

3. The lengths, x mm, of 50 pebbles are summarised in the table below.

Length	Frequency
$20 \leq x < 30$	2
$30 \leq x < 32$	16
$32 \leq x < 36$	20
$36 \leq x < 40$	8
$40 \leq x < 45$	3
$45 \leq x < 50$	1

A histogram is drawn to represent these data.

The bar representing the class $32 \leq x < 36$ is 2.5 cm wide and 7.5 cm tall.

- (a) Calculate the width and the height of the bar representing the class $30 \leq x < 32$ (3)
- (b) Using linear interpolation, estimate the median of x (2)

The weight, w grams, of each of the 50 pebbles is coded using $10y = w - 20$.
These coded data are summarised by

$$\sum y = 104 \quad \sum y^2 = 233.54$$

- (c) Show that the mean of w is 40.8 (2)
- (d) Calculate the standard deviation of w (4)

The weight of a pebble recorded as 40.8 grams is added to the sample.

- (e) Without carrying out any further calculations, state, giving a reason, what effect this would have on the value of
- (i) the mean of w
- (ii) the standard deviation of w (3)

3. A certain disease occurs in a population in 2 mutually exclusive types.

It is difficult to diagnose people with type A of the disease and there is an unknown proportion p of the population with type A .

It is easier to diagnose people with type B of the disease and it is known that 2% of the population have type B .

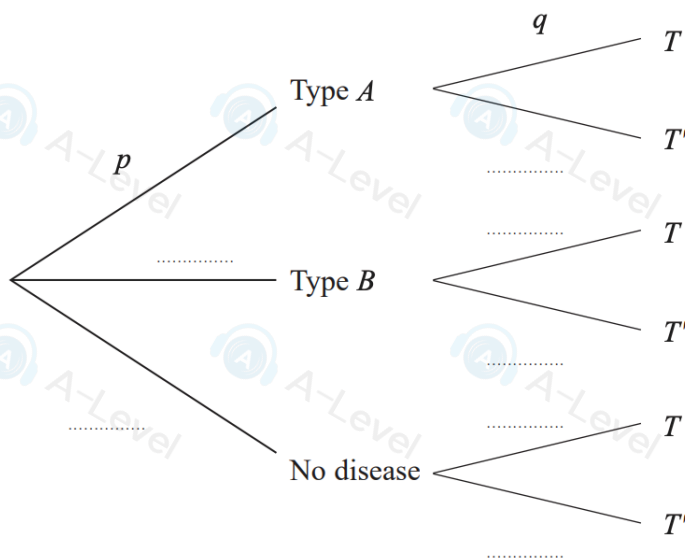
A test has been developed to help diagnose whether or not a person has the disease. The event T represents a positive result on the test. After a large-scale trial of the test, the following information was obtained.

For a person with type B of the disease the probability of a positive test result is 0.96

For a person who does not have the disease the probability of a positive test result is 0.05

For a person with type A of the disease the probability of a positive test result is q

- (a) Complete the tree diagram.



(2)

The probability of a randomly selected person having a positive test result is 0.169

For a person with a positive test result, the probability that they do not have the

disease is $\frac{41}{169}$

- (b) Find the value of p and the value of q .

(7)

A doctor is about to see a person who she knows does not have type B of the disease but does have a positive test result.

- (c) (i) Find the probability that this person has type A of the disease.

(3)

- (ii) State, giving a reason, whether or not the doctor will find the test useful.

(1)