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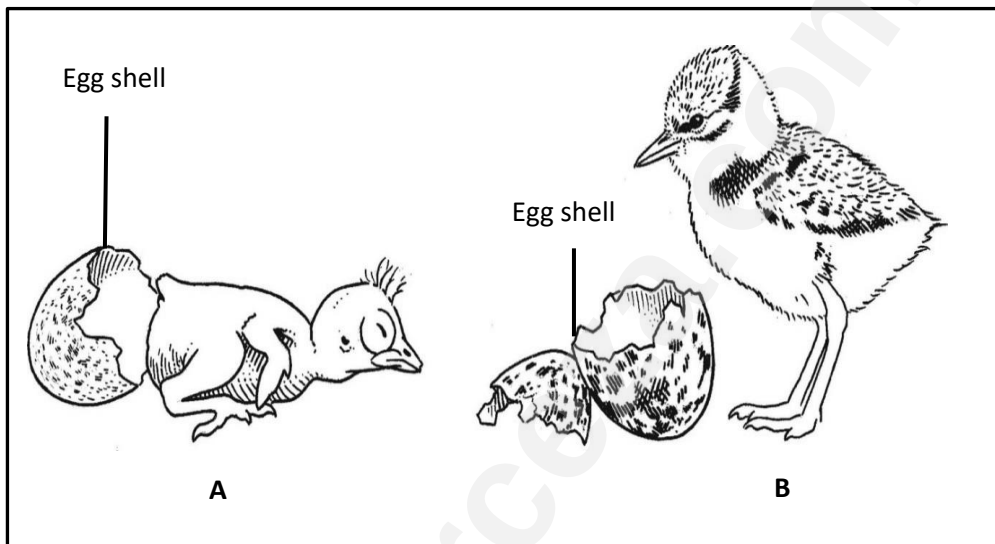
Grade 12
Time: 100 minutes

Assignment: Term 3
Total: 100

REPRODUCTIVE STRATEGIES IN VERTEBRATES

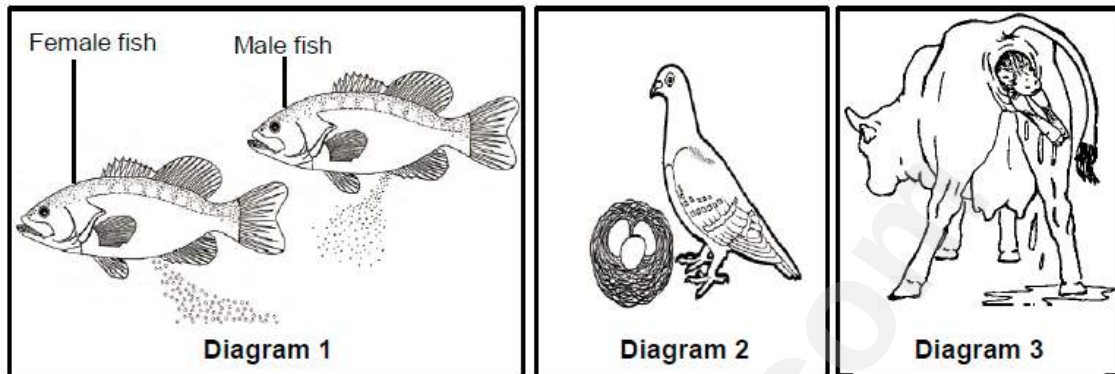
QUESTION 1

- 1.1 Study the diagram of one-day-old hatchlings A and B below. The diagram is not drawn to scale.



- 1.1.1 State TWO visible features in hatchling A which indicate altricial development. (2)
- 1.1.2 The diagram represents ovipary.
Explain ONE possible advantage of vivipary when compared to ovipary. (2)
- 1.1.3 Explain why you would expect that the yolk content of the egg of the hatchling B was more than that of hatchling A. (2)
(6)

- 1.2 The diagram below represents organisms with different reproductive strategies.



- 1.2.1 Which diagram(s) (1,2 or 3) represent(s) organism(s):

- (a) where external fertilization takes place. (1)
- (b) Where an extra-embryonic membrane develops to assist with the protection and development of the embryo. (2)
- (c) which is/are oviparous. (2)

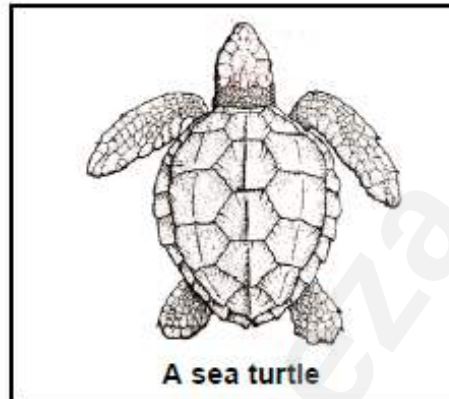
- 1.2.2 Name the type of egg produced by the organisms represented in Diagram 2.

(1)
(6)

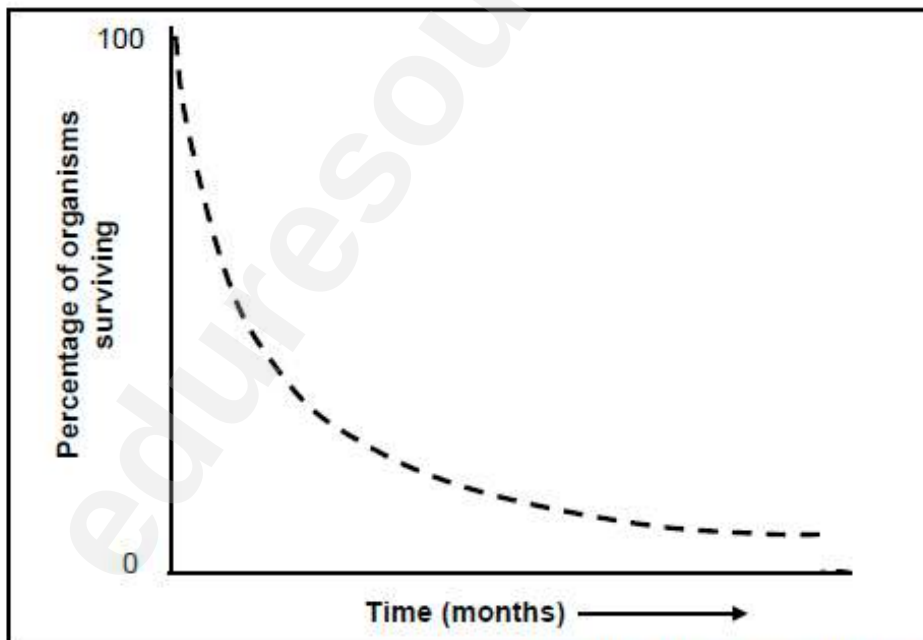
1.3 Read the extract and answer the questions that follow.

In a species of sea turtles (shown below), the females leave the water to lay their eggs in a nest on the beach. The female makes the nest by digging a hole with her hind legs. A female is known to lay about 100 or more eggs. After the eggs have been laid, the female covers the nest with sand to hide it from predators and leaves the eggs to incubate on their own.

It takes about two months for the hatchlings to emerge from the nest. The hatchlings must try to make it to the sea safely. Only about 10% of the hatchlings usually make it to the sea safely and survive to reproduce.



The graph below shows the percentage of survivors in a sea turtle population over a period of time.



[Adapted from <https://bioweb.uwlax.edu>]

1.3.1 Write down whether the type of reproduction in the sea turtles is oviparous, viviparous or ovoviviparous. (1)

1.3.2 Give a reason for your answer to QUESTION 1.3.1. (1)

- 1.3.3 The shape of the graph would differ if there were parental care.
- (a) Describe how the shape of the graph would differ if there were parental care. (1)
- (b) Explain your answer to QUESTION 1.3.3 (a). (2)
- (5)

MALE REPRODUCTIVE SYSTEM

QUESTION 2

2.1 Read the following extract and answer the questions:

Several recent studies have suggested a gradual decline in sperm production in men. Endocrine disruptors as well as life style have been suggested risk factors. One life style factor that may affect human fertility is driving a vehicle for a prolonged period. It is suggested that the driving position may increase the scrotal temperature.

- 2.1.1 State any TWO risk factors identified by the researcher. (2)
- 2.1.2 Explain why regular long-distance driving with no breaks could possibly lower the sperm count in healthy males. (3)
- 2.1.3 Suggest a consequence of lower sperm count in males. (2)
- 2.1.4 State any ONE daily life style trend or routine (other than the one mentioned in the extract) that should be avoided to maintain the optimum scrotal temperature. (1)
- 2.1.5 The entire human sperm cell is 50 μm (from the tip of the head until the end of the tail). The head is 3 μm and the middle piece is 1 μm in length.
Use the information provided above to draw a pie chart depicting the relative sizes of the three parts of a sperm cell.
SHOW ALL CALCULATIONS. (7)
- 2.1.5 Draw a labelled diagram of a sperm. (6)
- (21)

- 2.2 Records of human fertility for the period 1941 to 1990 have shown changes in the sperm count of normal men. The table below summarises the changing percentages of men with high or low sperm count over a period of 50 years.

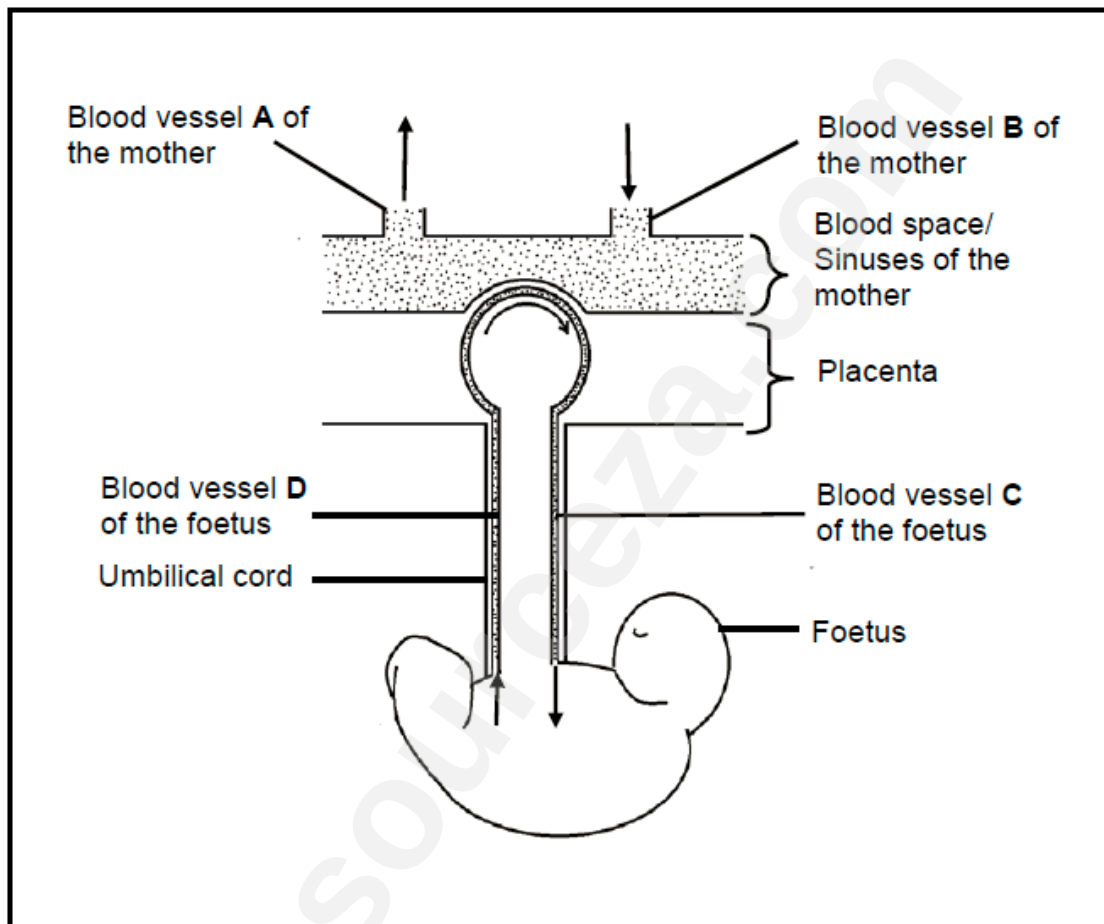
TIME PERIOD	MEN WITH HIGH SPERM COUNT (%)	MEN WITH LOW SPERM COUNT (%)
1941–1950	50	4
1951–1960	45	5
1961–1970	28	11
1971–1980	21	14
1981–1990	15	18

- 2.2.1 During which time period was there:
- the highest percentage of men with low sperm count. (1)
 - the lowest percentage of men with low sperm count. (1)
- 2.2.2 Calculate the percentage increase of men with low sperm counts from 1971 to 1990. (2)
- 2.2.3 Draw a histogram to show the percentages of men with high sperm count for the period indicated in the table. (6)
- 2.2.4 Draw a labelled structure of an ovum. (5)
- 2.2.5 Tabulate ONE difference between the sperm and ovum (3)
- (18)**

FEMALE REPRODUCTIVE SYSTEM

QUESTION 3

- 3.1 The diagram below represents the relationship between the blood system of the foetus and that of the mother. The arrows indicate the direction of blood flow in the blood vessels.



- 3.1.1 Apart from playing a role in the diffusion of substances from the mother's blood to the foetus' blood, and vice versa, state TWO other functions of the placenta. (2)
- 3.1.2 Blood vessel D is an artery. Tabulate TWO differences of the composition of the blood found in blood vessel C and the blood found in blood vessel D. (5)
- 3.1.3 Explain ONE consequence for the foetus if blood vessel D becomes blocked preventing blood flow. (2)
- 3.1.4 If the blood of the mother and the blood of the foetus come into contact with each other, it could lead to the death of the foetus. Explain why this would occur. (2)
- (11)**

- 3.2 An investigation was done to determine the size of the follicle in the human ovary during the menstrual cycle. The diameter of a follicle gives us an indication of the stage of development of the follicle.

The follicle size of 50 women was measured and recorded over a period of 25 days.

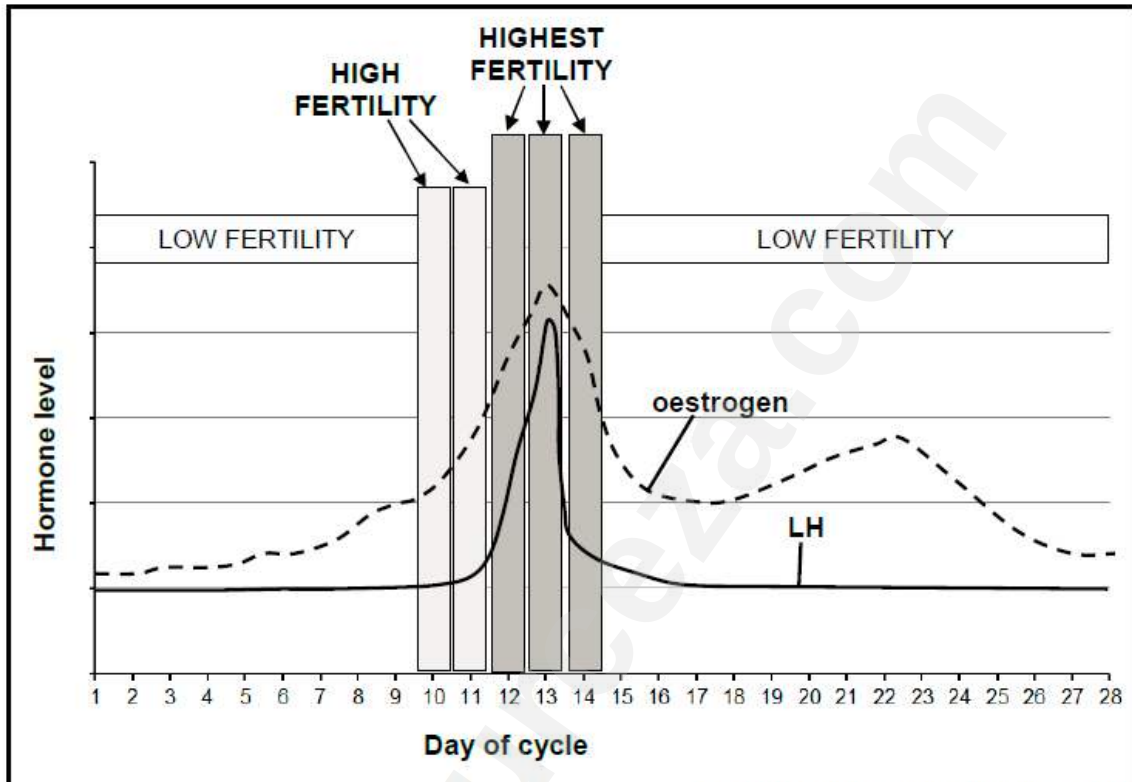
The results of the investigation are recorded in the table below:

Table showing Average Follicle Sizes Over 25 Days	
Days When Follicles were measured	Average Follicle Diameter of 50 woman (mm)
5	6.9
10	13.3
13	18.8
14	22.0
20	3.4
25	2.6

(Adapted from: Journal of Reproduction and fertilization, 1983)

- 3.2.1 State the name of the hormone responsible for the increase in follicle size from Day 5 to 14 (1)
- 3.2.2 Explain the changes in the follicle size from Day 14 to Day 25 (3)
- 3.2.3 Name TWO hormones that are secreted by the follicles (2)
- 3.2.4 Draw a line graph to show the average follicle diameter over the period of twenty days (6)
- (12)**

- 3.3 A fertility monitor measures the concentration of oestrogen and luteinising hormone (LH) in a woman's urine. A fertile period is the time when the ovum is ready to be fertilised. The graph below appears on the information sheet that is provided with the fertility monitor.



[Adapted from <http://www.amazon.co.uk>]

- 3.3.1 Name the gland that secretes LH. (1)
- 3.3.2 Explain why the fertility monitor measures the level of LH. (2)
- 3.3.3 Explain why some woman would use the fertility monitor. (2)
- 3.3.4 What evidence in the graph indicates that a healthy follicle is developing in the ovary during the first half of the cycle? (2)
- 3.3.5 If a woman using a fertility monitor finds out that her LH level peak on day 17, between which days does she experienced the "highest fertility" ? (2)
- 3.3.6 Explain why the fertility monitor does not measure the progesterone level in the blood to predict fertility. (3)

(12)

- 3.4 Research shows that the average age of first menstruation is influenced by socio-economic status as well as race.

Scientists carried out an investigation to determine the average age of the first menstruation of the girls in a community.

Their hypothesis was:

The average age of first menstruation has decreased over time.

- 3.4.1 For the investigation, state the:

- (a) Independent variable (1)
- (b) Dependent variable (1)

- 3.4.2 Name THREE planning steps that had to be considered before carrying out the investigation. (3)

- 3.4.3 If the results show that the average age of the first menstruation has remained at 12,9 years of age for the last 25 years, explain the implications for the hypothesis stated by the scientists. (2)

- 3.4.4 Name TWO physical characteristics in girls which would indicate the start of puberty. (2)

(9)

Total: 100