5}{6}\right)^{50}$
12	(b)		$H_0: p = \frac{1}{6}$ allow 0.167 or 0.17 $H_1: p < \frac{1}{6}$ $p = \text{P(dice shows a 2 (on any throw))}$ or $p = \text{proportion of 2s thrown}$	B1 B1 [2]	One error, eg undefined p or 2-tail or $H_1: p > \frac{1}{6}$: B1B0 Two errors, eg $H_1: p > \frac{1}{6}$ and undefined p : B0B0 Cannot be scored in part (c)
12	(c)		$B(50, \frac{1}{6})$ Attempt $P(X \leq a)$ for $1 \leq a \leq 20$ $P(X \leq 4) = 0.0643$ $P(X \leq 3) = 0.0238$ Rejection region is ≤ 3 twos or < 4 twos Alternative method ft if 12(b) $H_1: p > \frac{1}{6}$ $B(50, \frac{1}{6})$ Attempt $P(X \geq a)$ for $1 \leq a \leq 20$ $P(X \geq 14) = 0.0307$ $P(X \geq 13) = 0.0627$ Rejection region is ≥ 14 twos or > 13 twos	B1 M1 A1 A1	stated or implied or $P(X < 5) = 0.0643$ or $P(X < 4) = 0.0238$ Must see both probabilities correct oe. Allow $X \leq 3$ or $X < 4$
				B1 M1 A1 A1 [4]	stated or implied Must see both probabilities correct oe. Allow $X \geq 14$ or $X > 13$