

Reproduction

Question Paper 1

Level	International A Level
Subject	Biology
Exam Board	Edexcel
Topic	Cell Structure, Reproduction and Development
Sub-Topic	Reproduction
Booklet	Question paper 1

Time Allowed: 60 minutes

Score: /50

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

(c) One of the stages of the cell cycle is mitosis.

Place a cross (☒) in the box next to the correct words to complete each of the following statements.

(i) The stages of mitosis take place in the following order

(1)

- A** anaphase, telophase, metaphase, prophase
- B** metaphase, anaphase, prophase, telophase
- C** prophase, metaphase, anaphase, telophase
- D** telophase, anaphase, metaphase, prophase

(ii) By the end of prophase

(1)

- A** the chromatids move to the poles of the cell
- B** the nuclear envelope breaks down and the spindle is formed
- C** the nuclear envelope reforms and the spindle breaks down
- D** the spindle fibres contract and the chromatids are separated

(Total for Question 1 = 6 marks)

- 2 In Japan, scientists have used stem cells from the skin of mice to produce gametes.

The stem cells were stimulated to give rise to cells that can produce gametes. These cells were implanted into sterile female mice that had been unable to produce egg cells. These female mice were then able to produce egg cells.

The photograph below shows one of these female mice with her offspring.



© SSP

Magnification $\times 1$

- (a) State the property of the stem cells which allowed them to give rise to cells that can produce gametes.

(1)

- (b) The allele for white fur is recessive. The scientists took a skin cell from a brown mouse and used it to grow egg cells in a sterile white mouse. These egg cells were fertilised with sperm from another white mouse.

All the offspring had brown fur.

Suggest what conclusion can be made from this observation.

(2)

.....

.....

.....

.....

.....

.....

(b) Giant pandas are difficult to breed in captivity. The males tend to be aggressive towards the females and there is only a short period of time when the females are fertile.

Artificial insemination can be used to fertilise female pandas. The sperm for this has been stored by freezing.

Freezing for long periods of time can damage the mitochondria in the sperm.

(i) Explain how damage to the mitochondria could affect the ability of sperm to fertilise an egg.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

*(ii) Freezing sperm can also damage the acrosome membrane.

Suggest how damage to the acrosome membrane could affect the fertilisation of an egg.

(4)

.....

.....

.....

.....

.....

.....

.....

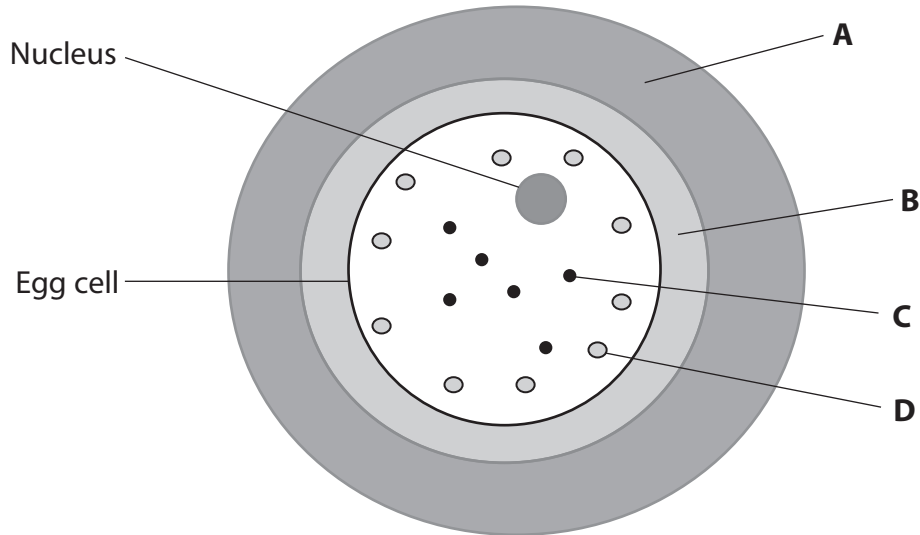
.....

.....

.....

- 4 A human egg cell contains a nucleus, lipid droplets and cortical granules. Cortical granules are lysosomes containing enzymes.

The diagram below shows a human egg cell and the structures surrounding it.



- (a) Labels **A**, **B**, **C** and **D** indicate the positions of structures either inside or associated with the human egg cell.

Place a cross in the box which corresponds to the correct name of each structure.

- | | | | | | |
|------------------------------|--|--|--|--|-----|
| (i) Cortical granule | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> D | (1) |
| (ii) Layer of follicle cells | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> D | (1) |
| (iii) Zona pellucida | <input checked="" type="checkbox"/> A | <input checked="" type="checkbox"/> B | <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> D | (1) |

(b) Describe the function of each of the following structures that are found in a human egg cell.

(i) Lipid droplets

(1)

.....
.....

(ii) Cortical granules

(3)

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

(c) Give **two** similarities of the nucleus of a human egg cell and the nucleus of a human sperm cell.

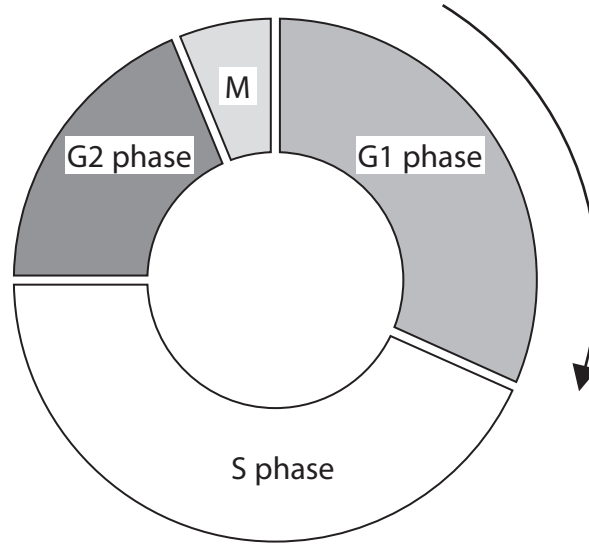
(2)

1.....
.....
.....

2.....
.....
.....

(Total for Question 4 = 9 marks)

5 A zygote forms after the fertilisation of a human egg cell. It divides several times to produce a ball of cells. This involves the cell cycle, shown in the diagram below.



(a) (i) Describe the function of the cell cycle.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

.....

(ii) Place a cross in the box next to the stage of the cell cycle during which DNA is replicated.

(1)

- A** G1 phase
- B** G2 phase
- C** M phase
- D** S phase

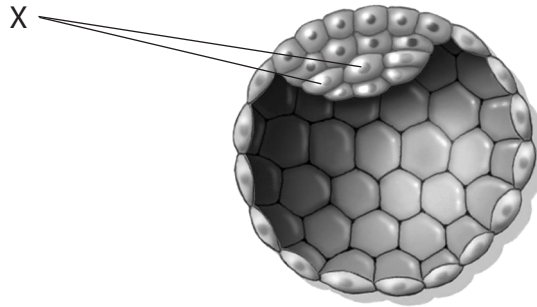
(iii) Name the stage indicated by the letter M on the diagram of the cell cycle.

(1)

.....

- (c) Several days after fertilisation the ball of cells becomes a blastocyst. The diagram below shows a section through a blastocyst.

The cells labelled X in the diagram are pluripotent. These cells give rise to tissues and then organs.



- (i) Explain what is meant by the term **pluripotent**.

(2)

.....

.....

.....

.....

.....

.....

.....

- (ii) Suggest how organs develop from pluripotent cells.

(2)

.....

.....

.....

.....

.....

.....

.....

(Total for Question 5 = 13 marks)