

## CONDITIONAL PROBABILITY Guide Notes

Two events,  $A$  and  $B$ , are \_\_\_\_\_ if the fact that event  $A$  occurs does not affect the probability of  $B$  occurring.

**Rolling a die and getting a 4, and then rolling a second die and getting a 5.**

**Drawing a card from a deck and getting a jack, replacing it, and then drawing a second card and getting an ace.**

When the outcome or occurrence of the first event  $A$  affects the outcome or occurrence of the second event  $B$  in such a way that the probability is changed, the events are said to be \_\_\_\_\_.

**Drawing a card from a deck, not replacing it, and then drawing a second card.**

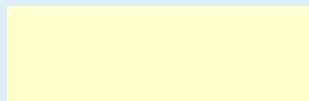
**Having a high grades and getting a scholarship.**

**Selecting a ball from a jar, not replacing it, and then selecting a second ball.**

A conditional probability of an event is used when the probability is affected by the knowledge of other circumstances. It can only occur to dependent events.

### Conditional Probability

The conditional probability of that the second event  $B$  occurs given that the first event  $A$  has occurred can be found by dividing the probability that both events occurred by the probability that the first event has occurred. It is denoted by  $P(B|A)$ , and is given by



where  $P(A) \neq 0$ .

**Sample Problem 1:** Black and white chips are placed in a box. Jack selects two chips without replacing the first one. If the probability of selecting a black chip and white chip is  $30/67$ , and the probability of selecting a white chip on the first draw is  $6/11$ , find the probability of selecting a black chip on the second draw, given that the first chip is white.

**Sample Problem 2:** 9 red balls and 3 green marbles are place in a bag. Find the probability of randomly selecting a red marble on the first draw and a green marble on the second draw.

**Sample Problem 3:** The probability Nathan buys butter is 0.10, and the probability that he buys bread and butter is 0.20. Find the probability that he will buy butter, given that he already bought bread.