For more awesome GCSE and A level resources, visit us at www.savemyexams.co.uk/

Sexual Reproduction in Mammals

Question Paper 2

Level	A Level
Subject	Biology
Exam Board	Edexcel
Topic	Cells & Viruses and Reproduction of Living Things
Sub Topic	Sexual Reproduction in Mammals
Booklet	Question Paper 2

Time Allowed: 53 minutes

Score: /44

Percentage: /100

Grade Boundaries:

A*	А	В	С	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

- 1 Meiosis is involved in the production of gametes such as human egg cells and sperm cells.
 - (a) An investigation was carried out to study the effect of changing the temperature on spindle fibre formation in human egg cells during meiosis.

Five human egg cells undergoing meiosis at 37 °C were incubated at 25 °C for 10 minutes and then returned to 37 °C. After 20 minutes, the number of egg cells showing spindle fibre formation was recorded.

The investigation was repeated at three different incubation temperatures.

The results are shown in the table below.

Incubation temperature /°C	Number of human egg cells used	Number of human egg cells showing spindle fibre formation
25	5	0
28	5	2
33	5	5
37	5	5

 (1)	throughout this investigation.	(1)
(ii)	Using the information in the table, describe the effect of temperature on	
	spindle fibre formation in human egg cells.	(2)

(b)	(b) A student made the statement that all 5 cells would have shown spindle fibre formation if the incubation temperature had been either 35 $^{\circ}$ C or 31 $^{\circ}$ C.				
	(i)	Using the information in the table, give evidence to support part of this statement.	(2)		
	(ii)	Using the information in the table, give evidence that may not support part of this statement.	(2)		

function.		(6)
		(0)

2 Meiosis is involved in the formation of human gametes.

(a) Explain the importance of meiosis in the formation of human sperm and egg ce	lls. (3)

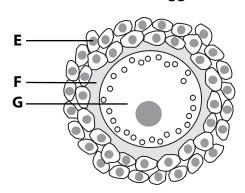
(b) Sperm cells release acrosin, an enzyme found in the acrosome. This enzyme is involved in digesting the zona pellucida (jelly layer) during fertilisation.

The diagrams below show a human sperm cell and a human egg.

A B C

Human sperm cell





(i) The table below describes four sites.
 Place a cross ⋈ in the box below the letter that correctly links the statement to one of the labels on the diagrams above.

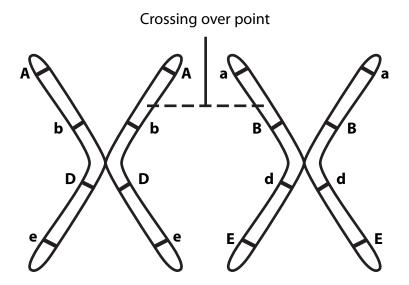
(4)

Statement	A	В	С	D	E	F	G
Site containing acrosin	X	X	X	X	X	X	X
Site where acrosin works	×	×	×	×	×	×	×
Site containing the haploid number of chromosomes	×	×	×	×	×	×	×
Site containing mitochondria	X	×	×	X	×	×	X

-			(2)
ferti mix thei	investigation was carried out to study the ilisation success. Sperm cells with differ ed with human eggs in a glass containe no counted and the percentage of eggs for executts are shown in the table below.	ent levels of acrosin activity were r. The number of eggs fertilised was	
me	Acrosin activity / arbitrary units	Percentage of eggs fertilised (%)]
	2.5	33	
	3.0	66	
	4.0	85	
	5.0	100	
(i)	A student stated that acrosin needs to and that the higher the acrosin activity fertilised. Give one piece of evidence from the tastatement.	, the greater the percentage of eggs	
			(1)
(ii)	Using the data in the table, suggest wh	ny the student could not support all of	(1)

- **3** Meiosis leads to the production of gametes and is important in allowing genetic variation to occur.
 - (a) The diagram below shows one homologous pair of chromosomes during early meiosis.

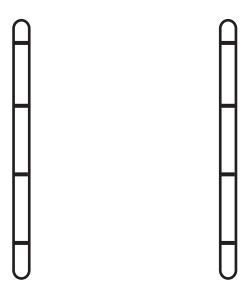
Four genes (A, B, D and E) and the crossing over point have been labelled.



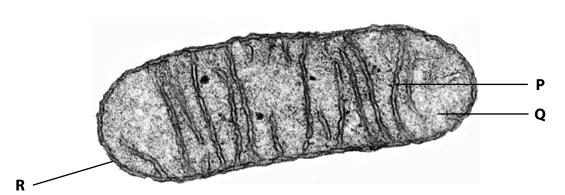
At the end of meiosis, four gametes will have been produced, each with a different combination of alleles.

Complete the diagram below to show the combination of alleles for the two recombinant chromosomes.

(1)



- (b) Sperm cells are gametes. They contain mitochondria in their mid region.
 - (i) The photograph below shows a mitochondrion as seen using an electron microscope.



CNRI / Science Photo Library Magnification x 90 000

(3)

Name the labelled structures shown in the photograph above.

Ρ			
Q			
R			
	(ii)	Explain the function of mitochondria in sperm cells.	(3)

	(Total for Question 3 = 10 ma	arks)	
(ii)	State how many cells there would be after the fertilised egg has divided, by mitosis, four times.	(1)	
(;;)			/
	Answer		9/
	come from the sperm cell. Show your working.	(2)	
(i)	A sperm cell containing 65 mitochondria fertilises an egg cell containing 100 000 mitochondria. Calculate the percentage of the total mitochondria in this fertilised cell that		
cell	. The fertilised cell then divides by mitosis.		

(c) In some species of mammal, at fertilisation most of the sperm cell enters the egg

4 Meiosis is involved in producing gametes such as sperm cells and egg cells.

(a) Describe three structural differences between a human sperm cell and a human egg cell.					
	egg cem	(3)			
1					
2					
3					
•••••	(b) When a sperm cell reaches an egg cell, enzymes are released from the head of the sperm. Explain the reasons for the release of these enzymes.				
		(2)			

(c) Describe what happens in the egg cell once the sperm cell nucleus has entered it.	
	(2)
(d) In plants, a double fertilisation occurs.	
(i) One fertilisation involves a male gamete nucleus fusing with the egg cell nucleus. Give two functions of this fertilisation.	
nucleus. Give two functions of this fertilisation.	(2)
1	
2	
(ii) In the second fertilisation, the other male gamete nucleus fuses with two polar nuclei forming a triploid structure. Name the triploid structure formed	٨
polar nuclei forming a tripiolo structure. Name the tripiolo structure formed	(1)
(Total for Question 4 = 10 m	arks)