EXAM PAPERS PRACTICE

Boost your performance and confidence with these topic-based exam questions

Practice questions created by actual examiners and assessment experts

Detailed mark scheme

Suitable for all boards

Designed to test your ability and

11.4 Sexual Reproduction

Hard

BIOLOGY

IB HL

EXAM PAPERS PRACTICE

11.4 Sexual Reproduction

Question Paper

Course	DP IB Biology
Section	11. Animal Physiology (HL Only)
Topic	11.4 Sexual Reproduction
Difficulty	Hard

Time allowed: 10

Score: /5

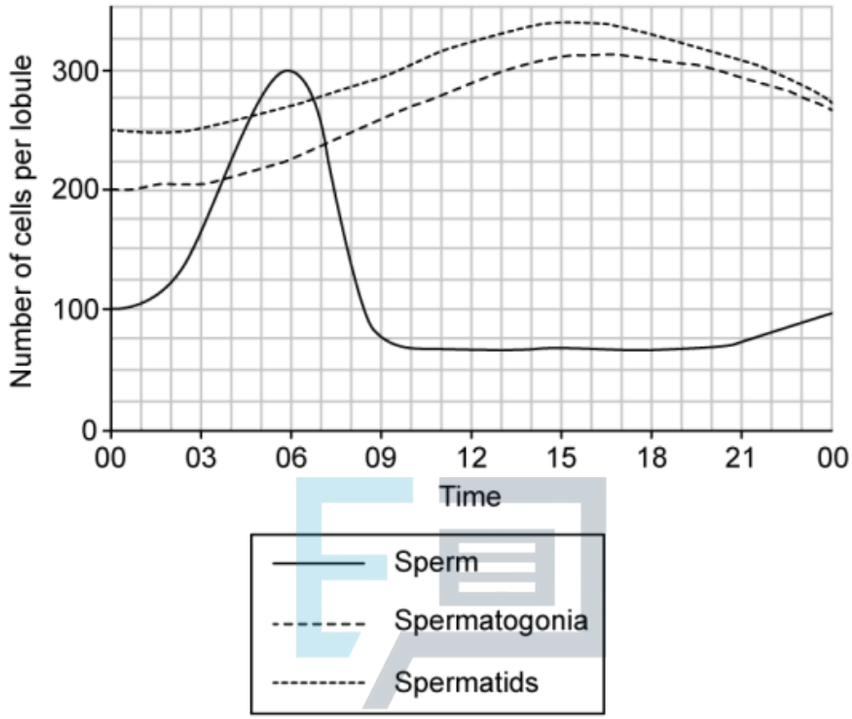
Percentage: /100

Question 1

The bambooleaf wrasse, *Pseudolabrus japonicus*, is a species of fish found off the coast of Japan. During the breeding season male wrasse release gametes (a process known as spawning) on a daily cycle in the presence of a single female.

The graph below shows some of the events occurring inside the testes of bambooleaf wrasse during a 24 hour period.

Note that lobules are regions within fish testes.



Which of the following statements relating to spermatogenesis and fertilisation in wrasse are correct?

I.
Wrasse spawning occurs between 06:00 and 10:00.

II.
Both mitosis and meiosis are occurring between 00:00 and 15:00.

III.
The percentage increase in the number of sperm per lobule between 00:00 and 06:00 is $66.\dot{6}$ %.

IV.
Wrasse use external fertilisation.

A. I and II only.

B. I, II, III, and IV.

C. I, II, and IV only.

D. I and IV only.

[1 mark]

Question 2

The zona pellucida in mice contains three different types of glycoprotein, known as ZP1, ZP2, and ZP3. The roles of each glycoprotein type are thought to be as follows:

ZP1 - provides structural support to the zona pellucida.

ZP2 - a secondary binding protein to which sperm cells bind after the initial stages of fertilisation are complete. The enzymes contained in cortical granules are thought to break down ZP2.

ZP3 - a primary binding protein to which sperm bind at the beginning of the fertilisation process.

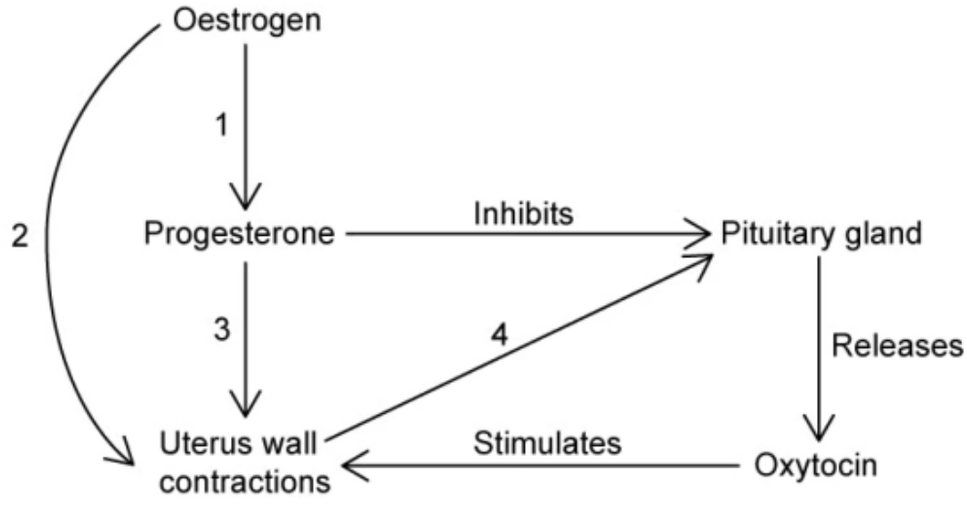
Which row correctly explains the mutation that is most likely to result in polyspermy?

	Mutation in gene that codes for...	Explanation
A.	ZP1	ZP1 proteins are no longer complementary to the active sites of acrosome enzymes
B.	ZP2	Sperm can no longer bind to ZP2 and initiate the acrosome reaction
C.	ZP2	ZP2 proteins are no longer complementary to the active sites of cortical granule enzymes
D.	ZP3	Sperm can no longer bind to ZP3 and initiate exocytosis

[1 mark]

Question 3

The diagram below shows some of the organs and hormones involved in childbirth.



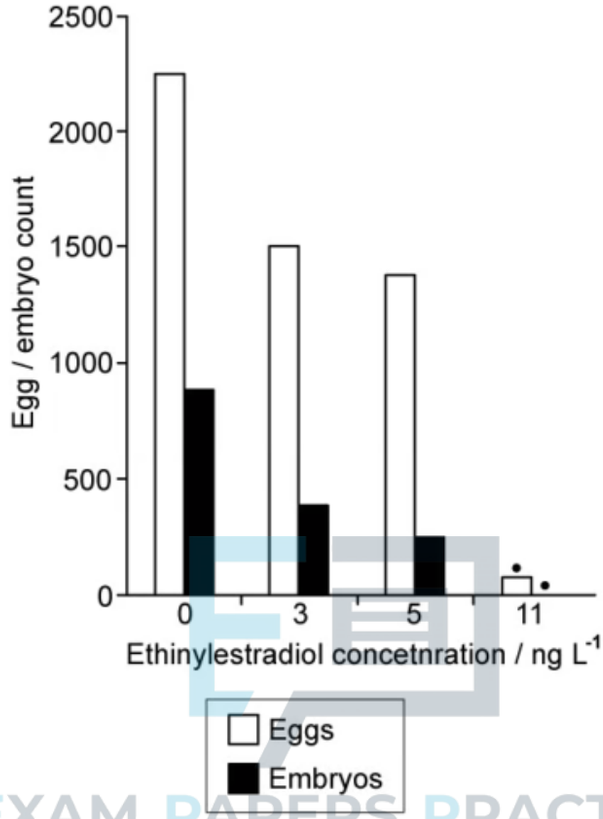
Which row in the table gives the correct labels for locations **1-4** in the diagram?

	1	2	3	4
A.	Stimulates	Increases sensitivity to oxytocin	Stimulates	Inhibits
B.	Inhibits	Decreases sensitivity to oxytocin	Inhibits	Stimulates
C.	Stimulates	Decreases sensitivity to oxytocin	Stimulates	Stimulates
D.	Inhibits	Increases sensitivity to oxytocin	Inhibits	Stimulates

[1 mark]

Question 4

The graph below shows the effect of ethinylestradiol concentration on egg and embryo production in the fish species *Pimephales promenas*, commonly known as fathead minnows. Note that ethinylestradiol is a type of synthetic oestrogen.



Which of the following conclusions can be drawn from the graph?

I.
Ethinylestradiol in rivers is harmful to fathead minnow populations.

II.
There is an association between ethinylestradiol concentration and reduced reproductive success in fathead minnows.

III.
There is an association between ethinylestradiol concentration and feminisation in fathead minnows.

IV.
At an ethinylestradiol concentration of 11 ng L^{-1} fish are unable to reproduce.

A. I, II, and III only.

B. II only.

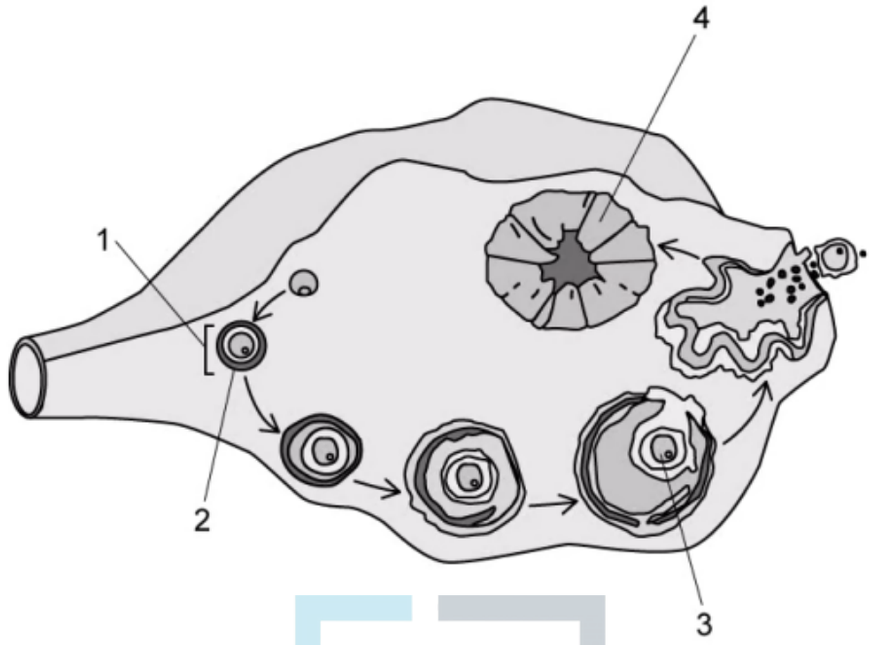
C. II and IV only.

D. III and IV only.

[1 mark]

Question 5

The diagram below shows the events occurring inside an ovary during oogenesis.



Which row correctly identifies the structures labelled **1-4**?

	1	2	3	4
A.	Oogonium	Layer of follicle cells	Primary follicle	Corpus luteum
B.	Primary follicle	Layer of follicle cells	Secondary oocyte	Corpus luteum
C.	Primary follicle	Zona pellucida	Secondary oocyte	Ovum
D.	Germinal epithelium cell	Zona pellucida	Ovum	Secondary oocyte

[1 mark]