Name _____

GENETICS: MULTIPLE ALLELE TRAITS

1. A man with AB blood marries a woman with type O blood. What are the possible phenotypes and genotypes of their children? ♂ = I^AI^B ♀ = ii So Phenotypes = Type A, Type B Genotypes = I^Ai, I^Bi

2. A man with type B blood marries a woman with type A blood. Their first child has type O blood. The man says this is impossible and accuses his wife if infidelity.
   a. Is it possible for these two people to produce a type O child? Yes
   b. What are the genotypes of both parents? ♂ = I^Bi ♀ = I^Ai
   c. Draw a Punnet square to show the possible blood types of their children

	I^A	i
I^B	I^AI^B	I^Bi
i	I^Ai	ii

3. A woman names her former boyfriend in a paternity suit. Her child is blood type A. The woman has blood type AB. The accused man has blood type B.
   a. Is it possible for this man to be the child's father? Draw a Punnet square to defend your answer. Yes if ♂ is I^Bi
   b. Does this evidence provide positive proof in this case? No. More traits than blood typing
   c. Suppose the woman had blood type O. Is it possible for the man to be the father of the child? Why or why not? No. Neither parent would carry I^A.

4. In a similar paternity case, the woman has type A blood, the man has type B blood, and the child has type AB.
   a. Is it possible for this man to be the child's father? Draw a Punnet square to defend your answer.
   b. Does this evidence provide positive proof in this case?

♀: I^AI^A × ♂ I^AI^B

	I^A	I^A
I^A	I^AI^A	I^AI^A
I^B	I^AI^B	I^AI^B

♀: I^Ai ♂: I^AI^B

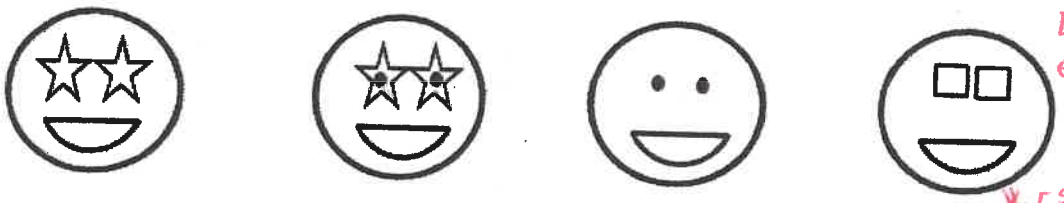
	I^A	i
I^A	I^AI^A	I^Ai
I^B	I^AI^B	I^Bi

5. A woman with type A blood is claiming that a man with type AB blood is the father of her child who is also type AB. Could this man be the father of the child? Yes Show the possible crosses; remember that the woman can have AA or AO genotypes.

6. A man with type AB blood is married to a woman with type O blood. They have two natural children and one adopted child. Jane has type A blood, Bobby has type B blood, and Grace has type O blood. Which child was adopted?
   Grace ♂ doesn't carry the recessive allele

SMILEYS GENETICS

In smileys, the shape of the eye is controlled by multiple alleles, much like blood types. The smileys pictured show the four possible phenotypes. It is known that the star and dot eyes are codominant and the square eyes is a recessive trait. Assign genotypes to each of the smileys pictured. (Hint: Use blood type genotypes to help you)



E^S = star
E^D = dot
e = square

$E^S = E^D > e$

* E^S is codominant with E^D + both are dominant to e

7. If a star-eyed smiley (homozygous) is crossed with a dot-eyed smiley (also homozygous) what will all of their offspring look like? $E^SE^S \times E^DE^D \rightarrow E^SE^D$ Star-dot eyed

8. If the pair in the cross about were both heterozygous, what will their offspring look like and in what proportion?

9. If a starry-dot eyed smiley is crossed with a square eyed smiley, what type of eyes can their children have and in what proportion. $E^SE^D \times ee$

	E^S	E^D
e	E^Se	E^De

50% Star eyed
50% Dot eyed
} 1:1

10. If two starry-dot eyes smileys are crossed, what type of eyes can their children have and in what proportion?
$E^SE^D \times E^SE^D$

	E^S	E^D
E^S	E^SE^S	E^SE^D
E^D	E^SE^D	E^DE^D

25% Star-eyed
50% Star dot-eyed
25% Dot-eyed
1:2:1