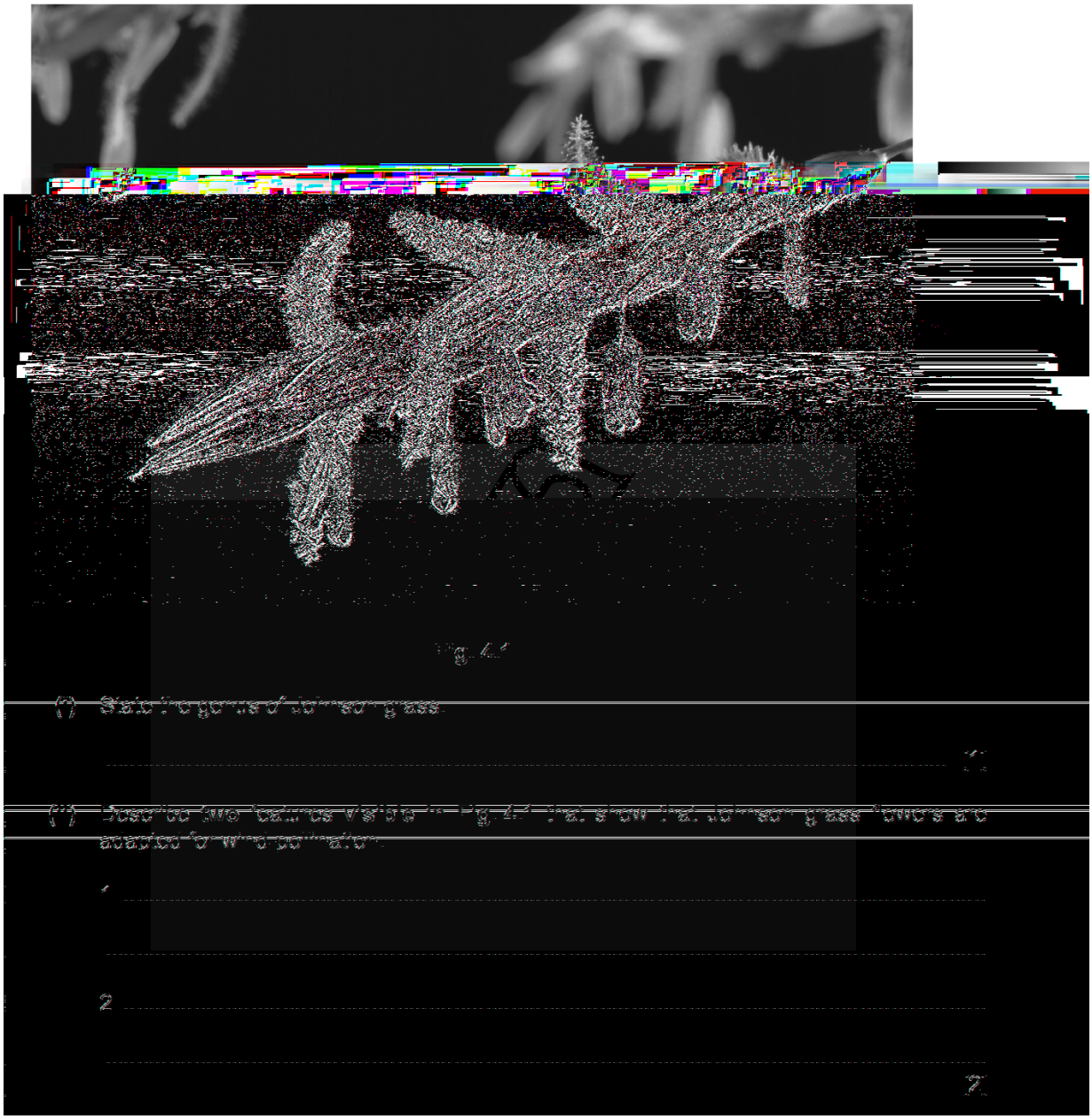
Chapter 16

Reproduction

01. 0610_s20_qp_41 Q: 4

Johnson grass, *Sorghum halepense*, is wind-pollinated.

(a) Fig. 4.1 shows some Johnson grass flowers.



(b) Fig. 4.2 shows a section through a carpel shortly after pollination.

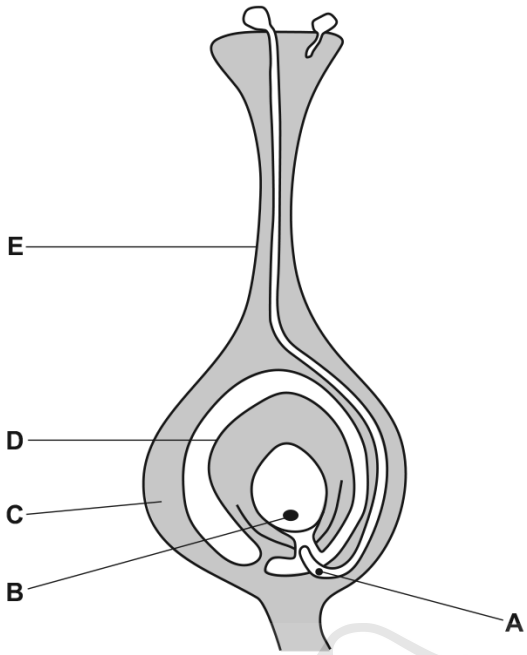


Fig. 4.2

(i) State the names of the parts of the carpel labelled **C**, **D** and **E**.

C .....

D .....

E .....

[3]

(ii) Complete the sentences:

Pollen grains are formed in anthers. During their formation the number of chromosomes in the nuclei is halved by the process of ..... . This means the male nucleus **A** in the pollen tube is described as a ..... nucleus. When nucleus **A** ..... with nucleus **B**, the chromosome number doubles to form a ..... nucleus. The name of this process is ..... . Then the ..... divides by the process of ..... to form an embryo.

[7]

(c) Discuss the advantages of sexual reproduction to a wild population of flowering plants such as Johnson grass.

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..... [5]

(d) Sexual reproduction requires energy.

State **three** uses of energy in organisms **other than in reproduction**.

1 .....

2 .....

3 .....

[3]

[Total: 21]

02. 0610_s19_qp_42 Q: 6

Fig. 6.1 shows some of the many different varieties of potato, *Solanum tuberosum*, that are cultivated across the world for food.

Fig. 6.1

All varieties of *S. tuberosum* are classified as the same species.

(a) Define the term *species*.

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.....

..... [2]

(b) Fig. 6.2 shows a method of reproduction that some potato farmers use to produce more potato plants.

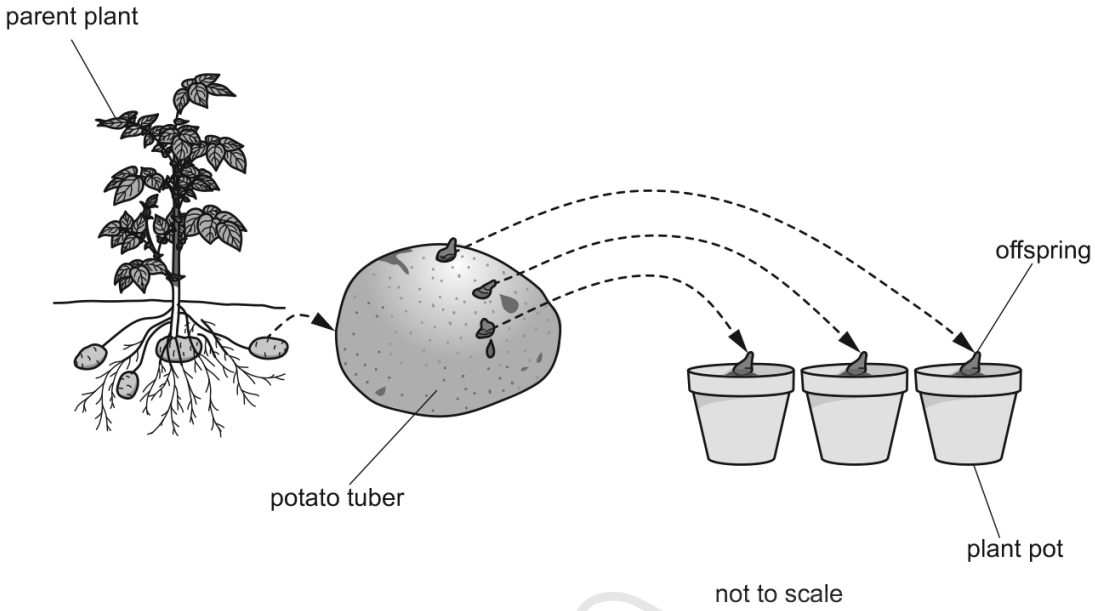

Fig. 6.2

Describe the advantages of the type of reproduction shown in Fig. 6.2 in crop production.

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..... [3]

(c) Potato tubers store starch.

Explain why plants store starch.

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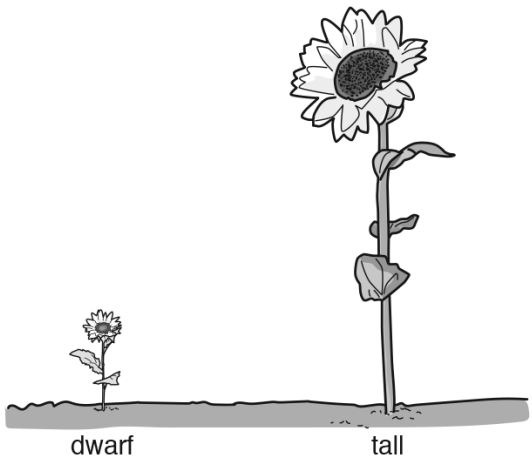
..... [2]

[Total: 7]

Fig. 2.1 shows a dwarf sunflower and a tall sunflower, *Helianthus annuus*. The height of the dwarf sunflower is 0.45 m and the height of the tall sunflower is 4.5 m.



not to scale

Fig. 2.1

Dwarf plants like the one in Fig. 2.1 have mutant alleles.

(a) Define the term *allele*.

.....

..... [1]

(b) Shoot growth in plants is controlled by auxins. An enzyme in shoot tips converts molecules of an amino acid into auxins as shown in Fig. 2.2.

amino acid $\xrightarrow{\text{enzyme}}$ auxin

Fig. 2.2

Explain how a mutation in DNA results in an abnormal enzyme which does **not** catalyse the reaction shown in Fig. 2.2.

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..... [3]

(c) Two tall sunflower plants were crossed. 25% of the offspring produced were dwarf.

Explain how it is possible for two tall parent plants to have this percentage of dwarf offspring.

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.....

..... [2]

(d) Fig. 2.3 shows how several strawberry plants can be formed from one parent plant.

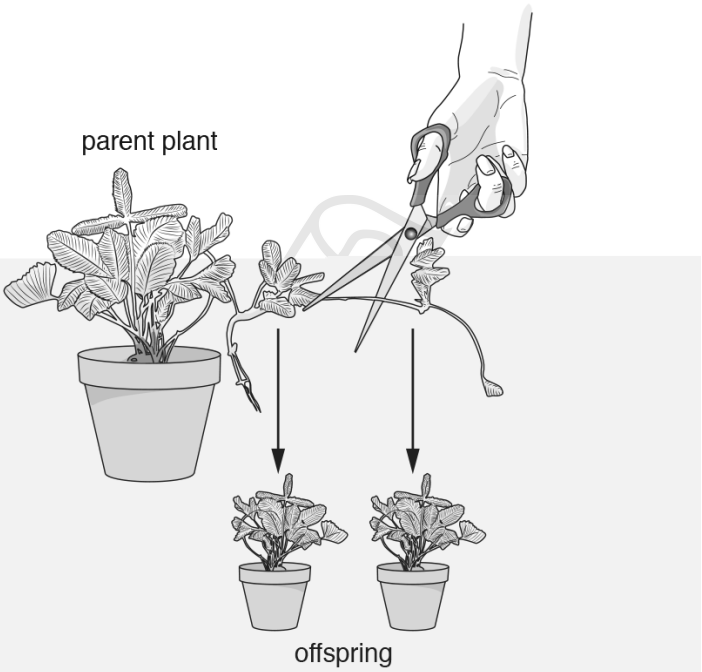

Fig. 2.3

(i) Explain the type of reproduction that produces plants by the method shown in Fig. 2.3.

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..... [3]

(ii) Explain the **disadvantages** of the type of reproduction shown in Fig. 2.3.

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..... [3]

[Total: 12]

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04. 0610_w16_qp_41 Q: 5

Fig. 5.1 is an image of a germinating seed showing the growing root.

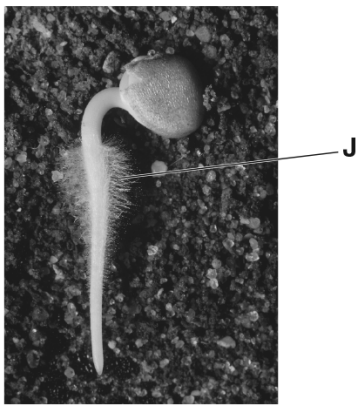

Fig. 5.1

(a) Describe **and** explain how the structures seen at **J** are adapted for their function.

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.....[5]

(b) (i) The root shown in Fig. 5.1 is growing downward into the soil.

Name this response seen in roots.

.....[1]

(ii) Name the chemical that controls this response.

.....[1]

(iii) There are situations, either in wild plants or in laboratory experiments, where roots do not grow downwards.

Suggest and explain **one** situation.

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.....

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.....[2]

[Total: 9]

05. 0610_s20_qp_43 Q: 1

(a) State **three** uses of energy in the human body.

1 .....

2 .....

3 .....

[3]

(b) Fig. 1.1 shows part of the digestive system of a human.

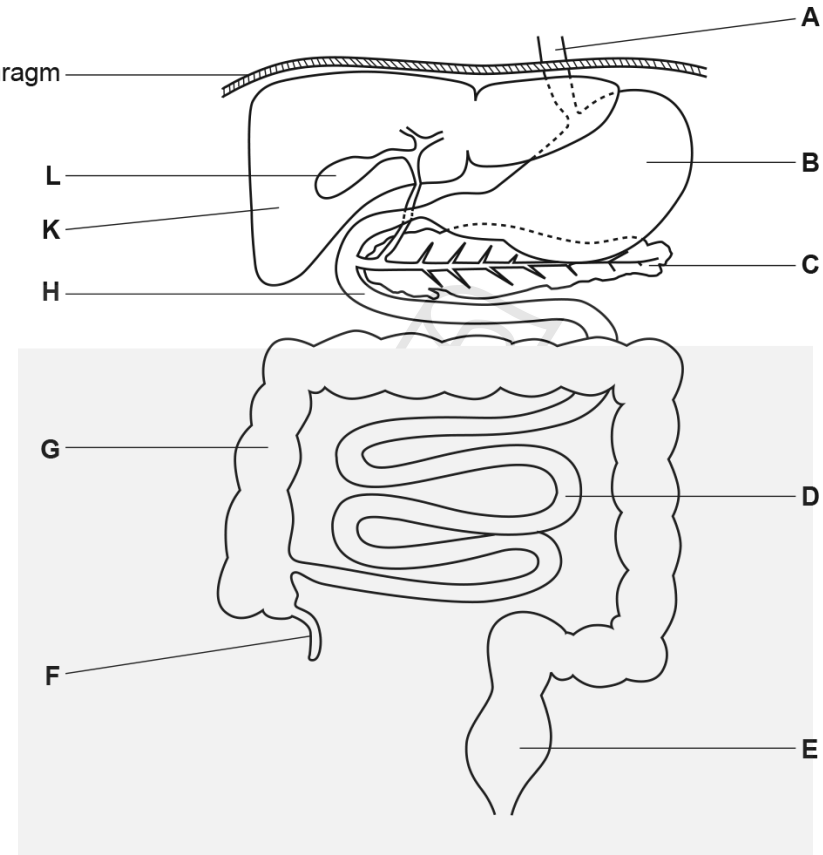

Fig. 1.1

Complete Table 1.1. One row has been done for you.

Table 1.1

function	name of structure	letter from Fig. 1.1
pushes food to the stomach	oesophagus	**A**
assimilation of amino acids to produce plasma proteins		
storage of bile		
secretion of insulin		
absorption of fatty acids and glycerol		
secretion of pepsin		
digestion of starch		

[6]

(c) Describe the role of the liver in the recovery from oxygen debt after strenuous exercise.

.....

.....

.....

.....

..... [2]

(d) Alcohol is a drug.

Define the term drug.

.....

.....

..... [2]

(e) **(i)** State **two** immediate effects of excessive alcohol on the body.

1 .....

2 .....
[2]

(ii) State **two** long-term effects of excessive alcohol on the body.

1 .....

2 .....
[2]

(f) Pregnant women are advised not to drink alcohol as it may have harmful effects on the fetus.

(i) Outline these harmful effects.

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.....

..... [2]

(ii) State **two** harmful substances **other than alcohol** that can cross the placenta.

1 .....

2 .....
[2]

[Total: 21]

06. 0610_s18_qp_41 Q: 6

(a) Fig. 6.1 is a diagram of the human female reproductive system.

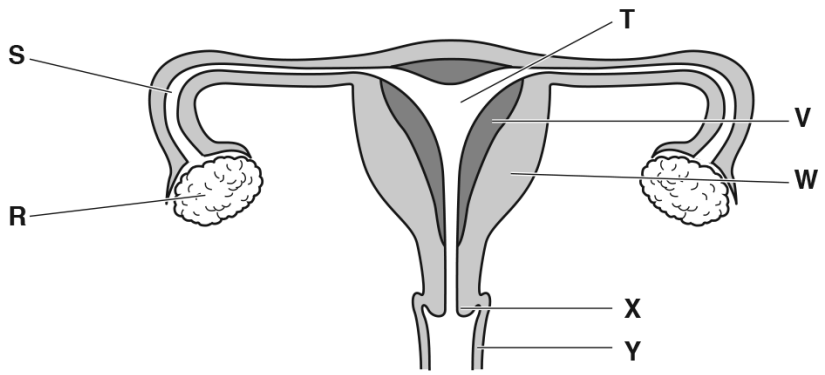

Fig. 6.1

(i) Complete Table 6.1 by stating the letter from Fig. 6.1 that identifies the structure where each process occurs.

Table 6.1

process	letter from Fig. 6.1
meiosis	
fertilisation	
implantation	

[3]

(ii) State the name of the part of the female reproductive system labelled **S** in Fig. 6.1.

..... [1]

(b) Fig. 6.2 is a diagram of a human sperm cell.

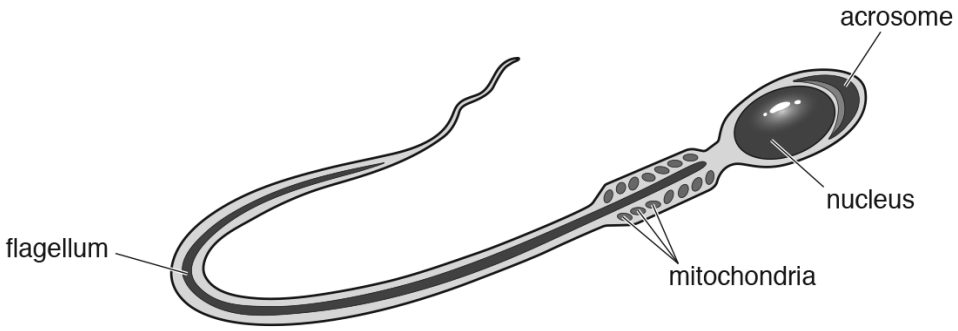

Fig. 6.2

(i) Write the formula that would be used to calculate the magnification of the diagram.

[1]

(ii) The actual length of the sperm cell in Fig. 6.2 is 0.055 mm.

Convert this value to micrometres (μm).

Space for working.

..... μm [1]

(c) Explain why the nuclei of sperm cells differ from those of other cells in the male.

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.....

.....

.....[2]

(d) Explain the roles of the flagellum, the mitochondria and the acrosome in sperm cells.

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.....[6]

(e) Explain why the sex of a child is determined by its father.

.....

.....

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.....[2]

[Total: 16]

07. 0610_s18_qp_43 Q: 6

(a) Fig. 6.1 is a half-flower drawing of pride of Barbados, *Caesalpinia pulcherrima*.

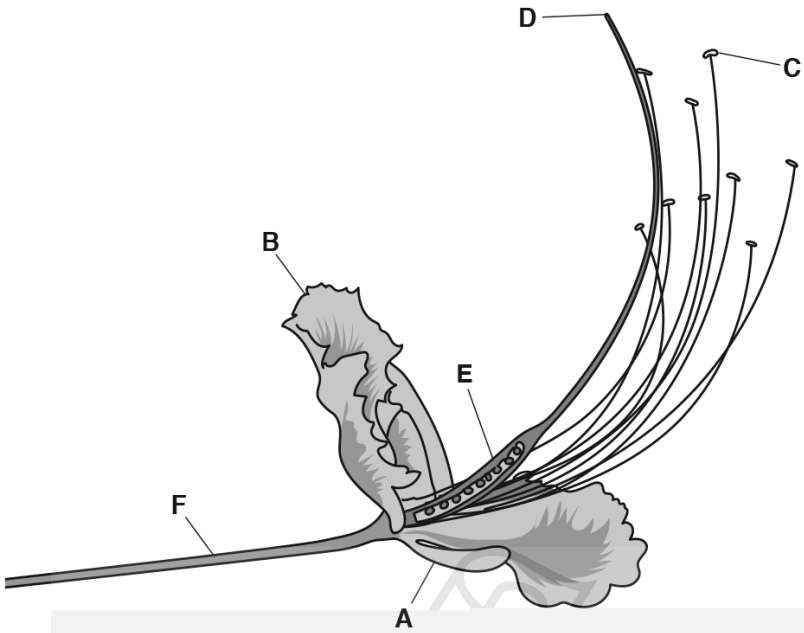


Fig. 6.1

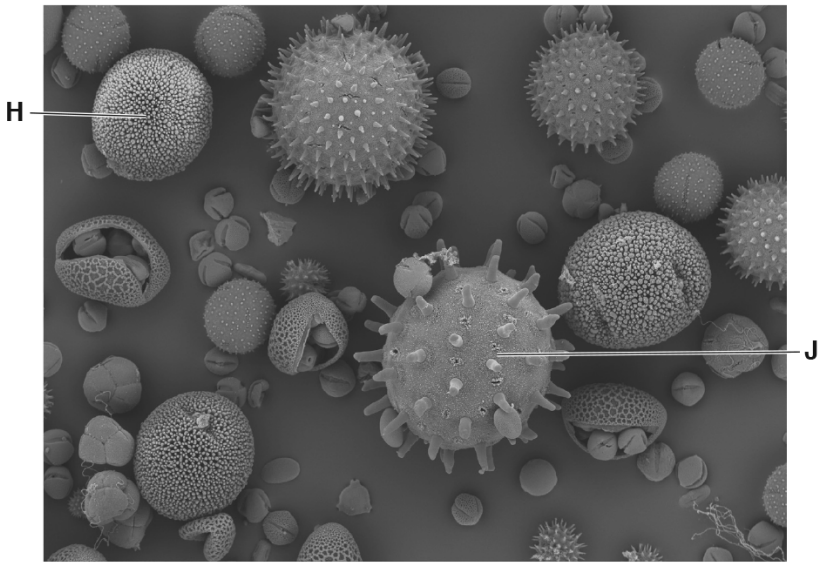
Complete Table 6.1 by stating the letter from Fig. 6.1 that indicates the organ where each function occurs and the name of the organ.

Table 6.1

function	letter from Fig. 6.1	name of the organ
meiosis to produce pollen grains		
pollination		
development of seeds		
protection of flower in the bud		

[4]

(b) Fig. 6.2 is a scanning electron micrograph of some pollen grains from wind-pollinated flowers and insect-pollinated flowers.



magnification ×220

Fig. 6.2

(i) Write the formula that would be used to calculate the actual diameter of pollen grain **H**.

[1]

(ii) The actual diameter of pollen grain **H** is 0.082 mm.

Convert this value to micrometres (μm).

Space for working.

..... μm [1]

(iii) Explain how the pollen grain labelled **J** is adapted for insect pollination.

.....

.....

.....

.....

.....[2]

(c) Pollen grains grow tubes, which contain haploid male gamete nuclei.

(i) One of these male gamete nuclei fuses with the female gamete.

State the part of the flower that contains the female gamete.

.....[1]

(ii) Define the term *haploid nucleus*.

.....

.....

.....[1]

(iii) Explain why it is important for gametes to be haploid.

.....

.....

.....[1]

[Total: 11]

08. 0610_w18_qp_41 Q: 6

Young mammals that are orphaned can be bottle-fed.

Fig. 6.1 shows a newborn tiger cub sucking on a bottle.

Fig. 6.1

(a) (i) Sucking is an example of an involuntary action observed in newborn mammals.

State the name given to involuntary actions.

.....[1]

(ii) Describe the advantages of breast-feeding compared with bottle-feeding.

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.....[4]

(b) The digestive systems of young mammals are not fully developed.

Enzymes such as amylase, maltase and protease are often added to baby food to aid chemical digestion.

(i) Complete Table 6.1 by stating the substrate and product(s) for each enzyme reaction.

Table 6.1

enzyme	substrate	product(s)
amylase		
maltase		
protease		

[3]

(ii) Suggest why the temperature of baby food must be controlled when the enzymes are added.

.....

.....

.....[2]

(iii) State **one** other condition that must also be controlled to optimise enzyme activity.

.....[1]

[Total: 11]

09. 0610_w18_qp_43 Q: 4

Glycogen is a storage carbohydrate in animals. Glycogen is made from glucose.

(a) **(i)** Cells that convert glucose to glycogen contain many mitochondria.

Suggest why these cells contain many mitochondria.

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.....

.....

.....[2]

(ii) State the type of biological molecule that catalyses reactions such as the conversion of glycogen to glucose.

.....[1]

(b) A fetus needs glucose to make glycogen.

Describe how a fetus obtains glucose.

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.....

.....[3]

(c) Fig. 4. 1 shows the concentration of glycogen in the fetus of a domestic cat during pregnancy and immediately after birth.

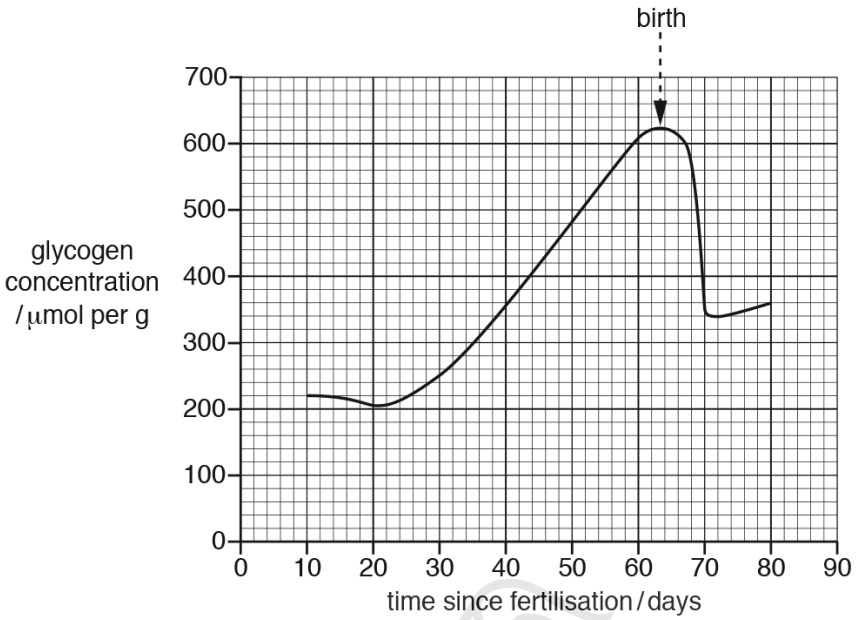

Fig. 4.1

Hormones stimulate changes in the concentration of glycogen in the fetus.

(i) Define the term *hormone*.

.....

.....

.....

.....

.....[3]

(ii) Calculate the percentage increase in the glycogen concentration in the fetus between day 10 and birth in Fig. 4.1.

Give your answer to the nearest whole number.

Show your working.

..... %
[2]

(iii) Describe the changes in glycogen concentration shown in Fig. 4.1 **and** explain how hormones in the fetus cause these changes.

Use data from Fig. 4.1 to support your answer.

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.....

.....[6]

(d) After birth, cats produce milk to feed their offspring.

Human babies can be breast-fed or bottle-fed with formula milk.

Outline **three** disadvantages of breast-feeding.

1 .....

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2 .....

.....

3 .....

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[3]

[Total: 20]

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10. 0610_s18_qp_42 Q: 4

One of the roles of the Centers for Disease Control and Prevention (CDC) in Atlanta, US, is to try to reduce the number of people who are infected with pathogens.

The CDC conducted a survey. They asked women which, if any, contraceptive methods they used.

(a) Suggest why the CDC collected data on contraceptive methods.

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..... [3]

Fig. 4.1 shows the results of the survey.

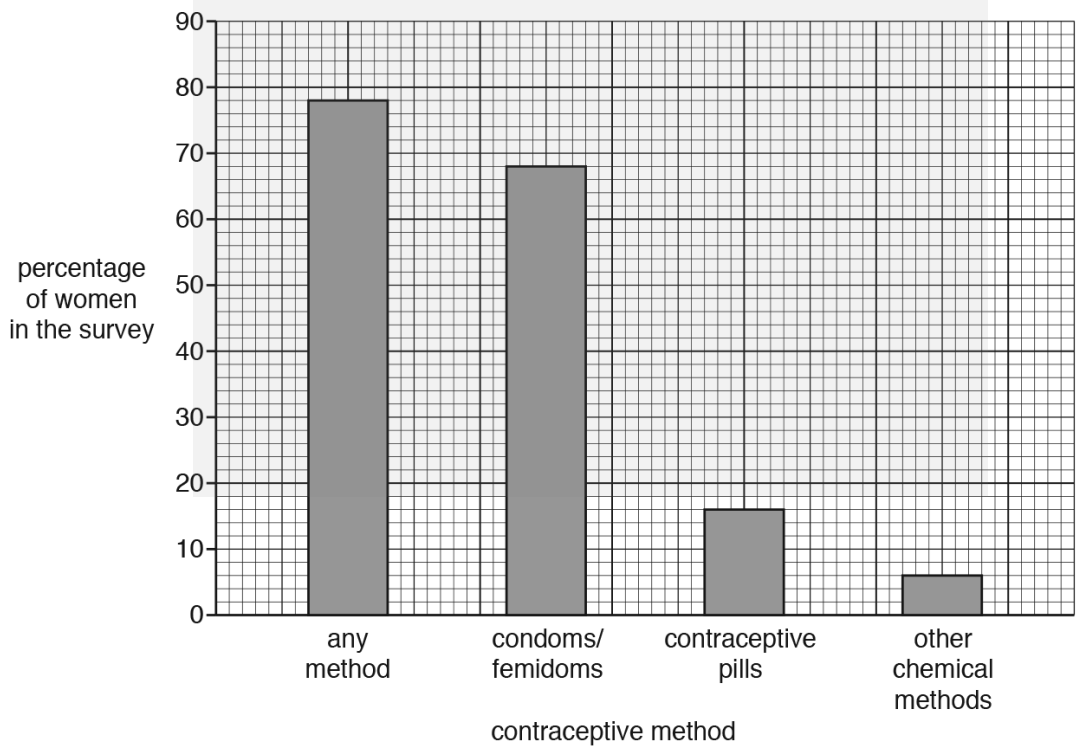

Fig. 4.1

(b) (i) State **two** hormones that are used in contraceptive pills.

1 .....

2 .....
[2]

(ii) Suggest why contraceptive pills do **not** contain FSH.

.....

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..... [3]

(iii) Give **one** example of 'other chemical methods' (fourth bar) that could be included in the bar in Fig. 4.1.

..... [1]

(iv) State **two** methods of birth control that were not listed in the survey.

1 .....

2 .....
[2]

(v) The percentage of the last three bars in Fig. 4.1 added together is 90%.

Suggest why the percentage of women who used any type of contraceptive method (first bar) is not equal to the sum of the last three bars.

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..... [1]

[Total: 12]

11. 0610_w16_qp_43 Q: 1

An *in vitro* fertilisation (IVF) procedure is outlined in Fig. 1.1.

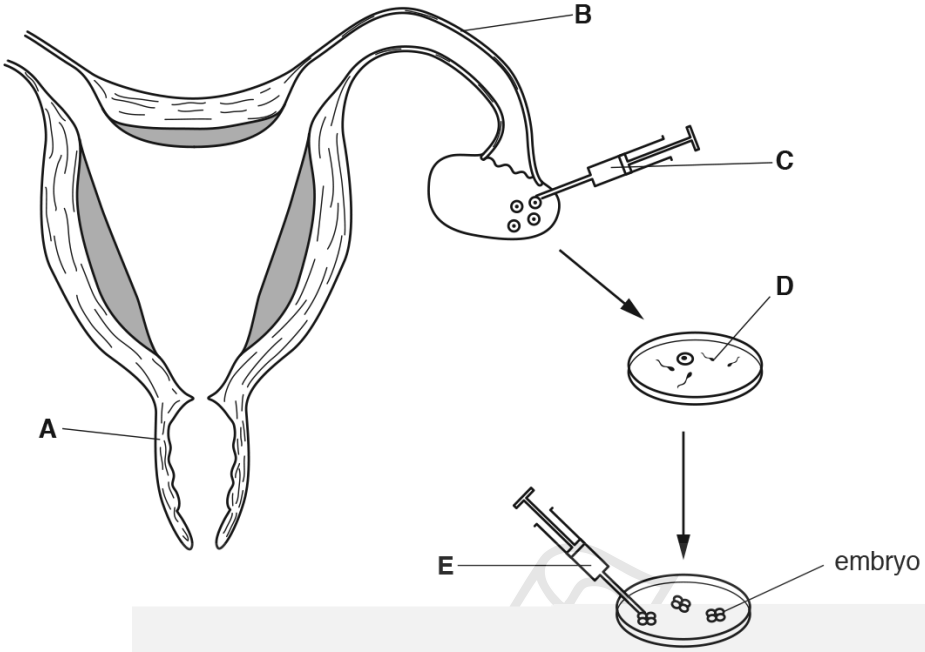

Fig. 1.1

(a) (i) Name structures **A**, **B** and **D**.

A .....

B .....

D .....

[3]

(ii) State the purpose of syringe **C**.

.....

.....[1]

(b) (i) Name a hormone that would be injected to stimulate egg cell development.

.....[1]

(ii) State when, during the menstrual cycle, this hormone should be injected.

.....[1]

(iii) Draw an **X** on Fig. 1.1 at the position where the embryos should be placed.

[1]

(c) Discuss the social implications of IVF.

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.....[4]

[Total: 11]

12. 0610_s20_qp_42 Q: 2

Pregnancy can occur after the fusion of a male gamete and a female gamete.

(a) State the name of the ball of cells that implants into the uterus after fertilisation.

..... [1]

(b) There are many changes that occur in a fetus during pregnancy.

Compare the development of a fetus in the early stages of pregnancy to its development in the late stages of pregnancy.

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..... [2]

(c) Describe the functions of amniotic fluid and the amniotic sac.

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..... [4]

(d) The umbilical artery is found in the umbilical cord. This artery transports blood away from the heart of the fetus.

The umbilical artery is unusual because it transports deoxygenated blood.

(i) State the name of **one** other artery in the mother that transports deoxygenated blood.

..... [1]

(ii) State **one** excretory product that is transported from the fetus to the placenta.

..... [1]

(iii) State the name of the process that allows substances to move down a concentration gradient across the placenta.

..... [1]

(e) One of the functions of the placenta is to provide a barrier to toxins and pathogens.

A study was done on donated afterbirths. The afterbirth is a placenta with part of the umbilical cord attached.

The purpose of the study was to find the maximum size of particles that can pass through the placenta and enter the umbilical cord.

The researchers inserted beads with a diameter of 0.5 μm into blood vessels in the placenta. Three hours later they recorded the percentage of beads found in the blood in the placenta and in the umbilical cord.

They then repeated the tests using beads with diameters of 0.8 μm, 2.4 μm, 5.0 μm and 8.0 μm.

Their results are shown in Fig. 2.1.

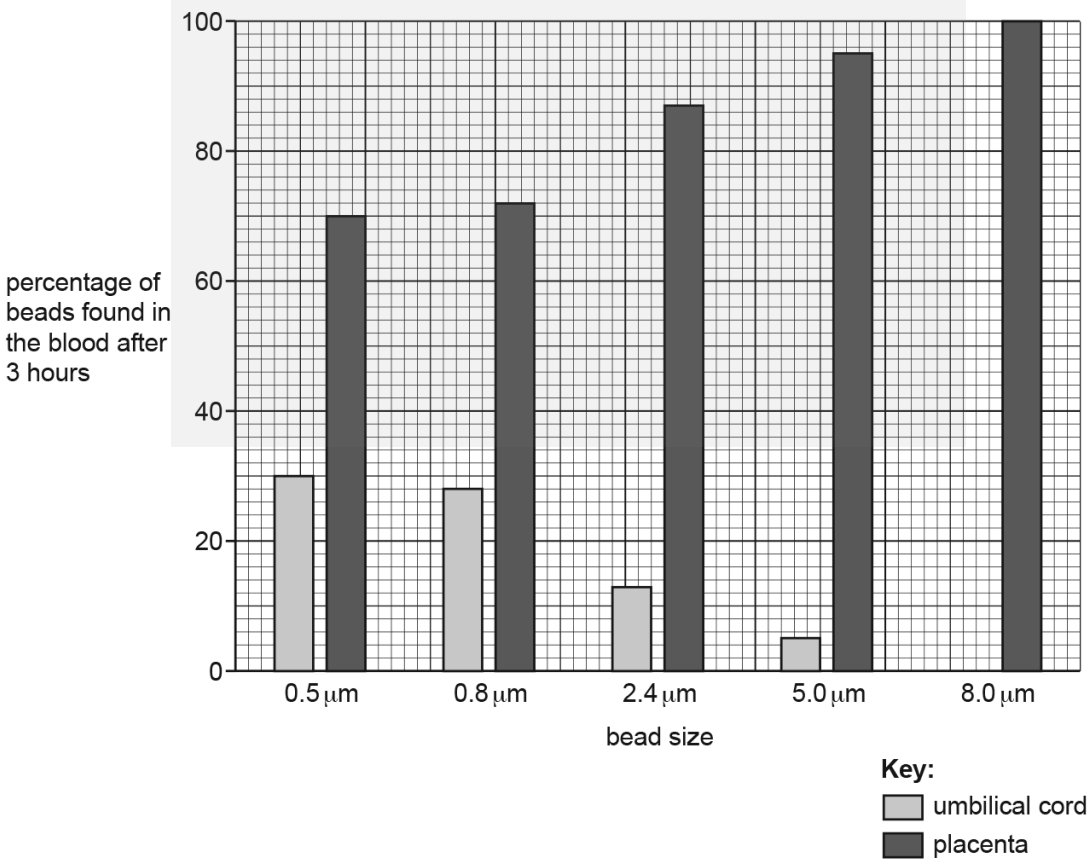

Fig. 2.1

(i) Convert the diameter of the 5.0 μm beads into millimetres (mm).

Space for working.

..... mm [1]

(ii) One million beads with a diameter of 2.4 μm were injected into the placenta.

Calculate the number of these beads in the umbilical cord after 3 hours.

Space for working.

..... beads [2]

(iii) Table 2.1 shows a range of substances and their diameters.

Table 2.1

toxins and pathogens	diameter / μm
nicotine	2.0×10^{-2}
drug **X**	3.0×10^{-2}
rubella virus	5.0×10^{-2}
Vibrio cholerae	8.0×10^{-1}
Trypanosoma brucei	1.8×10^{1}

State the names of **all** the toxins and pathogens listed in Table 2.1 that could pass through the placenta and enter the umbilical cord.

Use the data in Fig. 2.1 to make your choice.

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.....

..... [1]

13. 0610_m18_qp_42 Q: 4

Fig. 4.1 is a diagram of the human female reproductive system.

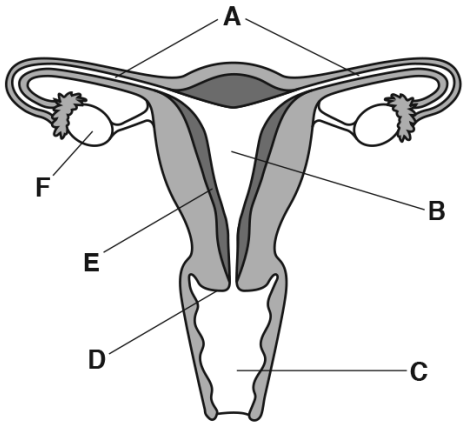

Fig. 4.1

(a) Complete Table 4.1 to show the letter and the name of each of the structures that perform these functions.

Table 4.1

function	letter	name
releases oestrogen		
site of fertilisation		
site of implantation		
dilates during the process of birth		

[4]

(b) Fertilisation is the fusion of the nuclei of a male gamete and a female gamete resulting in a zygote.

State the number of chromosomes present in a human:

female gamete .....

zygote .....

[2]

(c) Chlamydia is a sexually transmitted infection (STI).

Fig. 4.2 shows the number of reported cases of chlamydia in females in each age group in one country.

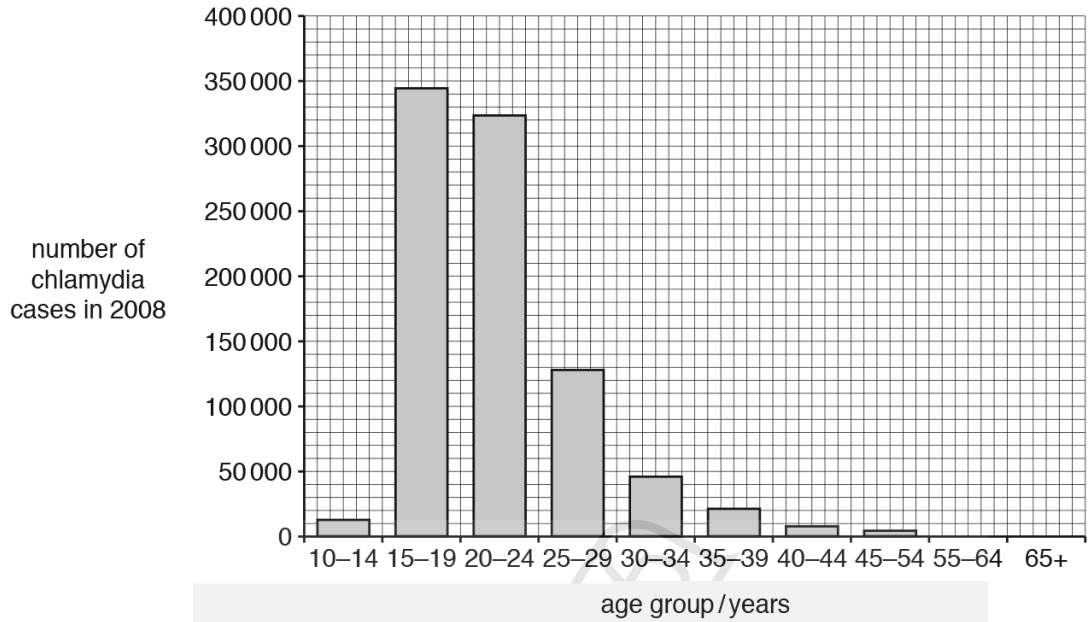

Fig. 4.2

Describe the results shown by the data in Fig. 4.2.

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.....

.....[3]

(d) Chlamydia is caused by a bacterium.

(i) Suggest a treatment for chlamydia.

.....[1]

(ii) State the name of **one other** STI.

.....[1]

(iii) Complete the sentences about the spread of STIs.

STIs are transmitted through the transfer of ..... during sexual contact. One way individuals can avoid the spread of STIs is to use a type of ..... contraception. One example of this type of contraception is ..... .

[3]

[Total: 14]

14. 0610_w16_qp_42 Q: 5

The numbers of different cells in a blood sample were counted. The results are shown in Table 5.1.

Table 5.1

cell type	number / per mm^3	percentage
red blood cells	4 820 000	94.91
lymphocytes	1 900	0.04
phagocytes	6 000	0.12
platelets	250 000	
total	5 077 900	100.00

(a) Complete the table by calculating the percentage of platelets. Write your answer in Table 5.1 to two decimal places. [1]

(b) State the role of platelets in the blood **and** describe the process they are involved in.

.....

.....

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..... [4]

(c) Lymphocytes are white blood cells that are produced in bone marrow. Lymphocytes travel in the blood from bone marrow to lymph nodes throughout the body.

If a pathogen infects the body, some of these lymphocytes are activated.

State the role of lymphocytes in defence against pathogens.

..... [1]

(d) During a second infection of the same pathogen the response by lymphocytes is much faster. Explain how this happens.

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..... [2]

(e) HIV invades specific lymphocytes that coordinate immune responses.

Fig. 5.1 shows the change in numbers of these lymphocytes following an HIV infection that has not been treated.

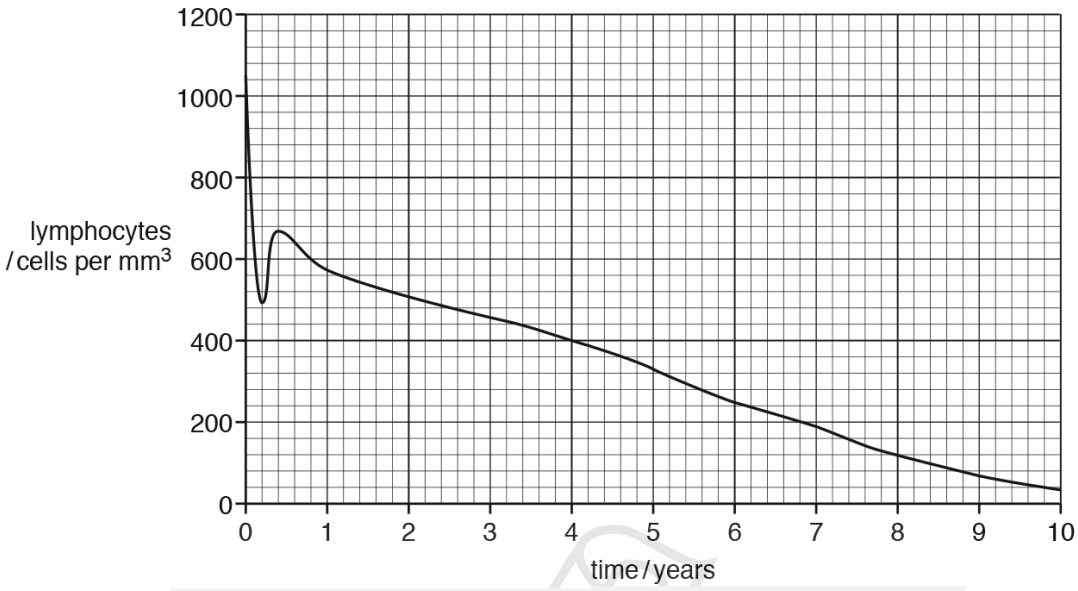

Fig. 5.1

(i) Describe the changes in lymphocyte numbers following HIV infection.

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..... [3]

(ii) Describe the effects on the body of an untreated HIV infection as shown in Fig. 5.1.

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.....

..... [3]

[Total: 14]

01. 0610_s20_MS_41 Q: 4

(a)(i)	*Sorghum* ;	1
(a)(ii)	feathery stigma / stigma with large surface area ; stigma / anthers, hang outside the flower(s) ;	2
(b)(i)	**C** ovary (wall) ; **D** ovule ; **E** style ;	3
(b)(ii)	meiosis / reduction division ; haploid ; fuses / joins / combines ; diploid ; fertilisation ; zygote ; mitosis ;	7
(c)	*any five from:* (gives) genetic variation / diversity ; ref to, alleles / genes / DNA, from different, plants / parents ; allows mutations to be, expressed / AW ; allows adaptation to, new conditions / changed environment / AW ; (new species) can evolve / allows natural selection to occur ; pollen exchanged between individuals / cross pollination ; seeds are dispersed ; can colonise new areas / AW ; less competition (with parent plant / among offspring) ; seeds may be dormant ; survival through, harsh / adverse, conditions ; AVP ;	5
(d)	*any three from:* protein synthesis ; transport in the phloem ; cell division / mitosis / meiosis ; active transport / absorption of ions (from the soil) ; growth ; movement / muscular contraction ; sensitivity ; nerve impulses ; AVP ;;;	3

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02. 0610_s19_MS_42 Q: 6

	Answer	Mark	Partial Marks
(a)	(group of) organisms that can reproduce ; produce fertile offspring ;	2	
(b)	genetically identical ; quick ; can reproduce even if variety is sterile ; described consequence of being genetically identical ; AVP ; e.g. no pollinators required / reliable / no harmful variation	3	
(c)	energy (store / sink) ; example of use of starch in plant ; as a reserve / source / store (of energy), when plant cannot photosynthesise / dormancy / winter / no leaves / dark / night ; AVP ; e.g. insoluble	2	

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03. 0610_w18_MS_42 Q: 2

	Answer	Mark	Partial Marks
(a)	a version of a gene ;	1	
(b)	change in base (sequence of DNA) ; DNA / gene / base sequence, codes for, protein / enzyme ; *ref. to* mRNA ; different (sequence of) amino acids in, protein / polypeptide / enzyme ; (mutant / changed) enzyme / active site, has different, shape / structure ; (active site / enzyme) not complementary to substrate / enzyme-substrate complexes cannot form / substrate will not fit into *or* bind ;	3	
(c)	the allele for dwarfism is, recessive / **t** ; both parents are heterozygous (so do not express the allele) ;	2	
(d)(i)	*ref. to* asexual reproduction ; (plantlets / cells / offspring grow by) mitosis ; all cells / new plants, are genetically identical ; AVP ;	3	
(d)(ii)	competition for resources as all individuals are close together ; increased risk of inheriting harmful, alleles / features / trait ; no / little, (genetic) variation ; no new adaptive features ; no evolution / no (natural) selection / no artificial selection / AW ; no / little, ability to respond to (named) environmental change ; all individuals are susceptible to the same, diseases / pests ; higher risk of extinction ;	3	

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04. 0610_w16_MS_41 Q: 5

	Answer	Mark	Partial Marks
(a)	root hair (cells); long and thin; thin cell wall; large surface area; for absorption; (water by) osmosis ; (ion / nutrients by) active transport; against the concentration gradient; protein (pumps) in membrane; require energy / ATP; ref. to many mitochondria;	5	
(b)(i)	(positive) gravitropism;	1	**A** geotropism **R** negative gravitropism
(b)(ii)	auxin;	1	
(b)(iii)	in space / AW; because no gravity; in a clinostat / AW; gravity constantly changing / AW; remove root tip; no auxin source; lateral roots; searching for, water / nutrients / hydrotropic; light source below, plant / root; roots grow away from light / negatively phototropic; anaerobic mud / mangrove swamp / pneumatophores; need oxygen (for respiration); ORA roots attaching plant to solid objects for support eg walls / other host plants; material is too hard for root to grow through (takes line of least resistance); AVP; e.g. epiphytes / parasitic plants	2	paired marking points
		Total: 9	

<table>
<tr><td>(a)</td><td>any three from:
protein synthesis ;
transport in the phloem ;
cell division / mitosis / meiosis ;
active transport / absorption of ions (from the soil) ;
growth ;
movement / muscular contraction ;
sensitivity ;
nerve impulses ;
AVP ;;;</td><td>3</td></tr>
<tr><td>(b)</td><td>one mark per correct row
<table><tr><th>function</th><th>name of structure</th><th>letter from Fig. 2.1</th></tr><tr><td>pushes food through the stomach</td><td>oesophagus</td><td>A</td></tr><tr><td>assimilation of amino acids to produce plasma proteins</td><td>liver</td><td>K</td></tr><tr><td>storage of bile</td><td>gall bladder</td><td>L</td></tr><tr><td>secretion of insulin</td><td>pancreas</td><td>C</td></tr><tr><td>absorption of fatty acids and glycerol</td><td>small intestine</td><td>H / D</td></tr><tr><td>secretion of pepsin</td><td>stomach</td><td>B</td></tr><tr><td>digestion of starch</td><td>small intestine</td><td>H / D</td></tr></table>;;;;;;</td><td>6</td></tr>
<tr><td>(c)</td><td>any two from:
lactic acid is produced, in muscles / during exercise ;
by anaerobic respiration ;
liver absorbs lactic acid from the blood ;
(aerobic) respiration / oxidation / breakdown, of lactic acid ;
to carbon dioxide and water ;</td><td>2</td></tr>
<tr><td>(d)</td><td>any substance taken into the body ;
that modifies or affects chemical reactions in the body ;</td><td>2</td></tr>
<tr><td>(e)(i)</td><td>any two from:
<u>depressant</u> ;
lengthens reaction time(s) ;
reduces self-control ;
any appropriate effect on the nervous system described ;
AVP ;</td><td>2</td></tr>
<tr><td>(e)(ii)</td><td>any two from:
addiction ;
liver damage ;
AVP ;;</td><td>2</td></tr>
<tr><td>(f)(i)</td><td>any two from:
miscarriage ;
premature birth ;
low birth weight ;
addiction / dependence ;
fetal alcohol syndrome (FAS) ;
AVP ;</td><td>2</td></tr>
<tr><td>(f)(ii)</td><td>any two from:
nicotine ;
pathogens / virus ;
any example ; e.g. HIV / rubella
(named) heavy metal(s) ; e.g. lead / mercury
carcinogen(s) ;
(named) toxin(s) ; e.g. pesticides
(named) medicinal drugs ;
(named) misused (illegal) drugs ; e.g. heroin</td><td>2</td></tr>
</table>

06. 0610_s18_MS_41 Q: 6

	Answer	Mark	Partial Marks
(a)(i)	process / event | letter from Fig. 6.1 meiosis | **R** ; fertilisation | **S** ; implantation | **V** ;	3	
(a)(ii)	oviduct ;	1	
(b)(i)	image size ÷ actual size ;	1	
(b)(ii)	55 (□m) ;	1	
(c)	haploid / *n* / one set of chromosomes / half the diploid number / 23 chromosomes ; (produced by) meiosis ; so number of chromosomes, remains the same / does not double at fertilisation ;	2	**A** so diploid number restored at fertilisation / so zygote is diploid
(d)	*flagellum* (flagellum) propels the sperm ; to, oviduct / site of fertilisation / egg (cell) / ovum ; *mitochondria* aerobic respiration ; provides / releases / supplies, energy / ATP ; *acrosome* (contains / has / releases) enzyme(s) ; (enzymes) digest / break down / dissolve, jelly coat / protein layer ; so sperm nucleus can enter the egg cell / so sperm and egg membranes can fuse together ;	6	**A** flagellum allows sperm to swim **R** 'produces energy'
(e)	*idea that* sex is determined by X and Y chromosomes / males are XY and females are XX ; egg cells have X chromosome / females can only provide X chromosome ; sperm cells have X or Y chromosome / only the males can provide X or Y chromosome / only males can provide the Y chromosome ;	2	

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07. 0610_s18_MS_43 Q: 6

	Answer	Mark	Partial Marks
(a)	process / event | letter from Fig. 6.1 | name of the organ meiosis to produce pollen grains | **C** | anther pollination | **D** | stigma development of seeds | **E** | ovary protection of flower in the bud | **A** | sepal ;;;;	4	*one mark per row*
(b)(i)	image size ÷ magnification ;	1	
(b)(ii)	82 (□m) ;	1	
(b)(iii)	(covered in) spikes / sticky ; (pollen) sticks to, insect / animal (bodies / legs / AW) ; large(r) size (in comparison with wind) ; AVP ;	2	
(c)(i)	ovule ;	1	
(c)(ii)	(nucleus) containing one set of (unpaired) chromosomes ;	1	
(c)(iii)	so that chromosome number does not double (at fertilisation) ; so that chromosome number remains constant from generation to generation ;	1	

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08. 0610_w18_MS_41 Q: 6

<table>
<tr><th></th><th>Answer</th><th>Mark</th><th>Partial Marks</th></tr>
<tr><td>(a)(i)</td><td>reflex (action) ;</td><td>1</td><td></td></tr>
<tr><td>(a)(ii)</td><td>contains antibodies / passive immunity / idea of fighting infections ;
bonding with mother /AW ;
is at a suitable body temperature ;
sterile / less risk of infection / contamination ;
convenience / always available / no preparation ;
cheap / free ;
easy to digest / less risk of colic / less risk of diabetes in child ;
no additives / less risk of allergies ;
idea of volume is controlled / no over-feeding ;
nutrient requirements met / change with age / change with development ;
AVP ;;</td><td>4</td><td></td></tr>
<tr><td>(b)(i)</td><td><table><tr><td>enzyme</td><td>substrate</td><td>product(s)</td></tr><tr><td>amylase</td><td>starch</td><td>glucose / maltose ;</td></tr><tr><td>maltase</td><td>maltose</td><td>glucose ;</td></tr><tr><td>protease</td><td>protein</td><td>amino acids ;</td></tr></table></td><td>3</td><td></td></tr>
<tr><td>(b)(ii)</td><td>high temperatures denature enzymes / AW ;
low temperatures result in low energy / fewer collisions / slower reactions / AW ;
enzymes work best / most efficient at optimum temperature ;</td><td>2</td><td></td></tr>
<tr><td>(b)(iii)</td><td>pH ;
enzyme concentration ;
substrate concentration ;</td><td>1</td><td></td></tr>
</table>

09. 0610_w18_MS_43 Q: 4

	Answer	Mark	Partial Marks
(a)(i)	conversion / process, needs energy ; aerobic respiration occurs (in mitochondria) ; (aerobic) respiration releases energy ;	2	
(a)(ii)	enzyme ;	1	
(b)	from the mother ; glucose (in mother / fetus) carried in blood ; glucose) diffuses / moves from high concentration to low concentration ; across the placenta ; (through) umbilical cord ; AVP ;	3	
(c)(i)	chemical substance produced by a (endocrine) gland ; carried by the blood ; alters the activity of specific target organs / AW ;	3	
(c)(ii)	182 (%) ;;	2	
(c)(iii)	*max four from mp1 to 6:* **1** no glycogen (measured) until day 10 / at first (measurable) / AW, glycogen concentration is 200–220 □mol per g ; **2** small / no, change / decrease, in glycogen until day 20–26 ; **3** glycogen increases from day 20 - 26, until birth / day 62–64 ; **4** 610–630 □mol per g at, peak / AW / birth ; **5** steep decrease in glycogen, after birth / after day 62–64 / to 330–350 □mol per g / to day 69–71 ; **6** glycogen starts to increase (slowly), after day 70–73 / 7–10 days after birth ; **7** insulin is linked to increase in glycogen ; **8** glucagon is linked to decrease in glycogen ; **9** *idea of* changes in glycogen is linked to control of (blood) glucose concentration ; **10** homeostasis / negative feedback (in context of Fig. 4.1 / blood glucose) ; **11** AVP ;	6	units must be stated at least once **A** 420 □mol per g increase at birth (from start)
(d)	not all mothers can produce enough milk ; some drugs can pass through into milk ; transfer of named pathogens in correct context ; painful nipples ; time consuming ; only mother can produce milk / fathers can't express milk ; infant not, suckling / has difficulties, so not enough intake / AW ; tiring ; AVP ;	3	

10. 0610_s18_MS_42 Q: 4

	Answer	Mark	Partial Marks
(a)	there are many, diseases / infections / pathogens / transmitted through sexual contact ; named example of STI ; STIs / AW, can be prevented by the use of some (contraceptive) methods ; such as, condoms / femidoms ; for education about STI prevention / inform preventative strategies / AW ; assess effectiveness of different (contraceptive) methods (to prevent disease) ;	3	
(b)(i)	(named) oestrogen ; (named) progesterone ;	2	
(b)(ii)	(FSH would) stimulate an egg / follicle, to mature / develop / grow / ripen ; **ora** (FSH would) stimulate (release of) oestrogen / LH ; **ora** (FSH would) lead to ovulation ; **ora** (FSH would) increase the chance of fertilisation / pregnancy / AW ; **ora**	3	**I** production (of eggs) **A** FSH is a fertility drug
(b)(iii)	implant / patch / injection / IUD / IUS (containing contraceptive hormones) ; spermicide ;	1	**I** birth control pills
(b)(iv)	abstinence / body temperature / cervical mucus / natural contraception ;; diaphragm ; (named) surgical (sterilisation) method ;;	2	**I** birth control pills **A** cap **A** (named) tubes tied
(b)(v)	some females could use more than one method of contraception ; some people may not have completed the survey, correctly / honestly / AW ;	1	 **A** not used a method regularly (so not answered all questions accurately)

11. 0610_w16_MS_43 Q: 1

	Answer	Mark	Partial Marks
(a)(i)	**A**: vagina; **B**: oviduct / Fallopian tube; **D**: sperm / male gamete;	3	
(a)(ii)	to remove, egg cells / ova / female gametes;	1	
(b)(i)	follicle stimulating hormone / FSH; luteinizing hormone / LH;	1	
(b)(ii)	start of new cycle / days 1–10 / during menstruation / AW;	1	
(b)(iii)	**X** positioned anywhere in uterus (wall / lining);	1	
(c)	1 allows infertile couples / single parents / same sex couples (to have children); 2 religious / legal / moral / ethical, concerns about IVF; 3 may not treat infertility successfully; 4 expense of fertility treatment; 5 may lead to multiple births; 6 *idea of* genetic screening before implanting is possible; 7 storage of, eggs / embryos, is possible (during chemotherapy); 8 qualification of an religious / ethical / legal / moral, issue; 9 has allowed stem cell research on embryos; 10 AVP;	4	**A** high chance of miscarriage / stress **A** cost to health services / cost means restricted availability
		Total: 11	

12. 0610_s20_MS_42 Q: 2

(a)	embryo ;	1
(b)	*any two from:* growth in all stages ; development during all stages ; (more) increase in complexity in early stages ; (more) increased in size in later stages ;	2
(c)	*any four from:* maintains temperature ; (mechanical) protection ; provides support (of the fetus) ; provides a sterile environment / prevents infections ; allows movement (of the fetus) ; (movement) allows for development of bones and muscles ; ref. to swallowing (of fluid) ; lubrication / AW ; AVP ;	4
(d)(i)	pulmonary (artery) ;	1
(d)(ii)	carbon dioxide / urea / AVP ;	1
(d)(iii)	diffusion ;	1
(e)(i)	0.005 (mm) ;	1
(e)(ii)	130 000 ;;	2
(e)(iii)	nicotine, drug X, rubella virus ;	1
(f)(i)	**A** sensory neurone ; **B** vesicle ; **C** synapse / synaptic cleft ; **D** receptor molecules ;	4
(f)(ii)	*any three from:* drug **X** blocks, **D** / receptor (molecules) ; neurotransmitters are not able to bind to, **D** / receptor (molecules) ; drug **X** is similar in shape to neurotransmitter / complementary to shape of receptor (molecule) ; drug **X** stops, impulse/electrical signal, being transmitted in relay neurone ; (so) less / no, pain felt with drug **X** ;	3
(g)	*any two from:* (contaminated) blood transfusion ; sexual fluids ; breast feeding ; blood to blood contact ; AVP ;;	2

13. 0610_m18_MS_42 Q: 4

	Answer	Mark	Partial Marks
(a)	<table><tr><th>function</th><th>letter</th><th>name</th></tr><tr><td>releases oestrogen</td><td>F</td><td>ovary</td></tr><tr><td>site of fertilisation</td><td>A</td><td>oviduct</td></tr><tr><td>site of implantation</td><td>E</td><td>uterus lining</td></tr><tr><td>dilates during the process of birth</td><td>C / D</td><td>vagina (C) / cervix (D)</td></tr></table> ;;;;	4	1 mark for each correct row
(b)	23 ; 46 / 23 pairs ;	2	
(c)	1 cases increases then decrease ; 2 large increase between 10–14 and 15–19 ; 3 most cases in the 15–19 age group ; 4 from 15–19 number of cases decrease / from 20–24 number of cases steep decrease ; 5 no cases above 55 years old / in 55–64 age group / 65+ age group ; 6 data quote with number of cases and age group ;	3	
(d)(i)	antibiotics ;	1	
(d)(ii)	HIV ;	1	
(d)(iii)	(named) bodily fluids / sexual fluid ; barrier ; condom / femidom ;	3	

14. 0610_w16_MS_42 Q: 5

	Answer	Mark	Partial Marks
(a)	4.92 / 4.93;	1	
(b)	(platelets) promote / involved in, clotting; fibrinogen changes to fibrin; soluble to insoluble; fibrin forms a mesh; traps blood cells; prevents loss of blood / stops bleeding; prevents entry of pathogens; AVP;	4	I ref. to scab formation A net A RBCs / WBCs / platelets
(c)	secrete / produce / release, antibodies;	1	
(d)	active immunity; ref to memory, cells / lymphocytes; memory cells produced in first infection;	2	
(e)(i)	decrease, steep / in short period of time / in two months / AW, to 500 cells per mm^3; increase to 650 – 670 cells per mm^3; gradual / AW, decrease until 10 years; to 40 cells per mm^3 at 10 years;	3	A by 500 – 700 cells per mm^3
(e)(ii)	no / reduced, (active) immune response; reduced production of antibodies; vulnerable to, infections / (opportunistic) disease / TB / cancers / pneumonia / AW; AIDS; weight loss / death / reduce life span;	3	
		Total: 14	