Topic: Heredity Lab

Summary: Students will determine what the head of their fictitious baby would look like using their genetics.

Goals & Objectives: Students will be able to relate classical genetics to their own body. Students will be able to comprehend the role of dominant and recessive traits.

Standards: CA Biology *2f. Students know* the role of chromosomes in determining an individual's sex. 2g. *Students know* how to predict possible combinations of alleles in a zygote from the genetic makeup of the parents. 3a. *Students know* how to predict the probable outcome of phenotypes in a genetic cross from the genotypes of the parents and the mode of inheritance (autosomal or X-linked, dominant or recessive).

Time Length: 2 days

Prior To Use: Make sure to consult with your principal before using this lesson plan.

Prerequisite Knowledge: Students have been introduced to gametes, traits, alleles, dominant and recessive, genotype and phenotype.

Materials:
- Photocopied handouts
- Color pencils
- Genetic parents (if a student cannot use their genetic parents, they can determine the parents' traits from a picture. Or they can make up their parents traits.)

Accommodations: Students with an IEP can take the handout home if they need extra time.

Evaluation:
A completed lab packet is worth 30 points.

Name: _____ Row: _____

Date:_____ Period:_____

Heredity Lab

Pretend the traits below are controlled by one gene and that they are located on their own chromosome (1 through 23). Determine your if you have the dominant or recessive traits listed below. If you have a dominant trait, **circle** a dominant allele (capital letter) in the allele column. If you have a recessive trait, **circle** a recessive allele (lowercase letter). Circle only one letter (capital or lowercase) in the allele's column for each row.

Characteristic	Dominant Trait	Recessive Trait	Alleles	
1. Skin Color *	Black / Dark (S)	Fair / Red (s)	S	s
2. Hair Color *	Black / Brown (H)	Blond / Red (h)	H	h
3. Hair Style **	Curly (M)	Straight (m)	M	m
4. Widow's Peak	Yes (P)	No (p)	P	p
5. Eye Color *	Brown (E)	Blue / Green (e)	E	e
6. Eye Lashes	Long (L)	Short (l)	L	l
7. Eye Shape	Round (R)	Almond, Squinty (r)	R	r
8. Eye Brow	Separated (B)	Attached (b)	B	b
9. Eyebrow Color **	Darker than hair (A)	Lighter than hair (a)	A	a
10. Eye Size **	Large (G)	Small (g)	G	g
11. Face Shape	Oval (K)	Square (k)	K	k
12. Freckles	Yes (F)	No (f)	F	f
13. Dimples	Yes (D)	No (d)	D	d
14. Cleft Chin	Yes (C)	No (c)	C	c
15. Nose Shape	Round (O)	Pointed (o)	O	o
16. Nose Width **	Large (N)	Small (n)	N	n
17. Nostril Shape	Rounded (Z)	Flared (z)	Z	z
18. Ear Lobe	Attached (W)	Hanging (w)	W	w
19. Ear Length	Long (T)	Short (t)	T	t
20. Mouth **	Long (I)	Small (i)	I	i
21. Lip Shape	Full (J)	Thin (j)	J	j
22. Tongue Roll *	Yes (U)	No (u)	U	u
23. Gender (X or Y)	X for female	Y for male	X	Y

* Polygenic traits. ** Incomplete dominant genes.

Homework
Tonight at home, observe your paternal parents and determine what traits they have.

If you have the recessive allele for a trait but your parent's express the dominant trait, they must be heterozygous for that trait. Make both parents' alleles recessive since that is the allele they gave you.

Circle one letter from "Mom's" column and one letter from "Dad's" column.

Characteristic	Dominant Trait	Recessive Trait	Mom's Alleles		Dad's Alleles	
1. Skin Color *	Black / Dark (S)	Fair / Red (s)	S	s	S	s
2. Hair Color *	Black / Brown (H)	Blond / Red (h)	H	h	H	h
3. Hair Style **	Curly (M)	Straight (m)	M	m	M	m
4. Widow's Peak	Yes (P)	No (p)	P	p	P	p
5. Eye Color *	Brown (E)	Blue / Green (e)	E	e	E	e
6. Eye Lashes	Long (L)	Short (l)	L	l	L	l
7. Eye Shape	Round (R)	Almond, Squinty (r)	R	r	R	r
8. Eye Brow	Separated (B)	Attached (b)	B	b	B	b
9. Eyebrow Color **	Darker than hair (A)	Lighter than hair (a)	A	a	A	a
10. Eye Size **	Large (G)	Small (g)	G	g	G	g
11. Face Shape	Oval (K)	Square (k)	K	k	K	k
12. Freckles	Yes (F)	No (f)	F	f	F	f
13. Dimples	Yes (D)	No (d)	D	d	D	d
14. Cleft Chin	Yes (C)	No (c)	C	c	C	c
15. Nose Shape	Round (O)	Pointed (o)	O	o	O	o
16. Nose Width **	Large (N)	Small (n)	N	n	N	n
17. Nostril Shape	Rounded (Z)	Flared (z)	Z	z	Z	z
18. Ear Lobe	Attached (W)	Hanging (w)	W	w	W	w
19. Ear Length	Long (T)	Short (t)	T	t	T	t
20. Mouth **	Long (I)	Small (i)	I	i	I	i
21. Lip Shape	Full (J)	Thin (j)	J	j	J	j
22. Tongue Roll *	Yes (U)	No (u)	U	u	U	u

23. Skip gender since you already know what you got.

| Your Genotype		Your Gamete
Copy each of the alleles from page 1 and circle below	If you have circled a recessive allele in the column on the left, then circle the corresponding lower case letter below. If you circled a capitol letter, on page 2 flip a coin for the rest of the alleles. For heads, copy the letter from your "Dad's" column. For tails, copy the letter from your "Mom's" column.	Both of the columns to the left are your genotype. Flip a coin once again to determine which allele from your genotype goes into your gamete below. Heads is from the left column and tails is from the middle column.
S s	S s	S s
H h	H h	H h
M m	M m	M m
P p	P p	P p
E e	E e	E e
L l	L l	L l
R r	R r	R r
B b	B b	B b
A a	A a	A a
G g	G g	G g
K k	K k	K k
F f	F f	F f
D d	D d	D d
C c	C c	C c
O o	O o	O o
N n	N n	N n
Z z	Z z	Z z
W w	W w	W w
T t	T t	T t
I i	I i	I i
J j	J j	J j
U u	U u	U u
X Y	X	X Y

Copy your gamete genotype onto the sperm of ova paper, fold the paper, and return it to the teacher. Copy the same gamete genotype below into the left column. The teacher will pass out the sperm or ova papers randomly. It is important that if your gamete were sperm that you receive an ovum paper and vice versa. Copy the letters from the sperm/egg paper to the mate's gamete allele. Write in your baby's genotype, and use the first page to determine the baby's traits for phenotype.

Your Gamete's Alleles		Mate's Gamete Alleles		Baby's Genotype	Baby's Phenotype
S	s	S	s	_____ _____	_____
H	h	H	h	_____ _____	_____
M	m	M	m	_____ _____	_____
P	p	P	p	_____ _____	_____
E	e	E	e	_____ _____	_____
L	l	L	l	_____ _____	_____
R	r	R	r	_____ _____	_____
B	b	B	b	_____ _____	_____
A	a	A	a	_____ _____	_____
G	g	G	g	_____ _____	_____
K	k	K	k	_____ _____	_____
F	f	F	f	_____ _____	_____
D	d	D	d	_____ _____	_____
C	c	C	c	_____ _____	_____
O	o	O	o	_____ _____	_____
N	n	N	n	_____ _____	_____
Z	z	Z	z	_____ _____	_____
W	w	W	w	_____ _____	_____
T	t	T	t	_____ _____	_____
I	i	I	i	_____ _____	_____
J	j	J	j	_____ _____	_____
U	u	U	u	_____ _____	_____
X	Y	X	Y	_____ _____	_____

Draw Your Baby

Use your baby's phenotypes from page 4 to draw the head of your fictitious baby. Use the half circle as the top part of the head as the starting place. Finish drawing the face shape based upon the phenotype. Then draw in the eye shape, nose shape, and lip shape. Fill in the rest of the traits and include the use of color pencils for eye, hair, and skin color. *Don't draw the following traits*: tongue roll.
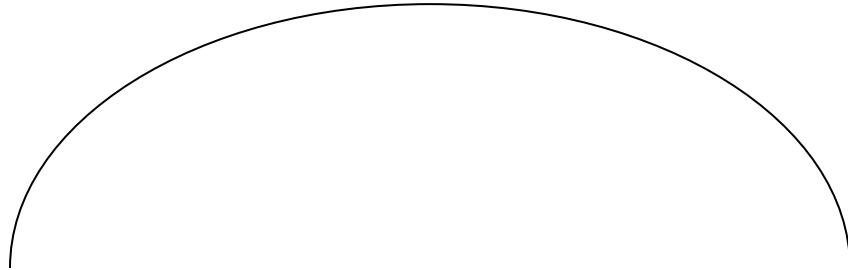
Your Gamete's Alleles		Your Gamete's Alleles		Your Gamete's Alleles		Your Gamete's Alleles		Your Gamete's Alleles	
S	s	S	s	S	s	S	s	S	s
H	h	H	h	H	h	H	h	H	h
M	m	M	m	M	m	M	m	M	m
P	p	P	p	P	p	P	p	P	p
E	e	E	e	E	e	E	e	E	e
L	l	L	l	L	l	L	l	L	l
R	r	R	r	R	r	R	r	R	r
B	b	B	b	B	b	B	b	B	b
A	a	A	a	A	a	A	a	A	a
G	g	G	g	G	g	G	g	G	g
K	k	K	k	K	k	K	k	K	k
F	f	F	f	F	f	F	f	F	f
D	d	D	d	D	d	D	d	D	d
C	c	C	c	C	c	C	c	C	c
O	o	O	o	O	o	O	o	O	o
N	n	N	n	N	n	N	n	N	n
Z	z	Z	z	Z	z	Z	z	Z	z
W	w	W	w	W	w	W	w	W	w
T	t	T	t	T	t	T	t	T	t
I	i	I	i	I	i	I	i	I	i
J	j	J	j	J	j	J	j	J	j
U	u	U	u	U	u	U	u	U	u
X	Y	X	Y	X	Y	X	Y	X	Y

| Sperm / Egg | Sperm / Egg | Sperm / Egg | Sperm / Egg | Sperm / Egg |