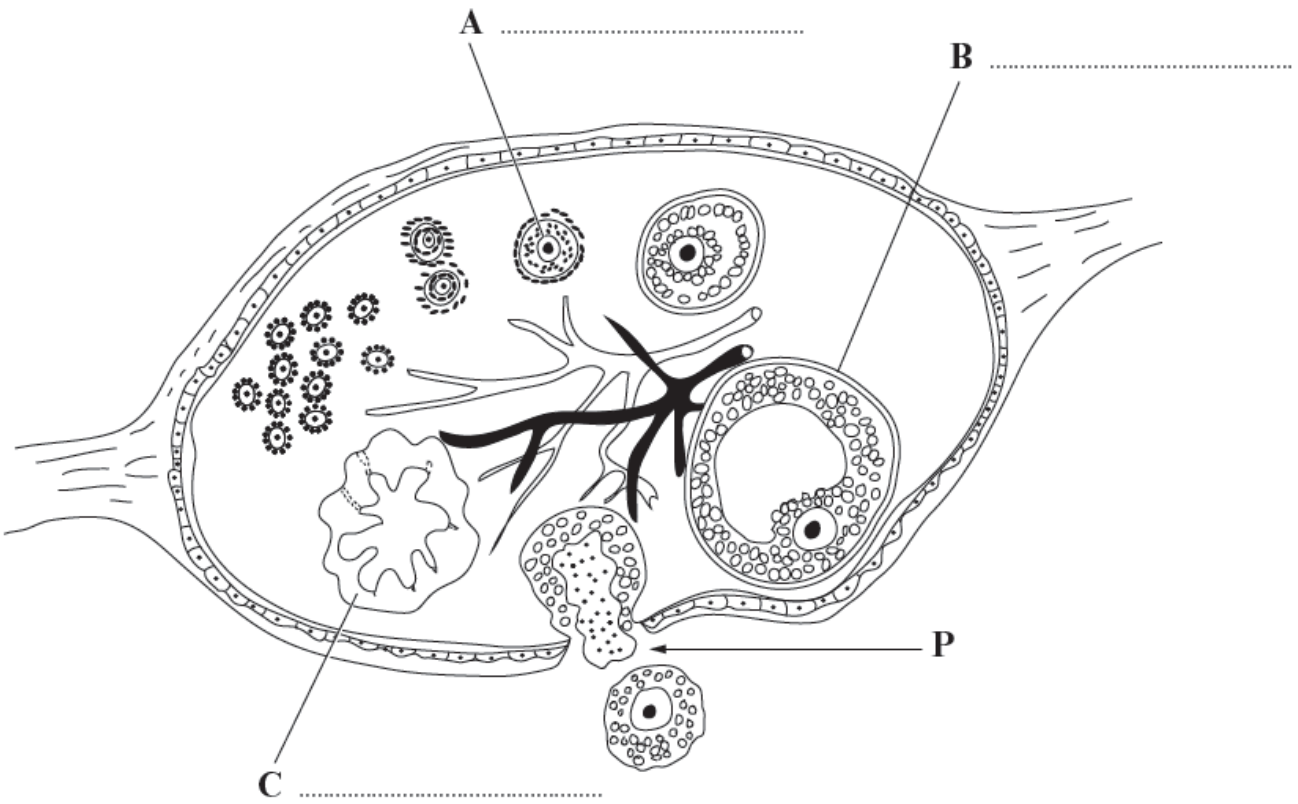
WJEC (Wales) Biology A-level
Topic 4.1: Sexual Reproduction in Humans
Questions by Topic

1. The diagram below represents a section through a human ovary showing the developmental stages which lead to ovulation.



(a) (i) Label the structures **A - C** shown on the diagram above.

[3]

(ii) What process is taking place at **P**?

[1]

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(iii) Name the hormone produced by the developing embryo which prevents the breakdown of structure **C**.

[1]

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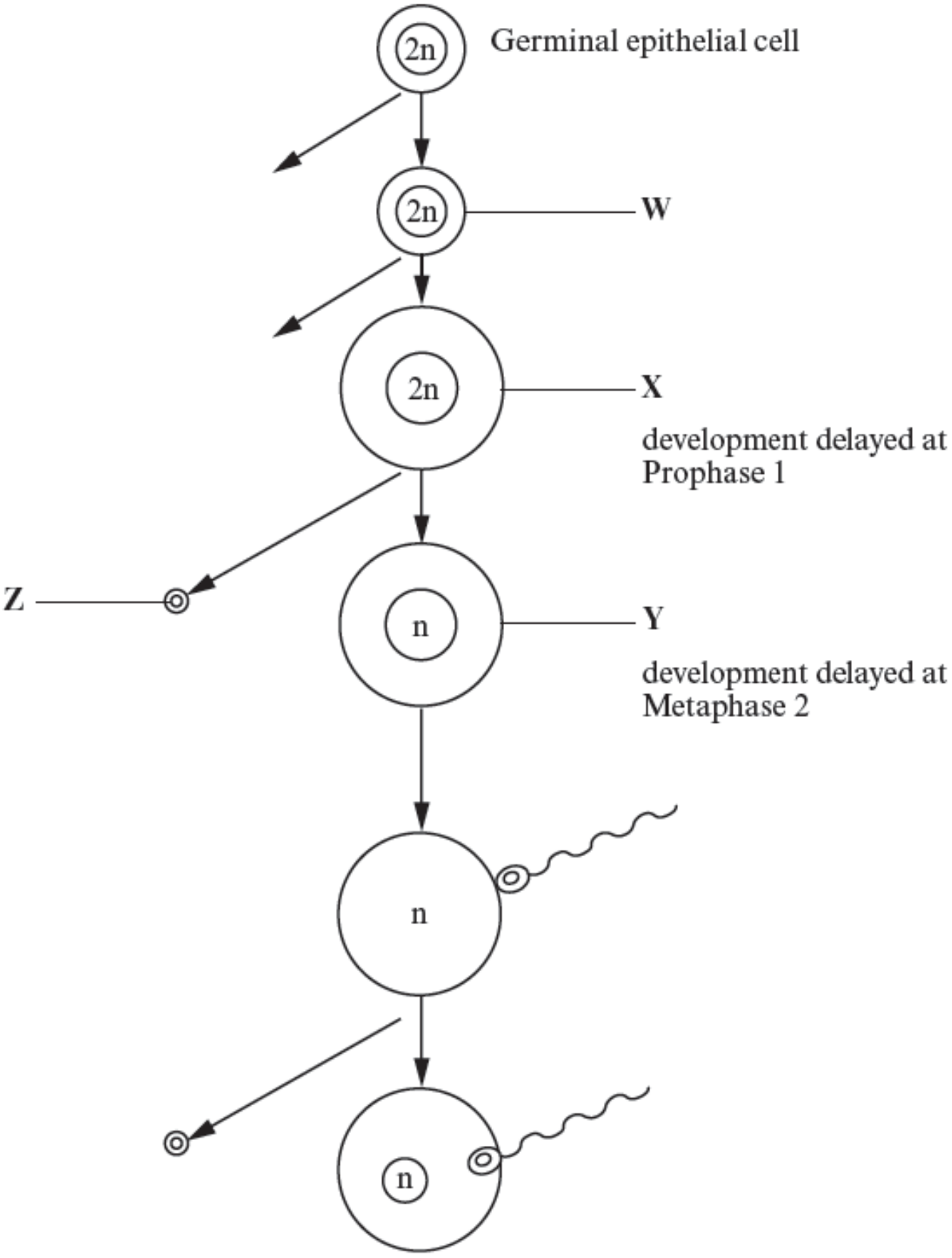
(b) The diagram below represents the stages of oogenesis and fertilisation.



(i) Name cells **W, X, Y and Z** shown on the diagram above.

[4]

W . . . . . .

. . . . . .

X . . . . . .

. . . . . .

Y . . . . . .

. . . . . .

Z . . . . . .

. . . . . .

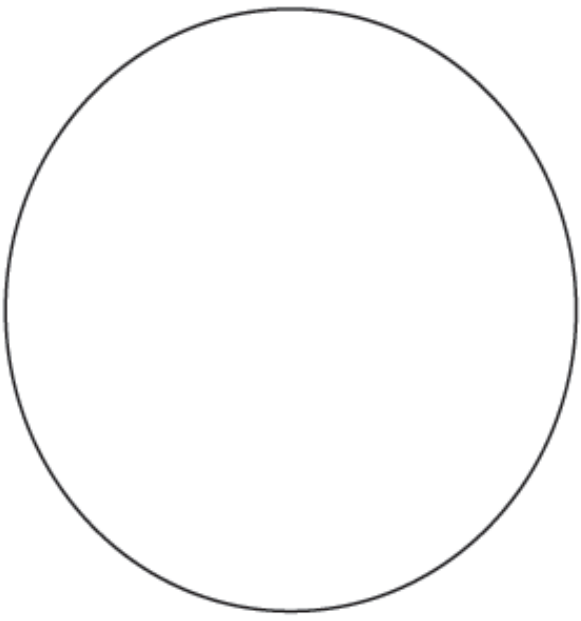
(ii) What process is involved in the production of cell **W**?

[1]

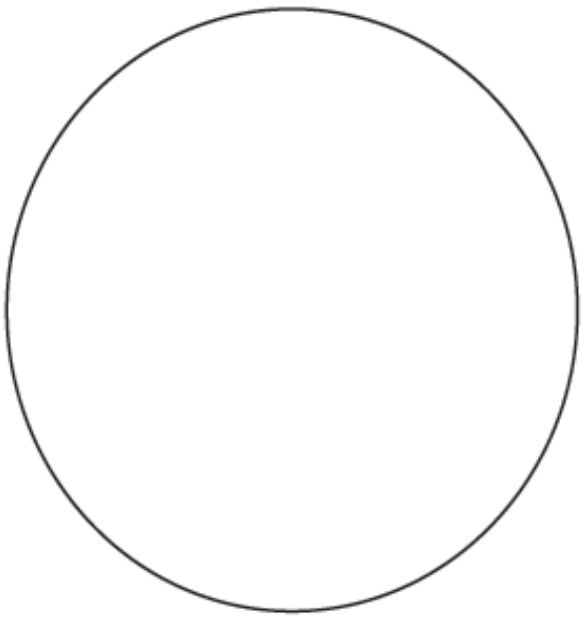
(iii) In the circles below draw diagrams showing **two pairs** of homologous chromosomes as they would appear in cell **X** on the diagram opposite (Prophase 1) and the appearance of the chromosomes following cell division to form cell **Y** on the diagram opposite (Metaphase 2).

[3]

Cell X



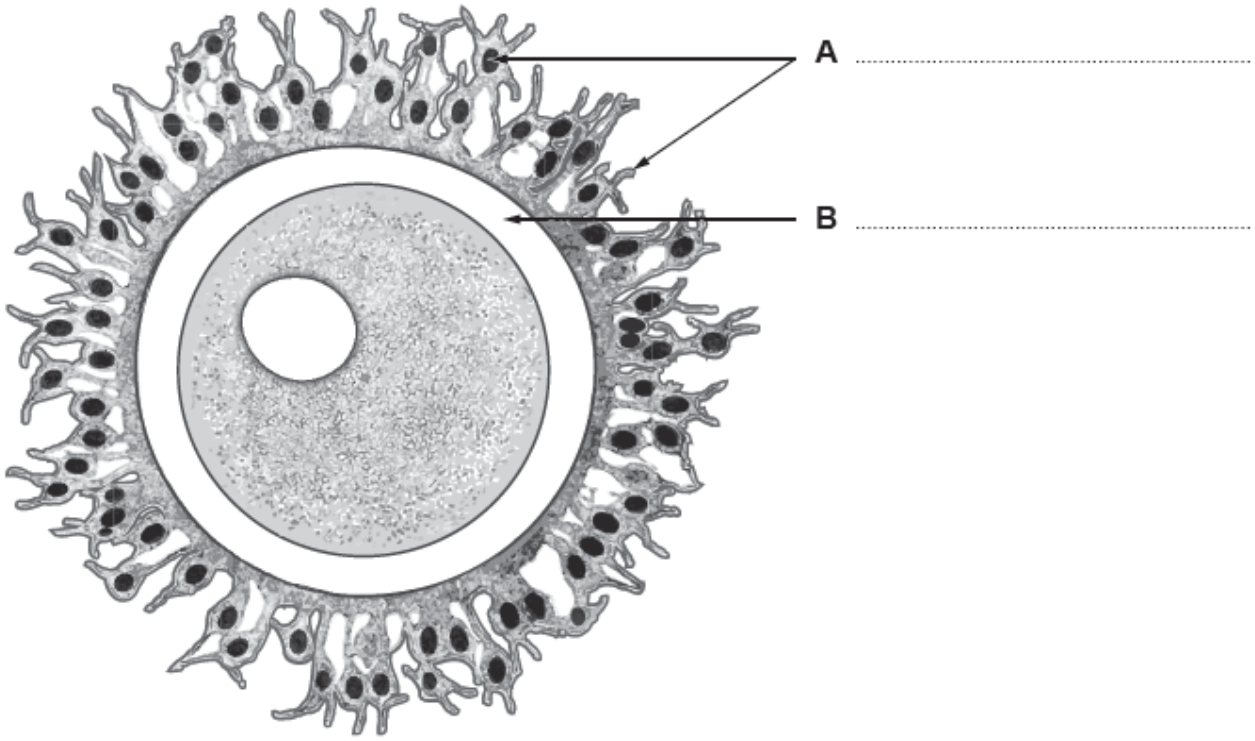
Cell Y



(c) Suggest why only one functional female gamete is produced as a result of meiosis.

[2]

2. The illustration below shows a secondary oocyte.



(a) Label parts **A** and **B**.

[2]

(b) The diagram below shows a sperm cell.

(i) Name the structure labelled **C**.

[1]

(ii) Describe the role that structure **C** plays in fertilisation of the ovum.

[2]

(c) Explain each of the following.

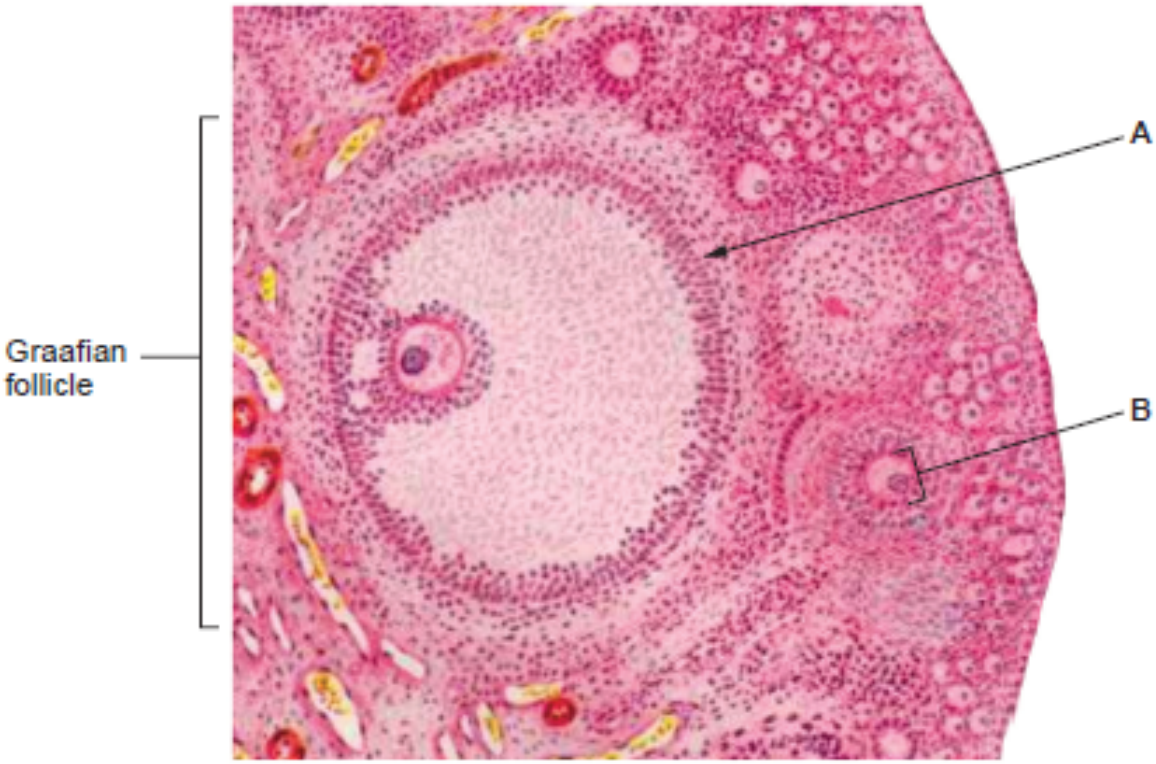
[3]

(i) cell cleavage

(ii) blastocyst

(iii) implantation

3. The photomicrograph below shows a section through part of a human ovary.



(a) (i) Name the structures A and B. [2]

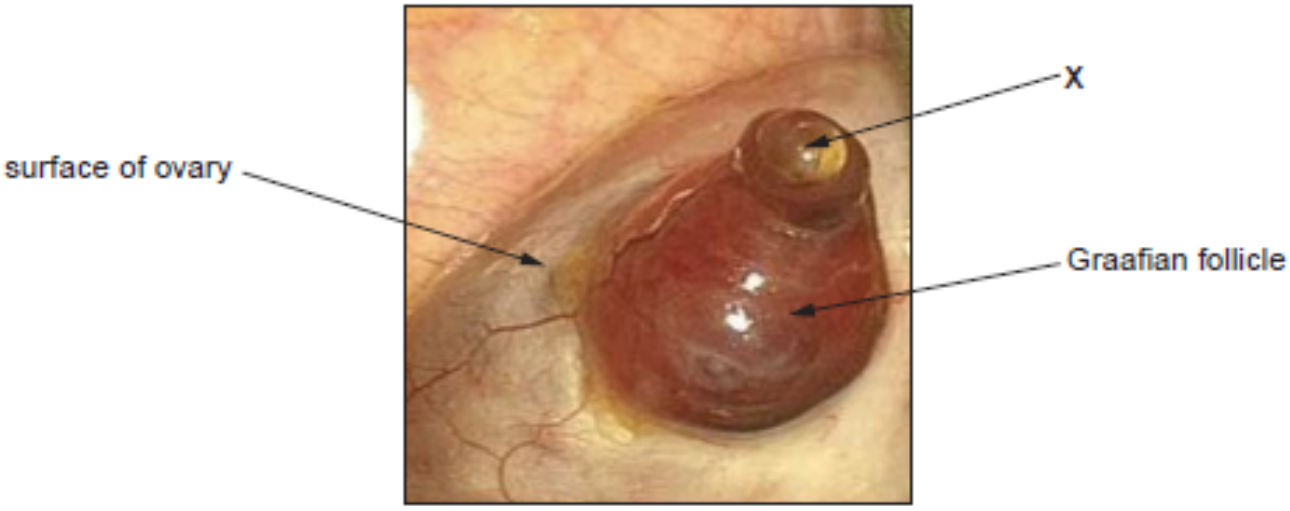
A .....

B .....

(ii) The volume of a primary follicle is $0.00005\,mm^3$ and the volume of a mature Graafian follicle is $4.19 \times 10^3\,mm^3$. By how many times is the volume of the Graafian follicle bigger than the volume of the primary follicle? Express your answer in standard form. [3]

Graafian follicle is ..... times bigger than the primary follicle

In the human female, the first half of the meiotic division takes place just before ovulation. The photograph below shows the surface of an ovary at ovulation.



(b) Structure **X** contains the secondary oocyte. Name the two outer layers of structure **X**. [1]

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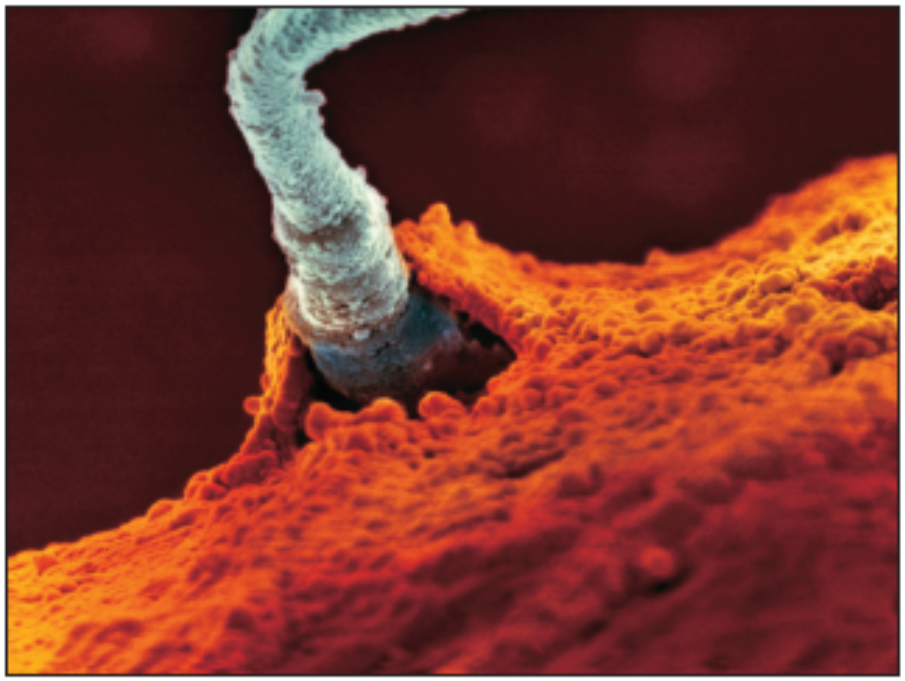
The scanning electron micrograph shows a sperm penetrating the surface of structure **X**.



(c) Describe how the sperm is able to penetrate the outer layers of this structure. [2]

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(d) In vitro fertilisation (IVF) is a technique available to help people with fertility problems. During IVF, secondary oocytes are removed from a woman's ovaries and are fertilised with sperm in a laboratory.

(i) There is a risk that during fertilisation more than one sperm enters the secondary oocyte. The risk is increased if the secondary oocyte is not fully mature. There is a 6% increased chance of more than one sperm entering the secondary oocyte with IVF.

State how the secondary oocyte usually prevents the entry of more than one sperm and suggest a reason why there is an increased risk with IVF. [2]

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(ii) The developing embryo is not transferred into the uterus until three days after IVF. Using your knowledge of fertilisation and implantation explain why this delay is needed. [3]

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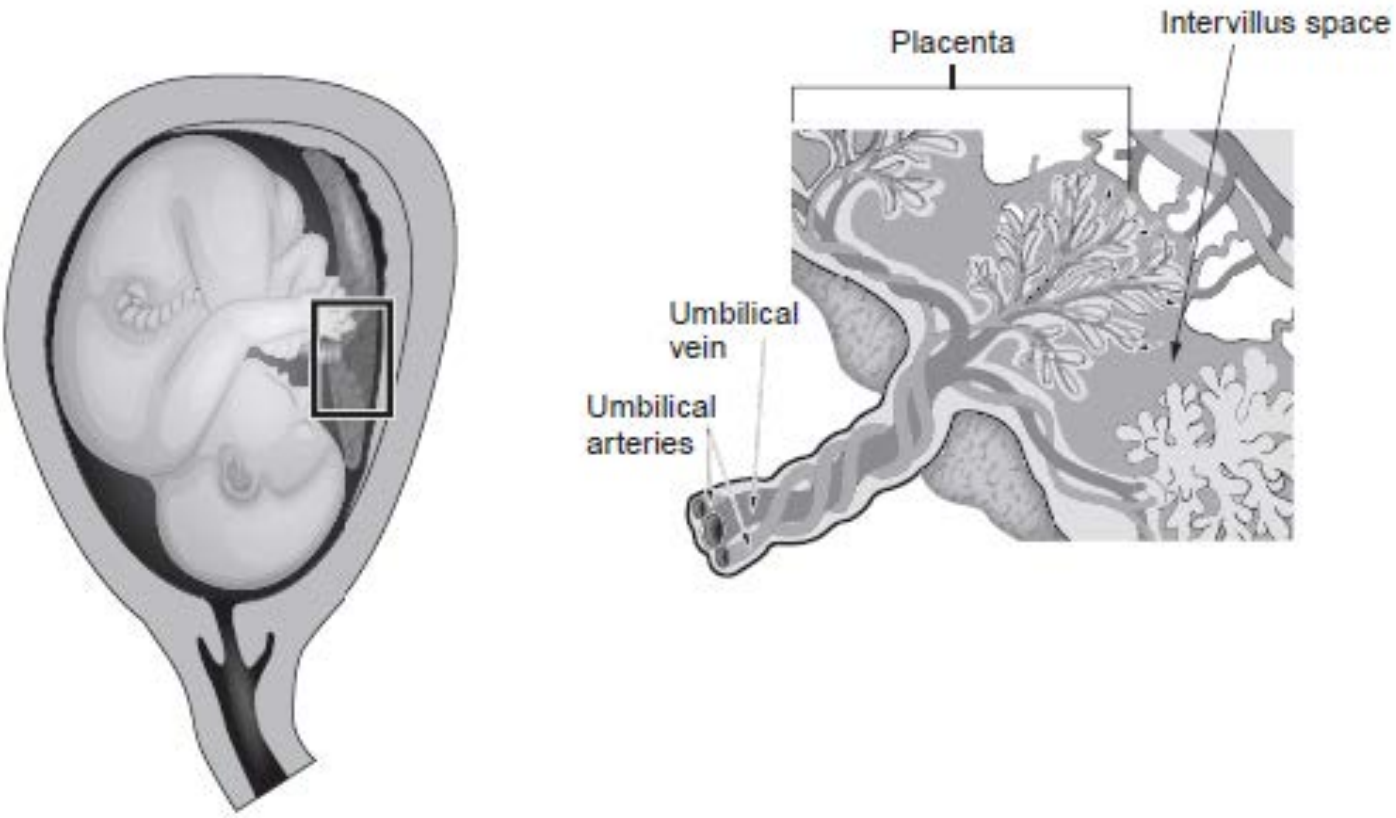
4. The diagram below shows the structure of a human placenta.



(a) State **four** differences between the composition of the blood in the umbilical arteries and the umbilical vein. [2]

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(b) Give **two** reasons why there must be a barrier between foetal and maternal blood systems. [2]

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(c) Suggest how the following features of the placenta enable it to carry out its function.

(i) The arterial blood flow to the placenta is high (700 $cm^3 min^{-1}$) and the blood in the intervillus space is exchanged three times per minute. [1]

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(ii) The pressure in the uterine arteries is ten times greater than the pressure in the intervillus space. [1]

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(iii) The length of the capillaries in the placenta is about 320 km. [1]

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