Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Reproduction in humans

Time allowed: 1 hour 20 minutes

Subject code **0610**

Biology

Questions from Paper 3 and Paper 4

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.

Total marks

/ 84

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.

Information

- This paper has 9 questions worth 84 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 Fig. 10.1 shows an early stage in the birth of a baby.

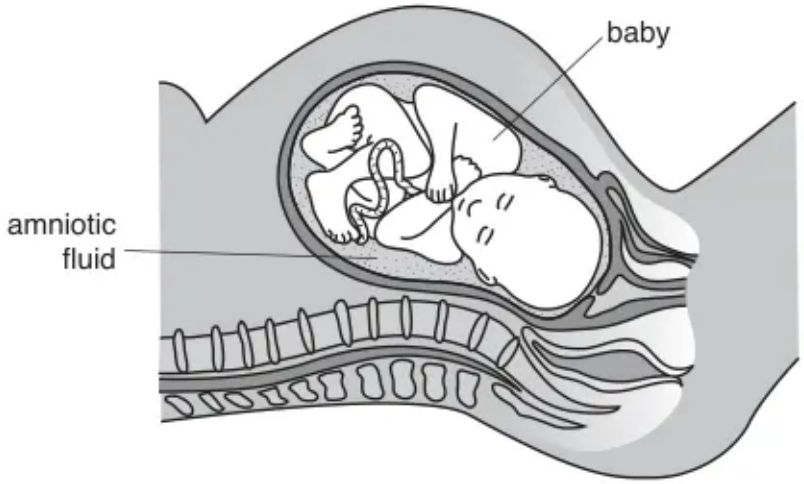


Fig. 10.1

(a) The unborn baby is surrounded by amniotic fluid.

Describe **one** function of this liquid.

.....

.....[1]

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(b) The list describes six stages in the birth of a baby.

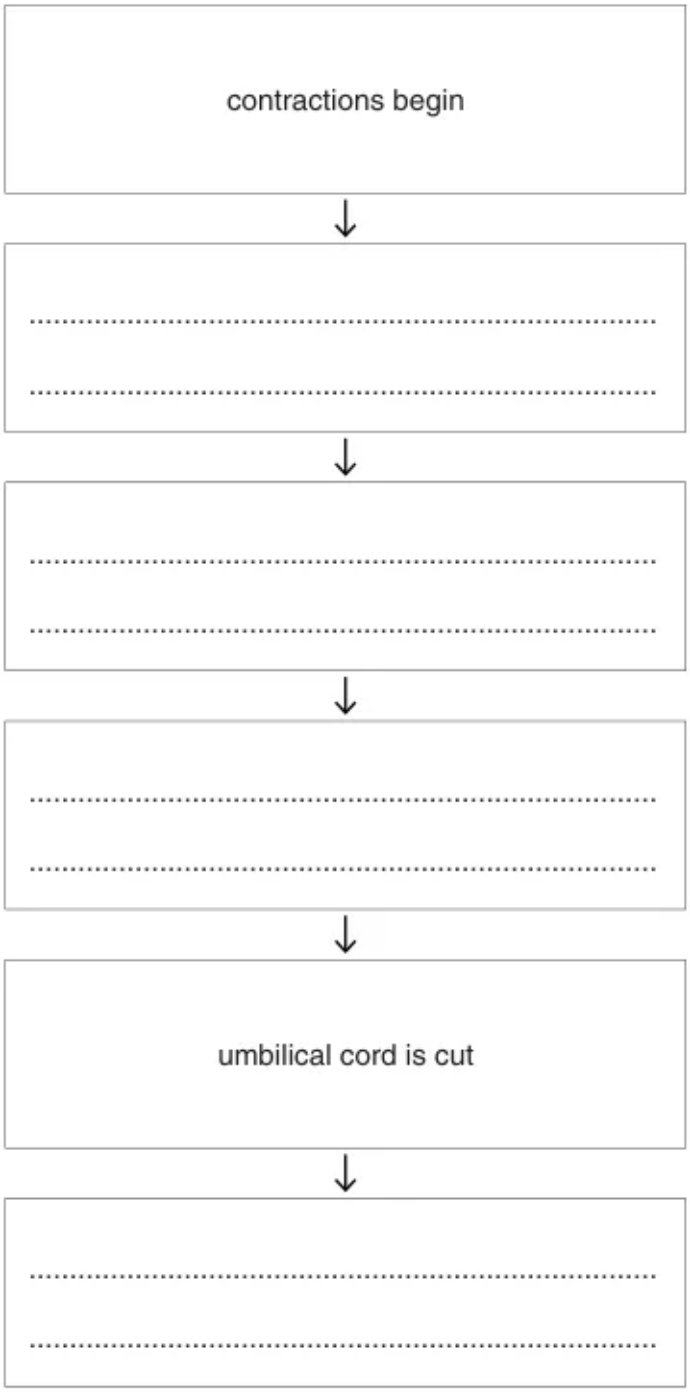
They are **not** in the correct order.

amniotic sac bursts **baby passes down vagina** **cervix dilates**

contractions begin **placenta delivered** **umbilical cord is cut**

Complete the boxes by writing the descriptions of the stages in the correct order.

Two of the stages have been completed for you.



[3]

[Total: 4]

Reproductive organs, fertilisation and pregnancy Click for more variations

1	**(a)**	cushions / protects (fetus) ; allows (fetus) to move ; supports (fetus) ;	[max 1]	I reference to maintains temperature
	(b)	*box 2 and 3:* cervix dilates / amniotic sac bursts (either order) ;; *box 4:* baby passes down vagina ; *box 6:* placenta delivered ;	[max 3]	3 or 4 correct = 3 2 correct = 2 1 correct = 1
			[Total: 4]	

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2 Fig. 5.1 is a diagram of the female reproductive system in humans.

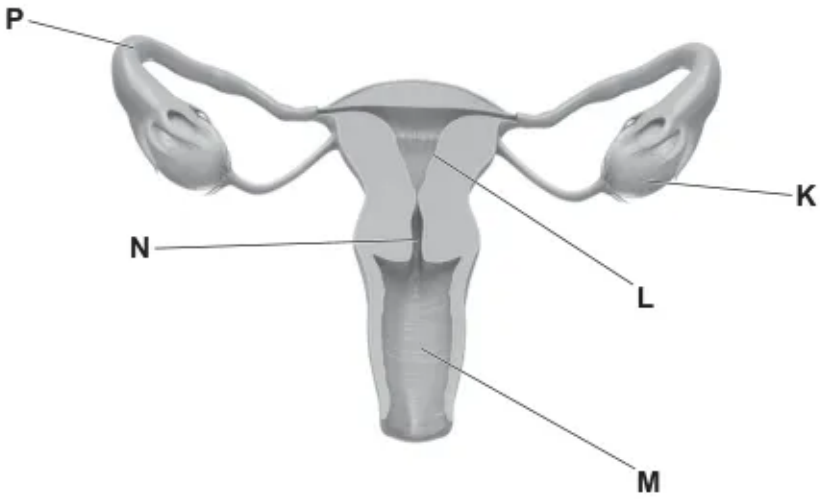


Fig. 5.1

(a) (i) State the letter in Fig. 5.1 that identifies:

the structure that releases egg cells .....

the structure where fertilisation usually occurs .....

the structure where an embryo implants. .....

[3]

(ii) State the names of structures **L**, **M** and **N** in Fig. 5.1.

L .....

M .....

N .....

[3]

(b) State **two** adaptive features of egg cells.

1 .....

2 .....

[2]

[Total: 8]

Reproductive organs, fertilisation and pregnancy Click for more variations

Reduced to 77% to fit the page (wider than A4).

2(a)(i)	**K** ; **P** ; **L** ;	**3**	
2(a)(ii)	***L*** uterus ; ***M*** vagina ; ***N*** cervix ;	**3**	
2(b)	energy stores ; jelly coat (that changes at fertilisation) ;	**2**	

3 **(a)** Fig. 6.1 shows the changes that happen to the thickness of the uterus lining during the menstrual cycle.

The loss of the lining of the uterus is called menstruation.

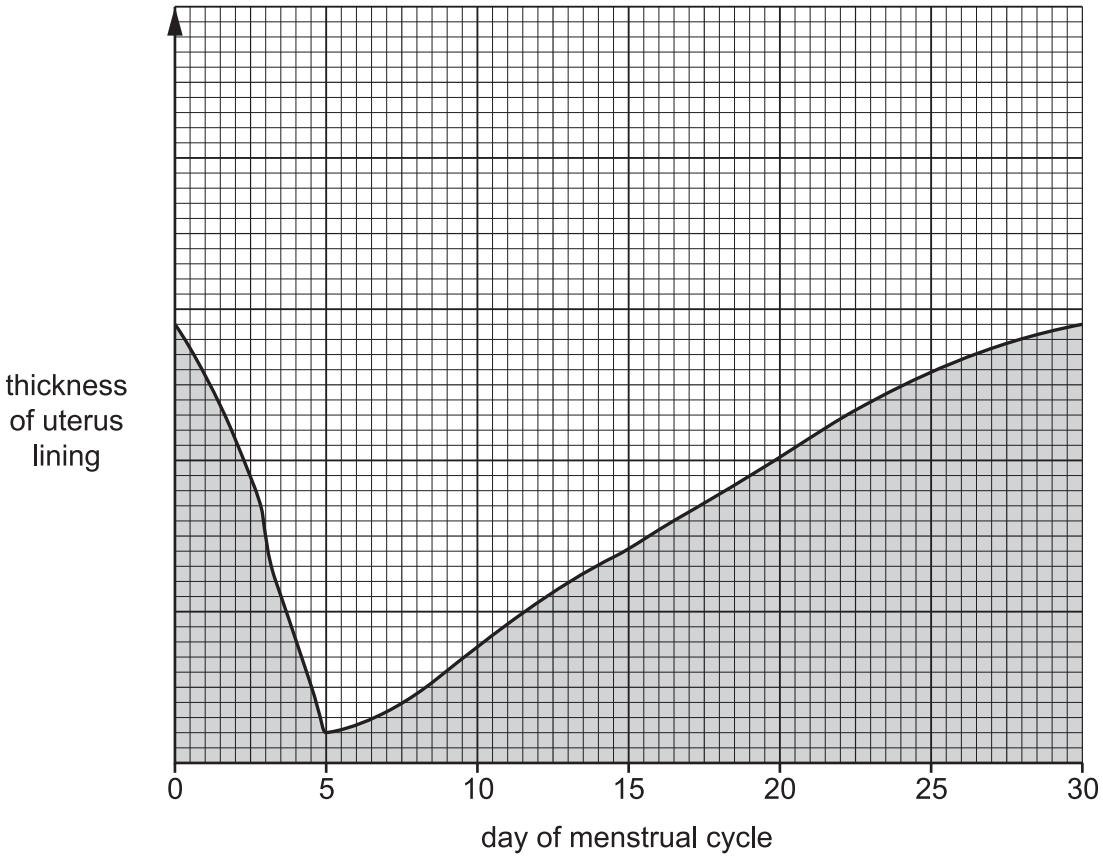


Fig. 6.1

Use Fig. 6.1 and the numbers from the list to answer these questions.

Each number can be used once, more than once or not at all.

0 **5** **8** **15** **28** **30**

State the number of days of this menstrual cycle. .....

State the number of days that menstruation lasts. .....

State the day on which ovulation is most likely to occur. .....

State **one** day when the uterus lining is at its thickest. .....

[4]

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(b) Table 6.1 shows some of the changes that happen to boys and girls during puberty.

Place ticks (✓) in Table 6.1 to show which changes happen in boys and which changes happen in girls.

Table 6.1

	boys	girls
breasts grow		
growth of pubic hair		
widening of hips		

[3]

(c) State the name of the hormone that causes the development of secondary sexual characteristics in girls.

..... [1]

(d) State where the hormone that causes the development of secondary sexual characteristics in boys is produced.

..... [1]

[Total: 9]

Sex hormones and the menstrual cycle Click for more variations

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3(a)(i)	30 ; 5 ; 15 ; 0 / 30 ;	4	
3(b)	<table><tr><td></td><td>boys</td><td>girls</td></tr><tr><td>breasts grow</td><td></td><td>✓</td></tr><tr><td>growth of pubic hair</td><td>✓</td><td>✓</td></tr><tr><td>widening of hips</td><td></td><td>✓</td></tr></table> ;;;	3	one mark for each correct row
3(c)	oestrogen ;	1	
3(d)	testes ;	1	

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4 Fig. 6.1 shows a fetus developing inside the uterus.

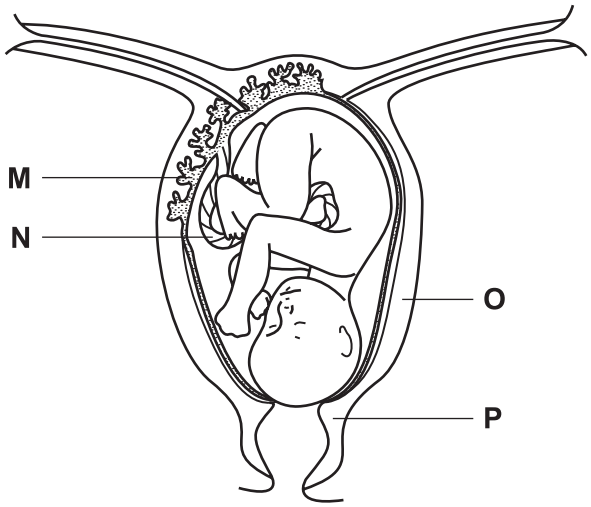


Fig. 6.1

(a) The fetus developed from a fertilised egg cell. Place an **X** on the diagram where an egg cell is normally fertilised. [1]

(b) **(i)** Name the structures **M** and **N**.

M .....

N ..... [2]

(ii) Describe the role of structure **M** in gaseous exchange.

.....

.....

.....

..... [3]

(c) Describe how the structures labelled **O** and **P** are involved in the birth of the baby.

structure **O** .....

.....

structure **P** .....

..... [2]

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(d) (i) If a woman infected with HIV becomes pregnant, her baby may also be infected with HIV, by the time it is born.

Suggest **two** ways this may happen.

.....

.....

..... [2]

(ii) Apart from avoiding infections, describe two other ways that a pregnant mother can help her baby develop healthily.

1. .....

.....

2. .....

..... [2]

[Total: 12]

Reproductive organs, fertilisation and pregnancy Click for more variations

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4 **(a)** **X** – placed clearly on oviduct; [1]		**A** – **X** with label line clearly indicating oviduct
(b) **(i)** M – placenta / villi; N – umbilical cord; [2]		**A** – umbilicus
(ii) 1 has large surface area; 2 for diffusion; 3 of oxygen from mother / to fetus; 4 of carbon dioxide from fetus / to mother; 5 two blood supplies very close to one another; *any three – 1 mark each* [3]		**A** – baby / embryo **A** – baby / embryo
(c) (O / uterus wall / muscle) contracts to push baby (out); (P / cervix) dilates to allow exit of baby / OWTTE; [2]		**A** – vagina
(d) **(i)** 1 virus may pass across / through placenta; 2 virus may be carried by blood leakage (during pregnancy / birth); 3 from mother to fetus *any two – 1 mark each* [2]		must be in context of leakage and not the misconception of joint blood systems
(ii) 1 eating a balanced / varied diet; 2 extra iron / calcium / protein in diet: 3 not smoking (tobacco); 4 not drinking (alcohol); 5 not taking drugs; 6 checks with health team; 7 taking exercise / antenatal exercises; 8 any other valid point; *any two – 1 mark each* [2]		**I** – healthy diet **A** – vitamin C / folic acid **A** – named (illegal) drugs Ignore numbering of answer spaces and read as a paragraph. **I** – inadequate / irrelevant answers and award up to 2 marks
[Total: 12]		

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5 Fig. 4.1 shows the concentrations of female sex hormones during the menstrual cycle.

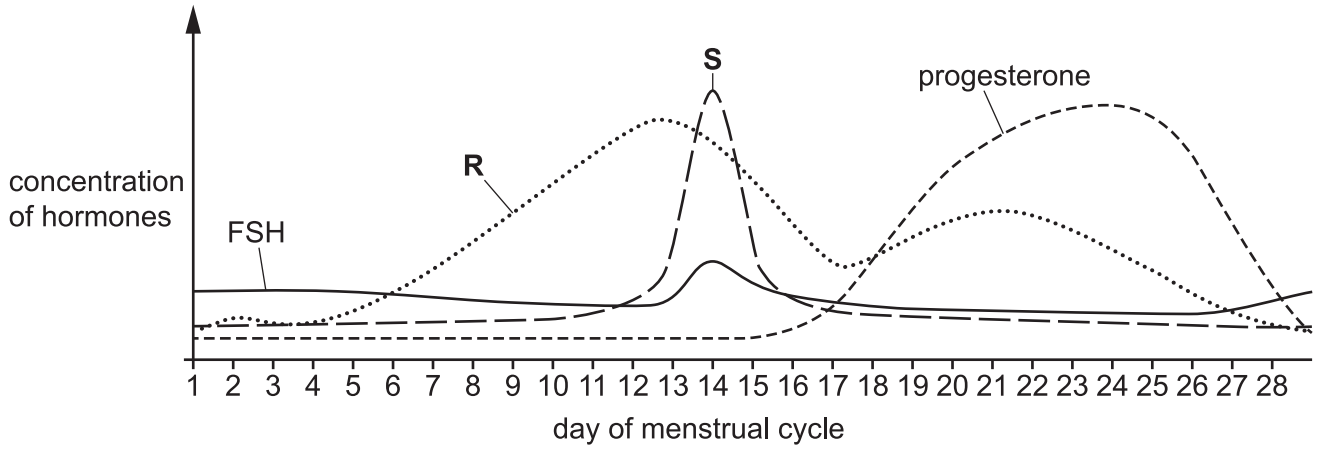


Fig. 4.1

(a) Identify, from Fig. 4.1, hormone:

R .....

S. .....

[2]

(b) State the day or days of the menstrual cycle shown in Fig. 4.1 when:

ovulation is most likely to occur .....

shedding of the uterine lining occurs. .....

[2]

(c) Describe how the concentration of progesterone would change during pregnancy.

Give a reason for this change.

.....

.....

.....

.....

..... [2]

(d) State the sites of production of progesterone during a menstrual cycle and during pregnancy.

during a menstrual cycle .....

during pregnancy .....

[2]

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(e) Describe the role of FSH in the menstrual cycle.

.....

.....

..... [1]

[Total: 9]

Sex hormones and the menstrual cycle Click for more variations

Reduced to 77% to fit the page (wider than A4).

5(a)	**R** oestrogen **;** **S** LH **;**	**2**	
5(b)	*ovulation* 12 / 13 / 14 / 15 / 16 **;** *menstruation* 1 – 8 **;**	**2**	

5(c)	*description* concentration of progesterone increases and remains / is, high **;** *reason* to thicken or maintain uterus lining / prevent ovulation or menstruation **;** **OR** progesterone is produced by the placenta **;**	**2**	1 mark for description and 1 mark for reason
5(d)	*during a menstrual cycle* – ovary **;** *during pregnancy* – ovary / placenta **;**	**2**	
5(e)	*any one from:* stimulates ovaries to release of oestrogen **;** stimulates eggs to, mature / develop (in the ovary) **;**	**1**	

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6 **(a)** Fig. 3.1 shows some of the events that occur in the menstrual cycle.

A	follicle is fully developed
B	gamete is released into the oviduct
C	lining of the uterus is removed from the body
D	lining of the uterus reaches a maximum thickness
E	lining of the uterus gets thicker

Fig. 3.1

(i) Put the events shown in Fig. 3.1 into the correct sequence.

One has been done for you.

		B		

[1]

(ii) State the name of the hormone that stimulates event **A** to occur.

..... [1]

(iii) Event **C** means that menstruating females lose blood regularly.

Two females of the same age have different dietary needs because one has started menstruating and the other has **not** started menstruating.

Suggest why the dietary needs of the two females are different.

.....

.....

.....

.....

..... [2]

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(b) During pregnancy menstruation does not occur.

Fig. 3.2 shows some of the organs of a pregnant woman, viewed from the side.

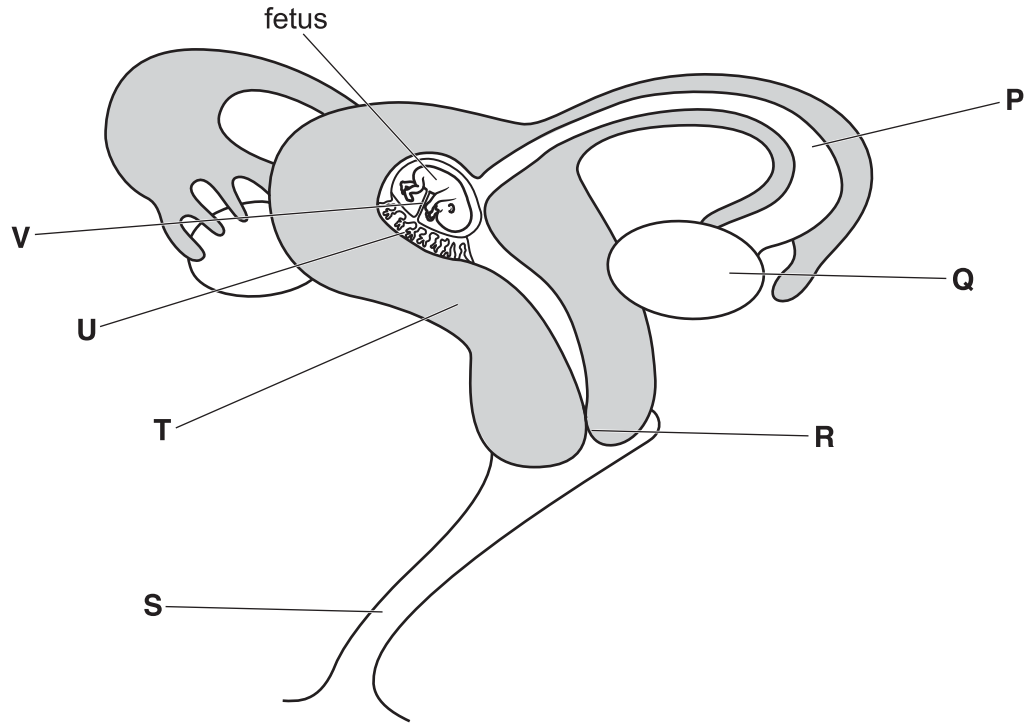


Fig. 3.2

Describe what happens between ovulation and the formation of a fetus.

Use the letters in Fig. 3.2 to support your answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 10]

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Reproductive organs, fertilisation and pregnancy Click for more variations

6(a)(i)	**E** **A** **B** **D** **C** ;	**1**	Accept **A** **E** **B** **D** **C**
6(a)(ii)	FSH ;	**1**	
6(a)(iii)	*any two from:* (menstruating females need more) iron ; ORA (iron is needed for) haemoglobin / red blood cells / transport of oxygen / to prevent (iron-deficiency) anaemia ;	**2**	
6(b)	**1** sperm / male gametes are, deposited in, **S** / vagina OR travel through, **R** / cervix ; **2** egg / sperm / gametes, travel, to **P** / oviduct ; **3** enzymes (from acrosome / sperm) digest jelly coat (around egg) ; **4** fertilisation OR fusion of nuclei, of sperm / male gamete, and of female gamete / egg (cell) ; **5** formation of diploid zygote ; **6** zygote / embryo, travels, down **P** / oviduct OR zygote / embryo, travels to, **T** / uterus ; **7** mitosis / cell division / growth / develop (zygote / embryo / fetus) ; **8** ball of cells / embryo, implants in, **T** / uterus ; **9** **U** / placenta / **V** / umbilical cord (between mother, and fetus) ; **10** delivery / diffusion, of (named) resource / excretion of (named) waste, via **U** / placenta / **V** / umbilical cord ; **11** AVP ; e.g. • named sperm adaptation for swimming e.g. mitochondria • **Q** / ovary / **U** / placenta, releases progesterone (to maintain lining) • *ref to* (cell) specialization / complexity, of fetus / (named) organs (in fetus)	**6**	

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7 **(a)** Fig. 4.1 shows part of a human placenta and umbilical cord. The arrows show the direction of blood flow.

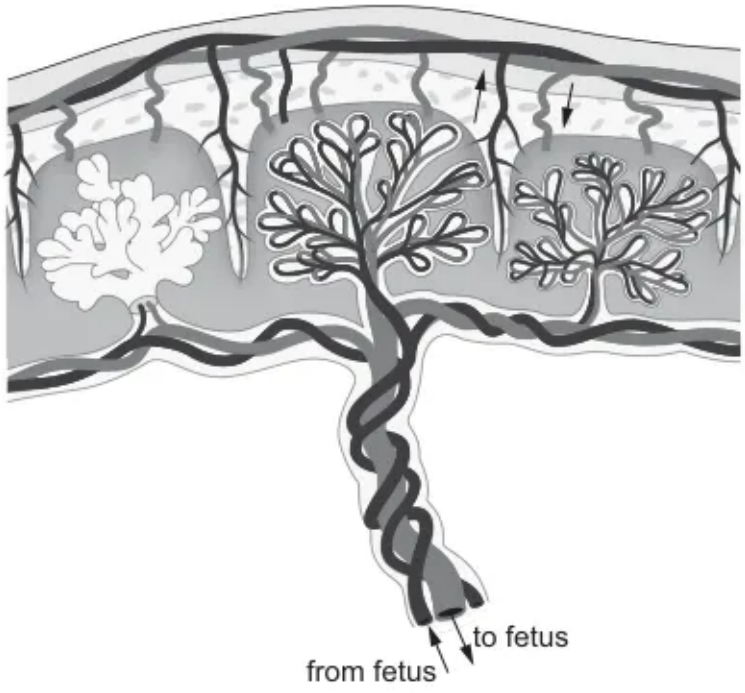


Fig. 4.1

(i) Describe the functions of the placenta and the umbilical cord shown in Fig. 4.1.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

STEM

(ii) A fetus develops inside an amniotic sac.

Describe the functions of the amniotic sac and amniotic fluid.

.....

.....

.....

.....

.....

.....

..... [3]

(b) Syphilis is a sexually transmitted infection (STI) that can be passed from a mother to her fetus.

(i) State the name of **one** other STI that can be passed from mother to fetus.

..... [1]

(ii) State **two** ways to control the spread of STIs.

1 .....

2 .....

[2]

[Total: 10]

Reproductive organs, fertilisation and pregnancy Click for more variations

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7(a)(i)	1 maternal and fetal blood are kept separate / AW ; *plus any three from:* 2 umbilical cord / placenta, transfers named substance, from mother / to fetus ; 3 umbilical cord / placenta, transfers named substance, from fetus / to mother ; 4 umbilical cord / placenta, transfers, antibodies / passive immunity, from mother / to fetus ; 5 placenta forms barrier to, toxins / pathogens ; 6 placenta secretes, progesterone / oestrogen ; 7 AVP ;	**4**	
7(a)(ii)	*any three from:* 1 protects, (fetus) against (mechanical) damage ; 2 regulation of temperature ; 3 allows fetus to move / allows muscle **or** bone development ; 4 protects fetus from infection / provides antibodies ; 5 allows lung development ; 6 sac produces amniotic fluid ; 7 AVP ;	**3**	
7(b)(i)	HIV / named STI ;	**1**	
7(b)(ii)	*any two from:* (named) barrier method of contraception / condom / femidom ; abstinence ; (regular) testing / screening ; education ; tracing sexual partners ; use of antibiotics ; vaccination ; AVP ;;	**2**	

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8 Fig. 1.1 shows a diagram and a photograph of the human immunodeficiency virus (HIV) after release from a human cell.

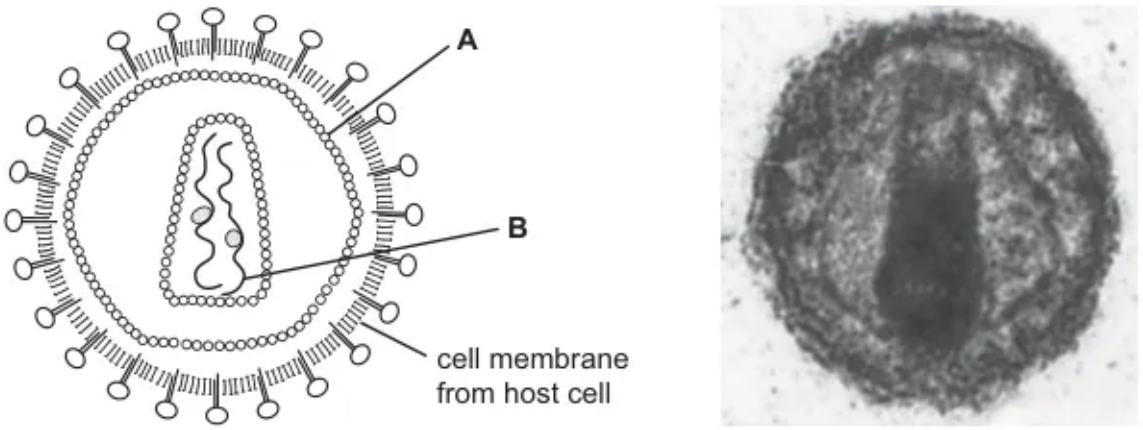


diagram photograph

Fig. 1.1

(a) Identify **A** and **B**.

A .....

B ..... [2]

(b) HIV infects lymphocytes and may lead to their destruction.

Explain why the destruction of lymphocytes puts people infected with HIV at increased risk of developing many infectious diseases.

.....

.....

.....

.....

.....

..... [3]

(c) List three methods of transmission of HIV.

1 .....

2 .....

3 ..... [3]

(d) Describe ways in which the spread of HIV can be reduced.

.....

.....

.....

.....

.....

..... [3]

[Total: 11]

Sexually transmitted infections and HIV Click for more variations

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8	(a)	**A** protein ; **B** RNA / nucleic acid ;	[2]	**A** capsid / protein coat **R** membrane **R** capsule, slime coat **A** DNA
	(b)	lymphocytes stop making antibodies ; *ref to* antibodies stop, bacteria / viruses, spreading / AW ; help <u>phagocytes</u>, ingest / AW, bacteria / AW ; lymphocytes kill infected cells ; AVP ; e.g. another function of antibodies	[max 3]	**A** lymphocytes normally make antibodies **A** in context of lymphocytes and antibodies NOT doing their normal functions **A** pathogens for bacteria **R** 'fight diseases' e.g. clumping bacteria / attaching to antigens
	(c)	(unprotected / AW) sexual intercourse ; across placenta ; at birth ; in breast milk ; sharing, needles / syringes ; in blood products / blood for transfusion / transplants / blood to blood contact ;	[max 3]	**R** saliva **R** other sharps, e.g. razors unless qualified by blood contact **R** using contaminated / dirty / used, needles unqualified **R** donating blood
	(d)	use of, condoms / femidoms ; provide education / suitable example ; publicity campaigns ; needle exchange schemes for drug addicts ; sterilisation of needles / safe disposal / no reuse ; screening blood / blood donors ; AVP ; e.g. HIV+ mothers should bottle feed, limit number sexual partners	[max 3]	**R** not sharing needles unqualified
		[Total: 11]		

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9 Fig. 5.1 shows the structure of the placenta and parts of the fetal and maternal circulatory systems.

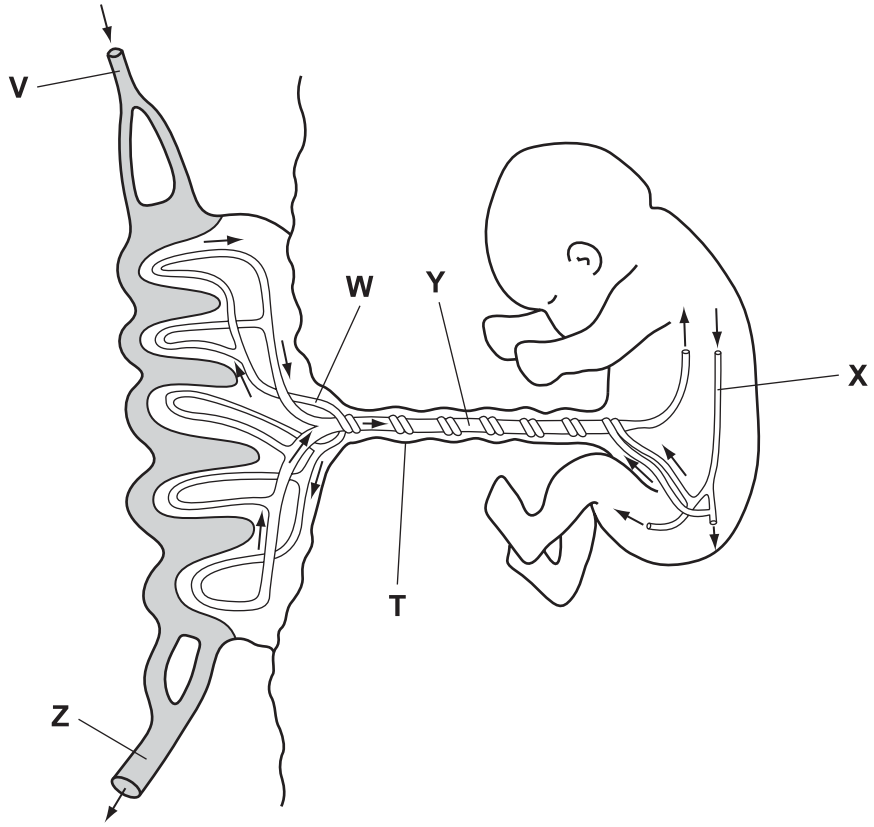


Fig. 5.1

(a) (i) Complete Table 5.1 by listing the blood vessels that carry oxygenated blood. Use the letters in Fig. 5.1 to identify the blood vessels.

Table 5.1

circulatory system	blood vessels that carry oxygenated blood
maternal	
fetal	

[2]

(ii) Name structure **T** and describe what happens to it after birth.

.....

.....

.....

..... [2]

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(iii) The placenta is adapted for the exchange of substances between the maternal blood and the fetal blood.

Describe the exchanges that occur across the placenta to keep the fetus alive and well.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) The placenta secretes the hormones oestrogen and progesterone.

Describe the roles of these hormones during pregnancy.

.....

.....

.....

.....

.....

..... [3]

[Total: 11]

Reproductive organs, fertilisation and pregnancy Click for more variations

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9 (a) (i)

circulatory system	blood vessels that carry oxygenated blood
maternal	V ;
fetal	Y / Y **and** X ;

[2]

(ii)

umbilical cord ;
Any one of the following:

tied / clamped ;
cut ;
(part attached to mother) comes away with placenta ;
(part attached to baby) drops off ;

[2]

(iii)

MP1 oxygen, from maternal / to fetal ;
MP2 carbon dioxide, from fetal / to maternal ;
MP3 named nutrients from maternal / to fetal ;
MP4 water, either direction or both ;
MP5 antibodies, from maternal / to fetal ;
MP6 urea / nitrogenous waste, from fetal / to maternal ;
MP7 passage of hormones, from maternal / to fetal / both directions ;
MP8 diffusion in correct context ;
MP9 active transport in correct context ; (amino acids)

[max 4]

(b)

oestrogen and progesterone

MP1 develops, (lining of) uterus / endometrium ;
MP2 prevent, shedding of lining / menstruation ;
MP3 inhibit (release of) FSH ;
MP4 by pituitary gland ;
MP5 prevent egg cells / follicles, developing (in ovary) / ovulation ;
MP6 promote development / growth, of mammary glands ;

[max 3]

[Total: 11]

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