Sacred Heart Canossian College
Mock Examination (2020-2021)

S6 Biology Paper 2

Time allowed: 1 hour
Total: 40 marks

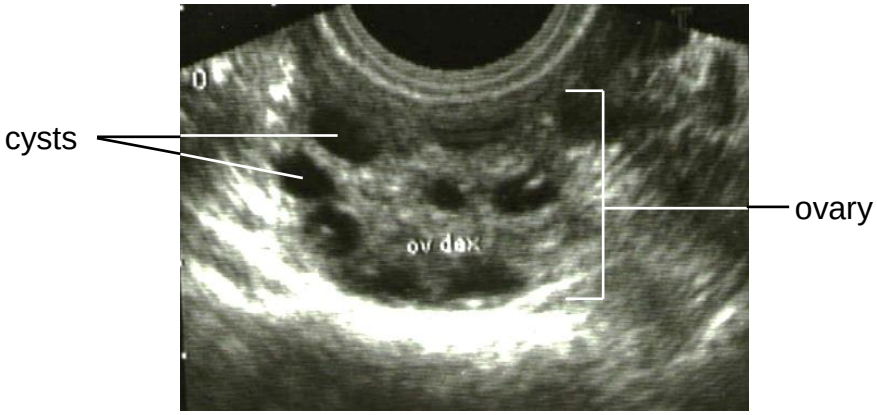
Instructions:

1. *There are **TWO** sections, A and B, in this Paper. (Sections C and D are not provided.) Attempt **ALL** questions in the two sections.*
2. *Write your answers in the Answer Book provided. Start each question (not part of a question) on a new page.*
3. *Write your name, class and class number on the Answer Book provided.*
4. *Present your answers in paragraphs wherever appropriate.*
5. *Illustrate your answers with diagrams wherever appropriate.*
6. *The diagrams in this Paper are **NOT** necessarily drawn to scale.*

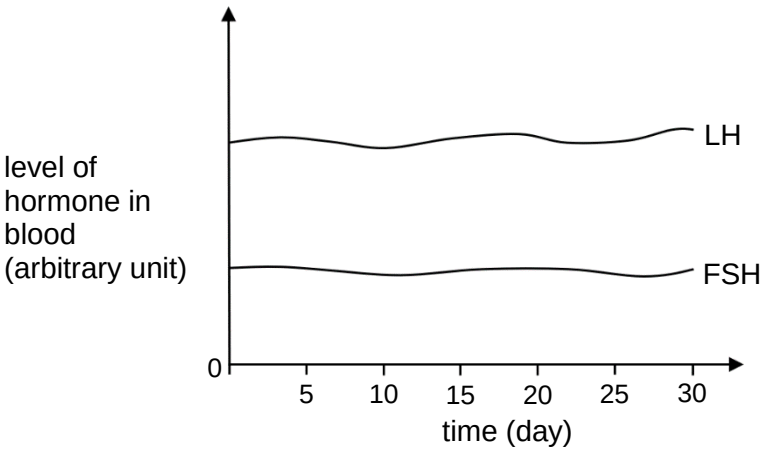
SECTION A Human Physiology: Regulation and Control

Answer **ALL** parts of the question.

1. (a) Mary is 20 years old. She had irregular menstrual cycles and each cycle usually lasted over 40 days. Her doctor performed an ultrasound scan of her ovaries. The ultrasound image below showed that a number of cysts had developed in Mary's ovaries. The doctor told Mary that each cyst was formed from a mature follicle which failed to ovulate.



(i) The doctor measured the levels of follicle stimulating hormone (FSH) and luteinising hormone (LH) in Mary's blood over 30 days. The graph below shows the results.

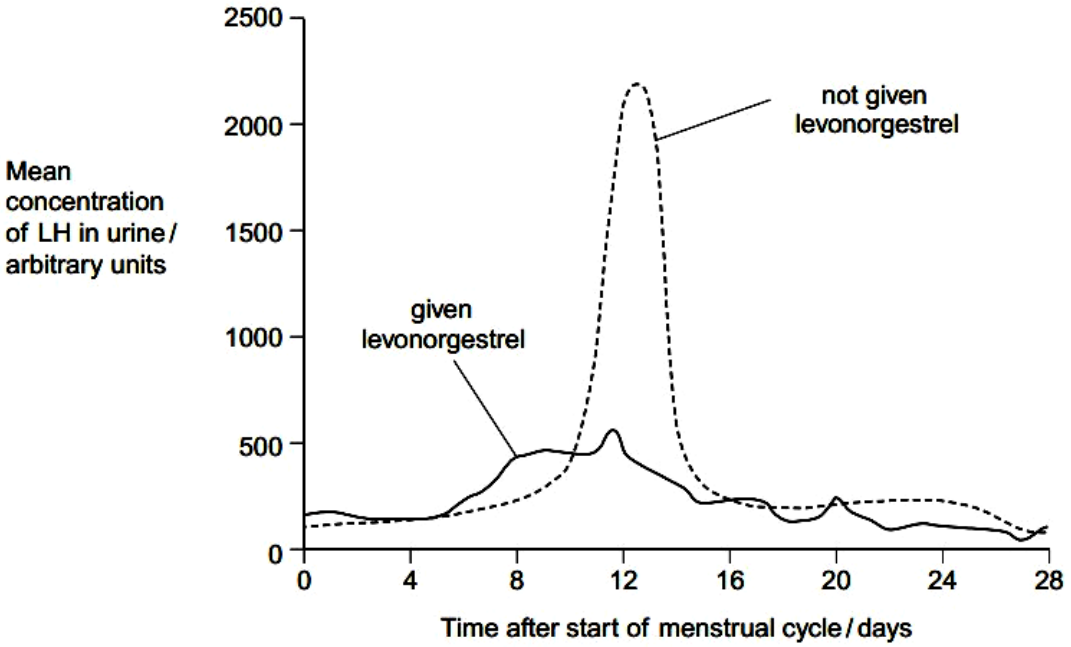


Based on the graph above, suggest reasons why the mature follicles in Mary's ovaries did not ovulate. (2 marks)

(ii) Besides irregular menstrual cycles, Mary sometimes experienced heavy menstrual bleeding. Give a possible reason for the heavy bleeding. (3 marks)

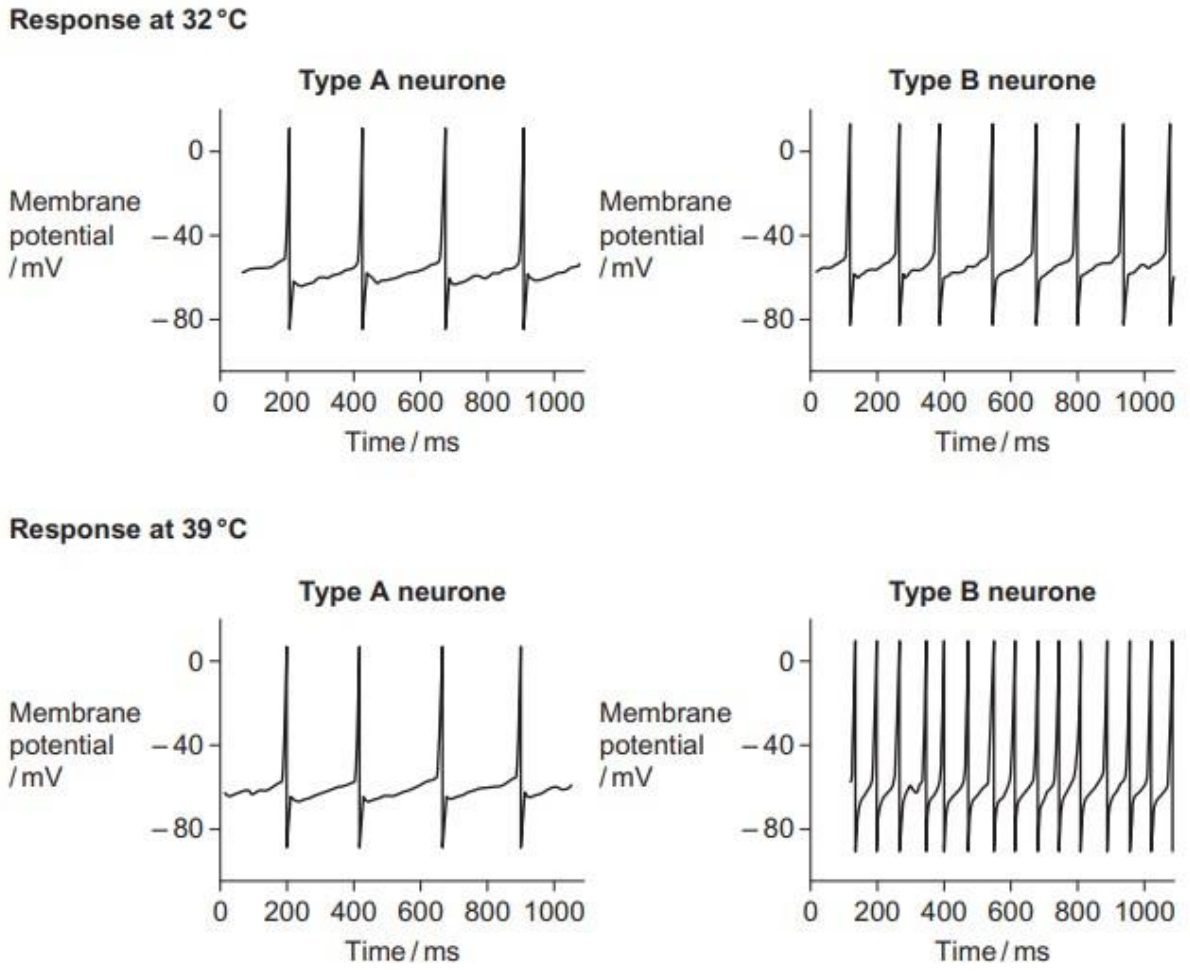
1. (a) (iii) The doctor prescribed oral contraceptive pills, which contained oestrogen and progesterone, to reduce the formation of cysts in Mary's ovaries. Explain the biological principle behind this treatment. (2 marks)

(iv) In a conversation with her doctor, Mary learned two methods of contraception, including an oral drug called levonorgestrel and intrauterine device (IUD). Below shows the mean concentration of LH in the urine of those who use levonorgestrel during their menstrual cycles.



Based on the given information and your own knowledge, explain the advantage of using the oral drug over IUD for contraception. (3 marks)

1. (b) A group of scientists investigated the effect of temperature on two types of neurone in the hypothalamus, Type A and Type B. The scientists measured the rate of production of nerve impulses in each type of neurone at two different temperatures. Graphs below show the results.



(i) What is the effect of a temperature rise from 32^{o}C to 39^{o}C on the rate of nerve impulse production in each type of neurone? (1 mark)

(ii) The scientists described the types of neurones as being either 'warm-sensitive' or 'temperature-insensitive'. Which type of sensitivity does neurone Type B have? Give evidence for your answer. (2 marks)

(iii) With reference to the sensitivity of neurone Type B, describe how sweating can be increased during vigorous exercises. (4 marks)

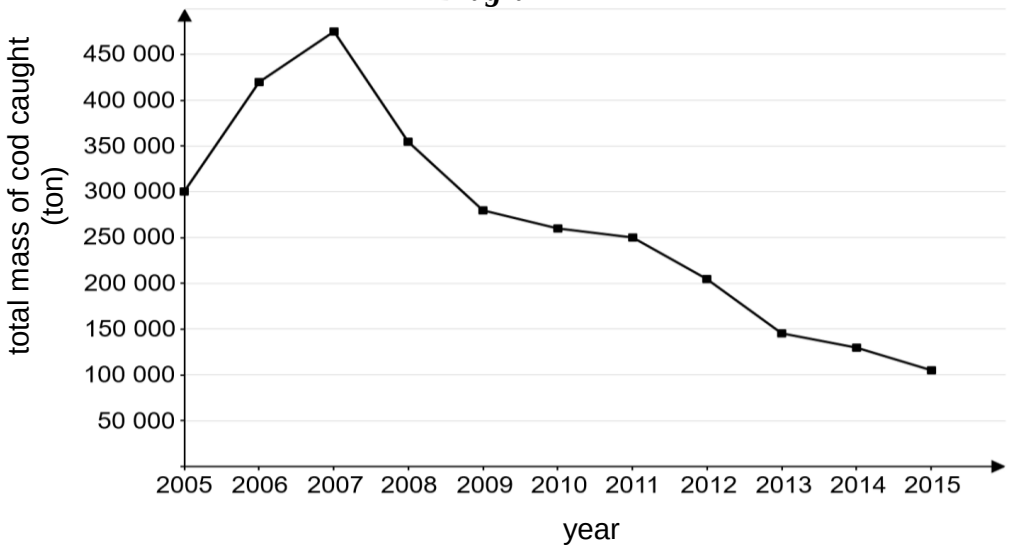
(iv) When doing vigorous exercises, the heart also beats faster and more strongly. Explain how a person's nervous system brings about these changes during exercise. (3 marks)

SECTION B Applied Ecology

Answer **ALL** parts of the question.

2 (a) Cod is a large fish commonly consumed as food. In city X, fishing for cod using bottom trawling was allowed between 2005 and 2015. Diagram I below shows the total mass of cod caught in city X from 2005 to 2015.

Diagram I

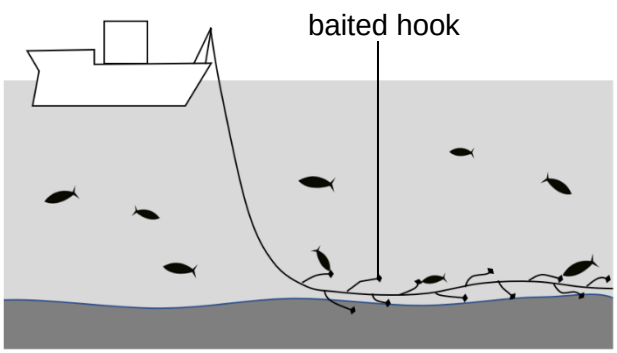


(i) Describe the change in the total mass of cod caught from 2007 to 2015 in city X. Suggest a reason for the change. (3 marks)

(ii) Bottom trawling has a high bycatch rate. Based on the feeding relationship of the cod and the bycatch, suggest how cod fishing using bottom trawling affects the future cod population in the sea. (3 marks)

(iii) To improve the future catch of cod, some people suggested changing the fishing method from bottom trawling to longlining, which is shown in diagram II. Explain two ways how longlining can help conserve cod stocks in the sea. (4 marks)

Diagram II

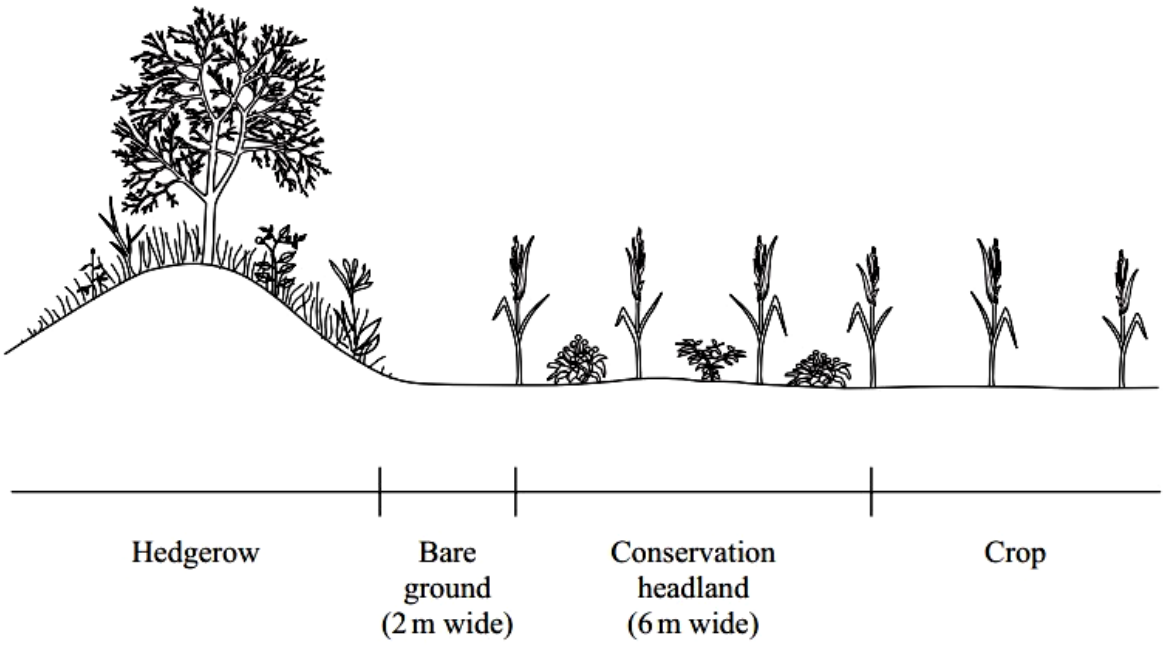


2. (b) A lake was affected by large swarms of midges (small biting insects that fly) in the summer. The lake area was sprayed with insecticide to kill the midges. The effect of spraying on the following food chain in the lake was investigated.

Phytoplankton → sunfish → western grebe (a bird species)

(i) After a few months, the concentration of insecticide in the grebes was more than six times the concentration in the sunfish. Explain why. (4 marks)

(ii) The diagram below shows a hedgerow and part of a field with a crop nearby the lake. The land was farmed in a way that conserves wildlife. The strip of bare ground next to the hedgerow was ploughed frequently to prevent any plants from growing. The first 6m of the field, called the conservation headland, was sprayed with a selective herbicide to control some kinds of weeds. The rest of the field was sprayed with herbicide to kill all weeds.



(1) A tree in the hedgerow was attacked by fungi and diseased. Suggest an advantage of leaving a 2m wide of bare ground between the hedgerow and the field. (1 mark)

(2) With reference to the concept of species diversity, suggest the benefit of allowing some weeds to grow in the conservation headland. (2 marks)

(3) After harvesting the crop, the farmer digs the unwanted stems and roots into the soil. Explain how the nutrients contained in these plant parts become available for use by other organisms. (3 marks)

END OF PAPER