This is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

Stage Exam 03

26JAN2024

Do NOT write in this box. Your MARK will be placed here.

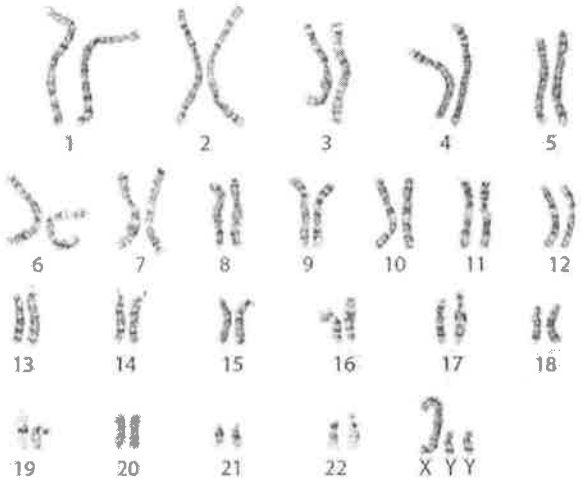
Subject :	Biology
Class :	10A
Teacher :	Miss Rahmeh Hilal
Duration :	1 hour

Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

Q1.

The photograph shows the chromosomes from a body cell of a person. This person has a rare condition that affects their chromosomes.



(a) (i) How many chromosomes are shown in this photograph?

(1)

.....

(ii) State the sex of the person the chromosomes were taken from.

(1)

.....

.....

(b) Describe how the chromosomes in the photograph differ from those found in a typical human body cell.

(2)

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(c) The rare condition leads to the formation of abnormal sperm cells. BONUS! ONLY ATTEMPT IF YOU HAVE TIME.

(i) Name the cell division that produces sperm cells.

(1)

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(ii) Suggest how an individual with the chromosomes shown could be produced.

(2)

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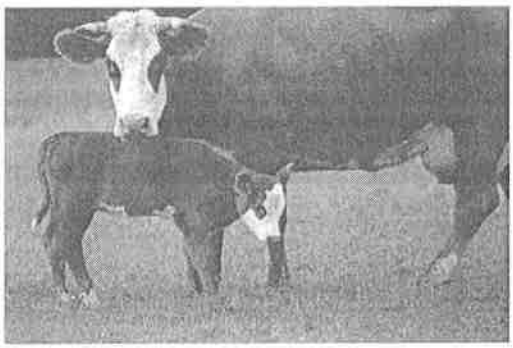
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(Total for question = 4 marks)

Q2.

The photograph shows a cow with her calf.



(a) Scientists investigated the success of transferring cloned embryos into surrogate cows.

In total, 2170 cloned embryos were transferred resulting in 535 pregnancies.
From these pregnancies, 103 calves were born.
Calculate the percentage of embryos that successfully developed into newborn calves.
Show your working.

(2)

percentage of embryos = ...

(b) The formation of a placenta is needed for the successful development of an embryo into a fetus.

(i) Name the part of the female reproductive system where the placenta forms.

(1)

.....

(ii) Suggest how the structure of the placenta is adapted to allow the exchange of substances between the mother and the fetus.

(4)

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(Total for question = 7 marks)

Q3.

The passage describes human reproduction.
Complete the passage by writing a suitable word or words in each blank space.

(10)

During sexual intercourse the male's ..... is inserted into the vagina. The male gametes, known as ..... , are released from the male urethra into the vagina. The male gametes carry on swimming until one meets a female gamete, known as the ..... . This process is fertilisation and takes place in a tube called the ..... .

The fertilised female gamete, also known as the ..... , moves down this tube. It undergoes the type of cell division called ..... and is now known as an ..... . This structure may then become implanted in the wall of the ..... .

The number of chromosomes in the fertilised female gamete is ..... the number found in the unfertilised gamete and is known as the ..... number.

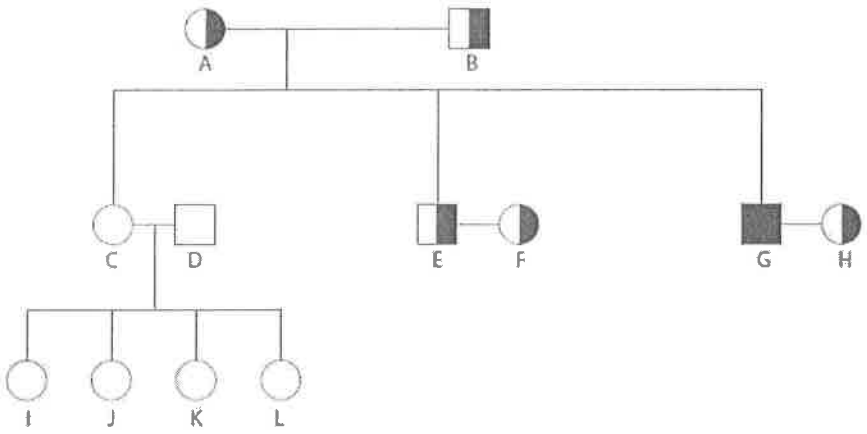
(Total for question = 10 marks)

Q4.

Cystic fibrosis is an inherited condition. It is caused by a recessive allele (d).

The non-cystic fibrosis allele is dominant (D).

The diagram shows how cystic fibrosis was inherited in a family.



key

○	homozygous dominant female
◑	heterozygous female
●	homozygous recessive female
□	homozygous dominant male
▣	heterozygous male
■	homozygous recessive male

(a) Use letters D and d to give the genotype of person A and person L in the table.

(2)

Person	Genotype
A	
L	

(b) How many people in this family do **not** have cystic fibrosis?

(1)

.....

(c) (i) Complete the table to show the probability of each set of people having a child with cystic fibrosis. One has been done for you.

(2)

People	Probability as a %
C and D	
E and F	25
G and H	

(ii) Parents E and F have four children. None of them have cystic fibrosis although the probability shown in the table is 25%.
Suggest why they did not have a child with cystic fibrosis.

(1)

.....

.....

.....

(Total for question = 6 marks)

Q5.

Machado-Joseph disease is a rare genetic condition that affects the nervous system.

The condition is caused by a dominant allele and results in lack of control of motor coordination, reflexes and eye movements.

(a) (i) Explain what is meant by the term **dominant allele**.

(2)

.....

.....

.....

.....

.....

.....

(ii) The symptoms of Machado-Joseph disease do not become obvious until the person is more than 40 years old.

Suggest why the late development of symptoms makes it difficult to reduce the number of people born with the condition.

(2)

.....

.....

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.....

(b) A man who is heterozygous for this condition has a child with a woman who is homozygous recessive.

Use a genetic diagram to show the genotypes of these parents, the gametes they produce and the genotypes and phenotypes of any possible offspring.

Use the letter D for the dominant allele and d for the recessive allele.

(4)

Genotypes of parents

Gametes

Genotypes of offspring

Phenotypes of offspring

(Total for question = 8 marks)

Q6.

The photograph shows a breed of dog called a Border Collie.

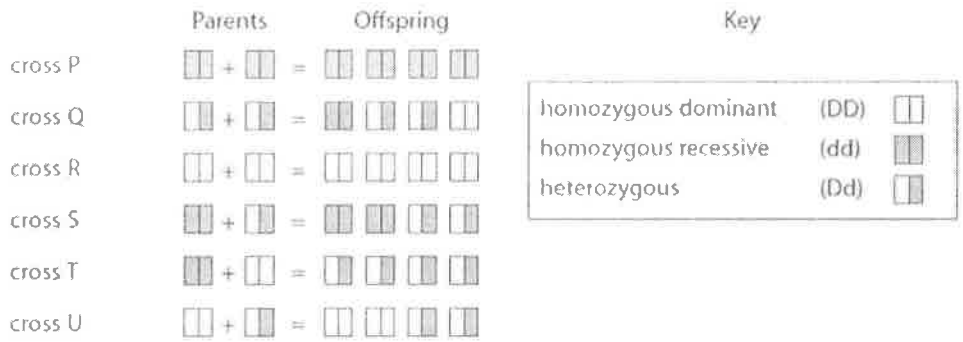


©Robb

Border Collies can inherit an eye defect called CEA (Collie Eye Anomaly).

The dominant allele D produces good vision but the recessive allele d produces poor vision.

(a) The diagram shows the possible offspring from parents with different genotypes.



(i) All the offspring from cross R have good vision.

Give the letters of the other crosses where all the offspring have good vision.

(2)

.....

(ii) Give the phenotype of each parent used in cross P.

(1)

.....

(iii) Which cross has a 50% probability of producing offspring with good vision?

(1)

.....

(iv) Give the genotype of each of the offspring produced in cross T.

(1)

.....

(Total for question = 5 marks)

Q7.

Human blood group is an example of a phenotype determined by alleles that show codominance.

The table shows the different blood groups and their genotypes.

Blood group	Genotypes
A	$I^A I^A$ or $I^A I^O$
B	$I^B I^B$ or $I^B I^O$
AB	$I^A I^B$
O	$I^O I^O$

(a) Explain what is meant by the term **codominance**.

(1)

.....

.....

(b) A man with blood group A married a woman with blood group B. They had four children, each with a different blood group.

Use a genetic diagram to show this cross.

(3)

Genotypes of the parents

Gametes

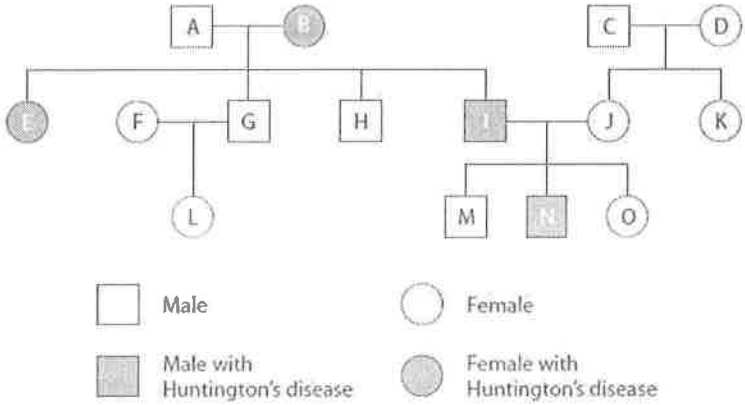
Genotypes of the offspring

(Total for question = 4 marks)

Q8.

Huntington's disease causes damage to the nervous system. It is an inherited condition caused by a dominant allele (H). Only individuals who are homozygous for the recessive allele (h) are protected from the disease.

The diagram shows the inheritance of Huntington's disease in a family.



(a) Complete the table to show how many people in the diagram fit each description. The first one has been done for you.

(4)

Description	Number of people who fit the description
male	7
female with Huntington's disease	
homozygous recessive	
heterozygous	
homozygous dominant	

(Total for question = 4 marks)

Q9.

(a) A student reads the following statement.

"the father determines the sex of a baby"

Explain why this statement is true.

(2)

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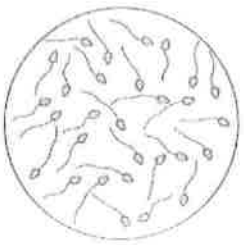
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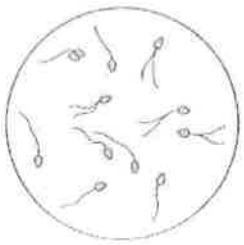
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(b) The diagram shows sperm cells, viewed using a microscope, from two different men.

Man A



Man B



Use the information in the diagram to give two reasons why man A is more fertile than man B.

(2)

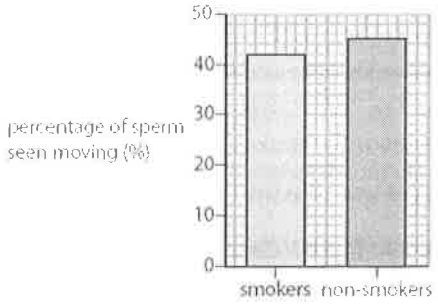
1 .....

.....

2 .....

.....

(c) The graph shows how smoking may affect the movement of sperm.



(ii) Use the information from the graph to explain why smoking could affect male fertility.

(2)

.....

.....

.....

.....

(Total for question = 6 marks)

Q1.

Question number		Answer	Notes	Marks
(a)	(i)	47;		1
	(ii)	male;		1
(b)		1. has more than 46 / has extra chromosome / trisomy; 2. (which is) sex chromosome / Y / eq;	Ignore 47 alone Has an extra sex chromosome =2	2
(c)	(i)	meiosis;		1
	(ii)	1. failure of chromosomes to separate / eq; 2. (gamete) has an extra chromosome / YY; 3. normal egg/gamete fertilised by abnormal sperm/gamete;		2

Q2.

Question number	Answer	Notes	Marks
(a)	4.7 / 4.75 / 4.747;;	Allow one mark for 2170 in working	2
(b)(i)	uterus / womb / endometrium / uterus lining / uterus wall;		1
(ii)	1. diffusion;		max 4
	2. large surface area;		
	3 villi;		
	4. blood supply / capillaries / vascular;		
	5. thin / one cell thick;	5. Reject thin cell walls short diffusion distance = 2	
(c)	1. calcium for bones / teeth;		max 3
	2. carbohydrates/lactose for respiration/energy;	2. Ignore sugar / glucose	
	3. protein for growth / for muscles / for tissue / for enzymes / for DNA;		
	4. lipid for energy / insulation / protection;		
	5. antibodies to protect from disease / infection / provide immunity / eq;		
	6. named vitamin for stated function;		

Total 10 marks

Q3.

Question number	Answer	Notes	Marks
	penis; sperm / eq; egg / ovum / ova; fallopian (tube) / oviduct; zygote; mitosis; embryo; uterus / womb; twice / double / two times; diploid;		10

Q4.

Question number	Answer	Notes	Marks
(a)	A – Dd / dD; L - DD;		2
(b)	11 / eleven;		1
(c) (i)	0 / zero; 50;		2
(ii)	1. no fusion of recessive gametes / eq; 2. random / probability / chance / luck / eq; 3. no children who are dd / each child has at least one dominant allele / eq; 4. embryo selection / IVF / eq;		1

Q5.

Question number		Answer	Notes	Marks
(a)	(i)	1. form / version / type of a gene; 2. present in phenotype / always expressed / homozygote and heterozygote are similar / eq;	2. Allow with one allele it has the disease / one present it has the disease	2
	(ii)	1. had children / already reproduced; 2. before symptoms appear / before knowing (have disease) / do not know (have the disease) / hard to diagnose before symptoms / eq; 3. pass on allele;		max 2

(b)	parents Dd dd; gametes D or d d; offspring Dd dd; phenotypes disease / affected + no disease / unaffected / eq;	Allow ecf from incorrect parents to max 3 Allow Mps 1, 2 and 3 from Punnett square Allow other symbols Must see separation of gametes Phenotypes do not need to be matched but no credit if matched incorrectly	4

(c)	1. rare / random; 2. change in gene / allele / genome / DNA / genetic code / eq;	Rare genetic change = 2 2. Allow fault in DNA	2

Total 10 marks

Q6.

Question number		Answer	Notes	Marks
(a)	(i)	T; U;	T and any = 1 U and any = 1 U, T and any = 1 P, Q and T = 0 Ignore R so U, T and R = 2	2
	(ii)	poor vision / CEA / Collie eye anomaly / defect;		1
	(iii)	(cross) S / dd + Dd / Dd + dd;	Allow Dd , Dd, Dd, Dd	1
	(iv)	Dd / heterozygous / dD;		1
(b)	(i)	sperm(s) / spermatozoa;	Ignore X and Y	1
	(ii)	egg(s) / ova / ovum;	Ignore X / Reject ovule	1
	(iii)	fertilisation;		1
	(iv)	uterus / womb;		1

Total 9 marks

Q7.

Question number	Answer	Notes	Marks
(a)	both characteristics expressed / both alleles are expressed / influence the phenotype (of the heterozygote) / both shown in phenotype / eq;	reject genes ignore same dominance ignore neither dominates	1
(b)	Parents $I^A I^0$ $I^B I^0$; Gametes I^A I^0 I^B I^0; Offspring I^AI^0 I^BI^0 I^AI^B I^0I^0;	allow if I not shown allow all marks if shown as Punnett square transfer error ONLY for gametes mark	3
		Total	**4**

Q8.

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>(a)</td><td>
<table>
<tr><th>description</th><th>number of people who fit the description</th></tr>
<tr><td>male</td><td>7</td></tr>
<tr><td>female with Huntington's disease</td><td>2 / two;</td></tr>
<tr><td>homozygous recessive</td><td>11 / eleven;</td></tr>
<tr><td>heterozygous</td><td>4 / four;</td></tr>
<tr><td>homozygous dominant</td><td>0 / zero / none;</td></tr>
</table>
</td><td></td><td>4</td></tr>
<tr><td>(b)</td><td>1. A parent XY and B parent XX;

2. gametes X and X and X and Y;

3. offspring half XY and male and half XX and female;</td><td>correct Punnett square = 3

use of other letters allow max 1 for correct gametes and correct offspring</td><td>3</td></tr>
</table>

Q9.

Question number	Answer	Notes	Marks
(a)	1. sperm/ male gametes have X or Y / sperm are X and Y; 2. eggs / female gametes are X / eq; 3. XX is female / mother is XX / X sperm meets X egg produces female; AND XY is male / father is XY / Y sperm meets X egg produces male;	Ignore gene allow MP1 and MP2 from a Punnett square	max 2
(b)	1. more sperm; 2. sperm have one tail / head;	Allow converse Ignore damaged / deformed / healthy	2
(c)(i)	24.75 million / 24 750 000 / 2.475×10^7 / 24.75×10^6;;	Allow one mark for 45% , 45 or 0.45 in working	2
(ii)	1. fewer moving sperm / less/no movement / swimming; 2. fail to reach egg / eq; 3. less fertilisation / fertilises ;	Allow converse ignore lowers fertility as fertility in stem	max 2

Total 8 marks