12	**12c**	Kim and Mel play a simple game using a spinner marked with the numbers 1, 2, 3, 4 and 5. The game consists of each player spinning the spinner once. Each of the five numbers is equally likely to occur. The player who obtains the higher number wins the game. If both players obtain the same number, the result is a draw.  (i) Kim and Mel play one game. What is the probability that Kim wins the game? (ii) Kim and Mel play six games. What is the probability that Kim wins exactly three games?	**1** **2**

(i) (2, 1), (3, 1), (4, 1), (5, 1), (3, 2), (4, 2), (5, 2), (4, 3), (5, 3), (5, 4)

$$\text{P(Kim wins)} = \frac{10}{25}$$

$$= \frac{2}{5}$$

OR, $$\text{P(Draw)} = \frac{5}{25}$$

$$= \frac{1}{5}$$

As, P(Kim wins) = P(Kim loses), then

$$\text{P(Kim wins)} = \frac{1-\frac{1}{5}}{2}$$

$$= \frac{2}{5}$$

(ii) Let P(Kim not win) = $p = \frac{3}{5}$

P(Kim wins) = $q = \frac{2}{5}$

P(Kim wins 3 games)

$$= {}^6C_3 p^3 q^3$$

$$= {}^6C_3 \left(\frac{3}{5}\right)^3 \left(\frac{2}{5}\right)^3$$

$$= \frac{4320}{15625}$$

$$= \frac{864}{3125}$$

State Mean:
0.37/1
1.36/2

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by the Board of Studies

Board of Studies: Notes from the Marking Centre

(i) In better responses, candidates first calculated the size of the sample space, which was 25. In many weaker responses, candidates ignored the possibility of a draw, even though it was in the question, and consequently stated that the probability of winning was 0.5.

(ii) A large majority of candidates gained full marks on this part by substituting their answer p from part (i) into the expression ${}^6C_3(p)^3(1-p)^3$.

Source: http://www.boardofstudies.nsw.edu.au/hsc_exams/