1. Which statement about bile is correct?

   ☐ It is a protease

   ☐ It emulsifies lipids

   ☐ It breaks every nutrient into monomers

2. Why blot all samples before the final weighing?

   ☐ To make the final masses larger and easier to read

   ☐ To remove water lost from inside the cells

   ☐ To remove surface solution consistently

3. Which change can leave the amino-acid sequence unchanged?

   ☐ A substitution producing a synonymous codon

   ☐ Every deletion of one base

   ☐ Every insertion of one base

4. 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

5. What does a 25% probability in Aa × Aa mean?

   ☐ One in four of the children will have genotype aa

   ☐ Each fertilization has probability one quarter of aa under this model

   ☐ The fourth child is more likely to be aa

6. A fixed endpoint takes 50 s. Calculate the rate proxy 1/time.

   _____ 1/s

7. A 40 cm reading has an absolute uncertainty of 1 cm. Find percentage uncertainty.

   _____ %

8. 9.0 cubic centimetres of gas are collected in 3.0 minutes. Find the rate.

   _____ cm^3/min

_____

10. A value rises from 4.0 to 5.0. Calculate the percentage increase.

    _____ %

1. **It emulsifies lipids**

   Bile is made in the liver and emulsifies lipids: it breaks large fat droplets into smaller ones, increasing the surface area for lipase. Bile is not an enzyme, so it is not a protease, and it digests nothing itself, so it cannot break nutrients into monomers.

2. **To remove surface solution consistently**

   Blotting removes solution clinging to the surface, which is not water that entered the tissue. Doing it the same way for every cylinder keeps the comparison fair; blotting cannot stop molecular movement and is not meant to equalise masses.

3. **A substitution producing a synonymous codon**

   The genetic code is degenerate: several codons can specify the same amino acid, so a substitution that produces a synonymous codon leaves the sequence unchanged. Deleting or inserting one base shifts the reading frame and changes every downstream codon.

4. **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.

5. **Each fertilization has probability one quarter of aa under this model**

   The 25% is a probability for each fertilization under the model: each child of Aa x Aa parents has a one-quarter chance of aa. Chance has no memory, so no fixed number of aa children is guaranteed in any family of four.

6. **0.02 1/s**

   The result is 0.02 1/s. Known: the endpoint is reached in 50 s. Use rate proxy = 1/time. Rate proxy = 1/50 = 0.02 per second. This proxy is comparable with the 40 s worked case (0.025 per second) only because the same endpoint definition is used.

7. **2.5 %**

   The result is 2.5 %. Known: reading 40 cm; absolute uncertainty 1 cm. Use percentage uncertainty = absolute uncertainty / value x 100. Percentage uncertainty = 1/40 x 100 = 2.5%. Smaller measured values carry larger percentage uncertainties for the same absolute uncertainty.

8. **3 cm^3/min**

   The result is 3 cm^3/min. Known: 9.0 cubic centimetres of gas collected in 3.0 minutes. Use rate = volume / time. Rate = 9.0/3.0 = 3.0 cubic centimetres per minute. This is an average rate over the collection interval.

9. **20**

   The result is 20 . Known: 12 cases among 600 people. Use rate per 1,000 = cases / population x 1,000. Rate = 12/600 x 1,000 = 20 cases per 1,000 people. Rates per equal population size allow a fair comparison between groups of different size.

The result is 25 %. Known: the value rises from 4.0 to 5.0 units. Increase = final - initial = 5.0 - 4.0 = 1.0 unit. Use percentage increase = increase / initial x 100. Percentage increase = 1.0/4.0 x 100 = 25%. The change is evidence of a disturbance, not a diagnosis by itself.