1 Plants can reproduce sexually and produce seeds.

These seeds can remain dormant for long periods of time before germination takes place.

(a) What is meant by the term **germination**?

(1)

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(b) Explain three conditions needed for seeds to germinate.

(6)

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(Total for Question = 7 marks)

2 A student wanted to investigate the conditions required for the germination of seeds.

He set up 5 boiling tubes each containing 10 cress seeds on cotton wool sealed with rubber bungs.

- Tube A contained dry cotton wool and was placed at room temperature in the light.
- Tube B contained moist cotton wool and was placed at room temperature in the light.
- Tube C contained moist cotton wool and was placed in a fridge in the dark.
- Tube D contained moist cotton wool and was placed at room temperature in the dark.
- Tube E contained moist cotton wool and was placed at room temperature in the light and contained alkaline pyrogallol to absorb oxygen.

The student left the tubes for 3 days and then returned to observe the results.

He measured the height of the seedlings and recorded how many had germinated.

Some of his results are shown below.

Tube A no seeds germinated.

Tube B 9 seeds germinated with the following heights: 2.0 cm, 2.1 cm, 3.1 cm, 2.2 cm, 2.1 cm, 1.8 cm, 2.3 cm, 2.7 cm and 2.5 cm.

Tube C one seed germinated with a height of 0.3 cm.

(a) Complete the summary table to show the conditions and the results for tubes A, B and C only.

(4)

Tube	Location	Water	Light	% seeds germinated	Average height in cm
A	room		yes		
B		yes			
C					0.3

(b) Explain how the student could tell whether the seeds had germinated.

(2)

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(c) The student's teacher commented that there were too many different independent variables in his experiment.

Identify the independent variables in the experiment.

(2)

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(d) Explain what the results would be for tube D.

(2)

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(e) Explain why the seeds in tube E failed to germinate.

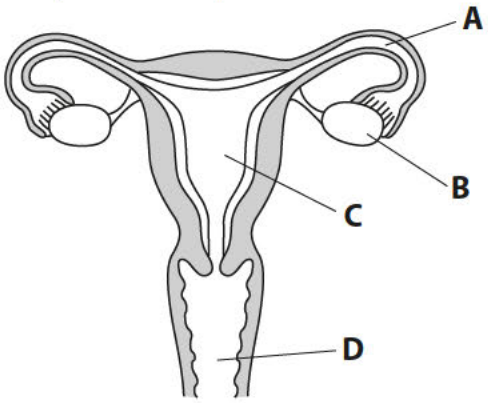
(1)

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(Total for Question = 11 marks)

3 The diagram shows the female reproductive system.



(a) Put a cross ☒ in the correct box to show

(i) where the egg is released

(1)

☐ **A**

☐ **B**

☐ **C**

☐ **D**

(ii) where the egg is fertilised

(1)

☐ **A**

☐ **B**

☐ **C**

☐ **D**

(iii) where the embryo becomes surrounded by amniotic fluid

(1)

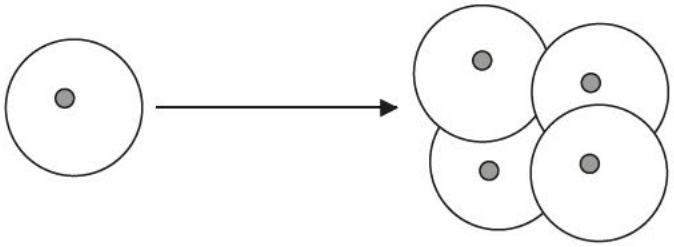
☐ **A**

☐ **B**

☐ **C**

☐ **D**

(b) The diagram shows a fertilised egg dividing into an embryo.



(i) What is another name used to describe a fertilised egg?

(1)

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(ii) Name the type of cell division used to produce the embryo.

(1)

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(iii) Complete the table by ticking the box that shows the correct description of each cell in the embryo.

(1)

Description	Tick
haploid with 23 chromosomes	
haploid with 46 chromosomes	
diploid with 23 chromosomes	
diploid with 46 chromosomes	

(c) Describe how the developing embryo is supplied with nutrients.

(3)

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(Total for Question = 9 marks)

4 (a) The average gestation period of an animal is the time from fertilisation to birth.

The table contains data about the length of the average gestation period and the average mass of the different species rather than an individual female deer.

Species of deer	Average mass of a female in kg	Average gestation period in days
muntjac	13	210
sika	35	217
roe	35	294
reindeer	100	224
red	145	233

(i) Describe the relationship between mass and gestation period.

(1)

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(ii) In one of the species of deer the embryo stays dormant for some months before it starts to develop in the uterus.

Using the information in the table, explain which species of deer this is.

(3)

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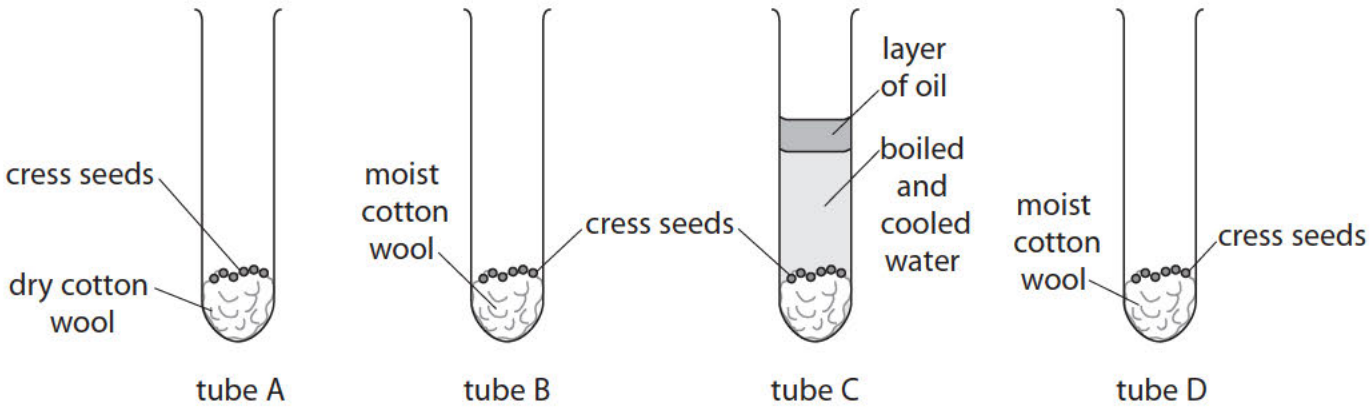
(b) The placenta supplies the embryo with nutrients during the gestation period.

Describe the role of the placenta in the development of the embryo.

(4)

(Total for Question = 8 marks)

5 A teacher set up an experiment to investigate the factors required for seed germination. He set up four test tubes containing cotton wool and cress seeds as shown in the diagram.



He placed tubes A, B and C in an incubator at 20 °C and tube D in a fridge at 4 °C.

He left the tubes for four days then returned to look at them.

He asked his students to produce a table to show the factor being tested and whether the seeds germinated.

(a) Complete the table to show the factor being tested and whether the seeds are likely to germinate.

(3)

Test tube	Factor being tested	Seeds germinated
A		
B	control (all factors present)	yes
C	oxygen	
D		

(b) (i) Suggest how the students could see if germination had taken place.

(1)

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(ii) Name two other variables the teacher should control in his experiment.

(2)

1 .....

2 .....

(c) Other seeds such as beans or peas contain larger food stores.

(i) Suggest a food molecule that seeds could use as a food store.

(1)

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(ii) Explain why it is important for seeds to have a food store.

(2)

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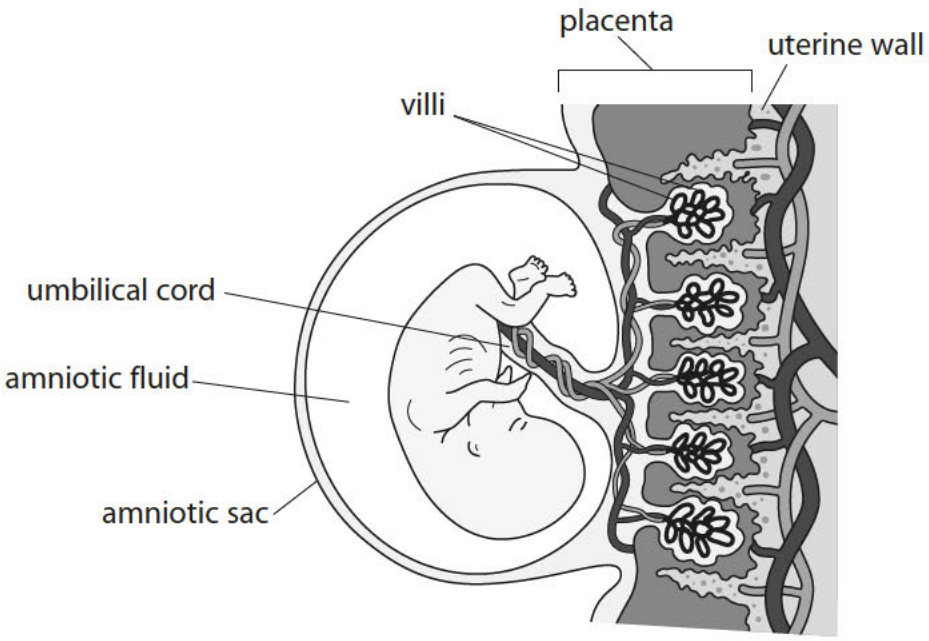
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(d) Describe an experiment you could carry out to determine the energy content of a seed.

(4)

(Total for Question = 13 marks)

6 The diagram shows a human fetus developing in the uterus.



(a) Describe the function of the amniotic fluid surrounding the fetus.

(2)

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(b) The placenta functions as an organ of exchange.

(i) Name two substances, required by the fetus, that move from the mother's blood into the blood of the fetus.

(2)

1 .....

2 .....

(ii) Name two waste substances that move from the blood of the fetus into the mother's blood.

(2)

1 .....

2 .....

(c) Use information from the diagram to help explain how the placenta is adapted for the efficient exchange of substances.

(3)

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(Total for Question = 9 marks)