

Solutions

Each answer shows the steps, then the **result**.

2.1

- height — continuous; ABO blood group — discontinuous

2.2

- e.g. height / body mass / skin colour

3.1 B

- ABO blood group falls into separate categories

3.2 B

- Continuous variation is polygenic and affected by the environment

3.3

(a)

- the t-test

(b)

- the difference between the means is significant; it is unlikely (less than 5% probability) to be due to chance

3.4

- the environment differs (e.g. light, water, minerals); environmental factors affect the phenotype as well as the genes

3.5

(a)

- Height is **continuous** — any value within a range is possible, and the data form a smooth distribution with no distinct categories. Flower colour is **discontinuous** — each plant falls into one of a few distinct categories with nothing in between

(b)

- Height is **polygenic**, controlled by many genes each of small effect, and it is strongly affected by the environment — light, water and minerals. Flower colour is controlled by one gene, or very few, with little or no environmental influence

(c)

- The standard deviation measures the **spread** of the values about the mean — a small value means the plants are closely grouped. 36.0 to 48.0 cm is one standard deviation either side of the mean; for a normal distribution that contains about **68%** of the plants

(d)

- The two samples will almost always have slightly different means by chance alone; the *t*-test uses the spread and the sample size to say whether the difference is larger than chance would explain, i.e. whether it is statistically significant