EXEMPLAR

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For Supervisor's use only

Level 1 Biology, 2007

90163 Describe the transfer of genetic information

Credits: Three
9.30 am Tuesday 27 November 2007

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should answer ALL the questions in this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–10 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

For Assessor's use only	Achievement Criteria		
Achievement	**Achievement with Merit**	**Achievement with Excellence**	
Describe biological ideas relating to transfer of genetic information. ✓	Explain biological ideas relating to transfer of genetic information. –	Discuss biological ideas relating to transfer of genetic information. –	
Overall Level of Performance A			

You are advised to spend 40 minutes answering the questions in this booklet.

Assessor's use only

QUESTION ONE

Persian cats show an inherited condition called PKD (polycystic kidney disease). PKD is caused by a dominant allele D. The recessive allele is d.

(a) **Describe** what is meant by **'dominant allele'**.

~~The allele always~~ An allele which phenotype will always show. //

A

(b) **Describe** the **genotype(s)** of cats with PKD.

The cats with it could either have the genotype DD or Dd. //

A

Two Persian cats that are **heterozygous** for PKD, are mated together.

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(c) Complete the Punnett square to identify the proportion of kittens from this mating that can be expected to have PKD.

	d	D
d	d d	d D
D	D d	D D

The proportion of kittens that can be expected to have PKD is 3/4

A

(d) **Explain** how two cats with PKD can have kittens that do NOT have PKD.

For a kitten to not have PKD and both it's parents to have it, it's parents must be heterozygous for PKD. So the recessive alleles from each of them get passed on to the kitten, making the kitten homozygous recessive to PKD. (d d)

M

QUESTION TWO

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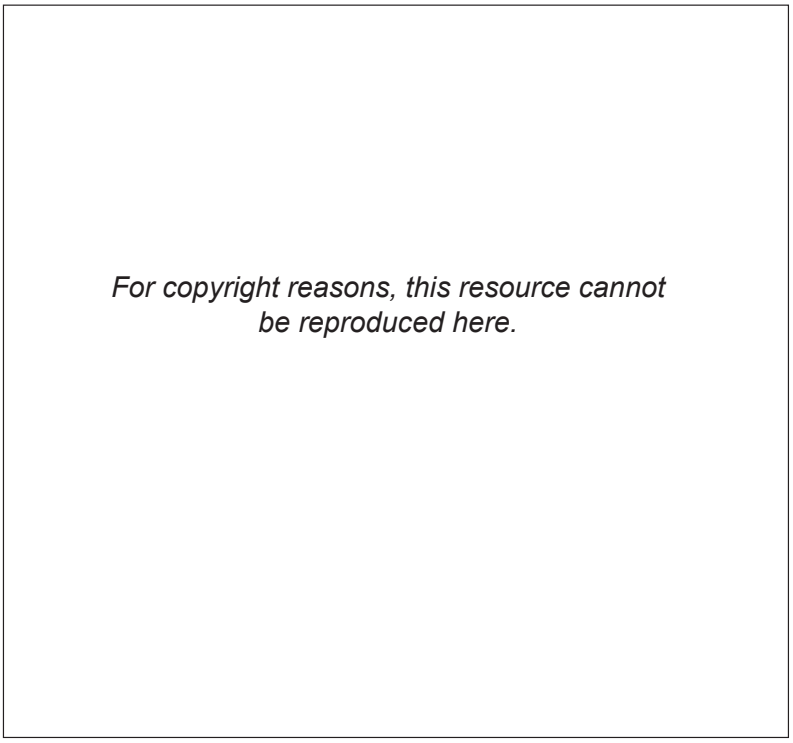
The diagram below shows a small section of DNA during replication.



Adapted from: http://www.accessexcellence.org/RC/AB/WYW/wkbooks/SFTS/SFTSg/7.gif

(a) **Describe** what a gene is.

code

The instructions in DNA how a particular feature on the organism is made. The instructions are written by the orders of the base nitrates. //

A

(b) **Explain** how the process shown in the diagram above ensures accurate replication of DNA.

The base nitrates can only pair with another certain nitrate. A can only pair with T and C can only pair with a G. When the DNA splits the nucleotides then can only join with ~~the~~ certain nitrate base. This creates an exact replica //.

A

no link to parent strand

code

(c) **Discuss** the reasons why **accurate** replication of DNA is important for cell functions.

Assessor's use only

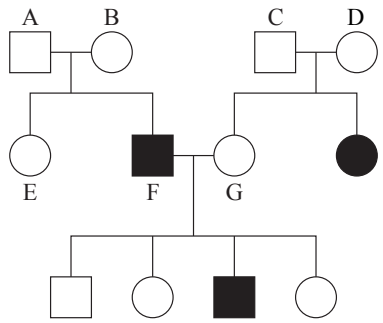
So that the instructions on how the body is made/works is carried on into every cell so it makes them properly according to where it is on the body. //

A

QUESTION THREE

Assessor's use only

The pedigree diagram below shows the inheritance of a type of deafness in a family group.



	Female	Male
Deaf	●	■
Hearing	○	□

(a) **Describe** the **phenotype** of Individual F.

Heterozygous recessive for deafness

N

(b) **Explain** how the pedigree diagram above shows that this type of deafness is caused by a **recessive allele**.

If the deafness was caused by a dominant allele, more people in the diagram would be deaf

N

(c) Determine the genotype of Individual G and use this to **discuss** the reasons for the proportion of children of F and G who ARE deaf.
Use the alleles H for hearing and h for deafness.
You may use a Punnett square.

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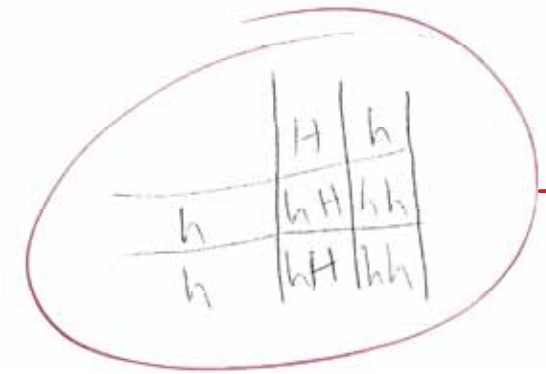
G must be heterozygous for deaf, otherwise they could not have had a deaf child.

Even though 50% of F and G's children are expected to be deaf it does not mean that it will always be 50% in reality because it's random. If they had more children, you're more likely to see the ratio.



Alleles shown in Punnett square.

M

QUESTION FOUR

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Potato plants can be reproduced either sexually from seeds, or asexually from the potato tuber or from stem cuttings.

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http://www.io.com/~hcexres/textbook/instrxx4c.html

Cells in some parts of the potato plant undergo meiosis.

(a) (i) Where does meiosis occur in the potato plant?

When ~~[illegible]~~ a potatoe plant creates a seed which has not been fertilised //

(ii) **Describe** the purpose of meiosis.

So that when the seed gets fertilized it combines the alleles and makes different phenotypes //

N

(b) **Explain** how asexual reproduction of potatoes is an advantage to the grower.

You can create copies of a good potatoe plant, giving good potatoes always. //

A

(c) **Discuss** how the genetic characteristics of the potato crop could be improved by selective breeding.
Consider both sexual and asexual reproduction methods in your answer.

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M

You could combine a potatoe plant that grows big potatoes and one that grows tasty potatoes to get a potatoe plant that makes big tasty potatoes! //

new variety