

Question 6

(25 marks)

- (a)** A class group carried out a study of the makes and fuel types of cars in a large carpark. It found that 30% of the cars ran on diesel and 70% of these diesel cars were Volkswagen. It found that 60% of the cars ran on petrol and 25% of these petrol cars were Volkswagen. It found that 10% of the cars were hybrid/electric and 9% of these cars were Volkswagen. One car is selected at random from the car park. Find the probability that it is a Volkswagen car.

- (b)** The Road Safety Authority has data on driving test pass rates at all its test centres.
- (i)** In a particular Driving Test Centre the probability that a person taking the test for the first time will pass is $\frac{1}{4}$. All of the test results are independent. In this centre on a particular day Joe, along with 5 others, takes the test. All six are taking the test for the first time. Find the probability that Joe passes the test along with exactly 2 others.

- (ii) The overall pass rate for all drivers at another centre is $\frac{1}{2}$ (Whether it is their first attempt or a subsequent attempt).

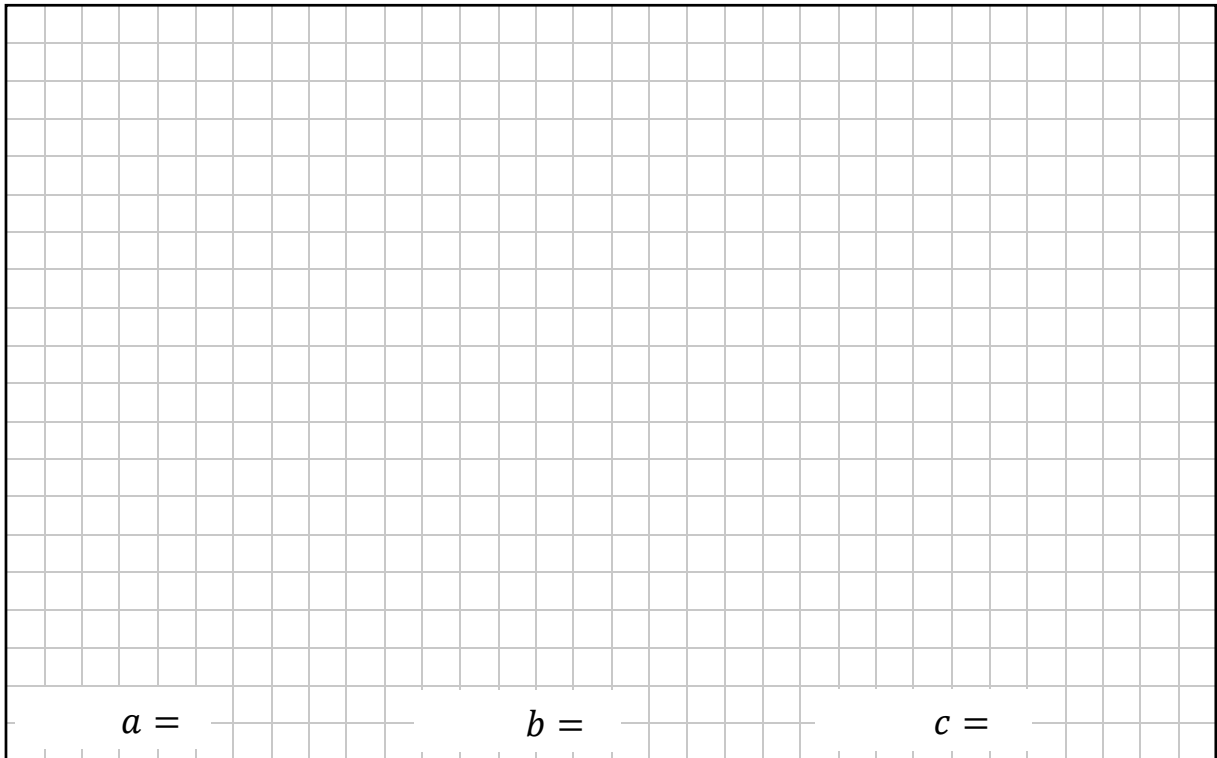
On a particular day, n people take the test in this centre.

The probability that two people or less than two people pass the test can be written in the form

$$\frac{an^2 + bn + c}{2^{n+1}}$$

where $a, b, c \in \mathbb{N}$.

Find the value of a , the value of b , and the value of c .



$a =$ _____ $b =$ _____ $c =$ _____