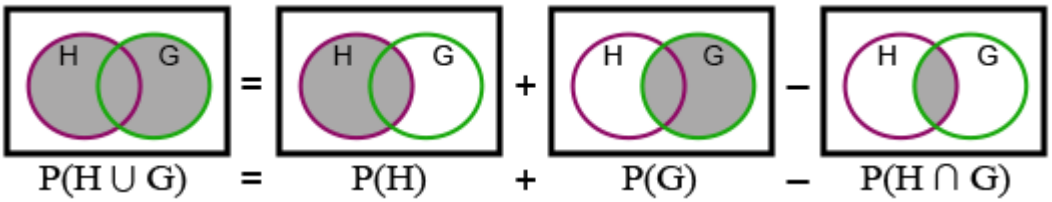
ADDITION RULE OF PROBABILITY

Addition rule for probability of two events H and G occurring



A jar contains one hundred marbles numbered 1 to 100. One marble is to be drawn at random.

TASK 1 100 marbles and non-mutually exclusive (intersecting) sets

Complete the working to find the probability that the numbered marble drawn will be a multiple of 5 **OR** a multiple of 8.

Using addition rule: P(multiple of 5 or 8) = P(multiple of 5) + P(multiple of 8) – P(multiple of 5 and 8)

1 100 ÷ 5 = _____ and so there are _____ multiples of 5 in the jar.

$$P(\text{multiple of 5}) = \frac{\square}{100}$$

2 100 ÷ 8 = _____ and so there are _____ multiples of 8 in the jar.

$$P(\text{multiple of 8}) = \frac{\square}{100}$$

3 The first multiple of 5 and 8 is _____.

The next multiple of 5 and 8 is _____.

There are _____ multiples of 5 and 8 in the jar.

$$P(\text{multiple of 5 and 8}) = \frac{\square}{100}$$

4 ∴ P(multiple of 5 or 8) = P(multiple of 5) + P(multiple of 8) – P(multiple of 5 and 8)

$$= \frac{\square}{100} + \frac{\square}{100} - \frac{\square}{100}$$

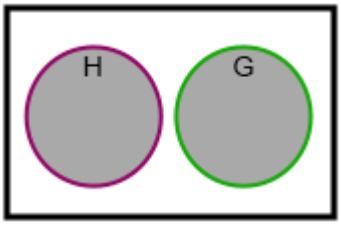
$$=$$

$$=$$

TASK 2 **100 marbles and mutually exclusive (non-intersecting) sets**

If H and G are **mutually exclusive** sets then there is no intersection between them, and so:

$P(H \cap G) = 0$ and $P(H \cup G) = P(H) + P(G)$



Find the probability of drawing a marble that is numbered between 85 and 90 **OR** is a square number.

$9^2 = 81$ and $10^2 = 100$, so there are no square numbers between 85 and 90. That is, these two events are mutually exclusive.

Use the addition rule as it applies to mutually exclusive events to work out the probability.