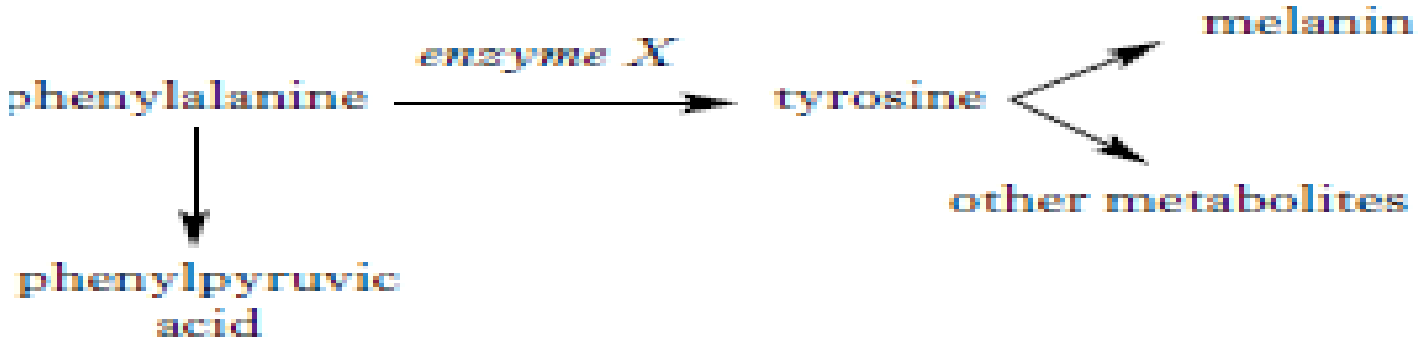
Unit 2 Homework 2b

Ante- and Postnatal Screening

1. Phenylketonuria (PKU) is a metabolic disorder which can be lethal in childhood. It is caused by an inability to make *enzyme X*, shown in the metabolic pathway below.



Which substance would have to be removed from the diet for someone who has this disorder?

A Phenylalanine

B Enzyme X

C Tyrosine

D Melanin

2. Cystic fibrosis is a genetic condition caused by an allele which is not sex-linked.

A child is born with cystic fibrosis despite neither parent having the condition.

The parents are going to have a second child. What is the chance this child will have cystic fibrosis?

A 75%

B 67%

C 50%

D 25%

3. 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 male child?

A 1 in 1

B 1 in 2

C 1 in 3

D 1 in 4

4. The table below shows some genotypes and phenotypes associated with a form of anaemia.

Genotype	*Phenotype*
AA	Unaffected
AS	Sickle cell trait
SS	Acute sickle cell anaemia

An unaffected person and someone with sickle cell trait have a child together.

What are the chances of the child having acute sickle cell anaemia?

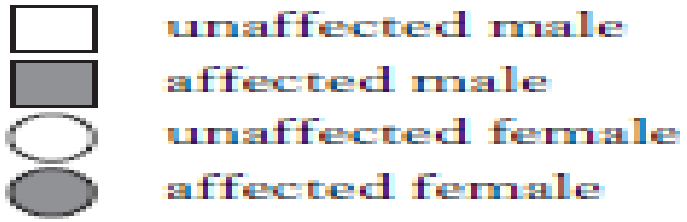
A none

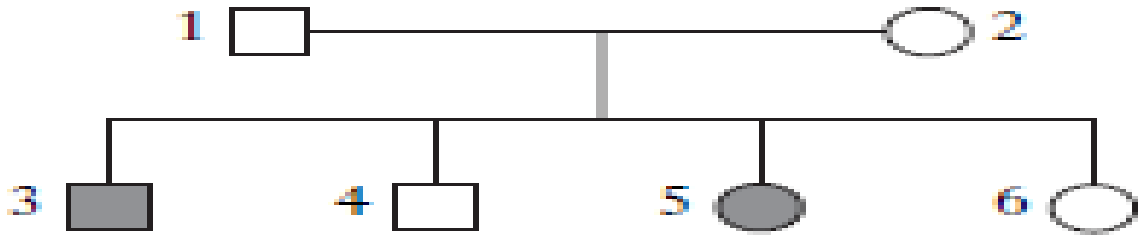
B 1 in 4

C 1 in 2

D 1 in 1

5. Cystic fibrosis is an inherited condition caused by a recessive allele. The diagram below is a family tree showing affected individuals.





Which two individuals in this family tree must be heterozygous for the cystic fibrosis gene?

A 3 and 5

B 4 and 6

C 1 and 2

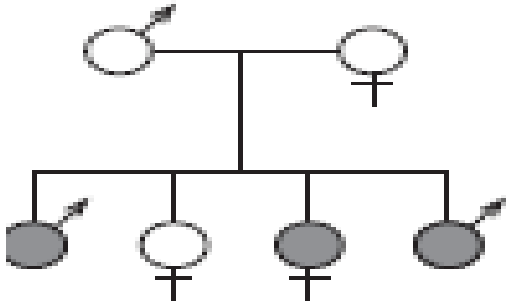
D 2 and 6

6. Haemophilia is a sex-linked recessive condition. A woman, who does not have this condition, has a haemophiliac son. The boy's father is also a haemophiliac.

What are the genotypes of the parents?

	Father	Mother
A	X^HY	X^HX^h
B	X^hY	X^hX^h
C	X^hY	X^HX^H
D	X^hY	X^HX^h

7. The transmission of a gene for deafness is shown in the family tree below.



Key

- Affected male
- Unaffected male
- Affected female
- Unaffected female

This condition is controlled by an allele which is

A dominant and sex-linked

B recessive and sex-linked

C dominant and not sex-linked

D recessive and not sex-linked.

8. Huntington's Disease is an inherited condition in humans caused by a dominant allele which is not sex-linked.

A woman's father is heterozygous for the condition and her mother is unaffected.

What is the chance of the woman having the condition?

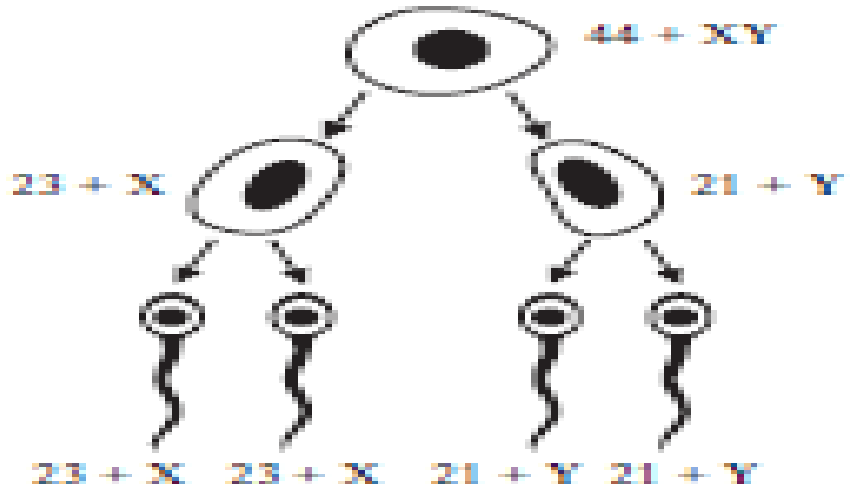
A 1 in 1

B 1 in 2

C 1 in 3

D 1 in 4

9. The diagram shows the chromosome complement of cells during the development of abnormal human sperm.



A sperm with chromosome complement 23+X fertilises a normal haploid egg. What is the chromosome number and sex of the resulting zygote?

	Chromosome number	*Sex of zygote*
A	24	female
B	46	female
C	46	male
D	47	female

10. Phenylketonuria is caused by a single autosomal gene.

A man and a woman, who are unaffected, have an affected child.

What is the probability that their next child will be affected?

A 25%

B 50%

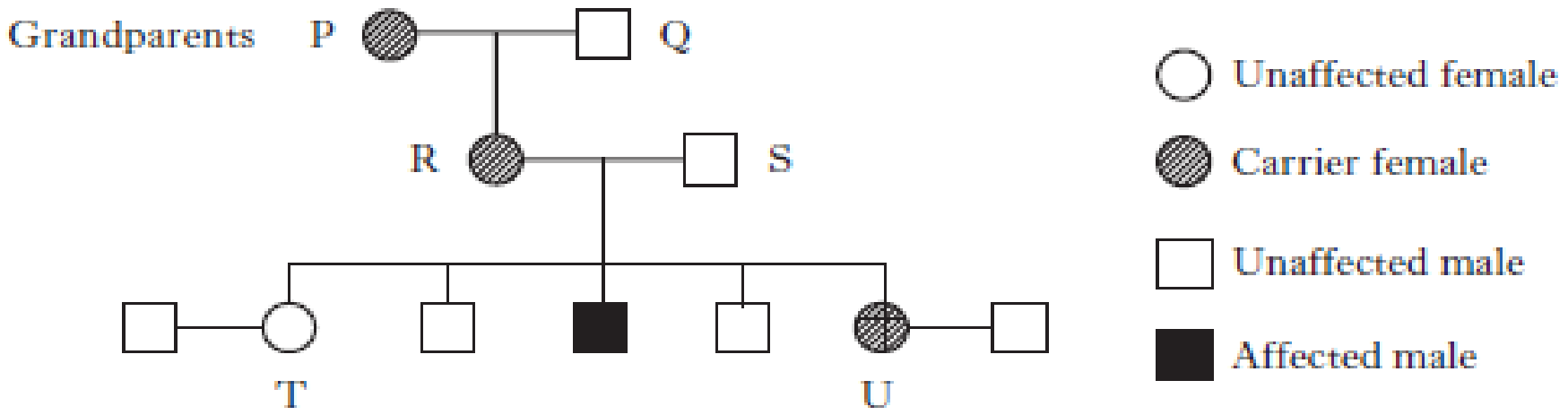
C 75%

D 100%

11. 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