



www.NGSSLifeScience.com

Topic: Heredity Lab

Summary: Students will model how DNA is passed from parent to offspring to cause the physical traits of a fictitious baby.

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.

NGSS Standards: *HS-LS3-1.* Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

Time Length: 1 day

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
- Penny (coin)

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

Editable DOCX File and Answer Key:

Available at www.ngsslifescience.com

Printable Cutouts

Your Gamete's
Alleles

S s
H h
M m
P p
E e
L l
R r
B b
A a
G g
K k
F f
D d
C c
O o
N n
Z z
W w
T t
I i
J j
U u
X Y

Your Gamete's
Alleles

S s
H h
M m
P p
E e
L l
R r
B b
A a
G g
K k
F f
D d
C c
O o
N n
Z z
W w
T t
I i
J j
U u
X Y

Your Gamete's
Alleles

S s
H h
M m
P p
E e
L l
R r
B b
A a
G g
K k
F f
D d
C c
O o
N n
Z z
W w
T t
I i
J j
U u
X Y

Your Gamete's
Alleles

S s
H h
M m
P p
E e
L l
R r
B b
A a
G g
K k
F f
D d
C c
O o
N n
Z z
W w
T t
I i
J j
U u
X Y

Your Gamete's
Alleles

S s
H h
M m
P p
E e
L l
R r
B b
A a
G g
K k
F f
D d
C c
O o
N n
Z z
W w
T t
I i
J j
U u
X Y

Sperm / Egg
Circle One

Sperm / Egg
Circle One

Sperm / Egg
Circle One

Sperm / Egg
Circle One

Sperm / Egg
Circle One

Heredity Lab

Pretend the traits below are controlled by one gene and each gene is located on their own chromosome (1 through 23). *This type of lab in real life is way more complex as most of the characteristics below are controlled by many genes.* Since you have two parents, you receive two copies of each gene from your paternal mother and father. Genes can have mutations, which can cause dominant and recessive traits. The mutation is represented as a letter, called an allele.

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

* Polygenic traits.

Directions:

- Left Column:** Have a partner look at you to determine if you have the dominant or recessive characteristic. Circle one letter (allele) for each characteristic
- Center Column:** Based on what your genetic parents look like, determine if they have the dominant or recessive characteristic. If they are opposites, choose one and circle it.
- Right Column:** Flip a coin for each characteristic. If it is heads, circle the same allele from the left column and if it is tails, circle the same allele from the center column.

Your Genotype

	#1 Look at Yourself <i>Circle one letter per line</i>		#2 Your Parents <i>Circle one letter per line</i>		#3 Your Gamete <i>Circle one letter per line</i>
	<i>Heads</i>		<i>Tails</i>		<i>Flip a coin</i>
	S	s	S	s	S
1. Skin Color *	H	h	H	h	H
2. Hair Color *	M	m	M	m	M
3. Hair Style **	P	p	P	p	P
4. Widow's Peak	E	e	E	e	E
5. Eye Color *	L	l	L	l	L
6. Eye Lashes	R	r	R	r	R
7. Eye Shape	B	b	B	b	B
8. Eye Brow	A	a	A	a	A
9. Eyebrow Color **	G	g	G	g	G
10. Eye Size **	K	k	K	k	K
11. Face Shape	F	f	F	f	F
12. Freckles	D	d	D	d	D
13. Dimples	C	c	C	c	C
14. Cleft Chin	O	o	O	o	O
15. Nose Shape	N	n	N	n	N
16. Nose Width **	Z	z	Z	z	Z
17. Nostril Shape	W	w	W	w	W
18. Ear Lobe *	T	t	T	t	T
19. Ear Length	I	i	I	i	I
20. Mouth **	J	j	J	j	J
21. Lip Shape	U	u	U	u	U
22. Tongue Roll *	X	Y	X	X	X
23. Sex (X or Y)					Y

- Copy your gamete's alleles onto the sperm or ova paper, fold the paper, and return it to the teacher.

5. Circle the same gamete genotypes (right column on page 2) into the left column below.

The teacher will pass out the gamete papers randomly. It is important that if your gamete were sperm that you receive an ovum paper and vice versa.

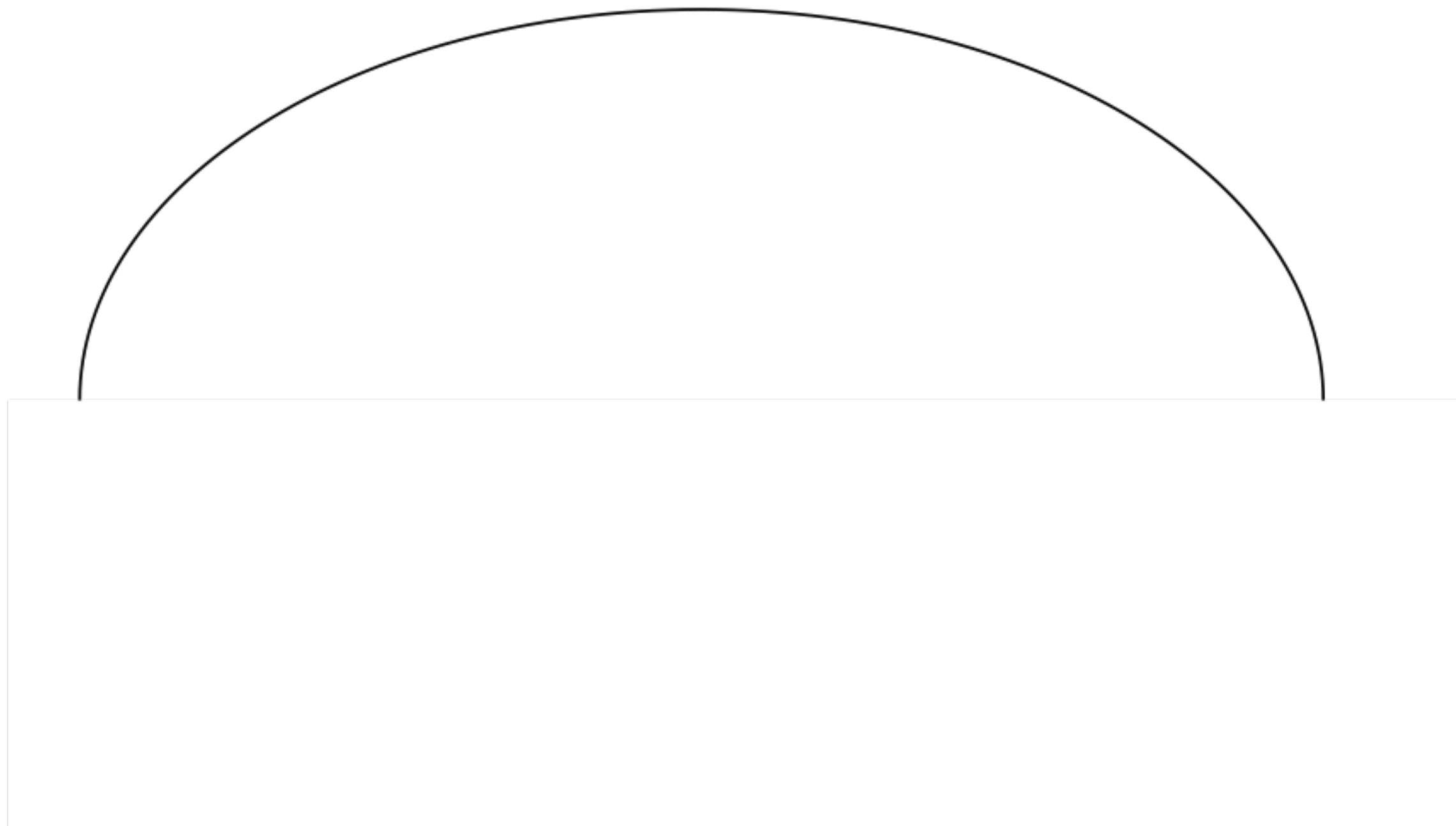
6. Circle the same letters from the sperm/egg paper under the mate's gamete allele column.
 7. Write in your baby's genotype using #5 and #6. *Capital letters always go first.*
 8. Use the genotype and the first page to determine the baby's traits for phenotype.

#5 Your Gamete's Alleles	#6 Mate's Gamete Alleles	#7 Baby's Genotype	#8 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	_____	_____

Baby Drawing

Remember, most of the traits in this activity are controlled by many genes. This means this is not realistic since we pretended those traits were controlled by a single gene.

Use your baby's phenotypes from page 3 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.



9. What was your genotype for dimples? _____
10. Each letter you circled on page 3 represents an allele. Each allele represents a different _____ of a gene.
11. Your baby's genotype has two copies of each _____
12. How many **total** alleles in this activity did your baby inherit? _____
13. How many chromosomes did **you give** your pretend baby? _____
14. Explain how traits and chromosomes are related? _____