11 HUMAN BIOLOGY GENETICS ASSIGNMENT /42

Name: Key. Due date: _____

1. **Explain** what co-dominant alleles are. (1 mark)

where both alleles are expressed in the phenotype in a heterozygous genotype.

2. An example of co-dominant alleles is the human ABO blood types. **State** the possible genotypes of the alleles for the ABO blood types. (2 marks)

AA, AO, AB, BB, BO, OO

-1 for each missing.

3. **List** the A and B blood antigens. (2 marks)

A and B

1. each.

4. **List** all the possible phenotypes for the ABO blood types. (2 marks)

A, B, O, AB

-1/2 for each one missing

5. **Explain** why is it important to receive compatible blood during a blood transfusion. (2 marks)

If different blood type given the recipients immune system will attack the donated blood (1) making the recipient unwell (dead) (1).

6. State the blood type that is the universal acceptor. (1mark)

AB

7. State the blood type that is the universal donor. (1 mark)

O

8. Another blood grouping is the Rh grouping. State the Rh blood group antigen. (1 mark)

There are 45 antigens controlled by two alleles.

9. List all the possible genotypes for the Rh blood type groupings. (1 mark)

~~Rh+ or Rh-~~

Rh+Rh+ Rh+Rh-

Rh-Rh-

10. State the allele that is recessive for the Rh blood group type. (1 marks)

Rh- = recessive.

11. A man who is blood type O marries a woman who is blood type AB. What proportion of the couple's offspring could donate blood to the father? Show all working using a punnet square.

Parent genotype = O→ OO ♀ AB (1)

Gametes O O A A (1)

	O	O
A	AO	AO
B	BO	BO

(1)

0% can donate to the father (1)

Genotypes

AO = 50%

BO = 50%

(1)

Phenotypes

A = 50%

B = 50%

(1)

(6 marks)

12. A man who is blood type AB marries a woman who is blood type BB. What proportion of the couple's offspring could donate blood to the father? Show all working using a punnet square.

Parent Genotype ♂ AB ♀ BB (1).

Gametes (A) or (B) (B) or (B) (1).

	A	B
B	AB	BB
B	AB	BB

(1)

All offspring can donate blood to the father (1).

Genotypes

AB = 50%

BB = 50%

(1)

Phenotypes

AB = 50%

B = 50%

(1)

(6 marks)

13. Bob Rocket is a wealthy film actor. He is blood type O. A woman attempts to sue Bob for the support of her child that she claims Bob is the father of. The Child is blood type AB and the mother is blood type AA. Is Bob the father? Show all working using a punnet square.

If Bob did have a child with mother?

Parent Genotypes ♂ OO ♀ AA. (1).

Gametes (O) (O) (A) or (A) (1)

	O	O
A	AO	AO
A	AO	AO

(1)

As Bob could not produce a child of blood type AB with the mother, he is not the father (1)

Genotypes

AO = 100%

(1)

Phenotypes

A = 100%

(1).

(6 marks)

14. Two newborn babies were accidentally mixed up in the hospital. In an effort to find out which parent each baby belongs to the blood type of the babies and the parents were collected. The following results were found.

Individual	Blood type
Baby 1	OO
Baby 2	AO
Mrs Brown	BO
Mr Brown	AB
Mrs Smith	BO
Mr Smith	BO

Which baby belongs to which set of parents? Show all working using punnet squares.

Mr + Mrs Brown

Parent Genotypes = AB ♂ BO ♀ (1)

gametes → A or B ; B O (1)

	A	B
B	AA	AB
O	AO	BO

(1)

genotypes (1)

AA : 25%

AB : 25%

AO : 25%

BO : 25%

No OO so cannot be Baby 1. (1)

AO possible so must be Baby 2. (1)

Mr + Mrs Smith

Parent genotypes BO ♂ BO ♀ (1)

gametes → B O ; B O (1)

	B	O
B	BB	BO
O	BO	OO

(1)

Genotypes

BB = 25%

BO = 50% (1)

OO = 25%

No AO so cannot be baby 2. (1)

OO is possible so must be baby 1. (1)

(10 marks)