

01.1 Organ

01.2 Palisade mesophyll → Contains the most chloroplasts. Spongy mesophyll → Contains many air spaces.

01.3 Transpiration

01.4 Lignin

01.5 It needs to be transparent to maximise light penetration to the photosynthesising palisade mesophyll tissue below it.

01.6 stomata, guard cells

01.7 Vacuole

01.8 Active transport

01.9 Mitochondria

02.1 It acts as a primary, non-specific defence mechanism by providing an impermeable physical barrier against pathogen entry.

02.2 $63 / 210 = 0.3 = 3/10$

02.3 Number killed at pH1 = $210 - 23 = 187$. Number killed at pH5 = $216 - 185 = 31$. The difference is $187 - 31 = 156$.

02.4 The student did not plot a graph and read the value for pH2, so they must have calculated the arithmetic mean of the y-values for the x-values of pH1 and pH3.

03.1 Platelets → Help clot the blood where the vaccine was injected. White blood cells → Produce antibodies to the measles virus.

03.2 1968

03.3 There is a positive correlation until approx. 1956, then a period of stasis, followed by a strong negative correlation after 1968.

03.4 The percentage decreased.

03.5 Parents were worried their children would get condition X.

03.6 Publish the research on the internet.

03.7 There may have been a financial incentive for the author, creating a conflict of interest and therefore bias.

04.1

Test for starch: Add a few drops of iodine solution. Positive result is a colour change from yellow-brown to blue-black. Negative is no change.

Test for sugar: Add Benedict's solution and heat in a water bath to $>60^{\circ}\text{C}$. Positive result is a precipitate that is green, yellow, orange or brick-red. Negative is the solution remaining blue.

04.2 amylase, sugar

04.3 The type of bread

04.4 1. White bread has the lowest time, so the fastest rate of digestion. 2. Wholemeal bread has the highest time, so the slowest rate of digestion.

04.5 They improved the validity by taking repeat readings and calculating a mean to reduce the effect of random errors.

04.6 $(58+55+61)/3 = 174/3 = 58$ seconds.

04.7 Each person's sense of taste is different.

05.1 Ionising radiation, Viruses. (Ticks both)

05.2 Mitosis

05.3 grow, replicate

05.4 40%

05.5 Chromosomes are pulled to each end of the cell.

05.6 cell membrane

05.7 $50\text{mm} / 800 = 0.0625\text{mm}$. $1\text{mm}=1000\mu\text{m}$ so $0.0625 \times 1000 = 62.5 \mu\text{m}$.

05.8 cells, people

05.9 Placebo

06.1 1. The initial mass of the potato. 2. The time the potato was in the solution.

06.2 You must carefully blot the potato pieces dry to remove surface solution that would add to the mass.

06.3 A top-pan balance with a resolution of 0.1g.

06.4 0.1 g

06.5 C

06.6 Change in mass = 1.1g. Start mass = 6.0g. $(1.1/6.0) \times 100 = 18.333...\%$. To 1dp this is 18.3%.

06.7 Line graph

06.8 water, osmosis, partially permeable membrane

06.9 0.2 mol/dm^3

07.1 Arteries

07.2 It applies pressure to the heart, artificially circulating blood. This ensures oxygen is delivered to vital organs like the brain.

07.3 It forces oxygen into the lungs to be absorbed by the blood.

07.4 Statins

07.5 A stent is a wire mesh tube that holds a narrowed coronary artery open, widening the lumen to restore blood flow to the heart muscle.

07.6 1. Smoking is a positive risk factor for all diseases shown. 2. The percentage increase in risk is greatest for disease H (70%).

07.7 (Draws graph perfectly)

07.8 A sedentary lifestyle (lack of exercise).

08.1 In the nucleus, on a chromosome.

08.2 A, D and E

08.3

The CF gene defect causes thick mucus to block the pancreas. This means lipase cannot get to the small intestine to digest fat into fatty acids and glycerol. Without this enzyme, fat digestion is very difficult.

Because the fat is not digested, its energy cannot be released and the building blocks cannot be absorbed. This calorific deficit means the person cannot store fat or have enough energy for metabolic processes, so gaining body mass is difficult.

08.4 1. large surface area to volume ratio. 2. walls are one cell thick for a short diffusion path. 3. rich capillary network to maintain a steep concentration gradient.

08.5 A reduced amount of oxygen in the blood will limit the rate of aerobic respiration in all body cells. This reduces the amount of energy released, leading to fatigue and potentially cell death if severe.
