

Combined Science A (Gateway Science) (J250)

Biology Paper 1 - 100 MCQs Challenge Beal High School

Please note that you may see slight differences between this paper and the original.

Candidates answer on the Question paper.

OCR supplied materials:

Additional resources may be supplied with this paper.

Other materials required:

- Pencil
- Ruler (cm/mm)

Duration: 100 mins

Candidate forename		Candidate surname								
Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions, unless your teacher tells you otherwise.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Where space is provided below the question, please write your answer there.
- You may use additional paper, or a specific Answer sheet if one is provided, but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

- The quality of written communication is assessed in questions marked with either a pencil or an asterisk. In History and Geography a *Quality of extended response* question is marked with an asterisk, while a pencil is used for questions in which *Spelling, punctuation and grammar and the use of specialist terminology* is assessed.
- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **100**.
- The total number of marks may take into account some 'either/or' question choices.

- 1 The table shows some information about insulin in the body.

Which row shows the correct information about insulin?

	Organ that produces insulin	Type of signal	Target organ
A	liver	chemical	pancreas
B	liver	electrical	pancreas
C	pancreas	chemical	liver
D	pancreas	electrical	liver

Your answer

[1]

- 2 The length of a bacteria cell is $5.3 \mu\text{m}$.

What is the length of this cell in **mm**?

(1 mm = 1000 μm)

- A 5.3×10^{-6}
- B 5.3×10^{-3}
- C 5.3×10^3
- D 5.3×10^6

Your answer

[1]

- 3 What are two characteristics of a cell membrane?

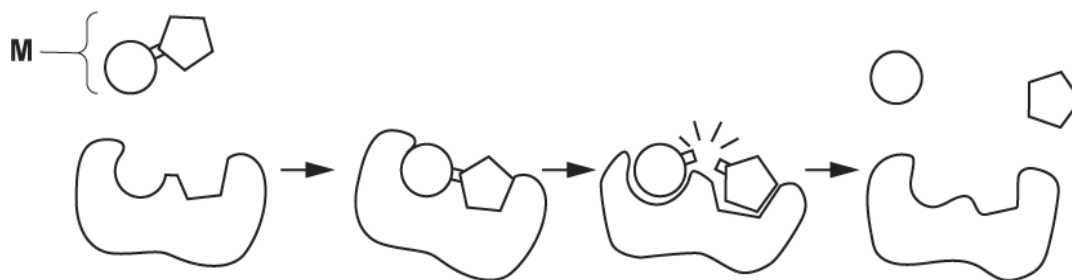
- A Non-selective barrier and contains plasmids
- B Non-selective barrier and contains receptors
- C Selective barrier and contains plasmids
- D Selective barrier and contains receptors

Your answer

[1]

4 The diagrams show stages in the hypothesis used to explain the mechanism of enzyme action.

Which term describes the molecule labelled **M**?



- A Active site
- B Enzyme
- C Lock and key
- D Substrate

Your answer

[1]

5 What is a difference between embryonic stem cells and adult stem cells?

- A Adult stem cells are less likely to be rejected when used in transplants.
- B Only embryonic stem cells can differentiate.
- C Only embryonic stem cells produce a full range of different cell types.
- D There are more ethical issues in the use of adult stem cells.

Your answer

[1]

6 The resolution of a microscope is limited to **half** the wavelength of light used to see the image.

Our eyes only detect light with a wavelength greater than 400 nm.

What is the approximate resolution of a light microscope?

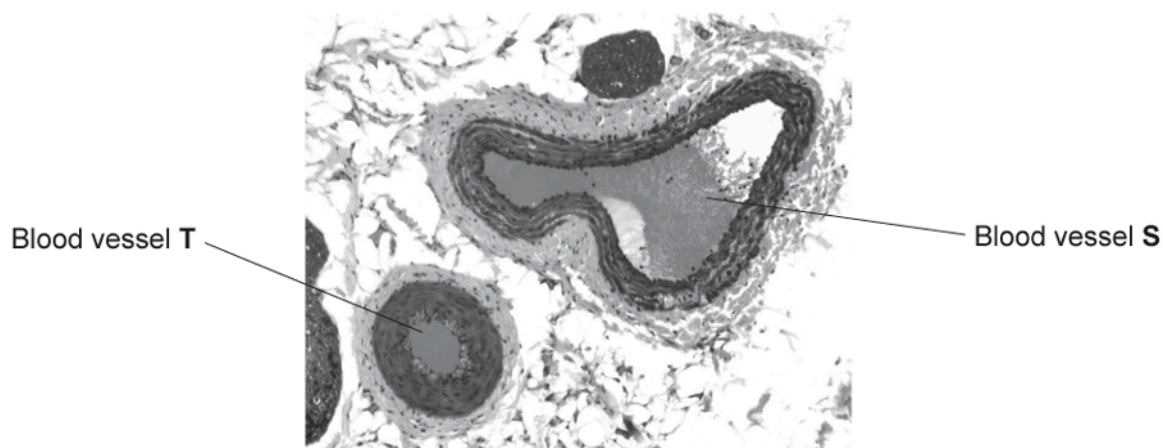
(1000 nm = 1 μm)

- A <0.2 μm
- B ~0.2 μm
- C ~0.4 μm
- D >0.4 μm

Your answer

[1]

7 The photograph shows two different blood vessels.



Which statement about these blood vessels is correct?

- A Blood flows through blood vessel T at a slower rate.
- B Blood vessel S has a thinner muscular wall.
- C Blood vessel T has a larger lumen diameter.
- D Both blood vessels transport blood to the heart.

Your answer

[1]

8 The table shows some information about respiration.

Which row is correct about anaerobic respiration in fungi?

	Products	Site of reaction	Endothermic or Exothermic
A	carbon dioxide and ethanol	mitochondria	endothermic
B	lactic acid and water	cytoplasm	exothermic
C	carbon dioxide and ethanol	cytoplasm	exothermic
D	lactic acid and water	mitochondria	endothermic

Your answer

[1]

9 Which statement correctly compares mitosis and DNA replication in eukaryotic cells?

- A Only DNA replication is part of the cell cycle.
- B Only DNA replication occurs inside sub-cellular structures
- C Only mitosis is needed to produce new cells.
- D Only mitosis is part of the cell cycle.

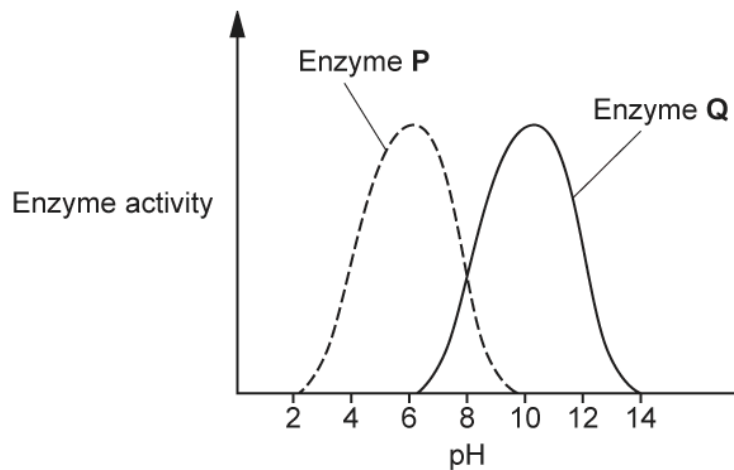
Your answer

[1]

10 The pH inside the small intestine of the human digestive system is between pH 7 and pH 8.

The pH inside the stomach of the human digestive system is between pH 1 and pH 2.

The graph shows the effect of pH on the activity of two enzymes.



Which statement about the enzymes is correct?

- A Both enzymes would be denatured inside the small intestine.
- B Enzyme Q would be more efficient inside the small intestine compared to enzyme P.
- C Neither enzyme would work at its highest activity inside the stomach or small intestine.
- D Only enzyme P would be active in the stomach.

Your answer

[1]

11 Which row is a correct comparison of meiosis and mitosis?

	Involves cell division	Halves the number of chromosomes	Requires DNA replication
A	both	meiosis only	both
B	both	both	both
C	meiosis only	both	mitosis only
D	mitosis only	meiosis only	mitosis only

Your answer

[1]

12 Which statement describes a **difference** between red blood cells and white blood cells?

- A Red blood cells contain enzymes.
- B Red blood cells make antibodies.
- C White blood cells contain proteins.
- D White blood cells respond to antigens.

Your answer

[1]

13 Which row shows how a high cholesterol diet is linked to cardiovascular disease?

	Coronary vessel blocked by cholesterol	Gas unable to be transported to cardiac muscle, damaging the heart
A	artery	carbon dioxide
B	artery	oxygen
C	vein	carbon dioxide
D	vein	oxygen

Your answer

[1]

14 To function correctly, the brain needs to make a chemical called dopamine. Parkinson's disease is where the brain does not make enough dopamine. Embryonic stem cells might be used to treat Parkinson's disease.

What is an ethical consideration in this kind of treatment?

- A The embryonic stem cells are obtained from a human fetus.
- B The embryonic stem cells may not produce the correct type of dopamine.
- C The embryonic stem cells may be rejected by the patient's immune system.
- D The embryonic stem cells will not have the same genome as the patient

Your answer

[1]

15 A student prepares a microscope slide to view colourless plant cells.

Which type of substance is used to colour the cells?

- A Acid
- B Hormone
- C Lipid
- D Stain

Your answer

[1]

16 The total magnification of an image viewed using a light microscope is calculated using a formula.

What is the correct formula for total magnification?

- A Total magnification = eyepiece lens magnification $\times$ objective lens magnification
- B Total magnification = eyepiece lens magnification – objective lens magnification
- C Total magnification = eyepiece lens magnification + objective lens magnification
- D Total magnification = eyepiece lens magnification $\div$ objective lens magnification

Your answer

[1]

17 Plasmids are small rings of genetic material.

Which row describes where plasmids are found?

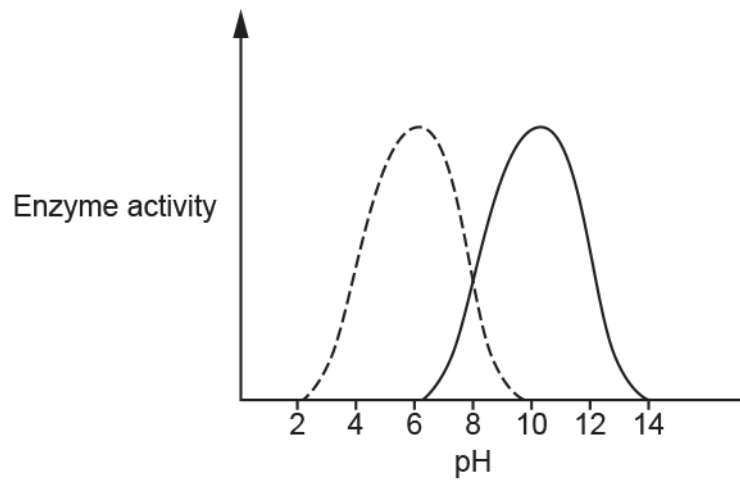
	Where they are found	Type of cell
A	cytoplasm	eukaryotic
B	cytoplasm	prokaryotic
C	nucleus	eukaryotic
D	nucleus	prokaryotic

Your answer

[1]

18 The graph shows the effect of pH on the activity of two enzymes.

Identify the pH where both enzymes are active.



- A pH 4
- B pH 6
- C pH 8
- D pH 10

Your answer

[1]

19 The model represents a molecule found inside human cells.



Which of these describes this model?

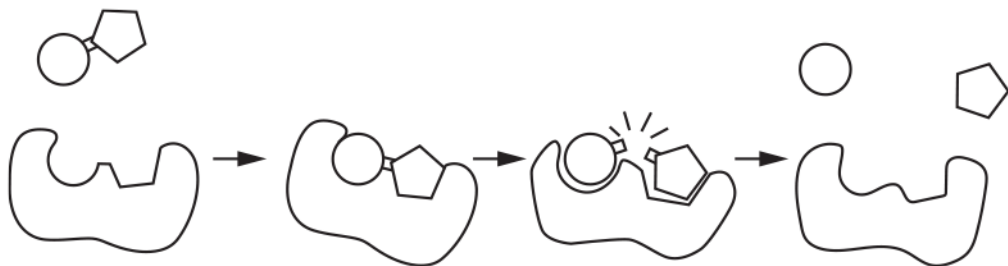
- A Monomer and a double helix
- B Monomer and a double twist
- C Polymer and a double helix
- D Polymer and a double twist

Your answer

☐

[1]

20 The diagrams show stages in the hypothesis used to explain the mechanism of enzyme action.



Which term describes this hypothesis?

- A Active site
- B Denaturing
- C Enzyme specificity
- D Lock and key

Your answer

☐

[1]

21 The table shows information about transport of substances.

Which row describes active transport?

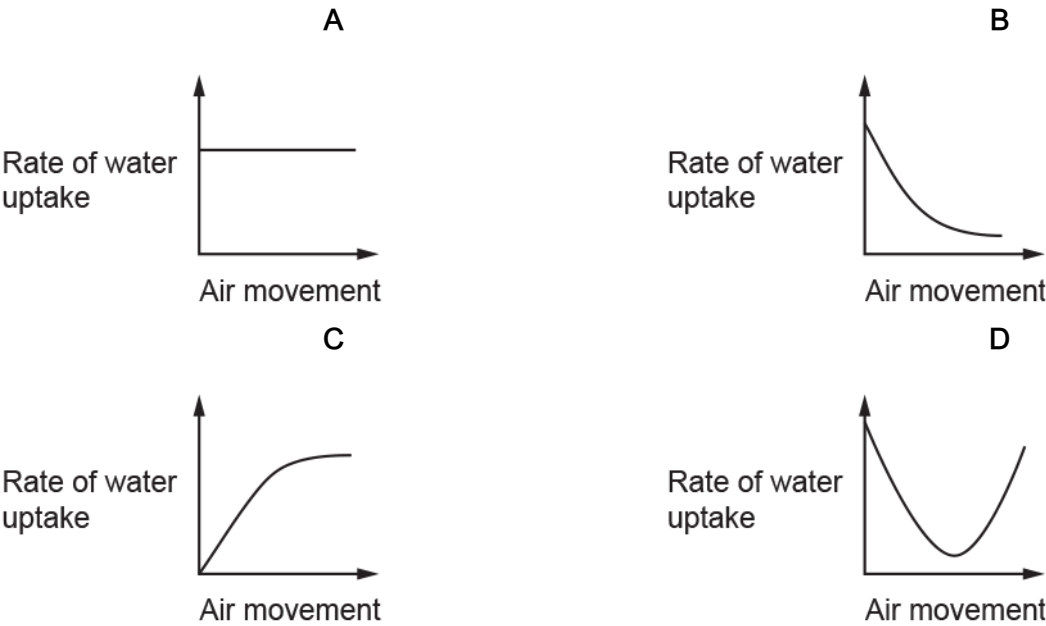
	Movement across a cell membrane	Movement down a concentration gradient	Requires energy
A	yes	yes	no
B	no	yes	no
C	yes	no	yes
D	no	no	yes

Your answer

[1]

22 The graphs show how the rate of water uptake in plants can change.

Which graph shows the correct effect of **increased** air movement on the rate of water uptake?



Your answer

[1]

23 The table shows some information about insulin in the body.

Which row shows the correct information about insulin?

	Organ that produces insulin	Type of signal	Target organ
A	liver	chemical	pancreas
B	liver	electrical	pancreas
C	pancreas	chemical	liver
D	pancreas	electrical	liver

Your answer

[1]

24 The length of a bacteria cell is $5.3 \mu\text{m}$.

What is the length of this cell in **mm**?

(1 mm = 1000 μm)

- A 5.3×10^{-6}
- B 5.3×10^{-3}
- C 5.3×10^3
- D 5.3×10^6

Your answer

[1]

25 Which risk is decreased by using adult stem cells instead of embryonic stem cells in skin transplants?

- A Fatty deposits forming below the skin
- B Rejection of transplanted skin
- C Skin becomes less waterproof
- D Skin cancer developing

Your answer

[1]

26 Which row is a correct comparison of meiosis and mitosis?

	Involves cell division	Halves the number of chromosomes	Requires DNA replication
A	both	meiosis only	both
B	both	both	both
C	meiosis only	both	mitosis only
D	mitosis only	meiosis only	mitosis only

Your answer

[1]

27 Which sub-cellular structure from a prokaryotic cell is used in genetic engineering?

- A Mitochondrion
- B Nucleus
- C Plasmid
- D Ribosome

Your answer

[1]

28 Which row correctly describes human stem cells?

	They are only found in human embryos	One risk of their use as a treatment is rejection	They can divide by mitosis	They differentiate to form cancer cells
A	✓		✓	
B		✓		✓
C	✓			✓
D		✓	✓	

Your answer

[1]

29 Which method of contraception is the **most** effective?

Method of contraception	Females who became pregnant while using the method of contraception (%)
A	1
B	8
C	9
D	18

Your answer

[1]

30 What are plasmids?

- A Genetic material found in the cytoplasm of a eukaryotic cell.
- B Genetic material found in the cytoplasm of a prokaryotic cell.
- C Genetic material found in the nucleus of a eukaryotic cell.
- D Genetic material found in the nucleus of a prokaryotic cell.

Your answer

[1]

31 Which row correctly describes a protein?

	Structure	Acid it is made from
A	monomer	amino acids
B	monomer	fatty acids
C	polymer	amino acids
D	polymer	fatty acids

Your answer

[1]

- 32 A student measures the effect of light intensity on photosynthesis. They place a lamp at different distances from pondweed in a beaker of water.

The student uses the inverse square law to calculate the relative light intensity.

$$\text{Relative light intensity} = \frac{1}{(\text{distance from light source})^2}$$

What is the distance of the lamp from the beaker when the relative light intensity is 4.00?

- A 0.2 m
- B 0.3 m
- C 0.4 m
- D 0.5 m

Your answer

[1]

- 33 What is one advantage of a light microscope compared to an electron microscope?

- A Only light microscopes are able to observe live specimens.
- B Only light microscopes are able to use stains.
- C Light microscopes have a greater magnification.
- D Light microscopes have a greater resolution.

Your answer

[1]

34 The table shows the sizes of different cells.

Cell	1	2	3	4	5	6	7	8	9
Size (mm)	0.4	0.6	0.4	0.5	0.3	0.4	0.6	0.5	0.3

Which statement about the results is correct?

- A The mode and the median size are both 0.3.
- B The mode and the median size are both 0.4.
- C The mode is 0.3 and the median is 0.0.
- D The mode is 0.4 and the median is 0.3.

Your answer

[1]

35 Which row shows correct information about cell membranes?

	Contains receptor molecules	Forms a selective barrier	Found in eukaryotic cells	Found in prokaryotic cells
A		✓	✓	✓
B	✓	✓	✓	✓
C	✓	✓		✓
D	✓		✓	

Your answer

[1]

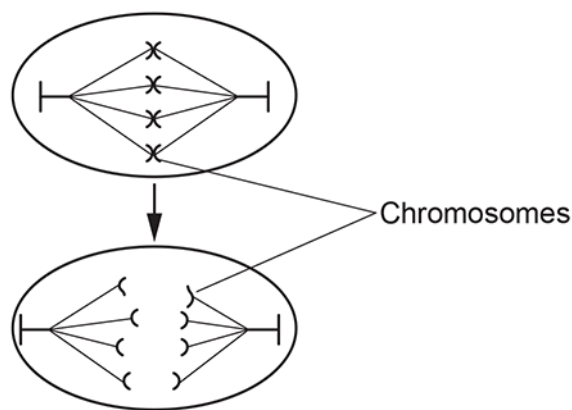
36 Which two hormones can be used in contraceptive pills to prevent ovulation during the menstrual cycle?

- A LH and FSH
- B LH and progesterone
- C Oestrogen and FSH
- D Oestrogen and progesterone

Your answer

[1]

37 Which stage of the cell cycle is represented in the diagram?



- A Differentiation of cell
- B DNA replication
- C Growth of cell
- D Movement of chromosomes

Your answer

[1]

38 Which cell size in the table is the **mode**?

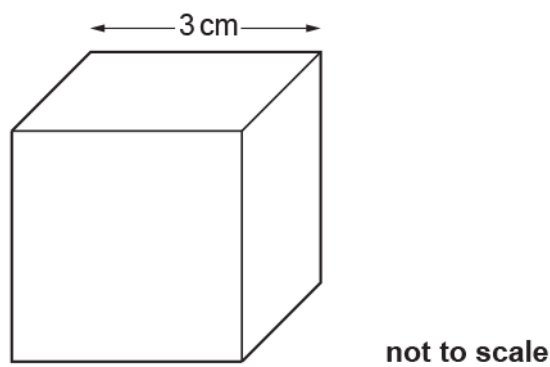
Cell	1	2	3	4	5	6	7	8	9
Size (mm)	0.4	0.3	0.4	0.5	0.3	0.3	0.6	0.5	0.3

- A 0.3 mm
- B 0.4 mm
- C 0.5 mm
- D 0.6 mm

Your answer

[1]

39 A student uses a cube to model the size of an organism.



Which row shows the correct calculation of the surface area to volume ratio?

	Surface area (cm ²)	Volume (cm ³)	SA:V ratio
A	6	27	2:9
B	9	27	1:3
C	54	27	2:1
D	162	27	6:1

Your answer

[1]

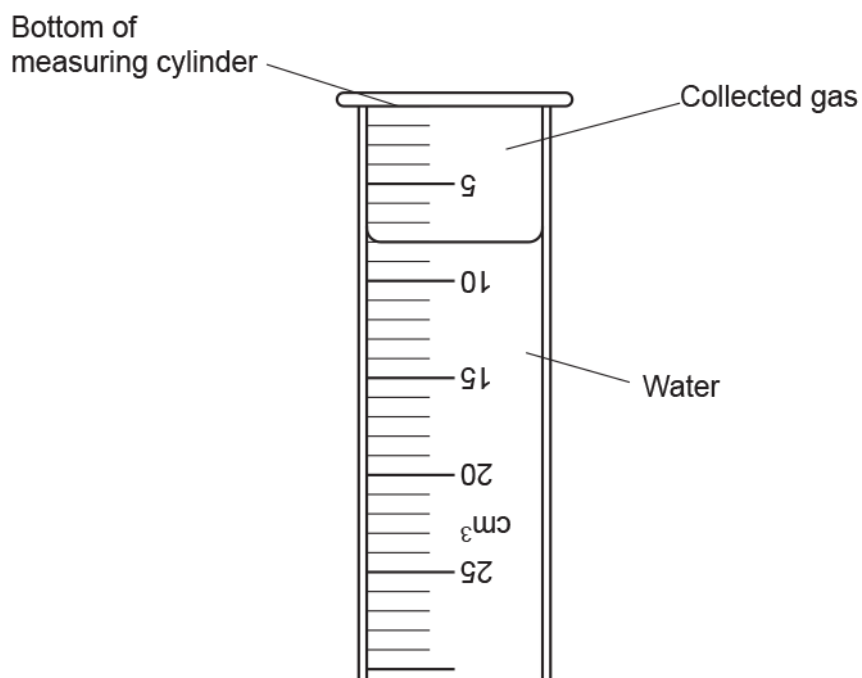
40 Which sentence describes **one** correct adaptation of phloem?

- A They are made of dead cells.
- B They contain large amounts of cytoplasm.
- C They have a thick cell wall.
- D They have sieve plates with holes in.

Your answer

[1]

- 41 The diagram shows the volume of gas collected during an enzyme reaction in an upside down measuring cylinder.



What is the volume of collected gas in the measuring cylinder?

- A 6 cm³
- B 8 cm³
- C 12 cm³
- D 14 cm³

Your answer

[1]

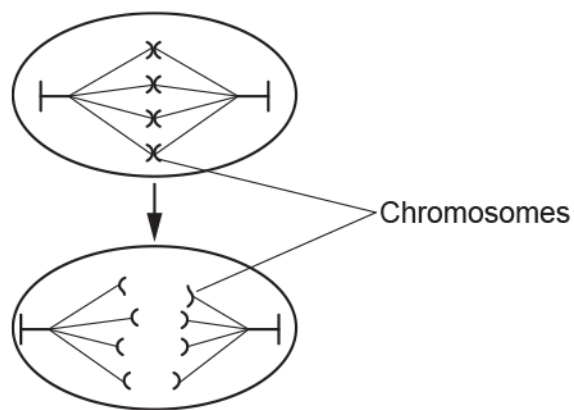
- 42 What is the function of FSH in the female body?

- A It causes the eggs to mature.
- B It inhibits the release of progesterone.
- C It maintains the uterus lining.
- D It prevents pregnancy.

Your answer

[1]

43 Which stage of the cell cycle is represented by the diagram?



- A Differentiation of cell
- B DNA replication
- C Growth of cell
- D Movement of chromosomes

Your answer

[1]

44 Which of the following is a similarity between xylem and phloem?

They both have:

- A Cell walls containing lignin
- B Companion cells
- C No nucleus
- D Sieve plates

Your answer

[1]

45 What happens to a plant cell when it is placed in a more dilute solution? It will:

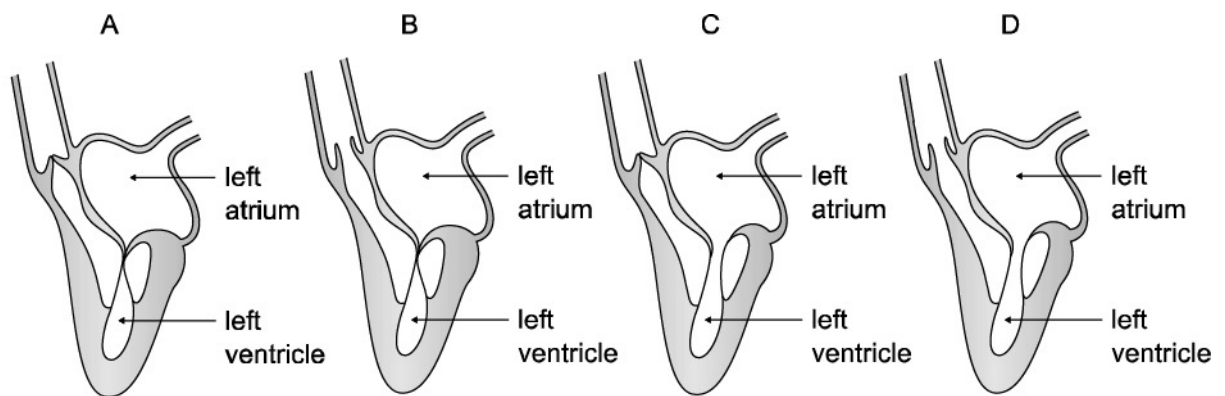
- A Absorb water until it bursts
- B Absorb water until it is turgid
- C Lose water and shrink
- D Lose water and become flaccid

Your answer ☐

[1]

46 The diagrams show sections through part of the heart.

Which diagram A, B, C or D shows the heart pumping blood to the rest of the body?

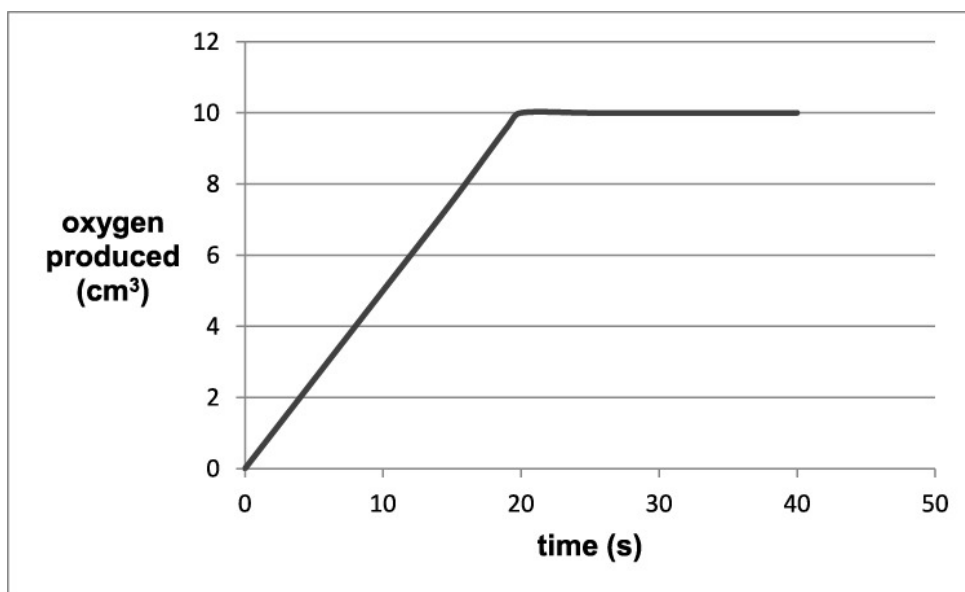


Your answer ☐

[1]

- 47 When the enzyme catalase is added to hydrogen peroxide, oxygen and water are produced. The oxygen produced can be collected and used to show the progress of the reaction.

The graph below shows this reaction.



What is the rate of reaction between 10 and 20 seconds?

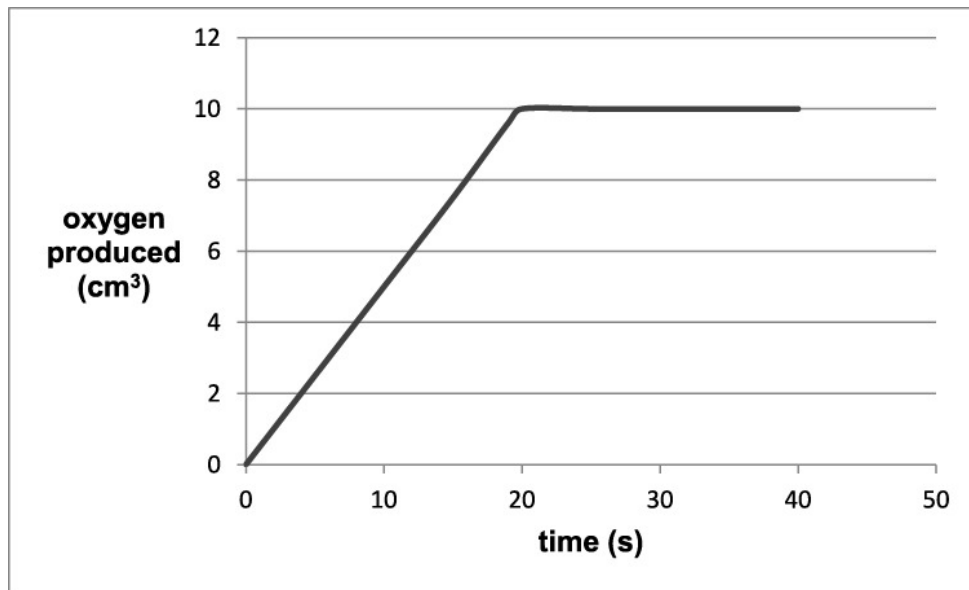
- A $0.5 \text{ cm}^3/\text{s}$
- B $2.0 \text{ cm}^3/\text{s}$
- C $5.0 \text{ cm}^3/\text{s}$
- D $10.0 \text{ cm}^3/\text{s}$

Your answer

[1]

- 48 When the enzyme catalase is added to hydrogen peroxide, oxygen and water are produced. The oxygen produced can be collected and used to show the progress of the reaction.

The graph below shows this reaction.



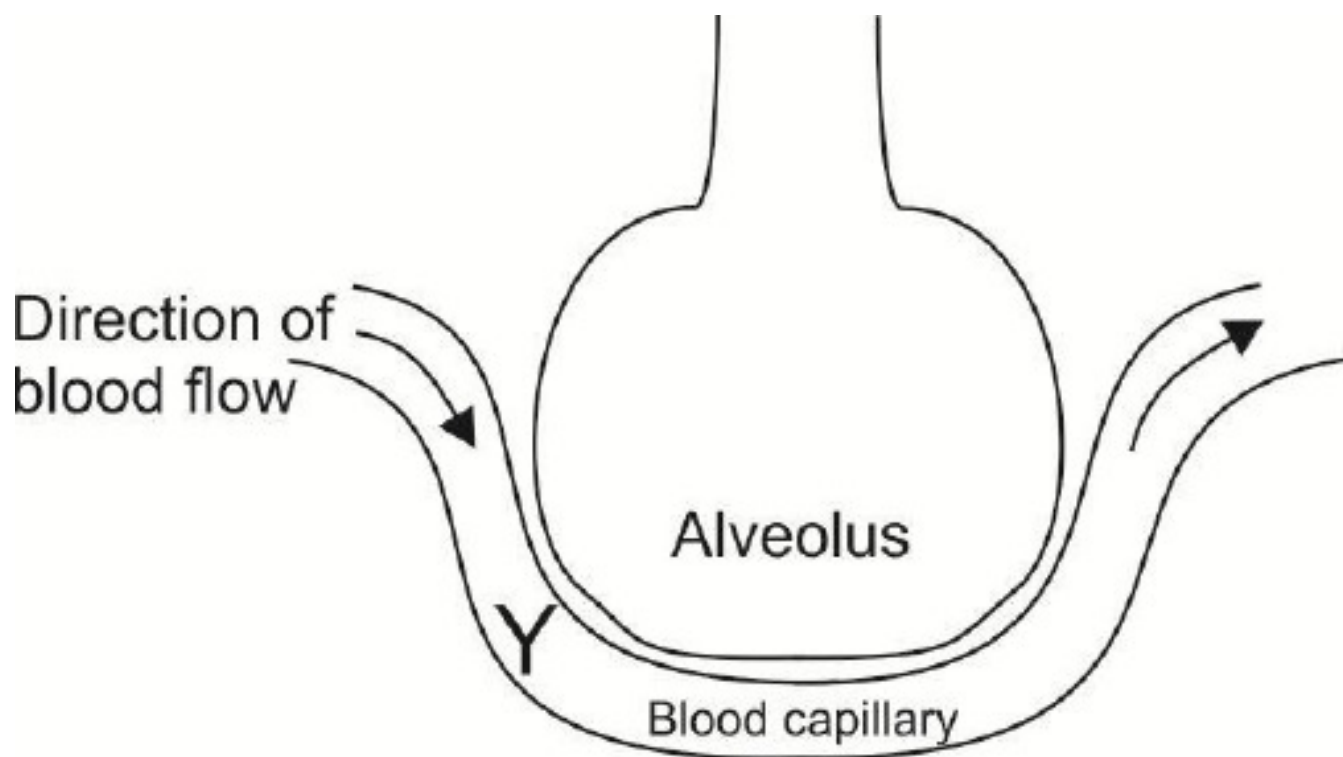
After 20 seconds no more oxygen is produced because the:

- A Active sites are all full
- B Enzyme has been used up
- C Enzyme has denatured
- D Substrate has been used up

Your answer

[1]

49 Gas exchange in a mammal occurs between an alveolus and the blood in a capillary.



Which of the following statements is correct?

At point Y the:

- A Carbon dioxide concentration is higher in the blood than in the alveolus.
- B Carbon dioxide concentration is lower in the blood than in the alveolus.
- C Oxygen concentration is higher in the blood than in the alveolus.
- D Oxygen concentration is the same in the blood as in the alveolus.

Your answer

☐

[1]

50 What structures do prokaryotic and eukaryotic cells have in common?

- A Cell membrane and cytoplasm
- B Cell membrane and nucleus
- C Cytoplasm and mitochondria
- D Mitochondria and nucleus

Your answer

☐

[1]

51 The table shows the number of mitochondria in different types of cell.

Type of cell	Number of mitochondria
liver	1500
heart muscle	5000
skin	100

Which statement best explains the data in the table?

- A Heart muscle cells produce more protein than other types of cell.
- B Skin cells need large amounts of energy.
- C Liver cells only respire using anaerobic respiration.
- D Muscle contraction requires large amounts of energy.

Your answer ☐

[1]

52



Glycogen

Glycogen

INSULIN

GLUCAGON

B

Glycogen

Glucose

INSULIN

GLUCAGON

C

Glucagon

Glucose

INSULIN

GLYCOGEN

D

Glucose

Glucagon

GLYCOGEN

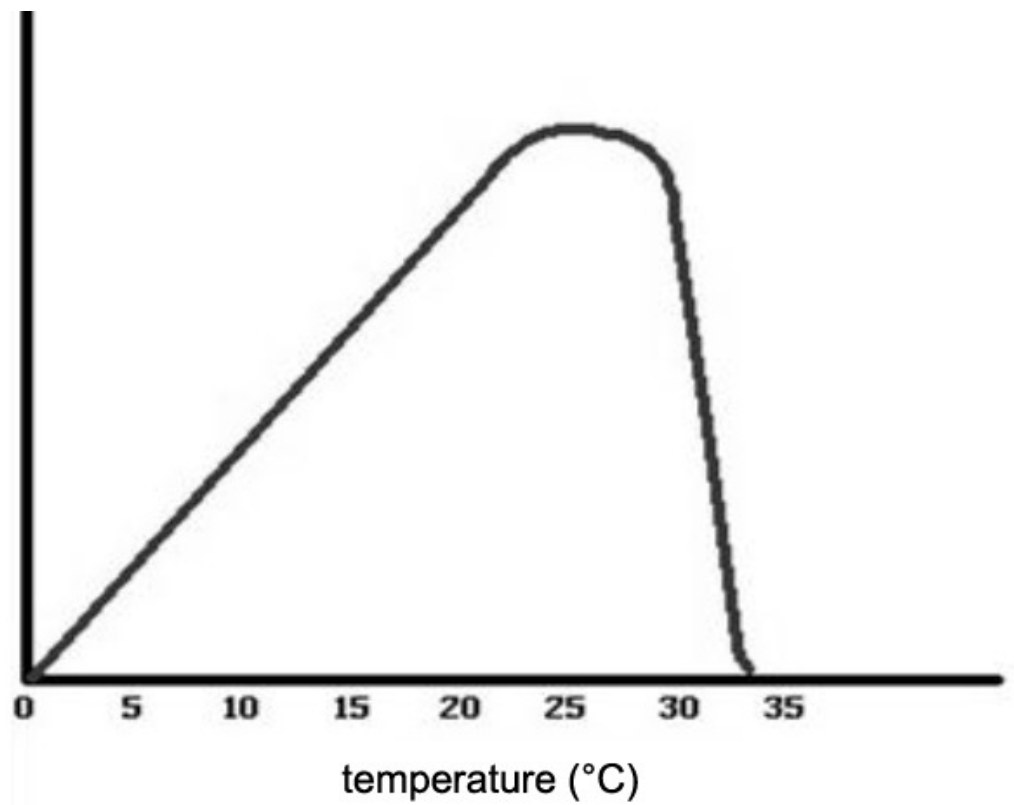
INSULIN

[1]

53

It shows the effect of temperature on the rate of photosynthesis for a plant.

rate of
photosynthesis



What is the optimum temperature for photosynthesis for this plant?

- A 0°C
- B 20°C
- C 25°C
- D 34°C

Your answer ☐

[1]

54 What is the advantage of using an electron microscope compared to a light microscope.

- A can be used on living tissue
- B increased resolution
- C inexpensive
- D portable

Your answer ☐

[1]

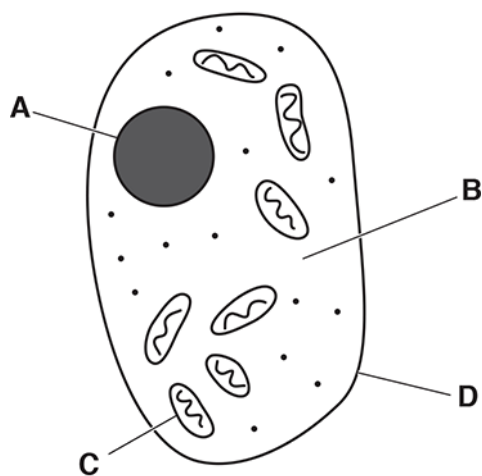
55 Which substances are used in the synthesis of **lipids**?

- A Amino acids and glucose
- B Amino acids and glycerol
- C Fatty acids and glucose
- D Fatty acids and glycerol

Your answer

[1]

56 The drawing shows some of the structures found in an animal cell.

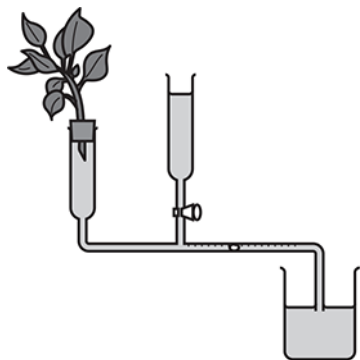


Which labelled structure contains enzymes for cellular respiration?

Your answer

[1]

57 Look at the diagram of a potometer.



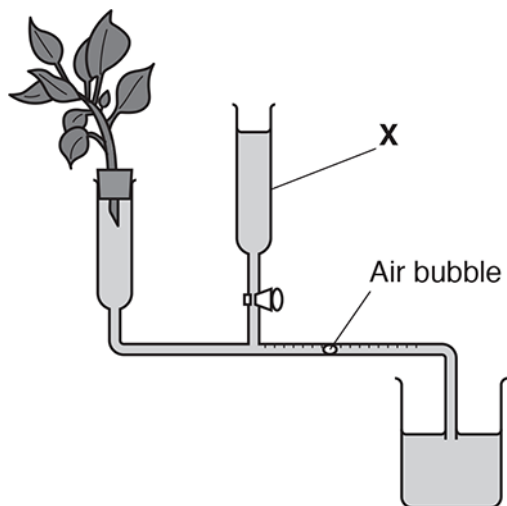
How can the apparatus be changed to **increase** the rate of water uptake?

- A Add more water to the beaker
- B Place an electric fan next to the apparatus and switch the fan on
- C Place a plastic bag over the plant
- D Remove half of the leaves from the plant

Your answer

[1]

58 The diagram shows a potometer.



Why is structure X needed?

- A Maintains temperature of the apparatus
- B Provides the plant with mineral ions
- C Returns the air bubble to its original position
- D Sucks water up from the beaker

Your answer

[1]

59 Which substances are transported in the **phloem** vessels?

- A Sucrose only
- B Water and mineral ions
- C Water and sucrose
- D Water only

Your answer

[1]

60 Photosynthesis is a process that occurs in plants.

	Type of reaction	Substrates	Products
A	Endothermic	Carbon dioxide and water	Oxygen and glucose
B	Exothermic	Carbon dioxide and water	Oxygen and glucose
C	Endothermic	Oxygen and glucose	Carbon dioxide and water
D	Exothermic	Oxygen and glucose	Carbon dioxide and water

Which row describes photosynthesis?

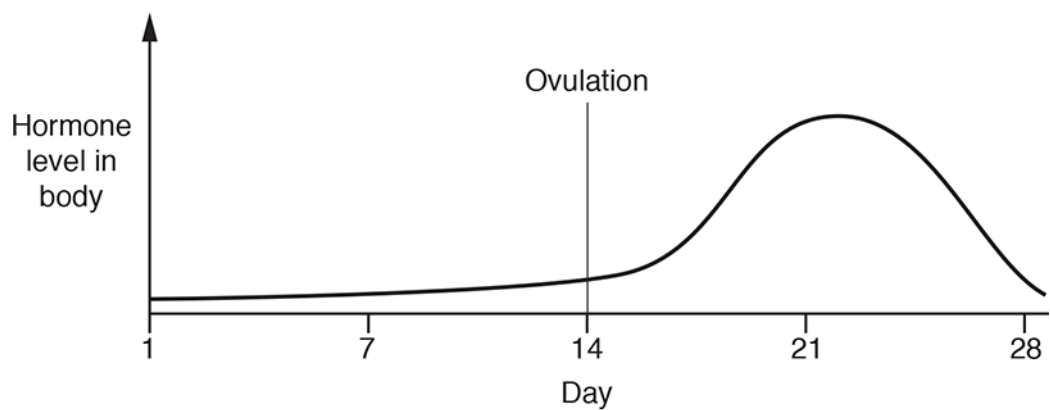
Your answer

[1]

61 The level of some hormones change during the menstrual cycle.

The graph shows how the level of one hormone changes during the menstrual cycle.

Fertilisation has not taken place after ovulation.



Which hormone is represented in the graph?

- A FSH
- B Oestrogen
- C Progesterone
- D Testosterone

Your answer

[1]

62 A student investigates osmosis. They place potato chips in different sugar solutions.

The table shows their results.

Sugar solution	Mass of potato chip (g)	
	At start	After one hour
X	2.0	2.2
Y	2.0	1.9
Z	2.0	1.7

What is the **percentage change** in mass for the potato chip in sugar solution Z?

- A -7
- B -15
- C -18
- D -30

Your answer

[1]

63 Which of these carbohydrates is a **polymer**?

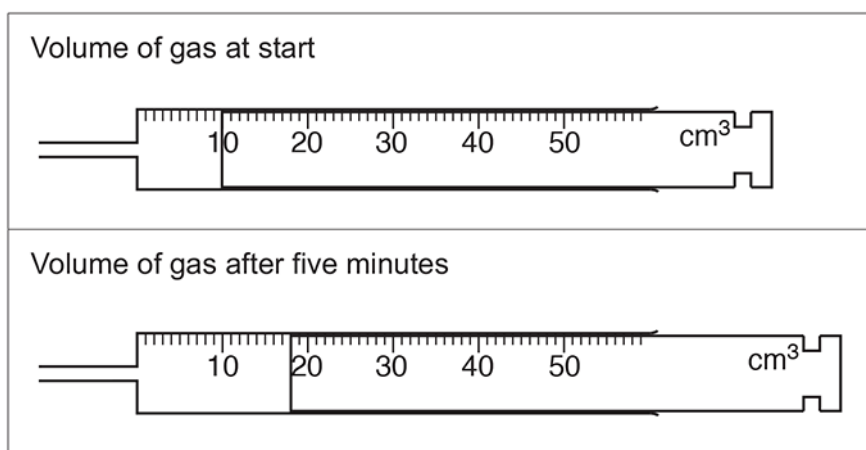
- A Glucose
- B Maltose
- C Starch
- D Sucrose

Your answer

[1]

- 64 A student investigates an enzyme controlled reaction. She collects the gas produced during the reaction in a gas syringe.

The diagrams show the amount of gas in the gas syringe at the **start** and after **five minutes**.



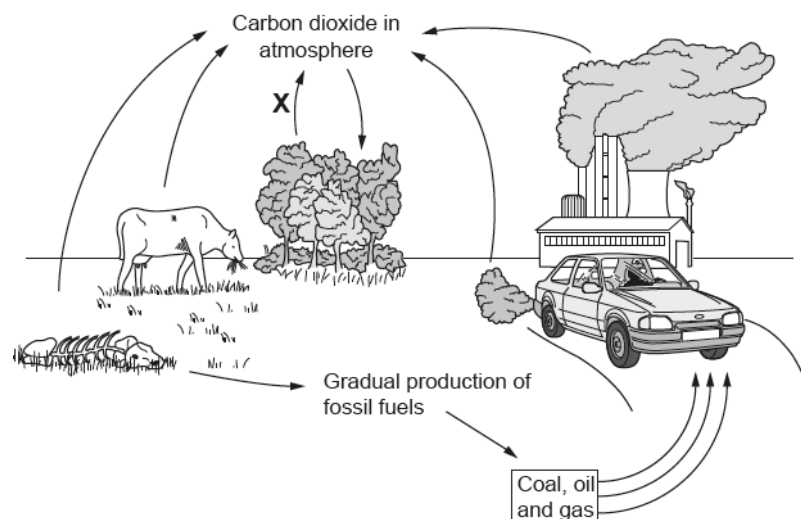
What is the rate of the reaction?

- A 0.625 cm³ / min
- B 1.6 cm³ / min
- C 3.6 cm³ / min
- D 8 cm³ / min

Your answer

[1]

65 Look at the diagram of the **carbon** cycle.



Which process is shown by the arrow labelled X?

- A Decomposition
- B Evaporation
- C Photosynthesis
- D Respiration

Your answer

[1]

66 Countries can compensate for their greenhouse gas emissions by planting new trees.

Why does planting new trees help compensate for their greenhouse gas emissions?

- A Produces biomass
- B Removes carbon dioxide from the air
- C Releases oxygen into the air
- D Water absorbed from the soil prevents flooding

Your answer

[1]

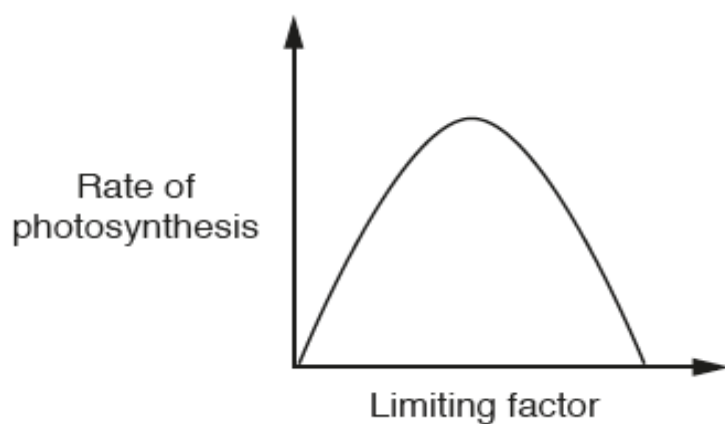
67 Which of these statements about photosynthesis is correct?

- A Single stage endothermic reaction
- B Single stage exothermic reaction
- C Two stage endothermic reaction
- D Two stage exothermic reaction

Your answer

[1]

68 The graph shows how one limiting factor affects the rate of photosynthesis.



Which limiting factor is having the effect shown in the graph?

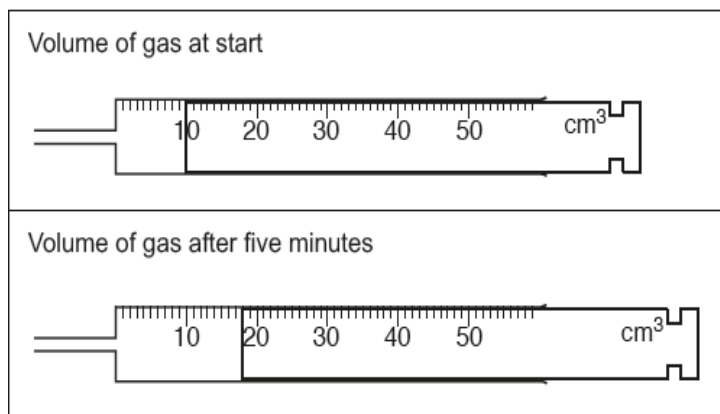
- A Carbon dioxide concentration
- B Humidity
- C Light intensity
- D Temperature

Your answer

[1]

- 69 A student investigates an enzyme controlled reaction. She collects the gas produced during the reaction in a gas syringe.

The diagrams show the volume of gas in the gas syringe at the **start** and after **five minutes**.



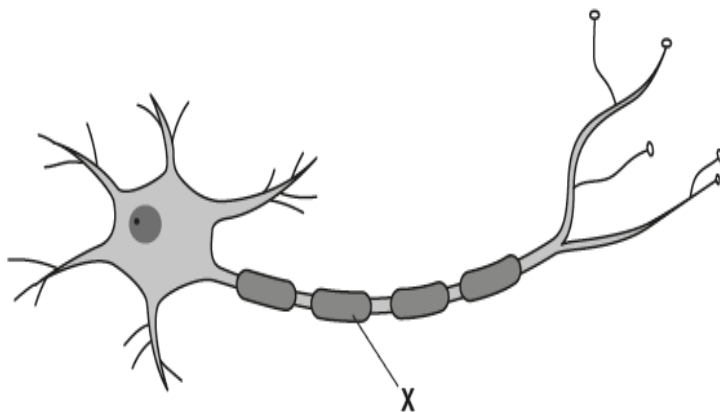
What is the rate of the reaction?

- A 0.625 cm³ / min
- B 1.6 cm³ / min
- C 3.6 cm³ / min
- D 8 cm³ / min

Your answer

[1]

70 The diagram shows a motor neurone.



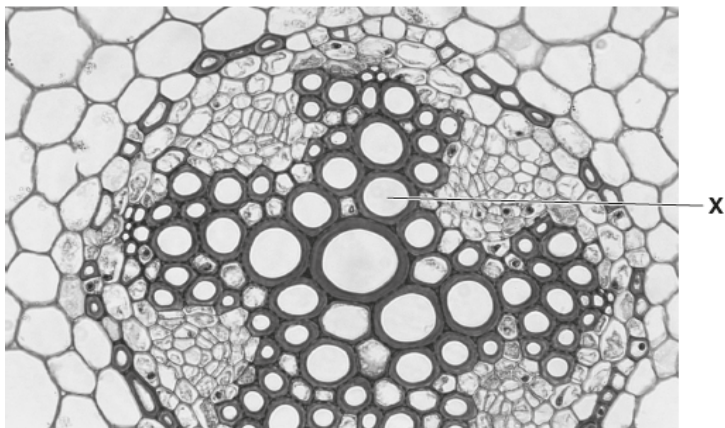
What is the function of part X?

- A Generates an impulse
- B Insulates the axon
- C Slows down the speed of an impulse
- D Stops an impulse travelling the wrong way

Your answer

[1]

71 The picture shows cells from the centre of a root, seen using a light microscope.



Which type of transport cell is labelled X?

- A Phloem
- B Root hair
- C Stomata
- D Xylem

Your answer

[1]

72 The table shows the dietary intake of four amino acids by one individual.

It also shows the recommended daily allowance (RDA) for the same individual.

Amino acid	Dietary intake (g / day)	RDA (g / day)
A	1.52	0.95
B	3.98	2.85
C	2.98	2.58
D	2.32	1.36

The individual has taken in more than 100% of the RDA for each of the four amino acids.

Which amino acid in their diet has the **highest** percentage of the RDA?

Your answer

[1]

73 Which of these is **not** an effect of adrenaline on the body?

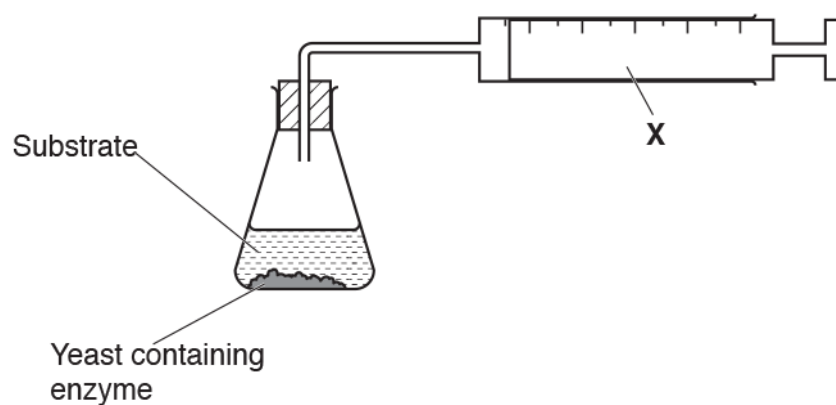
- A Air passages of the lungs expand
- B Blood flow to the digestive system increases
- C Blood pressure increases
- D Pupils dilate

Your answer

[1]

74 A student investigates the effect of an enzyme found in yeast on a substrate.

They use the apparatus in the diagram.



What is apparatus X used to measure?

- A Volume of enzyme
- B Volume of product
- C Volume of substrate
- D Volume of yeast

Your answer

[1]

75 Which process supplies **ATP** in all living cells?

- A Circulation
- B Photosynthesis
- C Protein synthesis
- D Respiration

Your answer

[1]

76 Which row shows the correct pathway of oxygen from the lungs to the body tissues?

A	artery	atrium	ventricle	vein
B	atrium	artery	vein	ventricle
C	vein	atrium	ventricle	artery
D	vein	ventricle	artery	atrium

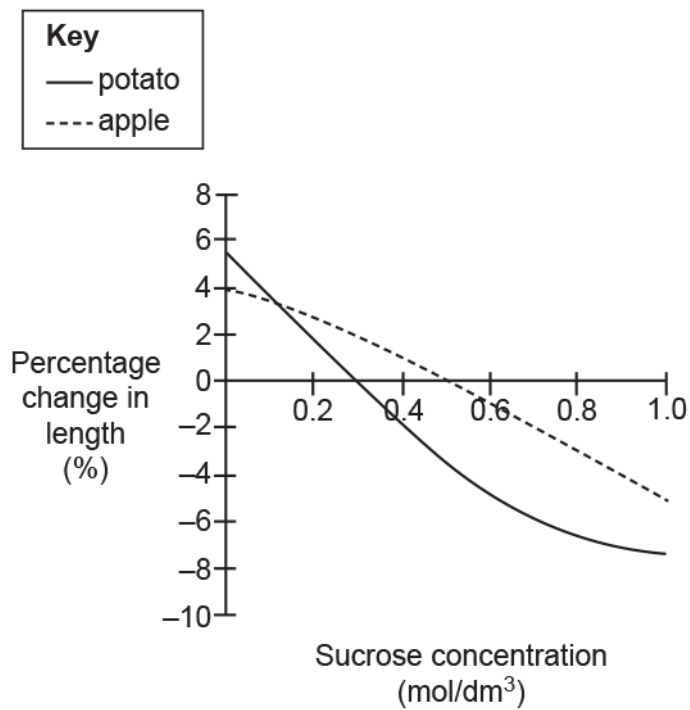
Your answer

[1]

77 A student investigates osmosis by placing chips of potato and apple into different concentrations of sucrose solution.

The student calculates the percentage change in length for each chip of potato and apple.

The graph shows the student's results.



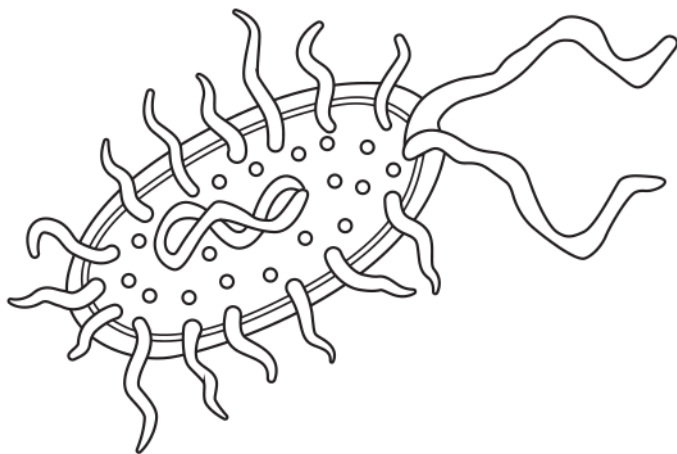
Estimate the concentration of sucrose inside the cells of the **apple**.

- A 0.06 mol/dm³
- B 0.3 mol/dm³
- C 0.5 mol/dm³
- D 1.0 mol/dm³

Your answer

[1]

78 A student draws this image of a prokaryotic cell.



The cell image drawn by the student is 55 mm long.

The actual length of the prokaryotic cell is 0.001 mm.

What is the magnification of the student's drawing?

- A 0.055×
- B 0.550×
- C 5500×
- D 55 000×

Your answer

[1]

79 The resolution of an electron microscope is $0.0001\text{ }\mu\text{m}$.

The resolution of a light microscope is $0.2\text{ }\mu\text{m}$.

How many times greater is the resolution of the electron microscope compared to the light microscope?

A 20

B 200

C 2000

D 20 000

Your answer

[1]

80 A student investigates the rate of reaction for photosynthesis using pondweed.

The student records the time it takes pondweed to produce 30 bubbles of oxygen. The student repeats the investigation using different light intensities.

The table shows one of the student's results.

Relative light intensity	Time (s)
0.7	14

The student calculates the rate of reaction using the formula:

$$\text{rate} = \frac{1}{\text{time}}$$

Calculate the rate of reaction for a relative light intensity of 0.7.

A 0.07

B 0.7

C 7

D 14

Your answer

[1]

81 Root hair cells have large numbers of mitochondria to provide lots of energy.

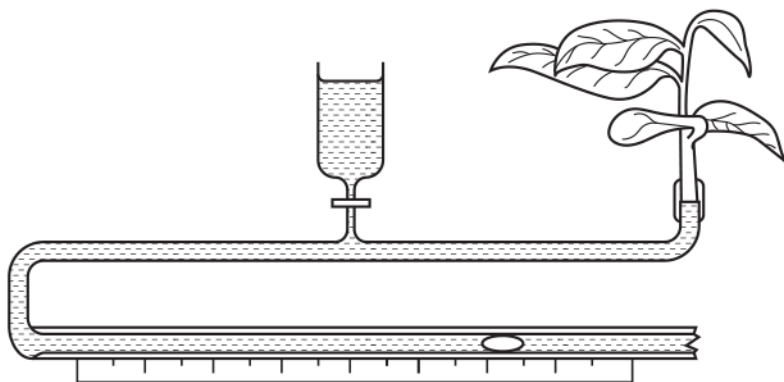
Why do root hair cells need lots of energy?

- A For active transport of minerals.
- B For active transport of water.
- C For diffusion of minerals.
- D For diffusion of water.

Your answer

[1]

82 Look at the apparatus in the diagram.



What is this apparatus used to measure?

- A Rate of blood flow
- B Rate of diffusion
- C Rate of food uptake
- D Rate of water uptake

Your answer

[1]

83 Which chamber of the heart receives blood directly from the pulmonary vein?

- A Left atrium
- B Left ventricle
- C Right atrium
- D Right ventricle

Your answer

[1]

84 Which substances are transported in the xylem vessels?

- A Mineral ions only
- B Sucrose only
- C Water and mineral ions
- D Water and sucrose

Your answer

[1]

85 A person needs to have injections every day because they have **type 1** diabetes.

Which substance do these injections contain?

- A Glucose
- B Haemoglobin
- C Insulin
- D Testosterone

Your answer

[1]

86 Scars are formed when skin is damaged. Which word describes the type of cell division used when scar tissue forms?

- A Differentiation
- B Mitosis
- C Replication
- D Specialised

Your answer

[1]

87 The diagram shows cells from a plant.



Where in the plant would these cells be found?

- A Leaf
- B Flower
- C Root
- D Stem

Your answer

[1]

88 A student uses a light microscope to look at cells.

The magnification of the eyepiece lens is $\times 10$.

The magnification of the objective lens is $\times 20$.

Calculate the magnification of the image they see.

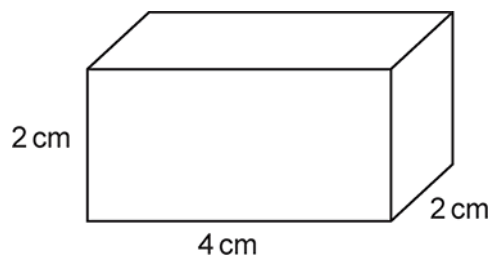
- A $\times 10$
- B $\times 20$
- C $\times 100$
- D $\times 200$

Your answer

[1]

89 A student investigates the rate of diffusion using blocks of agar.

The diagram shows one of the blocks of agar they use.



The block has a surface area of 40 cm^2 .

What is the surface area to volume ratio of this block of agar?

- A 1 : 2
- B 1 : 2.5
- C 2 : 1
- D 2.5 : 1

Your answer

[1]

- 90 **Table 9.1** shows the classification of non-diabetic, pre-diabetic and type 2 diabetes based on blood glucose levels.

Classification	Blood glucose levels 2 hours after food (mg / d / of blood)	Blood glucose levels 12 hours after food (mg / d / of blood)
non-diabetic	70–99	<140
pre-diabetic	100–125	140–199
type 2 diabetes	>126	>200

Table 9.1

Table 9.2 shows measurements of blood glucose levels taken from 4 people.

	Blood glucose levels 2 hours after food (mg / d / of blood)	Blood glucose levels 12 hours after food (mg / d / of blood)
A	73	140
B	100	125
C	105	148
D	129	206

Table 9.2

Which row in **Table 9.2** shows a person who is a **pre-diabetic**?

Your answer

[1]

- 91 What are the product(s) of anaerobic respiration in animals?

- A Alcohol
- B Alcohol and carbon dioxide
- C Lactic acid
- D Lactic acid and carbon dioxide

Your answer

[1]

92 Which of these statements about proteins is correct?

- A Proteins are monomers made from polymers called amino acids.
- B Proteins are polymers made from monomers called amino acids.
- C Proteins are monomers made from polymers called fatty acids.
- D Proteins are polymers made from monomers called fatty acids.

Your answer

[1]

93 The diagram shows cells from a plant.



What is the function of these cells?

- A Produce sucrose
- B Take in water from the soil
- C Transport sucrose to the roots
- D Transport water up the stem

Your answer

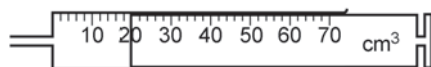
[1]

94 A student investigates the rate of photosynthesis.

They collect the gas produced during the reaction in a gas syringe.

The diagrams show the volume of gas in the syringe at the **start** and after **30 minutes**.

Volume of gas at start



Volume of gas after 30 minutes



What is the rate of reaction?

- A 0.7 cm³ / min
- B 0.9 cm³ / min
- C 1.4 cm³ / min
- D 2.1 cm³ / min

Your answer

[1]

95 **Table 1.1** shows the classification of non-diabetic, pre-diabetic and type 2 diabetes based on their blood glucose levels.

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A	73	140
B	100	125
C	105	148
D	129	206

Table 1.2

Which row in **Table 1.2** shows a person who is a **pre-diabetic**?

Your answer

[1]

96 Look at the table.

	Respiration rate	Heart rate	Blood flow to digestive system
A	decrease	decrease	decrease
B	decrease	increase	increase
C	increase	decrease	increase
D	increase	increase	decrease

The body releases adrenaline when we are stressed.

Which row describes the body's response to stress?

Your answer

[1]

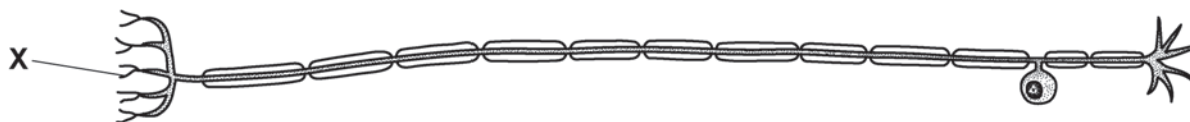
97 Which term describes the ability to see two points as separate points and not merged into one?

- A Depth of field
- B Magnification
- C Power
- D Resolution

Your answer

[1]

98 The diagram shows a sensory neurone.



What is the part labelled X?

- A Axon
- B Dendrite
- C Cell body
- D Nucleus

Your answer

[1]

99 Carbon is recycled in the ecosystem.

Which process helps reduce the level of carbon in the atmosphere?

- A Photosynthesis
- B Respiration
- C Translocation
- D Transpiration

Your answer

[1]

100 The table shows information about five different contraceptive methods.

Method	How it works	Number of unexpected pregnancies per 1000 women using the method
IUD	releases copper which stops sperm entering uterus	8
male condom	stops sperm entering vagina	180
patch	releases chemical into body	90
pill	contains chemical that stops ovulation	90
sterilisation	stops egg reaching uterus	5

Which **two** non-hormonal contraceptive methods are the most effective?

- A Male condom and IUD
- B Male condom and sterilisation
- C Patch and pill
- D Sterilisation and IUD

Your answer

[1]

END OF QUESTION PAPER

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
1			C	1 (AO 1.1)	<u>Examiner's Comments</u> The majority of candidates answered this correctly. Where there was an incorrect response, candidates tended to select A or D.
			Total	1	
2			B	1 (AO 1.2)	<u>Examiner's Comments</u> The majority of candidates answered this correctly. The most common incorrect response was C.  OCR support The Science Mathematical Skills Handbook would be useful to share with candidates or incorporate into lessons to practise using standard form and rearranging equations, among other mathematical skills.
			Total	1	
3			D	1 (AO 1.1)	<u>Examiner's Comments</u> The majority of candidates answered this correctly. The most commonly seen incorrect response was C.
			Total	1	
4			D	1 (AO 1.1)	<u>Examiner's Comments</u> The majority of candidates answered this correctly. The most commonly seen incorrect response was B.
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
5			C	1 (AO 1.1)	<u>Examiner's Comments</u> The majority of candidates answered this correctly. The most commonly seen incorrect response was B.
			Total	1	
6			B	1 (AO 2.2)	<u>Examiner's Comments</u> This was the most challenging question in this section, with over half of all candidates selecting an incorrect response. The most commonly seen incorrect response was A.
			Total	1	
7			B	1 (AO 2.1)	<u>Examiner's Comments</u> Over half of all candidates answered this correctly. The most commonly seen incorrect response was A.
			Total	1	
8			C	1 (AO 1.1)	<u>Examiner's Comments</u> This was a challenging question in this section, with only some candidates showing knowledge of anaerobic respiration in fungi. The most commonly seen incorrect response was A.
			Total	1	
9			B	1 (AO 1.1)	<u>Examiner's Comments</u> This question was quite challenging, with just over half of all candidates gaining the mark. The most commonly seen incorrect response was C.
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
10			C	1 (AO 2.1)	<u>Examiner's Comments</u> Over half of all candidates selected the correct response. The most commonly seen incorrect response was A.
			Total	1	
11			A	1 (AO 1.1)	<u>Examiner's Comments</u> Many candidates successfully identified A as the correct answer. There was no clear pattern to the incorrect answers seen.
			Total	1	
12			D	1 (AO 1.1)	<u>Examiner's Comments</u> Many candidates successfully identified D as the correct response. There was no clear pattern to the incorrect answers seen.
			Total	1	
13			B	1 (AO 1.1)	<u>Examiner's Comments</u> Many candidates selected the correct answer, B. Option D was the most commonly selected incorrect answer.
			Total	1	
14			A	1 (AO 1.1)	<u>Examiner's Comments</u> Most candidates correctly selected the correct answer, A. Options C and D were equally chosen as incorrect responses, indicating the candidates' misunderstanding of the term ethical.
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
15			D	1 (AO 1.2)	<u>Examiner's Comments</u> A majority of candidates correctly identified stain as the correct answer. Lipid was most commonly selected for candidates who answered the question incorrectly. This question assessed AO1.
			Total	1	
16			A	1 (AO 1.2)	<u>Examiner's Comments</u> Most candidates identified Statement A as being correct. This question assessed AO1.
			Total	1	
17			B	1 (AO 1.1)	<u>Examiner's Comments</u> Around half of the candidates identified plasmids are found in the cytoplasm of prokaryotic cells. Candidates who answered this question incorrectly selected the other options in equal proportions. This question assessed AO1
			Total	1	
18			C	1 (AO 2.1)	<u>Examiner's Comments</u> Few candidates were unable to identify that pH 8 is where both enzymes are active. This question assessed AO2.
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
19			C	1 (AO 2.1)	<u>Examiner's Comments</u> Most candidates identified Item C as being correct. Almost all of the incorrect answers selected Item A. This question assessed AO2.
			Total	1	
20			D	1 (AO 1.1)	<u>Examiner's Comments</u> Over half of candidates identified the diagram represents the lock and key hypothesis. A and B were selected by most of the remaining candidates in roughly equal proportions. This question assessed AO1
			Total	1	
21			C	1 (AO 1.1)	<u>Examiner's Comments</u> Over half of candidates identified active transport as corresponding to Item C. The remaining options were selected in roughly equal proportions suggesting they did not link active transport to the need for energy. This question assessed AO1
			Total	1	
22			C	1 (AO 2.1)	<u>Examiner's Comments</u> Many candidates correctly identified Graph C. Option D was the most common incorrect answer. This question assessed AO2.
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
23			C	1 (AO 1.1)	<u>Examiner's Comments</u> Many candidates correctly identified Option C. Option A accounted for most incorrect answers suggesting candidates had mixed up the organ that produces insulin with the target organ. This question assessed AO1.
			Total	1	
24			B	1 (AO 1.2)	<u>Examiner's Comments</u> Around half of candidates identified Option B as being correct. Option C was the most common incorrect answer. This question assessed AO1.
			Total	1	
25			B	1 (AO 1.1)	
			Total	1	
26			A	1 (AO 1.1)	<u>Examiner's Comments</u> This was the most challenging multiple-choice question with a minority of the candidates responding correctly. The most common incorrect response was C.
			Total	1	
27			C	1 (AO 1.1)	<u>Examiner's Comments</u> Most candidates successfully recalled that plasmids are used in genetic engineering.
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
28			D	1 (AO 1.1)	<u>Examiner's Comments</u> The more successful candidates identified D as the correct description of human stem cells. The majority of candidates got this question incorrect, identifying A or C, indicating that stem cells are only found in human embryos.
			Total	1	
29			A	1 (AO 2.1)	<u>Examiner's Comments</u> Most of the candidates correctly identified method A.
			Total	1	
30			B	1 (AO 1.1)	<u>Examiner's Comments</u> Most candidates identified B; there was no clear misconception evident from those candidates that did not identify B.
			Total	1	
31			C	1 (AO 1.1)	<u>Examiner's Comments</u> Candidates usually identified C as the correct answer. A few candidates seemed to misunderstand the terms polymer and monomer, incorrectly choosing A.
			Total	1	
32			D	1 (AO 2.2)	ALLOW 0.5 (m) <u>Examiner's Comments</u> The majority of candidates were able to rearrange the formula to identify the correct answer of D.
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
33			A	1 (AO 1.2)	<u>Examiner's Comments</u> Most candidates correctly identified A. A common misconception is that electron microscopes do not use stains.
			Total	1	
34			B	1 (AO 2.2)	<u>Examiner's Comments</u> The majority of candidates understood the terms mode and median to identify B as the correct answer
			Total	1	
35			B	1 (AO 1.1)	<u>Examiner's Comments</u> Less than half the candidates identified the correct answer of B. A seemed to be the most common incorrect answer.
			Total	1	
36			D	1 (AO 1.1)	<u>Examiner's Comments</u> Most candidates correctly identified D. There was no clear pattern to the incorrect answers.
			Total	1	
37			D	1 (AO 2.1)	<u>Examiner's Comments</u> Many responses assumed incorrectly that the answer was B. The diagram in fact shows the movement of chromosomes as they separate during mitosis.
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
38			A	1 (AO 2.1)	<u>Examiner's Comments</u> The correct answer is A. Nearly all responses correctly identified the mode as 0.3 mm (A). The minority of candidates who were incorrect in their choice, were roughly evenly split between 0.4 mm (B), 0.5 mm (C), and 0.6 mm (D). This question assessed AO2.
			Total	1	
39			C	1 (AO 1.1)	<u>Examiner's Comments</u> The correct answer is C. Only a small minority of responses selected the correct SA:V ratio of 2:1 (C). The most common suggestion for SA:V ratio was 1:3 (B). 2:9 (A) and 6:1 (D) were selected much less frequently than the correct response (C). This question assessed AO1.
			Total	1	
40			D	1 (AO 1.1)	<u>Examiner's Comments</u> The correct answer is D. The majority of responses correctly identified that phloem vessels contain sieve plates with holes in (D). Roughly equal numbers suggested that phloem vessels are made of dead cells (A) or possess a thick cell wall (C). Very few responses suggested that phloem vessels contain large amounts of cytoplasm (B). This question assessed AO1.
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
41			B	1 (AO 2.2)	<u>Examiner's Comments</u> The correct answer is B. A large majority of responses were able to correctly read the volume of gas in the measuring cylinder as 12 cm³ (B). Those candidates who suggested incorrect responses selected 6 cm³ (A), 12 cm³ (C), and 14 cm³ (D), in roughly equal numbers; those candidates who suggested 12 cm³ (C) had not taken into account that the measuring cylinder had been inverted, while those candidates who suggested 6 cm³ (A) or 14 cm³ (D) were possibly guessing. This question assessed AO2.
			Total	1	
42			A	1 (AO 1.1)	<u>Examiner's Comments</u> The correct answer is A. The majority of responses were able to correctly identify the function of FSH in females being to stimulate maturation of the eggs. Roughly equal numbers selected either inhibition of release of progesterone (B), maintenance of the uterus lining (C), or prevention of pregnancy (D). This question assessed AO1.
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
43			D	1 (AO 2.1)	<u>Examiner's Comments</u> The correct answer is D. Many responses were able to identify that the phase of the cell cycle represented by the diagram was anaphase (D). Of the candidates who selected incorrect responses the overwhelming majority suggested that the diagram showed DNA replication (B), presumably mistaking the separating chromosomes for the unwinding, and separating of the two polynucleotide strands of a DNA molecule (while demonstrating a potential lack of understanding of the process of DNA replication). Very few candidates identified the diagram as representing either cell differentiation (A) or cell growth (C) – those candidates that did were clearly guessing. This question assessed AO2.
			Total	1	
44			c	1	
			Total	1	
45			B	1	
			Total	1	
46			B	1	
			Total	1	
47			A	1	
			Total	1	
48			D	1	
			Total	1	
49			A	1	
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
50			A	1	
			Total	1	
51			D	1	
			Total	1	
52			A	1	
			Total	1	
53			c	1	
			Total	1	
54			B	1	
			Total	1	
55			D ✓	1 (AO 1.1)	<u>Examiner's Comments</u> Approximately 80% of candidates could not correctly identify the substances used in the synthesis of lipids. Answer D was the correct answer. This question assessed AO1.1.
			Total	1	
56			C ✓	1 (AO 1.1)	ALLOW B. <u>Examiner's Comments</u> Over 80% of candidates could correctly identify the areas of the cell containing those enzymes used in respiration. Both B and C were allowable answers. This question assessed AO1.
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
57			B ✓	1 (AO 2.2)	<u>Examiner's Comments</u> Approximately 70% of candidates were unable to identify correctly how to increase the rate of water uptake (answer B), which may suggest they don't understand how water enters and leaves a plant. This question assessed AO2.2.
			Total	1	
58			C ✓	1 (AO 2.2)	<u>Examiner's Comments</u> Just over 40% of candidates were familiar with the functioning of a potometer, which suggested that they had encountered it as part of their practical work, although approximately 60% were not familiar enough to correctly identify how Structure X could return the bubble to its original position (correct answer C). Centres may want to think about how to embed the potometer in candidates' learning of water transport, rather than it being a stand-alone demonstration, equipment permitting. This question assessed AO2.2.
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
59			C ✓	1 (AO 1.1)	<u>Examiner's Comments</u> Approximately 80% of candidates did not identify correctly that water and sucrose are transported in the phloem (answer C). The presence of water in the phloem is a common omission when teaching plant transport. Accordingly, the most common incorrect answers referred to sucrose only (A), or some candidates mixed up the phloem with the xylem and gave the answer water and mineral ions (B). This question assessed AO1.
			Total	1	
60			A ✓	1 (AO 1.1)	<u>Examiner's Comments</u> Over 50% of candidates could not correctly identify the characteristics of photosynthesis from the rows of the table (A). Many candidates gave the answer which was almost identical to the correct answer, but indicated that photosynthesis was exothermic (answer B). This may suggest confusion about whether photosynthesis is an exothermic or endothermic reaction. This question assessed AO1.1.
			Total	1	
61			C ✓	1 (AO 2.1)	<u>Examiner's Comments</u> Over 75% of candidates were unable to identify correctly that the graph represented progesterone levels (answer C). This question assessed AO2.1
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
62			B ✓	1 (AO 2.2)	<u>Examiner's Comments</u> Approximately 70% of candidates could not work out the correct percentage change (answer B). It may be useful for centres to focus more on teaching appropriate mathematical skills to ensure candidates' competence and confidence in using them in biological contexts. This question assessed AO2.2.
			Total	1	
63			C ✓	1 (AO 1.1)	<u>Examiner's Comments</u> A majority of candidates correctly identified starch as a polymer of glucose (answer C). This question assessed AO1.1.
			Total	1	
64			B ✓	1 (AO 2.2)	<u>Examiner's Comments</u> Approximately 60% of candidates could not calculate the correct rate of reaction (answer B). D was the most common incorrect answer, suggesting that candidates had forgotten to divide by time, or did not understand how to calculate a rate. This question assessed AO2.2.
			Total	1	
65			D ✓	1 (AO 1.1)	
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
66			B ✓	1 (AO2.1)	
			Total	1	
67			C ✓	1 (AO 1.1)	
			Total	1	
68			D ✓	1 (AO 2.1)	
			Total	1	
69			B ✓	1 (AO 2.2)	
			Total	1	
70			B ✓	1 (AO 1.1)	
			Total	1	
71			D ✓	1 (AO 2.1)	
			Total	1	
72			D ✓	1 (AO 2.1)	
			Total	1	
73			B ✓	1 (AO 1.1)	
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
74			B	1 (AO 2.2)	<u>Examiner's Comments</u> Around half of candidates identified the syringe is used for measuring the volume of product (answer B). Most candidates who answered this question incorrectly selected option C. This question assessed AO2.2.
			Total	1	
75			D	1 (AO 1.1)	<u>Examiner's Comments</u> The majority of candidates correctly identified respiration as the process which supplies ATP in living cells (Answer D). This question assessed AO1.1.
			Total	1	
76			C	1 (AO 1.1)	<u>Examiner's Comments</u> This question was incorrectly answered by the majority of candidates with many candidates not realizing that the pathway was starting at the lungs. A was the most commonly selected incorrect answer, suggesting that the candidates had not correctly processed the information in the question. This question assessed AO1.1.
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
77			C	1 (AO 2.1)	<u>Examiner's Comments</u> Approximately half of candidates correctly identified C as the correct answer by reading the value from the graph where the line for apple crossed the x axis. B and D were the most commonly selected incorrect answers. This question assessed AO1.1.
			Total	1	
78			D	1 (AO 2.2)	<u>Examiner's Comments</u> This question addressed similar mathematical skills to Question 6 and a similar proportion of candidates answered this question correctly. A and B were the most commonly selected incorrect answers. This question assessed AO2.2.
			Total	1	
79			C	1 (AO 2.2)	<u>Examiner's Comments</u> Over half of candidates correctly calculated the difference in the resolution of the light microscope and electron microscope, suggesting most have a good grasp of the mathematical operations required to calculate the answer. B and D were the most commonly selected incorrect answers. This question assessed AO2.2.
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
80			A	1 (AO 2.2)	<u>Examiner's Comments</u> The majority of candidates correctly used the equation given to correctly calculate the rate of reaction. D was the most common incorrect answer suggesting they had just substituted the value for time into the formula and not carried out the calculation. This question assessed AO2.2.
			Total	1	
81			A	1 (AO 1.1)	<u>Examiner's Comments</u> Over half of candidates identified that mitochondria are required to provide energy for the active transport of minerals. Candidates who answered the question incorrectly selected the other options in roughly equal proportions suggesting they did not correctly link active transport of minerals to the need for energy. This question assessed AO1.1.
			Total	1	
82			D	1 (AO 1.2)	<u>Examiner's Comments</u> The majority of candidates correctly identified the potometer is used to measure the rate of water uptake (answer D) suggesting they had encountered this apparatus in their practical work. This question assessed AO1.2.
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
83			A✓	1 (AO1.1)	
			Total	1	
84			C✓	1 (AO1.1)	
			Total	1	
85			C✓	1 (AO1.1)	
			Total	1	
86			B✓	1 (AO2.1)	<u>Examiner's Comments</u> The term replication was frequently confused with mitosis as a form of cell division
			Total	1	
87			C✓	1 (AO1.1)	<u>Examiner's Comments</u> In this question involved biological drawings revealed that many candidates had difficulty interpreting drawings of common structures which were different to those they may previously have encountered. Candidates should be exposed to as wide a range of representations as possible.
			Total	1	
88			D✓	1 (AO2.2)	
			Total	1	
89			D✓	1 (AO2.2)	
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
90			C✓	1 (AO2.2)	
			Total	1	
91			C✓	1(AO1.1)	
			Total	1	
92			B✓	1 (AO1.1)	
			Total	1	
93			B✓	1 (AO1.1)	
			Total	1	
94			A✓	1 (AO2.2)	
			Total	1	
95			C✓	1 (AO2.2)	
			Total	1	
96			D✓	1(AO1.1)	
			Total	1	
97			D✓	1(AO1.1)	
			Total	1	
98			B✓	1(AO1.1)	
			Total	1	
99			A ✓	1 (AO 1.1)	
			Total	1	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
10			D✓	1(AO2.1)	
0					
			Total	1	