Sex lined Past Paper Questions

1. Which one of the following statements about sex-linked traits is true?

   A A female transmits her sex-linked traits to her daughters only.

   B A male transmits his sex-linked traits to his sons only.

   C A male transmits his sex-linked traits to his grandchildren via his daughters only.

   D A female transmits her sex-linked traits to her grandchildren via her sons only.

2. A sex-linked gene carried on the X-chromosome of a man will be transmitted to

   A 50% of his male children

   B 50% of his female children

   C 100% of his male children

   D 100% of his female children.

3. White eye colour in *Drosophila* is caused by a recessive sex-linked allele. The dominant allele is for red eyes.

   What result would be obtained from a cross between a white-eyed female and a red-eyed male?

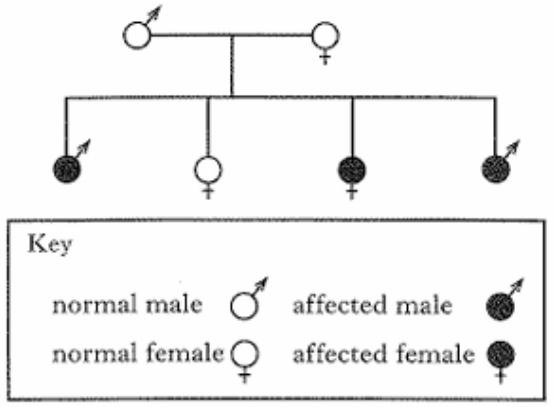
   A All white-eyed flies

   B All red-eyed flies

   C Equal numbers of white-eyed and red-eyed flies.

   D Three times as many red-eyed flies as white-eyed flies

4. The diagram shows the transmission of the gene for albinism.



   This condition is inherited as a characteristic which is

   A dominant and not sex-linked

   B recessive and not sex-linked

   C dominant and sex-linked

   D recessive and sex-linked.

5. A sex-linked condition in humans is caused by a recessive allele.

   An unaffected man and a carrier woman produce a son.

   What is the chance that he will be unaffected?

   A 1 in 1

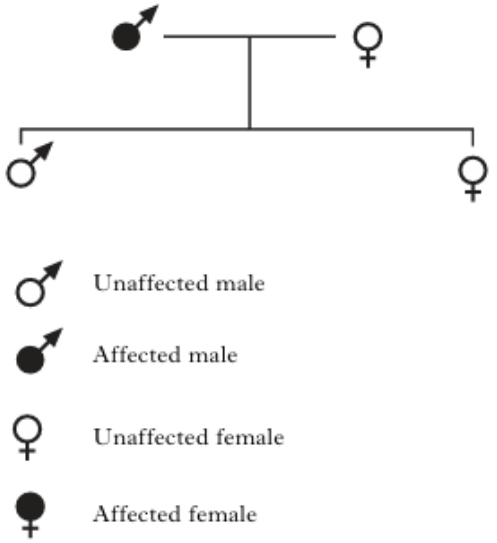
   B 1 in 2

   C 1 in 3

   D 1 in 4

Sex lined Past Paper Questions

6. The diagram shows a family tree for a family with a history of red-green colour deficiency.



The allele for red-green colour deficiency is sex-linked.

Which of the following statements is true?

A Only the son is a carrier.

B Only the daughter is a carrier.

C Both son and daughter are carriers.

D Neither son nor daughter is a carrier.

7. A sex-linked condition in humans is caused by a recessive allele. What is the chance of an unaffected man and a carrier woman having an unaffected child?

A 1 in 1

B 1 in 2

C 1 in 3

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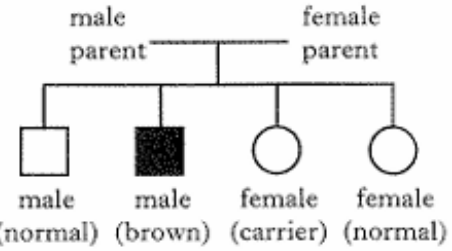
8. The colour of tooth enamel is a sex-linked characteristic. The allele for brown tooth enamel (**e**) is recessive to the allele for normal tooth enamel (**E**). The following family tree refers to this condition.



What are the genotypes of the parents?

A X^EY and X^EX^e

B X^EY and X^eX^e

C X^eY and X^EX^E

D X^eY and X^EX^e

9. The inheritance of eye colour in *Drosophila* is sex-linked and the allele for red eyes (R) is dominant to the allele for white eyes (r).

The progeny of a cross were all red-eyed females and white-eyed males.

What were the genotypes of their parents?

A X^rX^r X^RY

B X^RX^r X^RY

C X^RX^r X^rY

D X^RX^R X^rY

10 Colour blindness is a sex-linked trait. A man with normal vision marries a woman with normal vision. They have a son who is colour blind.

What is the chance of their next son being colour blind?

A no chance

B 1 in 2

C 1 in 3

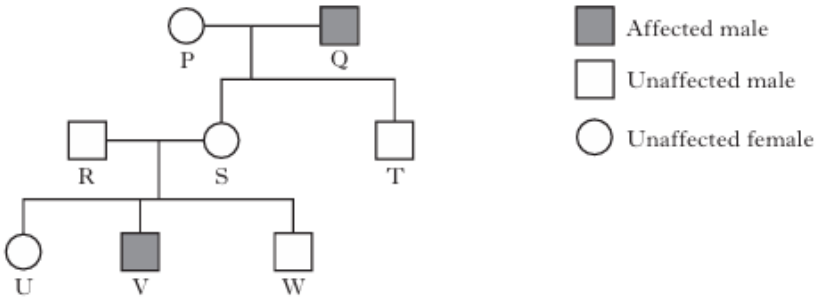
D 1 in 4

Sex lined Past Paper Questions

1. Red-green colour deficiency in humans is caused by a mutation in the gene coding for one of the proteins needed for normal colour vision.

This gene is sex-linked and the allele for colour deficiency **d** is recessive to the allele for normal colour vision **D**.

The diagram below shows inheritance of red-green colour deficiency in a family.



(*a*) Give the genotype of each of the following individuals.

Q _____

S _____

W _____ **2**

(*b*) Explain how information from the diagram confirms that the allele causing red-green colour deficiency is recessive.

_____

_____

_____ **1**

(*c*) Explain why males are more likely to be affected by red-green colour deficiency than females.

_____

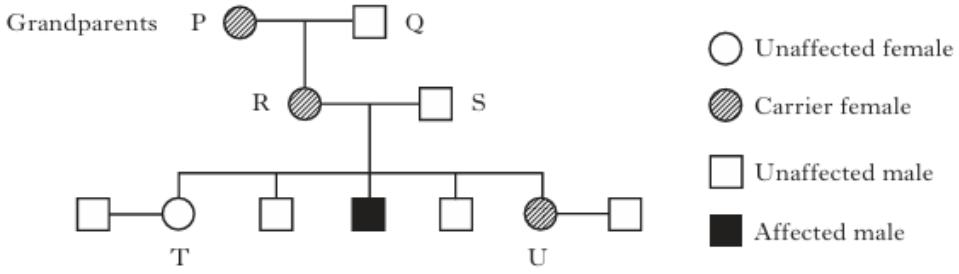
_____

_____ **1**

2. Duchenne's muscular dystrophy is an inherited condition in which muscle fibres gradually degenerate.

The condition is sex-linked and caused by a recessive allele.

The family tree below shows the inheritance of the condition through three generations of a family.



(*a*) (i) Using the symbols **D** and **d** to represent the alleles, state the genotypes of individuals R and S.

R _____ S _____ **1**

(ii) What percentage of the grandsons have muscular dystrophy?

_____ **1**

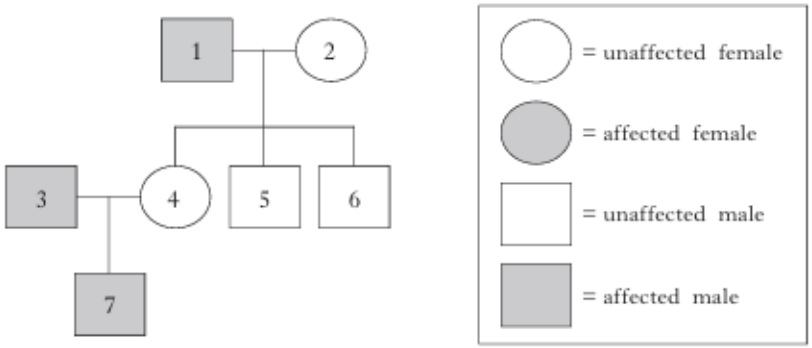
(iii) Sisters T and U each go on to have a son.

For each sister, state the percentage chance of her son having muscular dystrophy.

Son of T _____ Son of U _____ **1**

Sex lined Past Paper Questions

3. The diagram below shows the inheritance of a sex-linked condition in a family.



(*a*) The condition is caused by a recessive sex-linked allele represented by the letter **d**.

(i) State the genotypes of individuals 3 and 4.

Individual 3 _____

Individual 4 _____ **1**

(ii) Explain why individual 1 could not pass the condition to his sons.

_____

_____

_____ **1**

(iii) Individual 6 has a son with a woman who is a carrier of the condition.

Calculate the percentage chance of their son having this condition.

Space for calculation

_____ % **1**

4. Eye colour in fruit flies is sex-linked.

Red eye colour **R** is dominant to white eye colour **r**.

A heterozygous red-eyed female fly was crossed with a white-eyed male.

(i) Complete the grid by adding the genotypes of

1 the male and female gametes; **1**

2 the possible offspring. **1**

	Female gametes		
Male gametes			

(ii) Tick (✓) the box(es) to show all the expected phenotypes of the offspring from this cross.

red-eyed female ☐ white-eyed female ☐

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	X^R	Y
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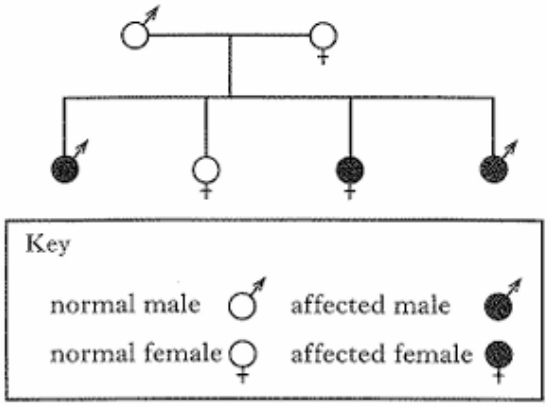

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Sex lined Past Paper Questions

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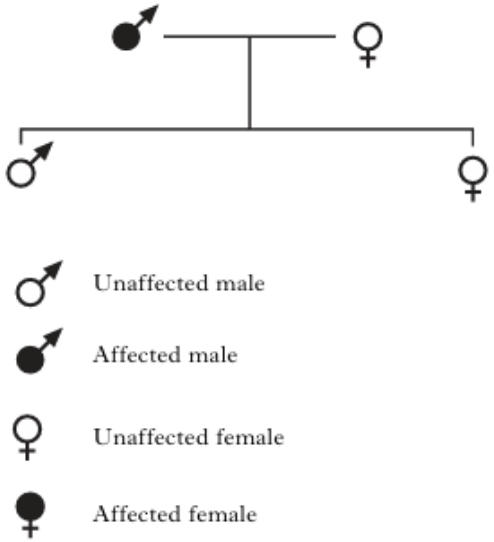

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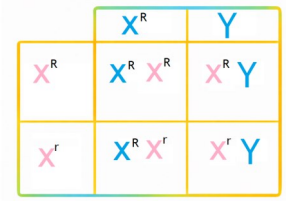

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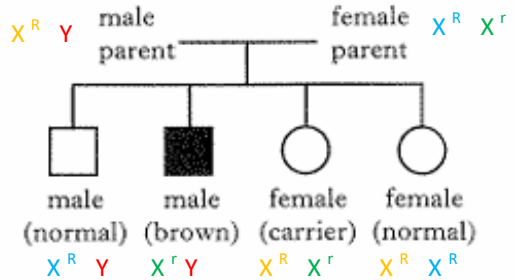

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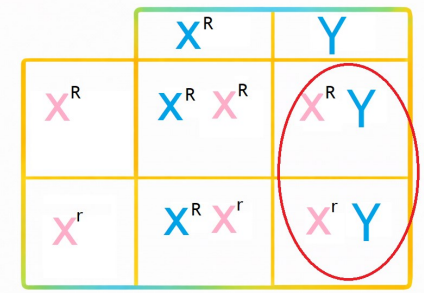

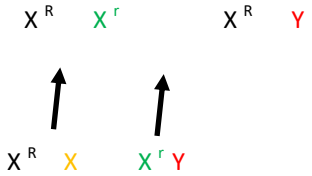

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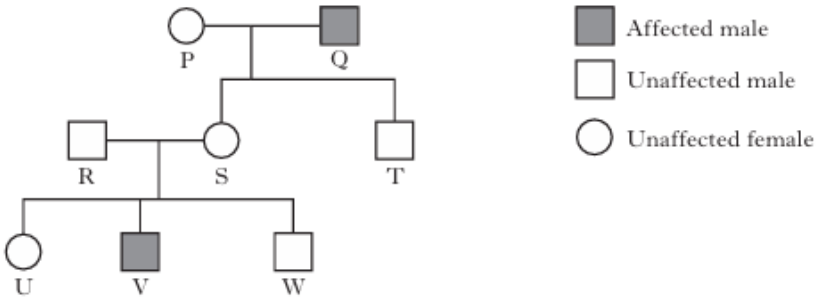

(*a*) Give the genotype of each of the following individuals.

Q X^dY

S X^DX^d

W X^DY **2**

(*b*) Explain how information from the diagram confirms that the allele causing red-green colour deficiency is recessive.

V is affected but neither parent R or S is.

Q is affected but neither S or T is. **1**

(*c*) Explain why males are more likely to be affected by red-green colour deficiency than females.

Males only need to inherit one recessive allele rather than

females who need to inherit two copies. **1**

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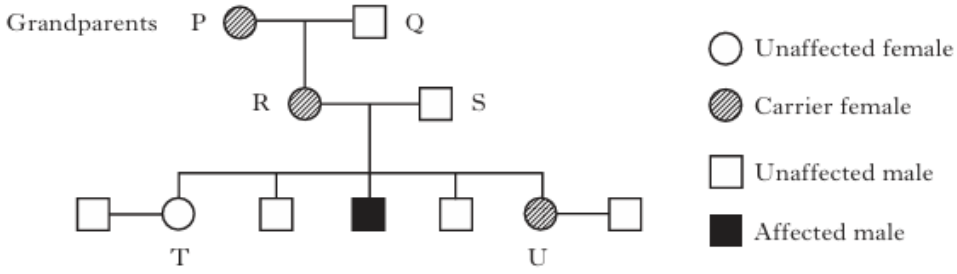

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R X^DX^d S X^DY **1**

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33% **1**

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Son of T 0% Son of U 50% **1**

Sex lined Past Paper Questions

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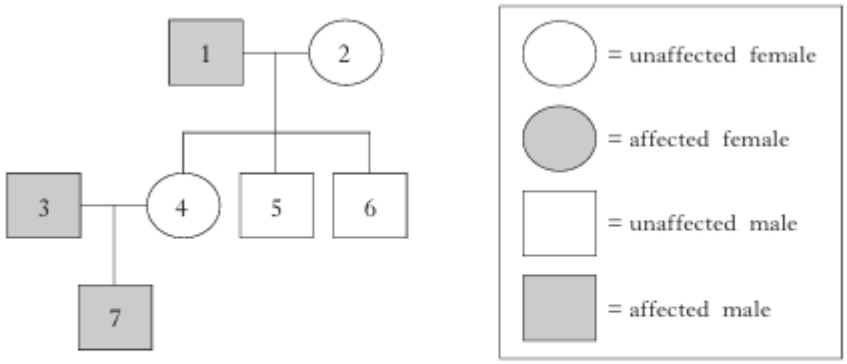

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(i) State the genotypes of individuals 3 and 4.

Individual 3 _____

Individual 4 $X^D\ X^d$ 1

(ii) Explain why individual 1 could not pass the condition to his sons.

The allele is carried on the X chromosome and the father passes the Y chromosome to his son.

_____

_____ 1

(iii) Individual 6 has a son with a woman who is a carrier of the condition.

Calculate the percentage chance of their son having this condition.

Space for calculation

50

_____ % 1

3

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A heterozygous red-eyed female fly was crossed with a white-eyed male.

(i) Complete the grid by adding the genotypes of

1 the male and female gametes; 1

2 the possible offspring. 1

		Female gametes	
		X^R	X^r
Male gametes	X^r	$X^R\ X^r$	$X^r\ X^r$
	Y	X^R Y Y	X^r Y

(ii) Tick (✓) the box(es) to show all the expected phenotypes of the offspring from this cross.

red-eyed female	x	white-eyed female	x
red-eyed male	x	white-eyed male	x

1