

1. Which comparison of two cell images is reliable?
 - ☐ Compare screen lengths only
 - ☐ Assume both images have the same zoom
 - ☐ Convert both lengths using their own scale bars
2. Which structure is directly associated with making proteins?
 - ☐ Permanent vacuole
 - ☐ Cellulose wall
 - ☐ Ribosome
3. Which denominator is used for percentage mass change?
 - ☐ Final mass and time
 - ☐ Length of the potato cylinder
 - ☐ Initial mass
4. What does a risk factor indicate?
 - ☐ Increased probability in relevant evidence
 - ☐ A direct cause of the disease in each case
 - ☐ That the factor alone explains the disease
5. Why are drugs against viruses difficult to develop?
 - ☐ Viruses reproduce too quickly for any medicine to reach them
 - ☐ Viruses have cell walls that antibiotics cannot break through
 - ☐ Viruses reproduce inside host cells, which must be protected
6. An approved yeast model produces 20 cm^3 gas in 5 minutes. Calculate mean output rate.
_____ cm^3/min
7. A model displacement is drawn as 18 mm at magnification 6. Calculate the represented displacement.
_____ mm
8. A fictional one-year record has 4 pregnancies among 200 users. Calculate the observed percentage.
_____ %

9. Five of 100 variants in a fictional study alter the measured phenotype. Find the percentage.

_____ %

10. A supplied historical comparison uses dates 1859 and 1909. Find the interval.

_____ years

1. Convert both lengths using their own scale bars

Reliable comparison needs a shared real scale. Converting each image length with its own scale bar gives real sizes that can be compared; screen lengths alone depend on zoom, which differs between the images.

2. Ribosome

Ribosomes are the sites of protein synthesis, where amino acids are joined. A permanent vacuole stores sap and a cellulose wall gives support - neither makes protein.

3. Initial mass

Percentage change compares the change with where the sample STARTED, so the denominator is the initial mass. Using the final mass or the time gives a different quantity with a different meaning.

4. Increased probability in relevant evidence

A risk factor is a statistical association: people with the factor show the outcome more often in the evidence. It raises probability; it does not guarantee the outcome for any individual or exclude other factors.

5. Viruses reproduce inside host cells, which must be protected

Viruses replicate inside our own cells, so a drug that blocks the virus risks damaging the host cell too; finding a virus-only target is hard. Viruses are not plants, and antiviral medicines do exist - they are just difficult.

6. $4 \text{ cm}^3/\text{min}$

The result is $4 \text{ cm}^3/\text{min}$. Known: 20 cm^3 of gas in 5 minutes. Use mean rate = volume / time. Rate = $20/5 = 4 \text{ cm}^3$ per minute. This compares gas output under the stated conditions only.

7. 3 mm

The result is 3 mm. Known: drawn displacement 18 mm at magnification 6. Use real size = drawn size / magnification. Displacement = $18/6 = 3 \text{ mm}$ in the model. The conversion concerns the drawing only.

8. 2 %

The result is 2 %. Known: 4 pregnancies among 200 users in one year. Use percentage = pregnancies / users x 100. Observed percentage = $4/200 \times 100 = 2\%$. This describes that record; published effectiveness needs typical and perfect use distinguished.

9. 5 %

The result is 5 %. Known: 5 of 100 variants alter the phenotype. Use percentage = altering / total x 100. Percentage = $5/100 \times 100 = 5\%$. A supplied frequency is not a universal mutation rate.

10. 50 years

The result is 50 years. Known: dates 1859 and 1909. Interval = $1909 - 1859 = 50 \text{ years}$. The arithmetic describes the stated interval only.