

## AS and A-level Biology: Answers to activities in Transition guide

### Activity 1

1. Depending on the organism, or fitness level, s or ms
2. cm
3. km
4.  $\mu\text{m}$
5. g or kg
6. g
7.  $\text{m}^3$

### Activity 2

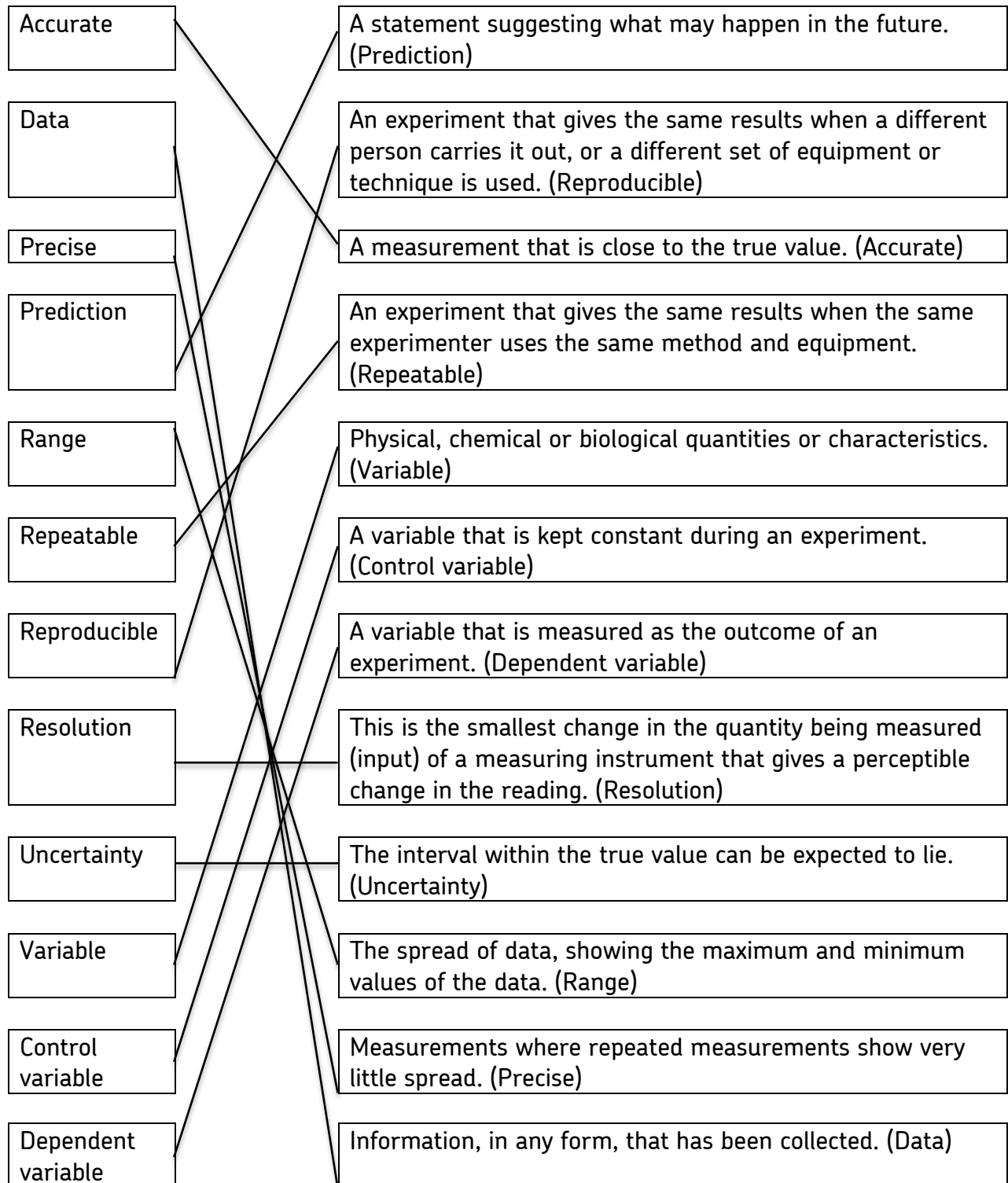
1. 6000 kg
2. 4 g
3. 0.5 ml
4.  $1.5 \text{ m}^3$
5. 120 days
6.  $2 \text{ }^\circ\text{C}$
7.  $150 \mu\text{m}$
8. 0.1 mm
9. The total length of each of the hairs on your head

### Activity 3

1. Width of a field
2. Height of a tree
3. Length of a human digestive system
4. Height of an elephant
5. Length of DNA strand
6. Length of a nerve cell
7. Length of a heart
8. Length of a finger
9. Length of a mosquito
10. Width of a hair
11. Width of a red blood cell
12. Size of a virus
13. Length of a water molecule
14. Width of a sodium ion

## Activity 4

Join the boxes to link the word to its definition.

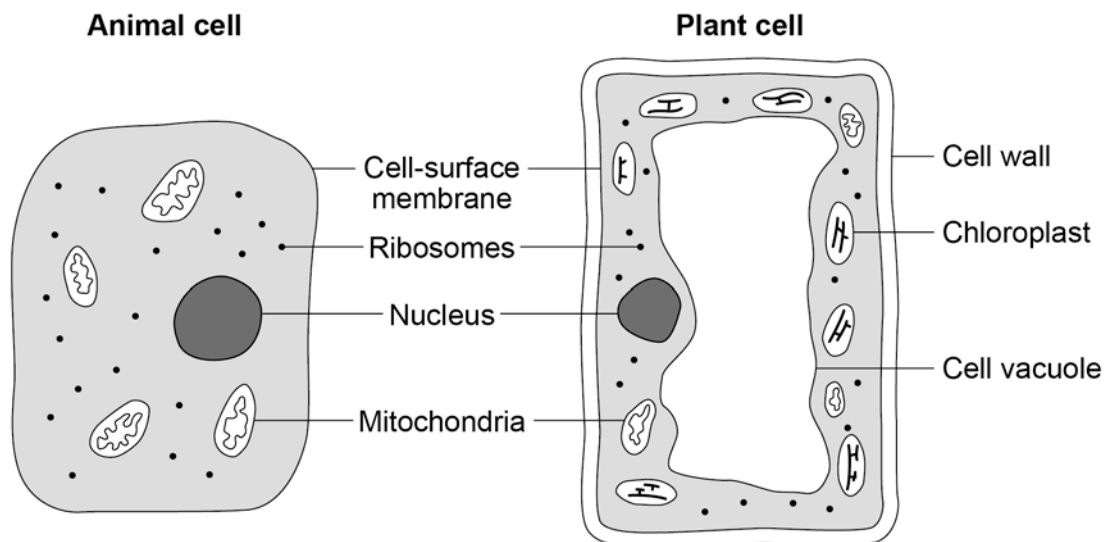


## Activity 5

Structure	Function
Cell-surface membrane	Provide a selectively permeable membrane for the control of passage of substances and protect the cell contents from the surroundings
Chloroplast	Photosynthesis
Cell vacuole	To hold materials and wastes and help maintain turgor pressure
Mitochondria	Aerobic respiration
Nucleus	Contains genetic material to regulate all cell activities
Cell wall	Provide rigidity, tensile strength, structural support, protection against mechanical stress and infection
Chromosomes	Contain genes and ensure accurate replication during cell division
Ribosomes	Translation of mRNA

Draw the structure of a plant cell and an animal cell.

On each cell, add labels showing each of the structures in the table, if they exist.



## Activity 6:

Complete the table.

	Photosynthesis	Aerobic respiration
Which organisms carry out this process	Plants, algae and some bacteria	All living organisms
Where in the organisms does the process take place?	Chloroplasts (cytoplasm in bacteria)	Cytoplasm (glycolysis) and mitochondria.  <i>Anaerobic cytoplasm only</i>
Energy store at the beginning of the process	Sun	Glucose
Energy store at the end of the process	Glucose	In cells
Reactants needed for the process	Carbon dioxide and water/hydrogen sulfide	Glucose and oxygen/sulfur  <i>Anaerobic glucose only</i>
Products of the process	Glucose and oxygen	Carbon dioxide, water and ATP  <i>Anaerobic in humans, lactic acid and ATP, in plants/fungi, ethanol, carbon dioxide and ATP</i>
Overall word equation	carbon dioxide + water → glucose + oxygen	glucose + oxygen → carbon dioxide (+energy)  <i>Anaerobic; In humans,</i>

		<p>glucose → l energy)</p> <p>In plants/fungi, glucose → etha carbon dioxide (+ energy)</p>
Balanced symbol equation for the overall process	$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$	<p><math>\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + 38\text{ATP}</math></p> <p>Anaerobic;</p> <p>In humans, <math>\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2\text{C}_3\text{H}_6\text{O}_3</math> (+ energy)</p> <p>In plants/fungi, <math>\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2</math> (+ energy)</p>

Which of the answers for aerobic respiration would be different for anaerobic respiration? Add these answers to the table in a different colour.

## Activity 7

### Osmosis

- Drinking a sports drink after exercise needs to ensure rapid rehydration.
- The effect of salt on slugs, salt causes water to leave slugs by osmosis, killing them.
- Potato pieces get heavier when put in pure water as they take up water by osmosis due to the water potential of potato cell cytoplasm being more negative than water.

### Diffusion

- Gas exchange in the lungs – oxygen into blood down a diffusion gradient and carbon dioxide out down a diffusion gradient.
- Absorbing nutrients from food into the body down a concentration gradient when possible.
- Moving ions into cells by diffusion through channel/carrier proteins.

### Active transport

- Drinking a sports drink after exercise contains glucose and amino acids that will be absorbed by active transport.
- Absorbing nutrients from food into the body against a concentration gradient if needed.
- Moving ions into cells by active transport, for example the Na<sup>+</sup>K<sup>+</sup> ATPase pump to maintain the resting potential.

### Changing surface area or length

## Activity 8

		Paternal alleles	
		H	h
Maternal alleles	h	<b>hH</b>	<b>hh</b>
	h	<b>hH</b>	<b>hh</b>

- Hh father has the disease
- hh mother is healthy
- hH children have the disease
- hh children have the disease
- As the disease is dominant, no individual can be a carrier.

		Paternal alleles	
		F	f
Maternal alleles	F	<b>FF</b>	<b>Ff</b>
	f	<b>fF</b>	<b>ff</b>

- Both parents are carriers
- FF child is healthy
- Ff and fF children are carriers
- ff child has the disease

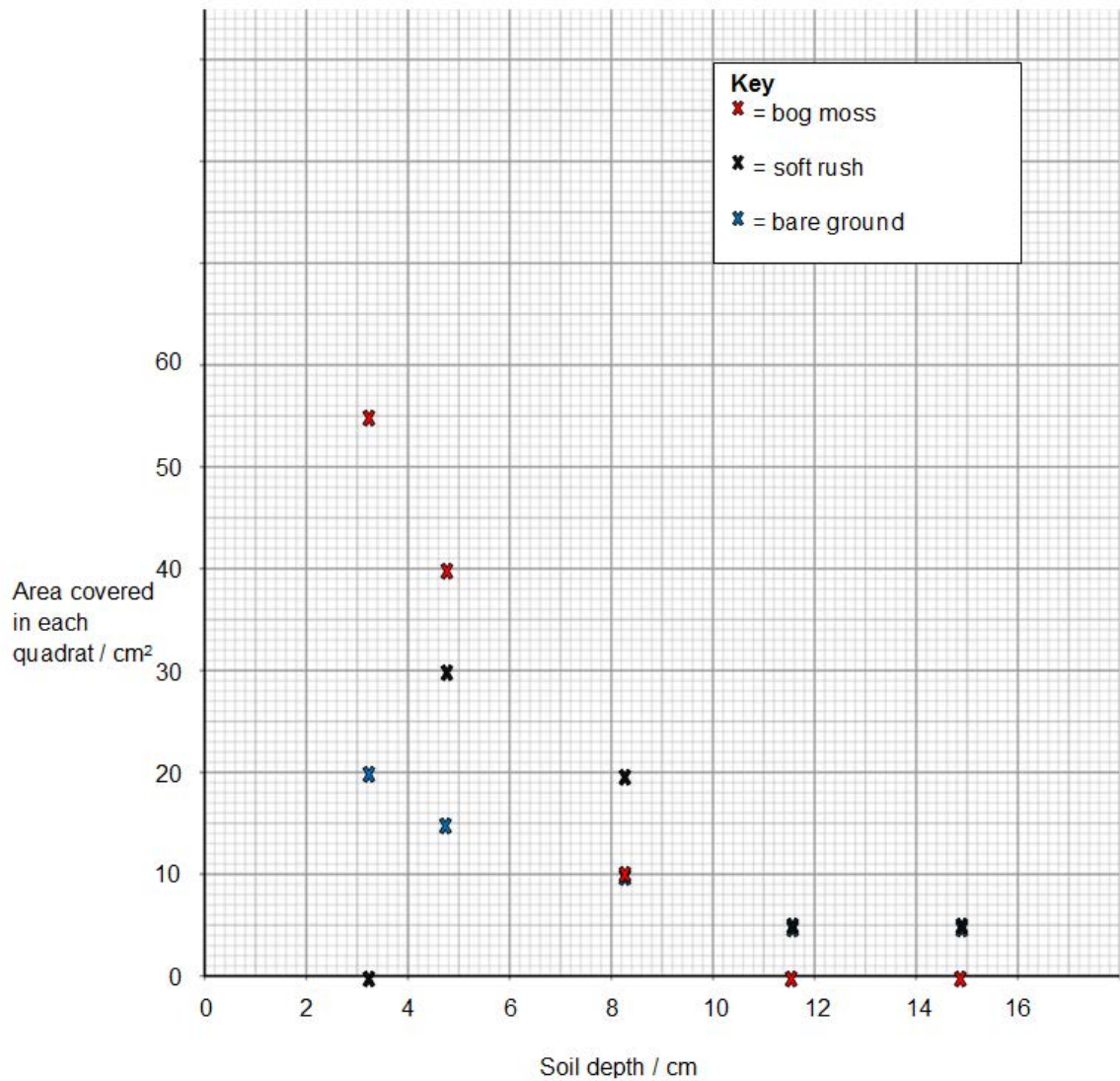


## Activity 8 (continued)

1. The first Punnett square shows that one in every **two** children from this couple will have Huntington's disease.
2. The second Punnett square shows that there is a one in four chance that a child born to this couple will have cystic fibrosis.
3. Three out of four children of the second couple will either be carriers or suffer from cystic fibrosis.
4. The percentage of children who are sufferers on the diagram is not necessarily the same as the percentage of children each couple will have who are sufferers.
5. Each time a child is born the chances of having a child with or without cystic fibrosis remains the same.
6. A 50:50 chance is the same as a 0.5 probability.

## Activity 9: Mean, media, mode and scatter graphs

1.  $5 \text{ cm}^2$
2.  $8.5 \text{ cm}^2$
3.  $10 \text{ cm}^2$



Note that some plots are obscured as plots are on the same coordinates.

### Activity 9: Mean, media, mode and scatter graphs (continued)

4. The two plant species favour shallow soils as the deeper the soil, the lower the area covered by bog moss, soft rush.

The deeper the soil, the better vegetation grows as the deeper the soil the less area covered by bare ground.

5. Not at all, the data set is far too small to make these conclusions and there is no repeat of the test. With no statistical analysis a degree of confidence cannot be placed on these correlations.

### Activity 10: Analysing tables

1. 24.3%
2. 28.4%
3. Men have a 49.6% decrease, women have a 43.8% decrease, so greater decrease in men.
4. For men the fraction is  $\frac{291}{941}$  or 0.309, for women the fraction is  $\frac{423}{689}$  or 0.614

## Activity 11: Analysing complex graphs

1.  $2.6 \text{ dm}^3$
2.  $13.5 \text{ km h}^{-1}$ ?
3. Increased from 14 to 20 breaths per minute. A 42.9% increase.
4.  $5 \text{ km h}^{-1}$
5.  $0.15 \text{ dm}^3$
6.  $y = 0.15x + 0.6$