Task 2

Situation 1

Let:

A = A driver who had an accident

B = A driver that is under 25 years old

P(B) = Probability that the driver is under 25 = 10%

P(A and B) = Probability that a driver had an accident and is under 25 = 5%

To find P(A | B): Probability that a driver had an accident if they are under 25 years old

$$P(A|B) = \frac{P(A\,and\,B)}{P(B)}$$.

0.05/0.1 = 0.5

P(B) = 10%

P(A and B) = 5%

P(A|B) = 50%

Situation 2

Let:

Event A = First flip is heads that has already happened

Event B = Second flip is heads

The coin flips are independent events, so

P(B) = 0.5

P(A and B) = P(A) * P(B) = 0.5*0.5 = 0.25

Hence:

P(B) = 0.5

P(A and B) = 0.25

Since the first flip is done, the chance of having heads again is back to 0.5

Scenario 3

Let:

A = 80% score

B = Took maths

Given P(B) = 0.6, P(A and B) = 0.3

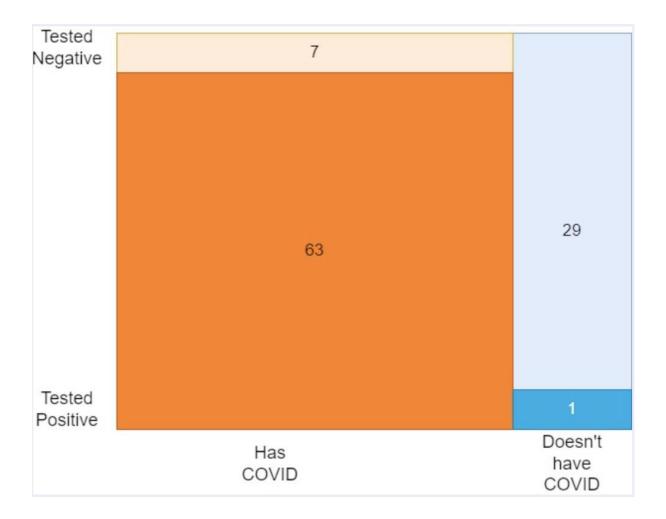P(A|B) = Probability of achieving 80% given that the person took Maths

0.3/0.6 = 0.5

Ans:

P(B) = 0.6

P(A and B) = 0.3

P(A|B) = 0.5

H (Hypothesis): The person has COVID

E (Evidence): The person tested positive for COVID

Total participants = 100

Has Covid = 63 (Tested positive) + 7 (Tested negative) = 70

Does not have Covid = 1 (Tested positive) + 29 (Tested negative) = 30

Tested positive = 63 (True positive) + 1 (False positive) = 64

Tested negative = 7 (False negative) + 29 (True negative) = 36

P(H) = Probability that someone has COVID

70/100 = 0.7

= 70%

P(E|H) = Probability that someone tests positive given they have Covid

63/70 = 0.9

= 90%

P(E) = Probability that someone test positive (regardless of whether they have covid)

64/100 = 0.64

64%

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$.

(0.9 * 0.7)/0.64

= 0.63/0.64

= 0.984