

SCIENCE COORDINATE 9-1

0973 | Paper 4
2020 — 2025

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1 - (0973/41_Summer_2020_Q10)

- (a) Plant shoots respond to stimuli such as light.

Fig. 10.1 shows the growth response of a shoot to light.

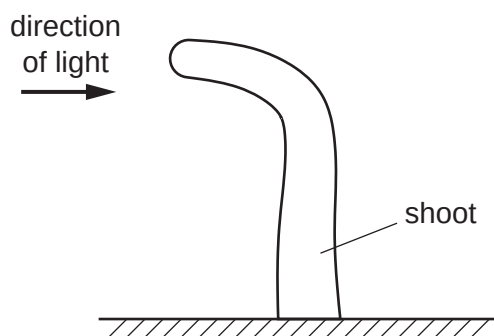


Fig. 10.1

- (i) Name the response shown in Fig. 10.1.

..... [1]

- (ii) Draw an **X** on Fig. 10.1 to show the area with the greatest cell elongation. [1]

- (iii) Name the hormone that controls cell elongation.

..... [1]

- (b) Fig. 10.2 shows a plant shoot with the tip removed.

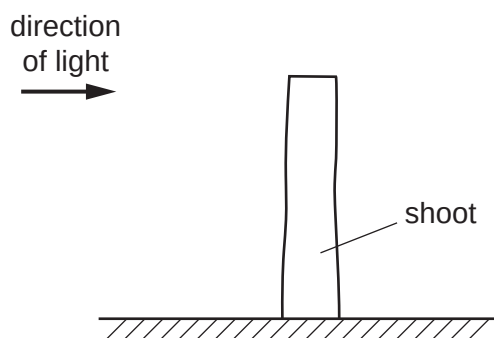


Fig. 10.2

State why the shoot in Fig. 10.2 did **not** bend.

..... [1]

- (c) Explain why plants need magnesium ions for photosynthesis and healthy growth.

Use ideas about energy in your answer.

..... [3]

(d) Growth is one of the characteristics of living things.

(i) Complete the definition of the term *growth*.

Growth is a increase in size and dry
by an increase in cell number or cell size or both. [2]

(ii) State the name of two other characteristics of living things.

1
2 [2]

[Total: 11]

2 - (0973/41_Winter_2023_Q4)

(a) A student investigates the effect of different types of sugar on the anaerobic respiration in yeast.

She mixes yeast with five different types of sugar solutions of the same concentration and measures the volume of gas produced after 2 hours.

Table 4.1 shows the results.

Table 4.1

sugar	volume of gas produced in 2 hours/cm ³
A	9
B	16
C	82
D	3
E	65

(i) Identify the sugar in Table 4.1 that produces the largest volume of gas.

..... [1]

(ii) Calculate the rate of anaerobic respiration for sugar **A** in Table 4.1.

rate of anaerobic respiration for sugar **A** = cm³/min [2]

(iii) State the name of the gas produced in this investigation.

..... [1]

(iv) State **one** practical use for the anaerobic respiration of yeast.

..... [1]

(b) Describe **three** ways that aerobic respiration is different from anaerobic respiration in humans.

1

2

3

[3]

(c) Respiration is one of the characteristics of living organisms.

State **one other** characteristic.

..... [1]

[Total: 9]

3 - (0973/42_Summer_2024_Q1)

(a) Fig. 1.1 is a diagram of a wind-pollinated flower.

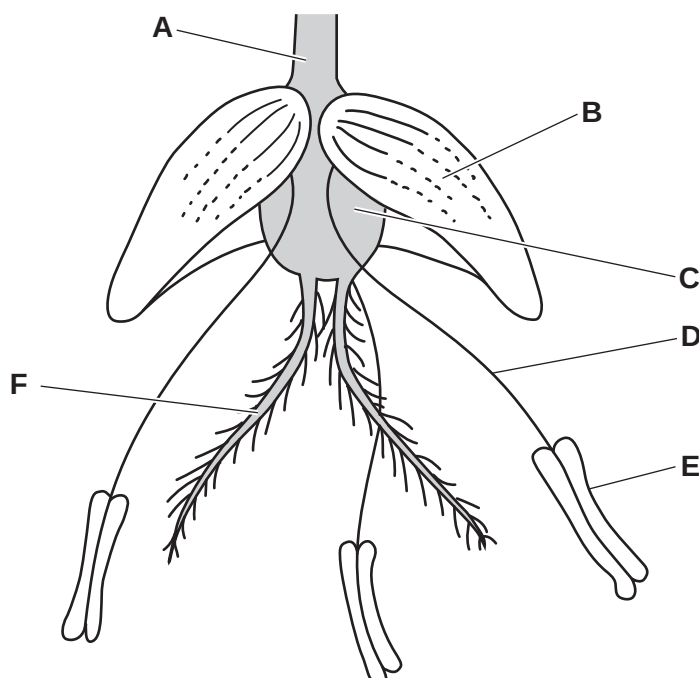


Fig. 1.1

(i) State which letter in Fig. 1.1 identifies the part where:

fertilisation occurs

pollen is produced.

[2]

(ii) Describe **two visible** pieces of evidence in Fig. 1.1 that show the flower is adapted for wind-pollination.

1

.....

2

.....

[2]

(b) Fig. 1.2 is a photomicrograph of pollen from an **insect**-pollinated flower.



Fig. 1.2

Describe **two** ways the appearance of pollen from a wind-pollinated flower is different from the pollen from an insect-pollinated flower.

1

2

[2]

(c) Some plants can reproduce asexually and sexually.

(i) State **two** advantages of sexual reproduction compared to asexual reproduction in plants.

1

2 [2]

(ii) Suggest a situation where asexual reproduction is more useful to a plant in the wild than sexual reproduction.

..... [1]

(d) Reproduction is one of the characteristics of living organisms.

State **two** other characteristics of living organisms.

1

2 [2]

[Total: 11]

1 - (0973/41_Summer_2020_Q10)

(a)(i)	phototropism ;	1
(a)(ii)	X drawn on the upper side of the shoot bend ;	1
(a)(iii)	auxin ;	1
(b)	auxin / hormone / chemical, produced at the shoot tip ;	1
(c)	magnesium ions required to make chlorophyll ; chlorophyll absorbs light energy (and converts this to chemical energy) ; (chemical) energy used to synthesise, carbohydrates or glucose / carbohydrates or glucose are used to make proteins (for growth) ;	3
(d)(i)	permanent ; mass ;	2
(d)(ii)	any two from: movement reproduction sensitivity excretion nutrition respiration ;;	2

2 - (0973/41_Winter_2023_Q4)

(a)(i)	C ;	1
(a)(ii)	evidence of unit conversion / (2 hours =) 120 minutes ; 0.075 (cm ³ /min) ;	2
(a)(iii)	carbon dioxide ;	1
(a)(iv)	bread making / named practical use of anaerobic respiration by yeast ;	1
(b)	<i>any three from:</i> requires oxygen ; (releases) more energy (per glucose molecule) ; produces carbon dioxide ; produces water ; does not produce lactic acid ;	3
(c)	<i>any one from:</i> movement ; sensitivity ; growth ; reproduction ; excretion ; nutrition ;	1

3 - (0973/42_Summer_2024_Q1)

(a)(i)	C ; E ;	2
(a)(ii)	<i>any two from:</i> feathery stigma ; small / no, petals ; anther hangs outside (the, flower / petals) ; stigma hangs outside (the, flower / petals) ;	2
(b)	smooth(er) / not spiky ; small(er) ;	2
(c)(i)	<i>any two from:</i> genetic diversity ; disease unlikely to wipe out all the plants ; able to adapt to <u>changes</u> in the environment ; allows, natural selection / evolution / adaptation ;	2
(c)(ii)	when the plant becomes isolated (from other plants) / when there is a shortage of pollinators / lack of other plants ;	1
(d)	<i>any two from:</i> movement ; respiration ; sensitivity ; growth ; excretion ; nutrition ;	2

1 - (0973/41_Summer_2020_Q7)

(a) Fig. 7.1 is a diagram of a fetus inside a uterus.

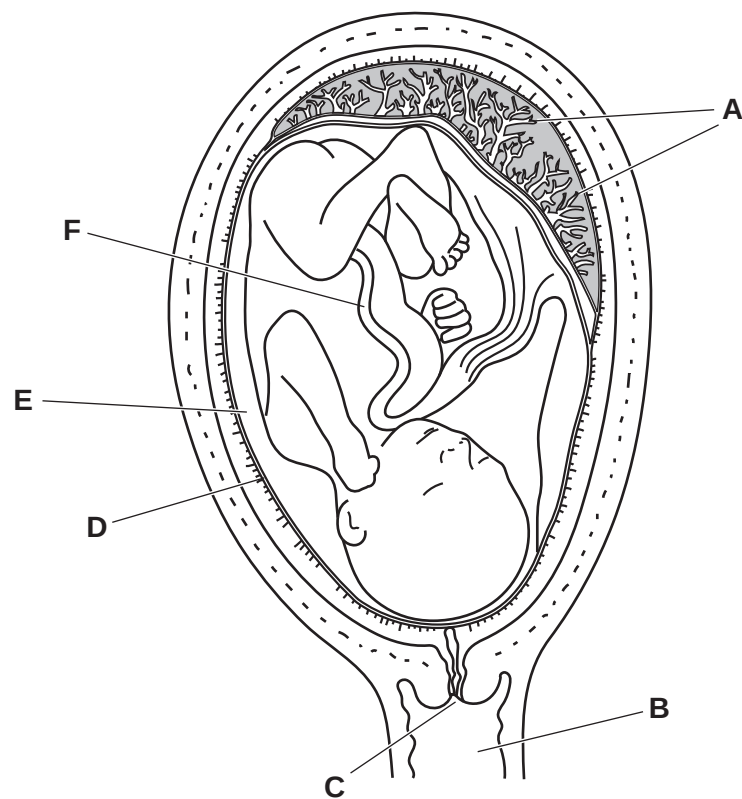


Fig. 7.1

Table 7.1 shows the functions of some parts shown in Fig. 7.1.

Table 7.1

name of part	letter in Fig. 7.1	function
	F	carries nutrient rich blood to fetus
		contains amniotic fluid
amniotic fluid		protects baby from mechanical damage
		site of exchange between the blood of the fetus and the mother

(i) Complete Table 7.1. [4]

(ii) Name **one** gas that is transferred from the blood of the fetus to the mother's blood.

..... [1]

(b) Pregnancy can occur after fertilisation.

(i) Name the **two** types of gametes involved in fertilisation in humans.

..... [1]

(ii) Name the process that is involved in the production of gametes.

..... [1]

(iii) Describe two differences between the nuclei in gametes and those in body cells.

1

.....

2

.....

[2]

[Total: 9]

2 - (0973/41_Winter_2020_Q4)

(a) A student investigates what effect immersing grapes in distilled water and concentrated salt solution has on the mass of the grapes.

The student measures the mass of a grape before and after immersion.

The results are shown in Table 4.1.

Table 4.1

	mass before immersion/g	mass after immersion/g	percentage change in mass
distilled water	5.0	5.1	+2.0
concentrated salt solution	5.1	4.8	−5.9

Explain why the grape placed in distilled water increased in mass.

..... [3]

(b) The student repeated the investigation by immersing a grape in 100% pure grape juice.

This time there was **no** change in mass.

Suggest why there was no change in mass.

..... [1]

- (c) Fig. 4.1 shows diagrams of plant cells that have been immersed in different concentrations of solutions.

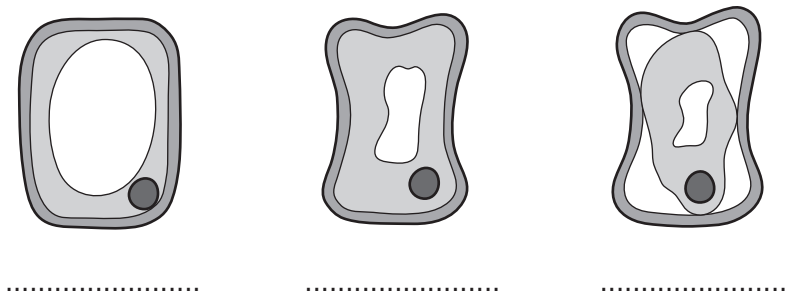


Fig. 4.1

Each cell can be described using one of these words:

- flaccid
- plasmolysed
- turgid.

Write on the lines underneath each cell in Fig. 4.1, the correct word to describe the cell. [1]

- (d) State **two** structures in plant cells that are **not** found in animal cells.

1

2 [2]

[Total: 7]

3 - (0973/42_Summer_2021_Q1)

- (a) Some plant cells are immersed in a **concentrated** salt solution.

Fig. 1.1 is a photomicrograph showing the appearance of the cells.

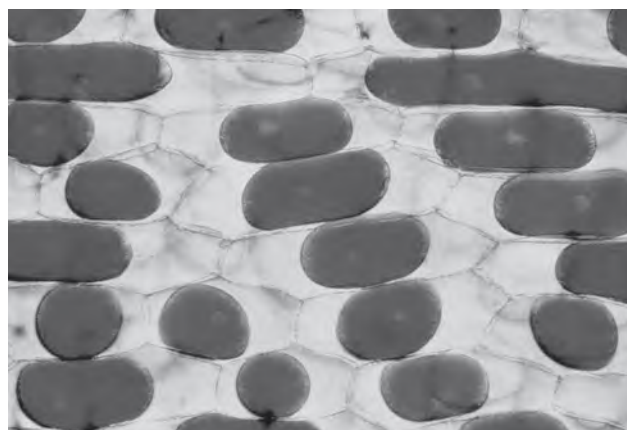


Fig. 1.1

Complete the sentences using words or phrases from the list to explain the appearance of the cells in Fig. 1.1.

Each word or phrase may be used once, more than once or not at all.

active transport

a higher

a lower

osmosis

plasmolysis

the same

turgor

The solution outside the cell has water potential than the cells.

Water diffuses across the cell membrane by from high water potential to low water potential.

This reduces the pressure of the cells.

The cytoplasm is pulled away from the cell wall.

This is called

[4]

(b) Fig. 1.2 shows two specialised plant cells.

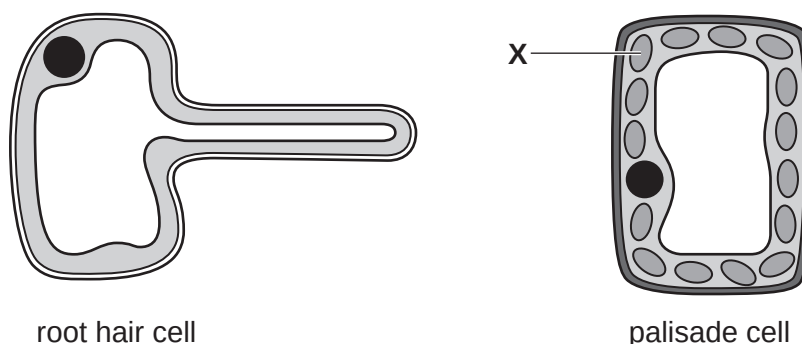


Fig. 1.2

(i) Name the cell structure labelled **X** in Fig. 1.2.

..... [1]

(ii) Explain why cell structure **X** is **not** needed in root hair cells.

..... [2]

(iii) Use Fig. 1.2 to identify two cell structures found in root hair cells but **not** in animal cells.

1

2

[2]

(c) Fig. 1.3 is a photomicrograph of a type of specialised animal cell.

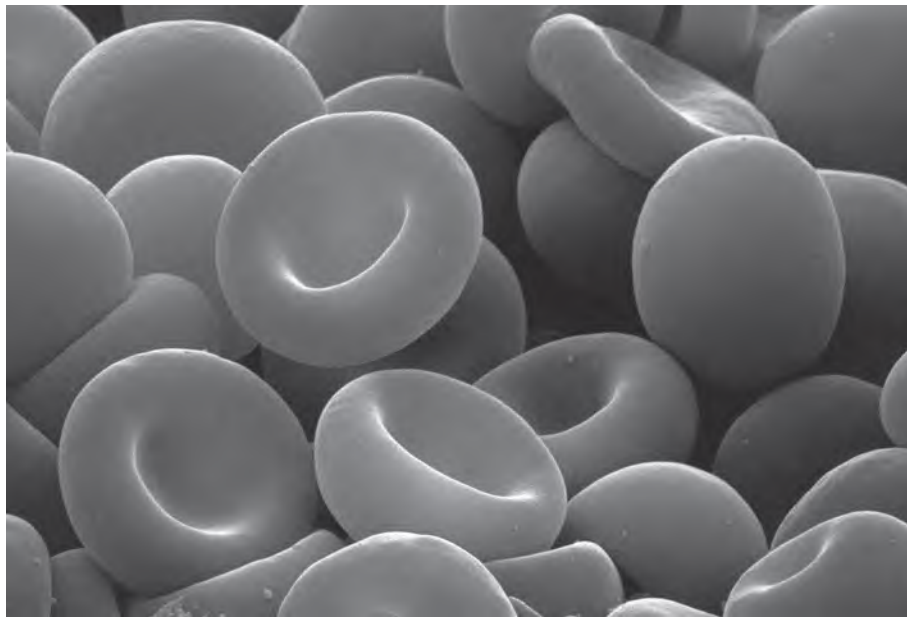


Fig. 1.3

(i) Name the cells shown in Fig. 1.3.

..... [1]

(ii) Describe two ways the cells shown in Fig. 1.3 are adapted for their function.

1

2 [2]

[Total: 12]

4 - (0973/42_Summer_2021_Q7)

Different species have different numbers of chromosomes in their cells.

(a) State where chromosomes are found in cells.

..... [1]

(b) State the female and male sex chromosomes in humans.

female

male

[1]

- (c) State the number of chromosomes in each human body cell.

.....

[1]

- (d) Table 7.1 shows the number of chromosomes found in each body cell of four different organisms.

Table 7.1

organism	number of chromosomes
goldfish	94
potato	48
pea	14
fruit fly	8

- (i) State the number of chromosomes in each body cell of a goldfish.

.....

[1]

- (ii) State the number of chromosomes in one gamete of a fruit fly.

.....

[1]

- (e) A mutation is a change in a chromosome.

State one factor that increases the rate of mutation in cells.

.....

[1]

- (f) State two roles of mitosis in the body.

1

2

[2]

- (g) The list shows some statements about meiosis.

Place ticks (✓) in the boxes next to **all** the correct statements.

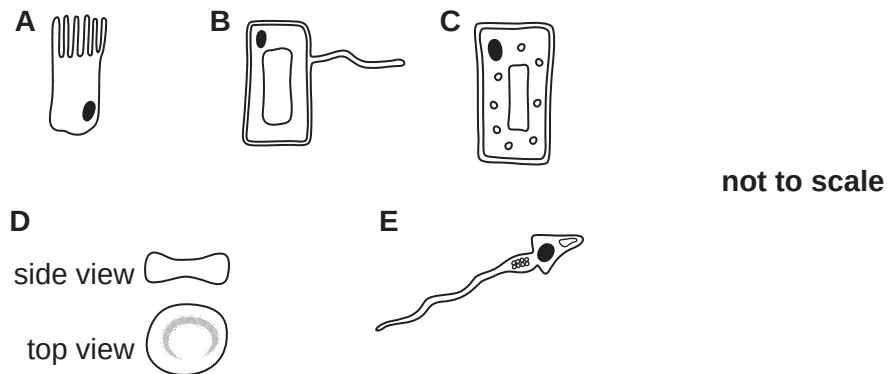
Meiosis produces genetically identical cells.	
Meiosis produces sperm in humans.	
Meiosis is a type of cell division.	
Meiosis results in the production of diploid cells.	
Meiosis only occurs when there is a mutation in cells.	

[2]

[Total: 10]

5 - (0973/41_Summer_2022_Q1)

(a) Fig. 1.1 shows some specialised cells.

**Fig. 1.1**(i) Identify the names of the cells labelled **B** and **E** in Fig. 1.1.

B

E [2]

(ii) Explain how the structure of cell **A** is related to its function.

..... [2]

(iii) Describe two ways in which cell **D** is adapted for transporting oxygen.

1

2 [2]

(b) Cell **D** is one of the main components of blood.

State two other main components of blood.

1

2 [2]

(c) Blood vessels are adapted to their function.

(i) Explain why arteries have a thick elastic wall.

..... [1]

- (ii) Explain why veins have valves.

..... [1]

- (iii) Explain why capillaries have very thin walls.

..... [1]

[Total: 11]

6 - (0973/41_Summer_2022_Q4)

- (a) Tay-Sachs disease is a genetic disorder that destroys nerve cells in the brain and spinal cord.

The allele for Tay-Sachs disease is recessive **t**.

The allele for unaffected by Tay-Sachs disease is dominant **T**.

Fig. 4.1 is a pedigree diagram showing the inheritance of Tay-Sachs disease.

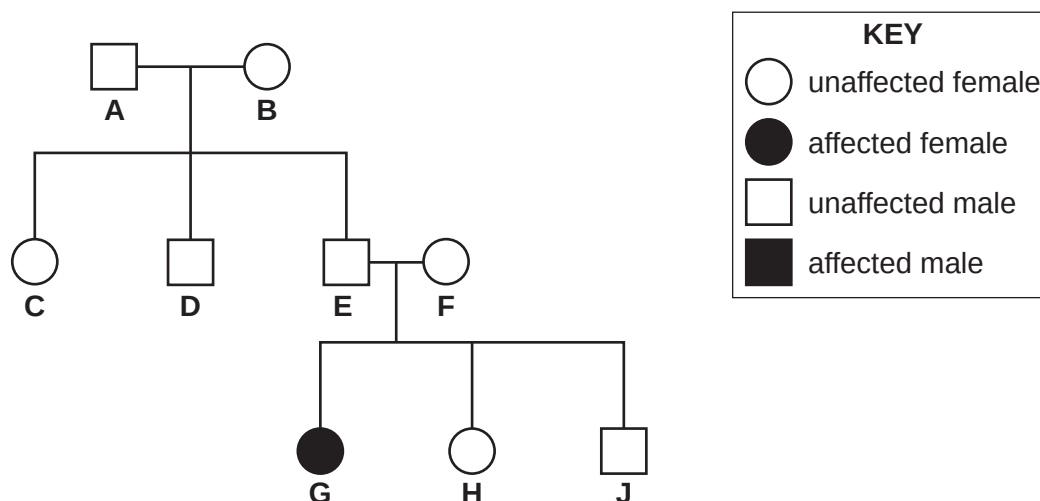


Fig. 4.1

- (i) State the number of males in Fig. 4.1 that are **unaffected** by Tay-Sachs disease.

..... [1]

- (ii) Complete the sentences to explain the genotypes of some of the people in Fig. 4.1.

Person **E** and person **F** are by Tay-Sachs disease.

Person **E** and person **F** both have the genotype

Person **G** has Tay-Sachs disease. They have the genotype

Person **G** will have inherited one allele from each parent.

[4]

- (iii) State the probability of two parents with the genotypes **TT** having a child with Tay-Sachs disease.

..... [1]

- (b) Growth of offspring involves mitosis.

The box on the left contains the term mitosis.

The boxes on the right contain some sentence endings.

Draw **three** lines from the word mitosis to the boxes on the right to make **three** correct sentences about mitosis.

Mitosis

occurs after exact duplication of chromosomes.

is involved in the production of gametes.

is reduction division.

produces cells with diploid nuclei.

produces nuclei with paired chromosomes.

produces genetically different cells.

[3]

- (c) State the number of chromosomes in a human diploid cell.

..... [1]

- (d) State the term given to a change in a gene or chromosome.

..... [1]

[Total: 11]

7 - (0973/41_Winter_2022_Q1)

(a) Fig. 1.1 is a diagram of the male reproductive system in humans.

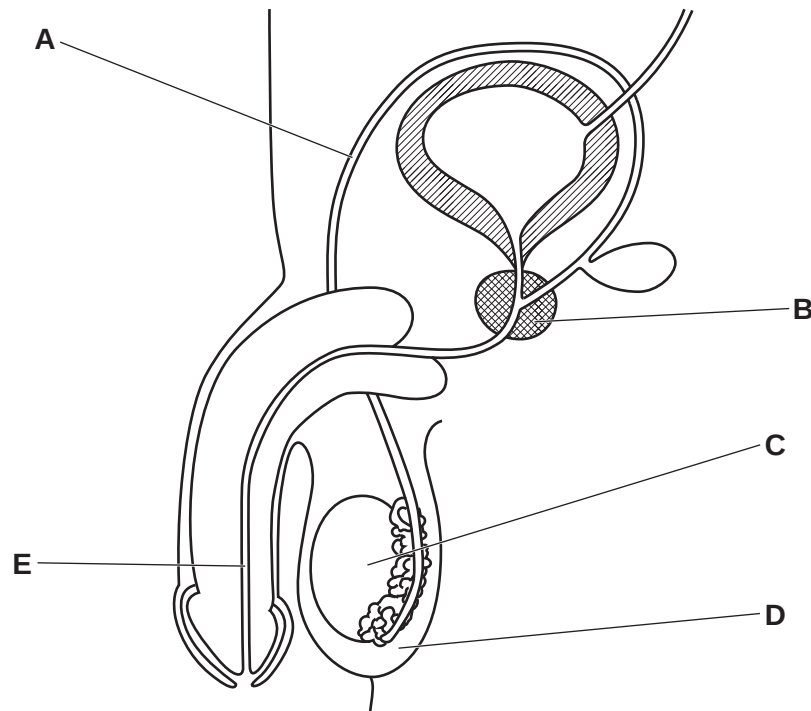


Fig. 1.1

State the letter from Fig. 1.1 that represents the part:

where meiosis occurs

which secretes fluid for sperm to swim in

which carries urine

which produces sperm.

[4]

(b) Fig. 1.2 is a drawing of a sperm cell.

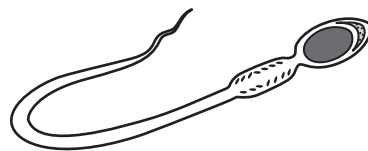


Fig. 1.2

Label Fig. 1.2 to identify **two** features of sperm that adapt it for reproduction.

[2]

- (c) Describe the difference between the arrangement of chromosomes found in the nuclei of sperm and those in a zygote.

.....
..... [1]

- (d) Sperm and egg cells are specialised for their function of reproduction.

The boxes on the left show some other specialised cells.

The boxes on the right show some functions.

Draw lines to link each specialised cell with its function.

	absorption
ciliated	
	movement of mucus
palisade mesophyll	
	photosynthesis
root hair	
	transport of oxygen

[3]

[Total: 10]

8 - (0973/41_Winter_2022_Q10)

(a) Fig. 10.1 is a diagram of a cross-section through skin.

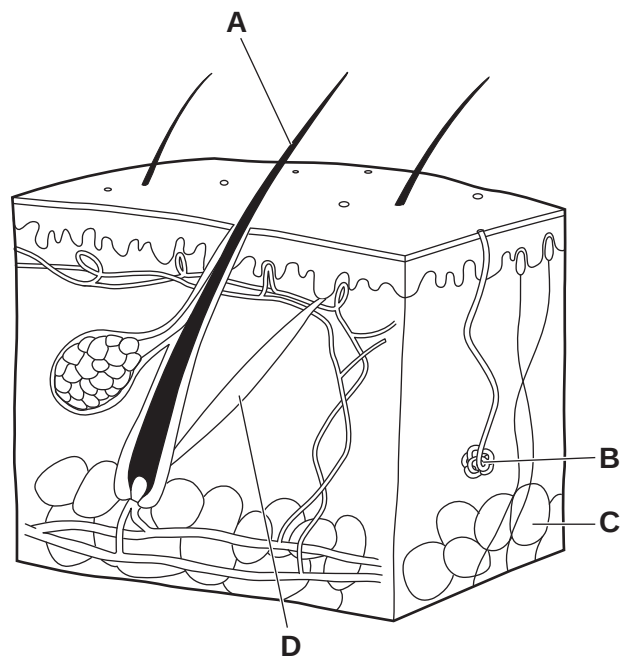


Fig. 10.1

Table 10.1 shows the names and functions of some of the parts labelled **A–D** in Fig. 10.1.

Complete Table 10.1.

Table 10.1

name of part	letter in Fig. 10.1	function
		provide insulation
hair erector muscle		
	B	

[3]

(b) Describe the role of **arterioles** in reducing body temperature when the body gets too hot.

..... [3]

(c) The control of internal body temperature is an example of negative feedback.

(i) Explain what is meant by the term negative feedback.

..... [2]

(ii) State **one** other example of negative feedback.

..... [1]

[Total: 9]

9 - (0973/41_Summer_2023_Q10)

Fig. 10.1 shows two red blood cells after they have been immersed in different solutions for an hour.

Cell **A** was immersed in a concentrated salt solution.

Cell **B** was immersed in blood plasma.

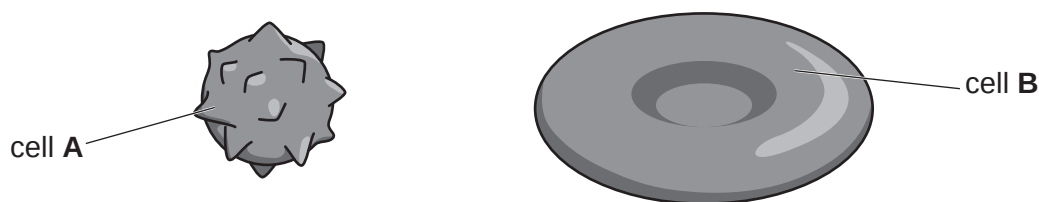


Fig. 10.1

(a) Complete the sentences to explain the appearance of cell **A** in Fig. 10.1.

The concentrated salt solution has a lower than cell **A**.

Water crosses the and leaves the cell by osmosis.

Water molecules move from a more solution to a more solution.

[3]

(b) Immersion of cell **A** in concentrated salt solution changes the shape of the cell.

Suggest how this change in shape affects the function of red blood cells in the body.

..... [2]

(c) Concentration gradients affect the rate of osmosis.

Suggest two other factors that affect the rate of osmosis.

1

2

[2]

(d) Plant cells have additional cell structures that are not present in animal cells.

(i) State the names of two cell structures present in plant cells but **not** in animal cells.

1

2

[2]

(ii) State the name of the type of plant cell that is specialised for absorption of water.

..... [1]

[Total: 10]

10 - (0973/41_Summer_2025_Q2)

Fig. 2.1 is a diagram of the human heart and the blood vessels that connect with it.

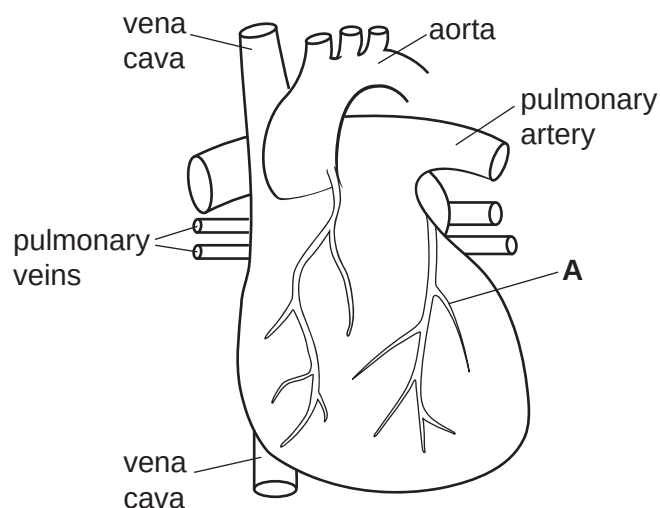


Fig. 2.1

(a) Describe **two** differences between the pulmonary artery and the vena cava.

1

2

[2]

(b) Describe how blood is moved through the heart from the pulmonary veins to the aorta.

Include the names of the chambers.

..... [4]

(c) A patient has a problem with his heart.

(i) The doctor takes the patient's pulse rate.

State **one** other way doctors monitor the activity of the heart.

..... [1]

(ii) The doctor thinks the blood vessel labelled **A** in Fig. 2.1 is blocked.

Explain why this causes a problem with the function of the heart.

Include the name of blood vessel **A** in your answer.

..... [3]

[Total: 10]

11 - (0973/41_Summer_2025_Q3)

Fig. 3.1 is a magnified image of a plant root tip viewed using a light microscope.

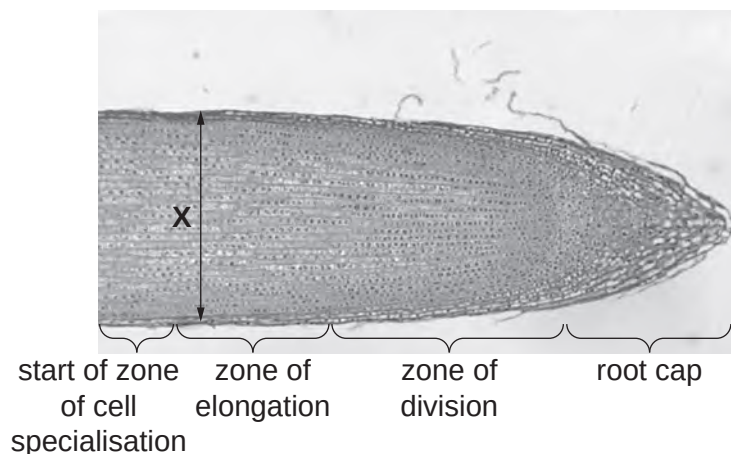


Fig. 3.1

(a) At **X** in Fig. 3.1, there are 37 cells across the width of the root tip.

The actual width of the root tip at **X** is 1.2 mm.

Calculate the average size of the cells in the root tip in μm .

..... μm [2]

(b) Fig. 3.1 shows a zone in the root tip where cells become specialised.

Tick (✓) **one** box to identify a type of specialised cell made in the root.

ciliated cells

☐

guard cells

☐

palisade mesophyll cells

☐

phloem cells

☐

[1]

(c) Fig. 3.1 shows a zone in the root tip where cells divide so the root can grow.

(i) State the type of cell division needed for growth.

..... [1]

(ii) During this type of cell division, the number of chromosomes is maintained in each daughter cell.

Describe **two** processes in cell division that ensure that the chromosome number is maintained.

1

2

[2]

(d) A different type of cell division takes place in the ovary and anther of flowers to make gametes.

(i) Fig. 3.2 is a diagram of a wind-pollinated flower.

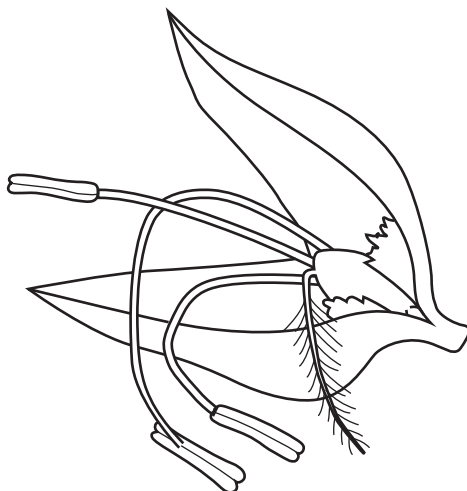


Fig. 3.2

On Fig. 3.2, draw a label line and the letter **A** to identify **one** anther.

[1]

- (ii) The anthers produce male gametes.

Complete the sentences about male gametes in plants.

Male gametes in plants are called grains.

During production of male gametes, the chromosome number is halved from to haploid.

Male gametes produced are all genetically

A nucleus of a male gamete will fuse with the nucleus of an ovule. This process is called

[4]

- (iii) Describe **one** advantage of sexual reproduction to a population of plants in the wild.

..... [1]

[Total: 12]

12 - (0973/42_Summer_2025_Q1)

Fig. 1.1 is a diagram of a root hair cell.

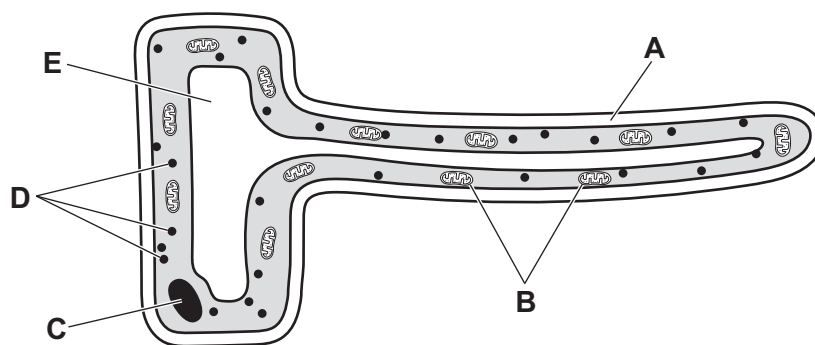


Fig. 1.1

- (a) Using letters **A – E** in Fig. 1.1, identify the part of the cell:

where protein synthesis takes place

made from cellulose.

[2]

- (b) Amino acids are used in protein synthesis.

State the name of the process used to transport amino acids from sources to sinks in plants.

..... [1]

- (c) Root hair cells are specialised for absorption.

Complete Table 1.1 about substances absorbed by root hair cells.

Table 1.1

substance	method of absorption	one use of substance in plant
water		
nitrate ions		

[2]

- (d) Fig. 1.2 shows two of the same plant cells, one immersed in pure water (water with no chemical impurities) and the other immersed in concentrated salt solution.

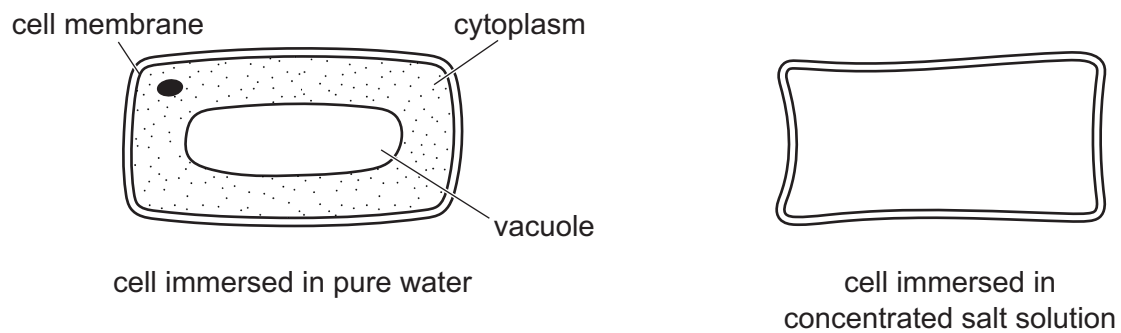


Fig. 1.2

Complete Fig. 1.2 to show the contents of the plant cell immersed in the concentrated salt solution. [2]

- (e) Explain the effects of high winds on transpiration rate in plants.

..... [3]

[Total: 10]

13 - (0973/42_Summer_2025_Q2)

Fig. 2.1 is a diagram of the human breathing system.

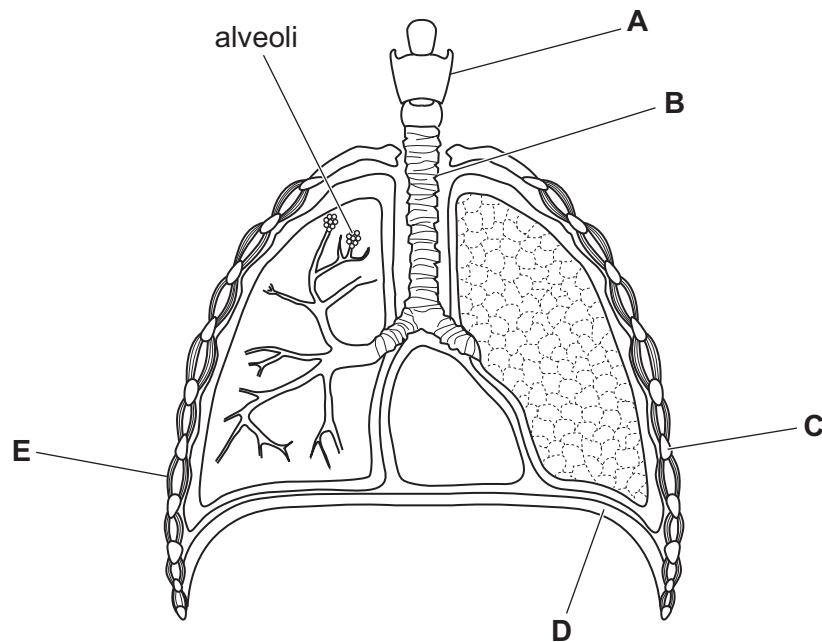


Fig. 2.1

(a) Using letters **A – E** in Fig. 2.1, identify the:

trachea

diaphragm.

[2]

(b) Alveoli are the gas exchange surface in humans.

Describe **two** features of an efficient gas exchange surface.

1

2

[2]

(c) Table 2.1 shows the composition of inspired and expired air.

Table 2.1

gas	composition / %		
	inspired air	expired air	difference
oxygen	21.00	16.00	–5.00
carbon dioxide	0.04	4.00	
water vapour	low	high	increased

- (i) Calculate the difference in composition of the carbon dioxide in Table 2.1.

Write your answer in Table 2.1.

[1]

- (ii) Explain the differences in composition between inspired and expired air.

..... [3]

- (d) A student runs very fast for 20 minutes.

The rate and depth of breathing increases during exercise and stays high after the student has finished running.

Explain why the rate and depth of breathing **stays high** after the student has finished running.

..... [4]

[Total: 12]

14 - (0973/42_Summer_2025_Q3)

- (a) Table 3.1 shows the diameter of a flu virus and different types of cells.

Table 3.1

	diameter/ μm
flu virus	0.1
bacterial cell	1.0
red blood cell	7.0
lymphocyte	15.0
plant cell	50.0
human egg cell	120.0

- (i) Calculate the difference in size between the largest and smallest **animal** cells in Table 3.1.

..... μm [2]

- (ii) State the name of the cell in Table 3.1 that contains haemoglobin.

..... [1]

- (b)** Complete the sentences about an immune response to a flu virus infection.

Use words from the list.

active	antibodies	enzymes	
lymphocytes	passive	pathogens	phagocytes

The flu virus has antigens on its surface. Proteins with a specific shape bind to antigens.

These proteins are called

This causes the virus to be destroyed or marked for engulfing by

.....

After the infection, a human has immunity to the flu virus.

[3]

- (c)** Flu vaccinations are used each year to protect people from flu virus infection.

Outline how this vaccine gives protection.

..... [3]

- (d)** The flu virus reproduces quickly and often mutates.

Suggest why a new vaccine is developed every year.

..... [2]

[Total: 11]

1 - (0973/41_Summer_2020_Q7)

(a)(i)	name of part	letter in Fig. 7.1	function	4
	umbilical cord	F	attaches growing baby to placenta	
	amnion / amniotic sac	D	contains amniotic fluid	
	amniotic fluid	E	protects baby from mechanical damage	
	placenta	A	site of exchange between the blood of the fetus and mother	
;;; 1 mark for each row				
(a)(ii)	carbon dioxide ;			1
(b)(i)	sperm and eggs ;			1
(b)(ii)	meiosis ;			1
(b)(iii)	gametes have haploid nuclei / body cells have diploid nuclei ; gametes have unpaired chromosomes / body cells have paired chromosomes ; gametes have 23 chromosomes / body cells have 46 or 23 pairs ;			max 2

2 - (0973/41_Winter_2020_Q4)

(a)	ref to osmosis ; water moves into the grape ; distilled water has a <u>higher</u> water potential / (water moves) from a high to low water potential / down a water potential gradient ;	3
(b)	the <u>water potential</u> was the same ;	1
(c)	<i>from left to right</i> turgid, flaccid, plasmolysed ;	1
(d)	<i>any two from</i> cell wall ; chloroplast ; (permanent) vacuole ;	2

3 - (0973/42_Summer_2021_Q1)

(a)	a lower ; osmosis ; turgor ; plasmolysis ;	4
(b)(i)	chloroplast ;	1
(b)(ii)	<i>any two from:</i> root hair cells absorb, water / mineral ions ; root hair cells, are underground / do not receive light ; correct reference to <u>photosynthesis</u> ;	2
(b)(iii)	vacuole ; cell wall ;	2

(c)(i)	red blood cells ;	1
(c)(ii)	<i>any two from:</i> contain haemoglobin ; no nucleus ; biconcave shape / large surface area ; AVP ;	2

4 - (0973/42_Summer_2021_Q7)

(a)	<u>nucleus</u> ;	1
(b)	(female) XX (male) XY ;	1
(c)	46/ 23 pairs ;	1
(d)(i)	94 ;	1
(d)(ii)	4 ;	1
(e)	(named) <u>ionising</u> radiation / chemicals ;	1
(f)	<i>any two from:</i> asexual reproduction ; growth ; repair of damaged tissues ; replacement of cells ;	2
(g)	meiosis produces sperm in humans ticked ; meiosis is a type of cell division ;	2

5 - (0973/41_Summer_2022_Q1)

(a)(i)	B – root hair (cell) ; E – sperm (cell) ;	2
(a)(ii)	presence of <u>cilia</u> ; to remove mucus (from the, trachea / bronchi / gas exchange system) ;	2
(a)(iii)	<i>any two from:</i> biconcave shape ; contain haemoglobin ; no nucleus ;	2
(b)	<i>any two from:</i> white blood cells ; platelets ; plasma ;	2
(c)(i)	to prevent bursting / withstand high pressure (of blood) ;	1
(c)(ii)	to prevent backflow of blood ;	1
(c)(iii)	so there is a short diffusion distance / AW ;	1

6 - (0973/41_Summer_2022_Q4)

(a)(i)	4 ;	1
(a)(ii)	unaffected ; Tt ; tt ; recessive ;	4
(a)(iii)	0(%) ;	1

(b)	<i>Mitosis joined to:</i> occurs after exact duplication of chromosomes ; produces cells with diploid nuclei ; produces nuclei with paired chromosomes ;	3
(c)	46 / 23 pairs ;	1
(d)	mutation ;	1

7 - (0973/41_Winter_2022_Q1)

(a)	C ; B ; E ; C ;	4
(b)	<i>any two from:</i> flagellum labelled ; <u>haploid</u> nucleus labelled ; enzymes labelled ; AVP ;	2
(c)	1 from: sperm: unpaired chromosomes / single set of chromosomes ; zygote: paired chromosomes / 2 sets of chromosomes ;	1
(d)		3

8 - (0973/41_Winter_2022_Q10)

(a)		name of part	letter in Fig. 10.1	function	3
		fatty tissue / fat	C	provide insulation	
		hair erector muscle	D	(contract to) raise hair	
		sweat gland	B	produce sweat	
					;;;
(b)	ref to <u>vasodilation</u> / arterioles widen / dilate ; increase in blood flow to, skin surface / capillaries ; (more) heat loss from skin (by radiation) ;				3
(c)(i)	ref to a, set point / normal level ; any change results in an opposing action / AW ;				2
(c)(ii)	control of blood glucose concentration / AVP ;				1

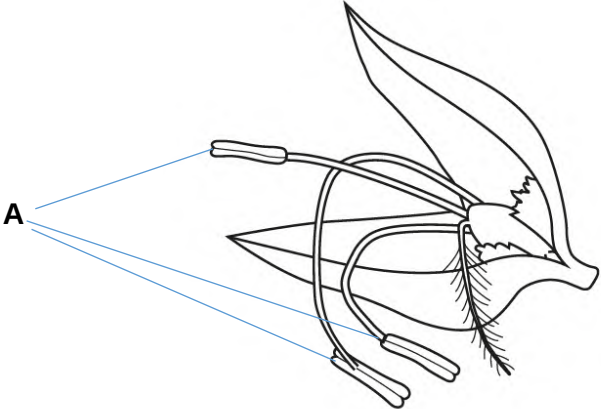
9 - (0973/41_Summer_2023_Q10)

(a)	water potential ; (cell) membrane ; dilute, concentrated ;	3
(b)	<i>any two from:</i> less, surface area / (internal) volume ; so less oxygen transported ; AVP ;	2
(c)	<i>any two from:</i> surface area ; temperature ; diffusion distance/thickness of cell membrane ;	2
(d)(i)	<i>any two from:</i> chloroplast ; (permanent) vacuole ; cell wall ;	2
(d)(ii)	root hair (cell) ;	1

10 - (0973/41_Summer_2025_Q2)

(a)	any two from: (pulmonary artery) carries blood away from heart (to lungs), vena cava carries blood to heart {from body}; (pulmonary artery) has a thicker <u>er</u> wall / more elastic wall ; (pulmonary artery) has blood at higher <u>er</u> pressure ; (pulmonary artery) has a narrower <u>er</u> lumen ;	2
(b)	any four from: (blood flows from pulmonary vein) into <u>left</u> atrium ; left atrium/muscles <u>contract</u> pushing blood ; (atrium) through valve to (left) ventricle ; (muscles of) ventricle <u>contracts</u> pushing blood (into the aorta) ; valves (shut) to prevent backflow of blood ;	4
(c)(i)	ECG / listening to sounds of valves closing ;	1
(c)(ii)	coronary artery ; any two from: less / no, supply of, oxygen / oxygenated blood (to heart); less / no, respiration ; less / no, energy for muscle contraction ;	3

11 - (0973/41_Summer_2025_Q3)

(a)	1.2 / 37 or 0.0324 ; 32.4 (μm) ;	2
(b)	phloem cells ;	1
(c)(i)	mitosis ;	1
(c)(ii)	any two from: replication (of, DNA / chromosomes) ; separation of chromosomes (into two identical sets) ; cells only divide once / splits into two daughter cells;	2
(d)(i)	 correct labelling of any one anther = 1 mark ;	1

(d)(ii)	pollen ; diploid ; different ; fertilisation ;	4
(d)(iii)	any one from: produces (genetic) variation ; able to adapt to change in environment ; spreads offspring through dispersal of pollen / seeds ;	1

12 - (0973/42_Summer_2025_Q1)

(a)	D ; A ;	2									
(b)	translocation ;	1									
(c)	<table border="1"> <thead> <tr> <th>substance</th><th>method of absorption</th><th>use in plant</th></tr> </thead> <tbody> <tr> <td>water</td><td>osmosis</td><td>support / photosynthesis / prevent wilting</td></tr> <tr> <td>nitrate ions</td><td>active transport</td><td>(making) amino acids</td></tr> </tbody> </table> ; ;	substance	method of absorption	use in plant	water	osmosis	support / photosynthesis / prevent wilting	nitrate ions	active transport	(making) amino acids	2
substance	method of absorption	use in plant									
water	osmosis	support / photosynthesis / prevent wilting									
nitrate ions	active transport	(making) amino acids									
(d)	cell membrane plasmolysed ; smaller vacuole ;	2									

(e)	any three from: increases transpiration rate ; wind blows water (vapour) away from leaf (surface) ; increases concentration gradient (from inside the leaf to the air) ; increases (rate of) / faster, evaporation / diffusion ;	3
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13 - (0973/42_Summer_2025_Q2)

(a)	B ; D ;	2
(b)	any two from: large surface area ; thin (surface / membrane / wall) ; good blood supply ; good ventilation (with air) ; AVP ;;	2
(c)(i)	3.96 ;	1
(c)(ii)	oxygen used in (aerobic) respiration ; carbon dioxide produced in (aerobic) respiration ; water <u>evaporates</u> from, alveoli / cells ;	3

(d)	<i>any four from:</i> <i>ref to anaerobic respiration (in muscles) ;</i> <i>production / build up, of lactic acid ;</i> <i>ref to oxygen debt ;</i> <i>(extra) <u>oxygen</u> required to, break down / remove, lactic acid ;</i> <i>(lactic acid removed) by <u>aerobic</u> respiration in the liver ;</i>	4
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14 - (0973/42_Summer_2025_Q3)

(a)(i)	120.0 – 7.0 ; 113 μm ;	2
(a)(ii)	red blood cell ;	1
(b)	antibodies ; phagocytes ; active ;	3
(c)	<i>any three from:</i> <i>idea that weakened / dead, pathogens / virus OR antigens, given ;</i> <i><u>antigens</u> stimulate an <u>immune response</u> ;</i> <i>lymphocytes produce antibodies ;</i> <i>correct ref to memory cells / ref to long-term OR active, immunity ;</i> <i>idea of antibodies destroy, (flu) virus or (flu) pathogens in <u>future infections</u> ;</i>	3
(d)	ref to changes in (shape of) <u>antigen</u> (of flu virus) ; <i>idea of new antibodies are required (to match antigen) ;</i>	2

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