

Do you want to build a snowman?

Part 1



**A winter themed
genetics activity on
Dominant & Recessive Traits**

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**Student answers will vary, so
answer documents contain sample
student data.**

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A Note to Teachers – Part 1

Thank you for purchasing this **Build a Snowman** activity. There are several ways that you can use this product in your classroom.

You can use this as an independent activity, giving each student two coins to flip or you can have students work in pairs, giving each student one coin to represent one parent each.

Each student (or pair) should receive a copy of the **Build a Snowman** worksheet to record their coin flips, determine alleles, genotypes, phenotypes, and vocabulary.

You can mix and match the rest of the pages in this file to meet the needs of your classroom. You may choose to print the **My Snowman** page on the back of their worksheet, which is where they can draw their unique snowman. If you prefer a fun way to display student creations, you can give them the snowman cutouts to actually build their snowmen. In this case, you may choose to print the **Snowman Phenotypes** page or **Snowman Class Data** on the back of their worksheet.

I personally like to project the phenotypes page on my screen so students can see them in color. If your kids have 1-to-1 devices, you may opt to allow them to bring the phenotypes chart up on their screens.








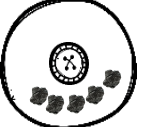





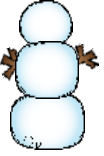
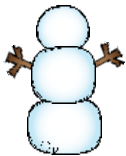
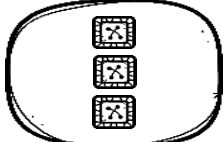
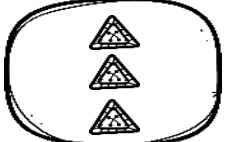

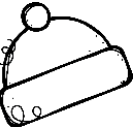

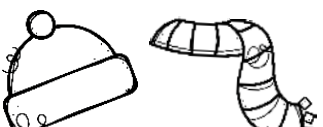
If your students need some graphing practice, I've included a page for them to graph their class data, but again, how you utilize these resources is up to you. There is one graph sheet that includes titles and axis values and a higher level differentiated version that does not. The class data pages can provide important segue into conversations about allelic frequency and dominance ratios. If you teach multiple sections of this class, you may want to compile all of your class data for bigger numbers.

In part 2 of this activity, students will pair up to use their snowmen to create snowbabies using Punnett Squares.

As always, if you have any questions, concerns, problems, or even suggestions on better/other ways to use this product, please feel free to email me at Schilly.science@gmail.com . I would love to hear from you!

Happy Teaching,
~Schilly

Snowman Phenotypes

<u>Trait</u>	<u>Dominant</u>	<u>Recessive</u>	<u>Incomplete / Codominance</u>
Number of Snowballs	 Three (S)	 Two (s)	N/A
Height	  Tall (H)	  Short (h)	N/A
Nose	 Carrot (N)	 Button (n)	N/A
Pipe	No pipe (P)	 Pipe (p)	N/A
Eyes	 Coal (c)	 Buttons (B)	 One of each (CB)
Arm Length	 Long (L)	 Short (S)	 Medium (LS)
Button Shape	 Square (S)	 Triangle (T)	 Hearts (TS)
Clothing (any color)	 Hat (H)	 Scarf (S)	 Hat & scarf (HS)

Name _____

Do You Want to Build a Snowman?

Dominant & Recessive Traits

Your objective is to create your own snowman by determining the traits that it has inherited from its parents.

Step 1—Obtain two coins; one for each parent. Parents are heterozygous for all traits

Step 2—Flip coins for each trait. Heads = dominant & tails = recessive**. Circle the correct allele to determine the genotype and the phenotype for each trait.

<u>Trait</u>	<u>Parent 1</u>	<u>Parent 2</u>	<u>Genotype</u>	<u>Phenotype</u>
# of Snowballs	S s	S s		
Height	H h	H h		
Nose	N n	N n		
Pipe	P p	P p		
Eyes	C B	C B		
Arm Length	L S	L S		
Button Shape	S T	S T		
Clothing	H S	H S		

**Some traits are represented by incomplete dominance or codominance, resulting in a third phenotype

Vocabulary

Dominant _____

Recessive _____

Genotype _____

Phenotype _____

Homozygous _____

Heterozygous _____

Allele _____

Incomplete Dominance _____

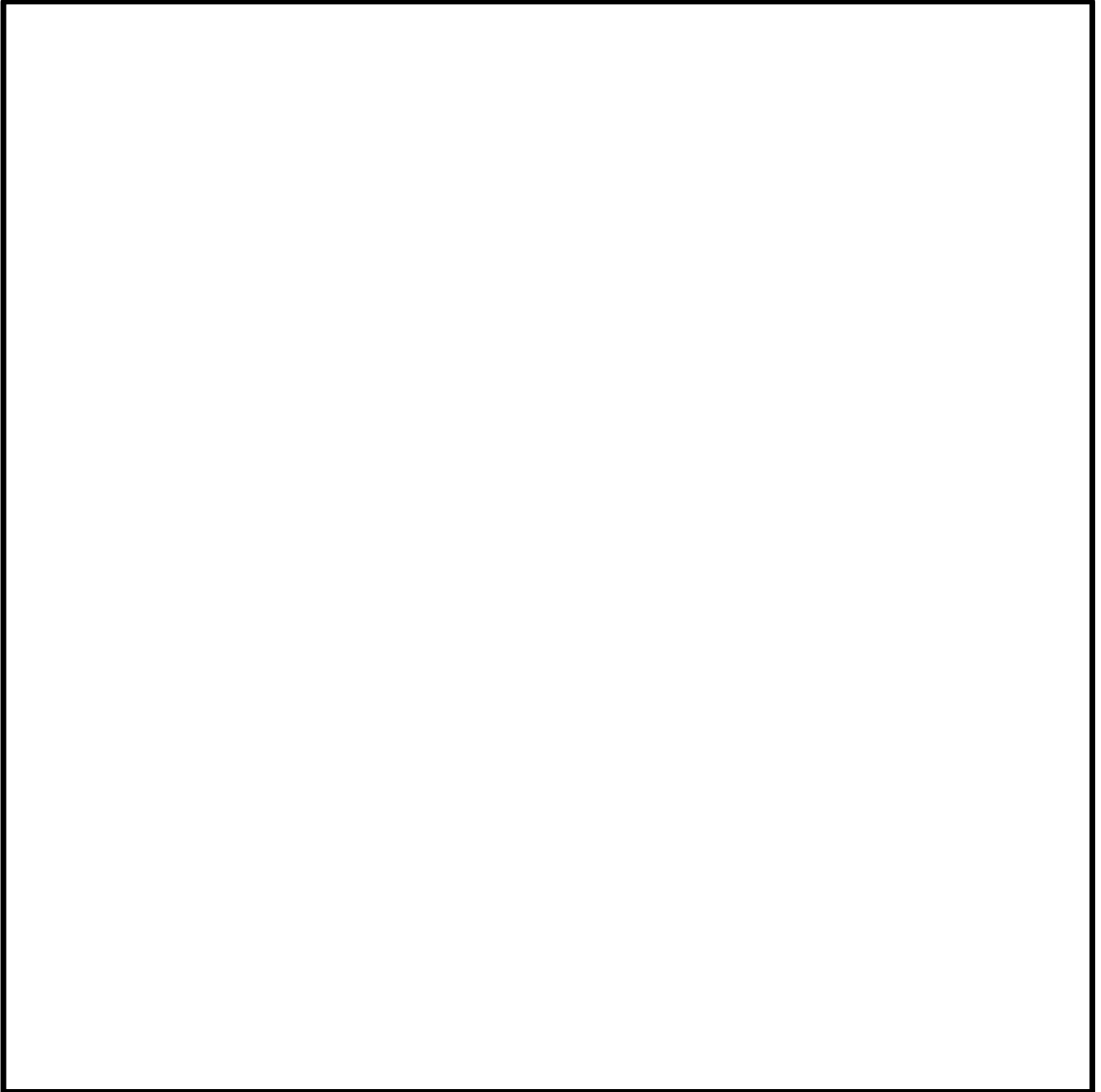
Codominance _____



My Snowman

My Snowman's Name _____

Directions: In the space below, draw the snowman that you created by flipping coins. Use the snowman phenotype chart to determine your snowman characteristics.



Snowman Traits Class Data

Fill in the chart below with class data and answer the questions at the bottom of the page.

Trait	# Dominant	# Recessive	Incomplete/ codominant	Total	% Dominant	% Recessive
# of Snowballs			N/A			
Height			N/A			
Nose			N/A			
Pipe			N/A			
Eyes**						
Arm Length**						
Button Shape**						
Clothing**						

1. How many alleles does a snowman have for each trait? Where do they come from?

2. Describe the difference between a dominant trait and a recessive trait.

3. Would you expect to see more tall snowmen or short snowmen? Explain why.

4. For which traits is your snowman dominant? Recessive? Neither?

Dominant –

Recessive -

Neither –

5. What is the only way that a snowman can have a recessive phenotype?

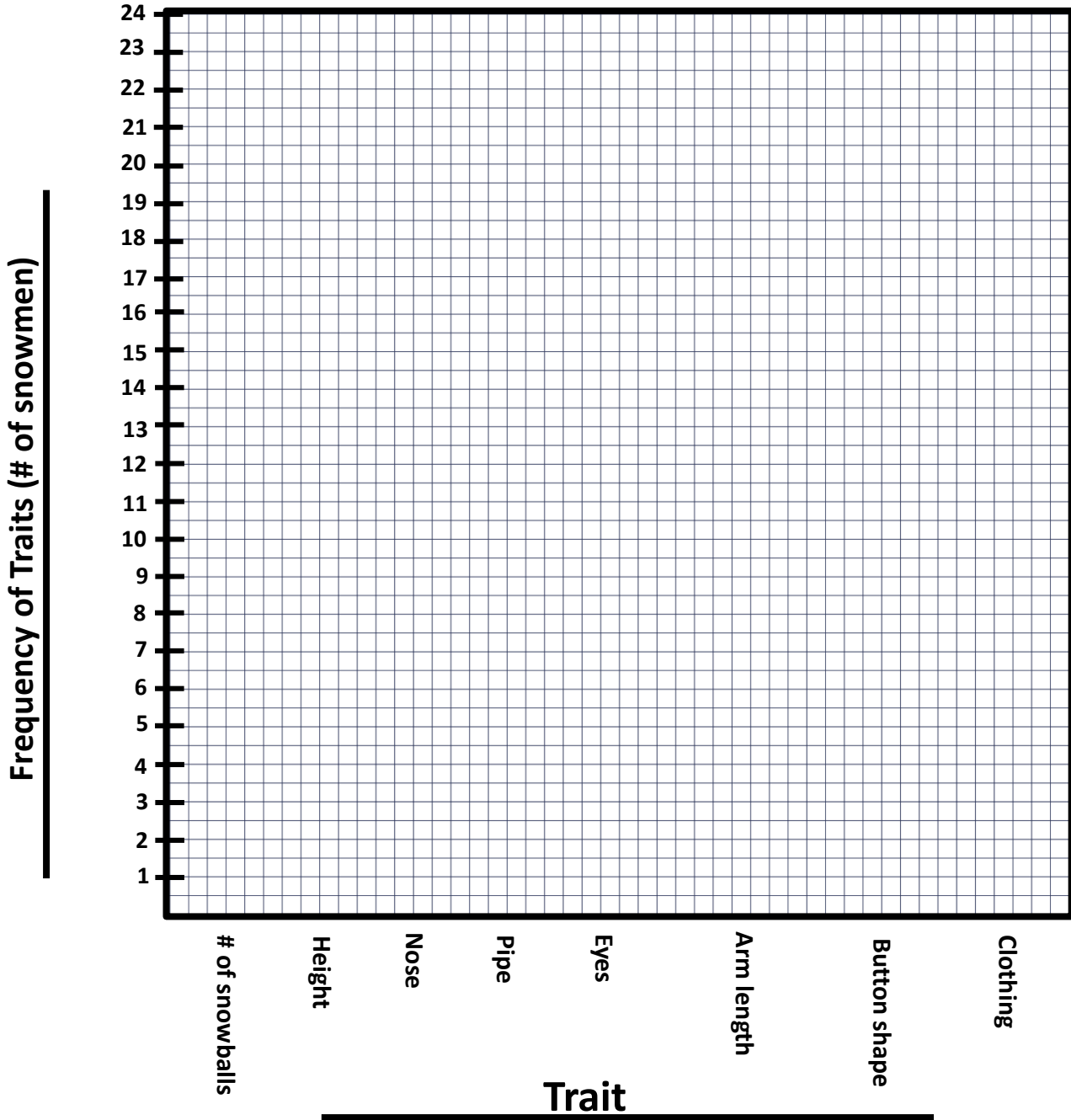
6. Explain why there are three different options for some traits but not others.

7. Describe how this activity represents real life. Use evidence from your coin flips to explain how traits can be inherited in humans. Use at least one real, human example in your explanation.

Graphing Snowman Class Data

Directions Use our class data to create a bar graph below. Make sure to identify which color is which on the key at the bottom.

Frequency of Snowman Traits in our Class



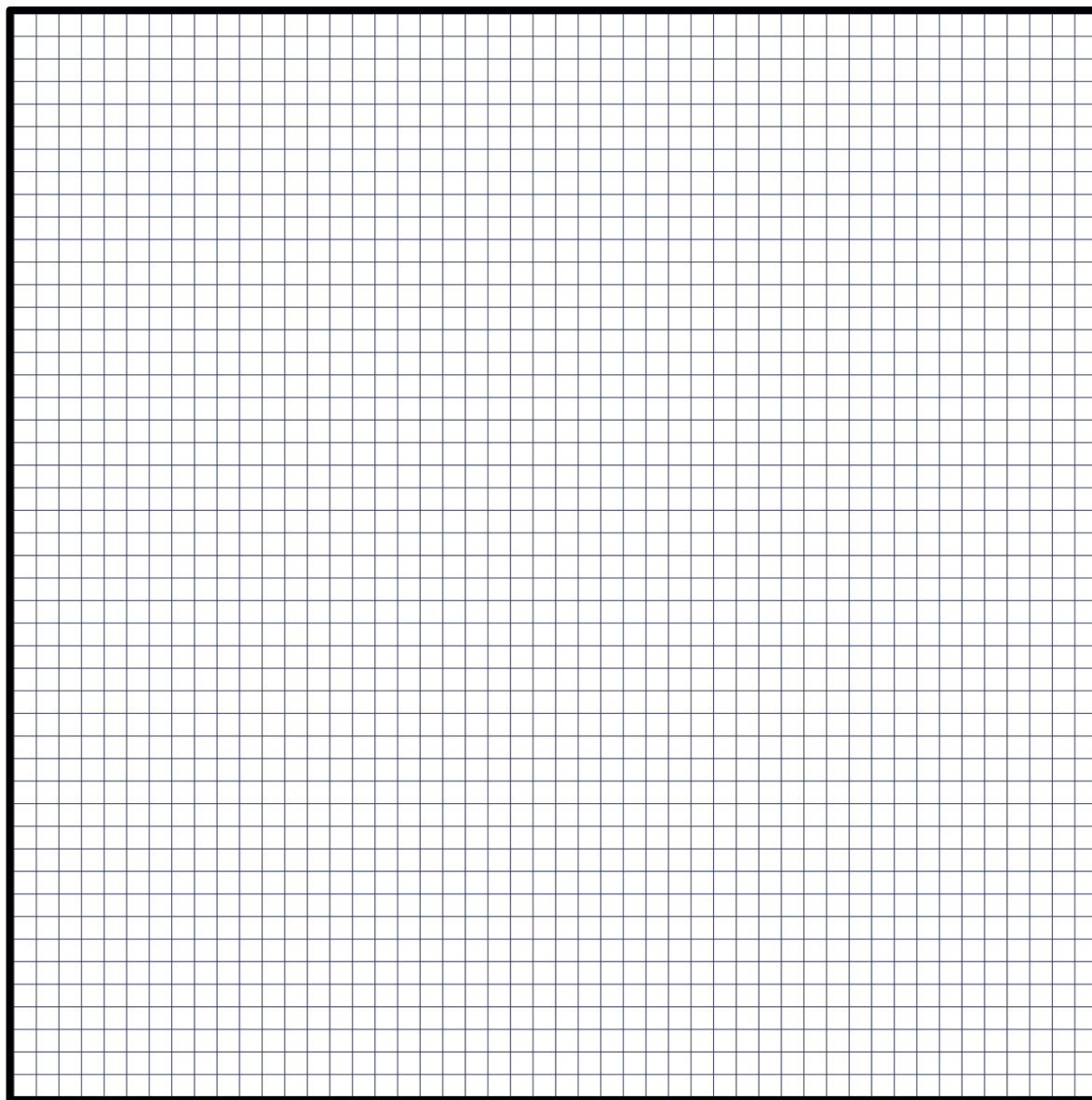
key

<input type="checkbox"/> Dominant	<input type="checkbox"/> Recessive	<input type="checkbox"/> Inc/Codominant
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Graphing Snowman Class Data

Directions In the space provided below, create a bar graph of class data. Make sure to include titles for the graph, each axis, and a key.

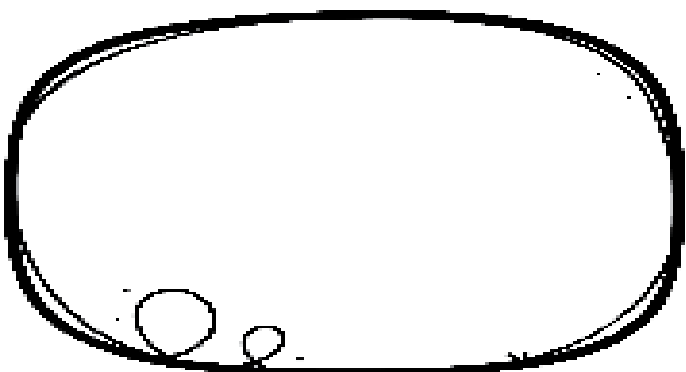
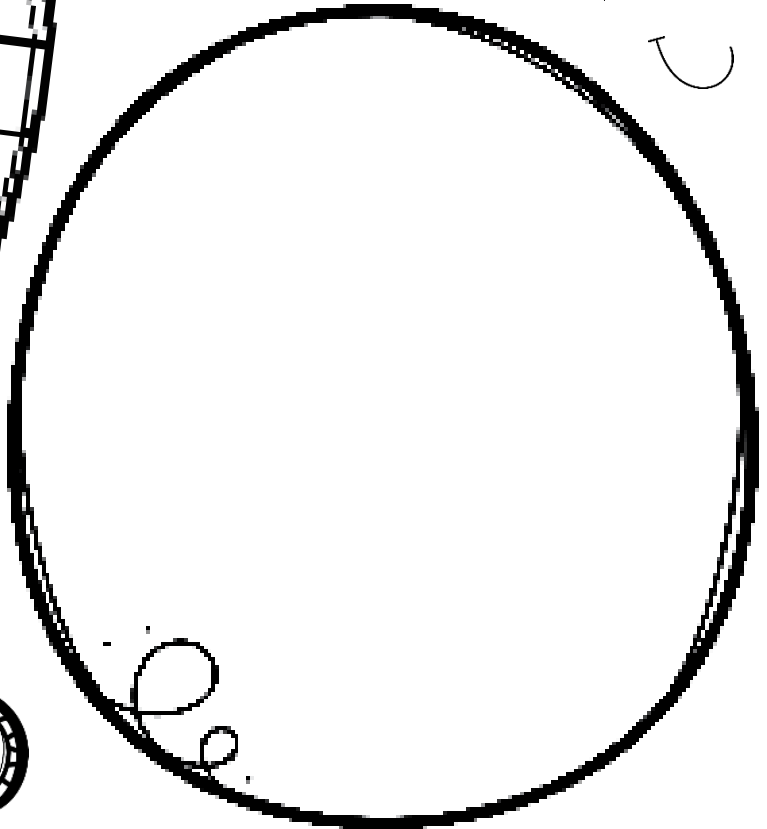
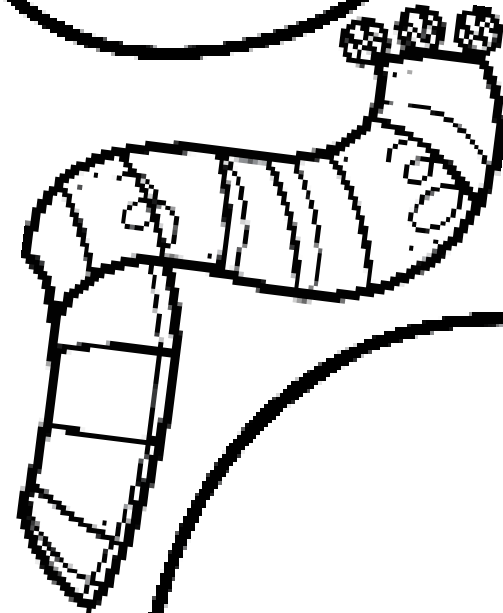
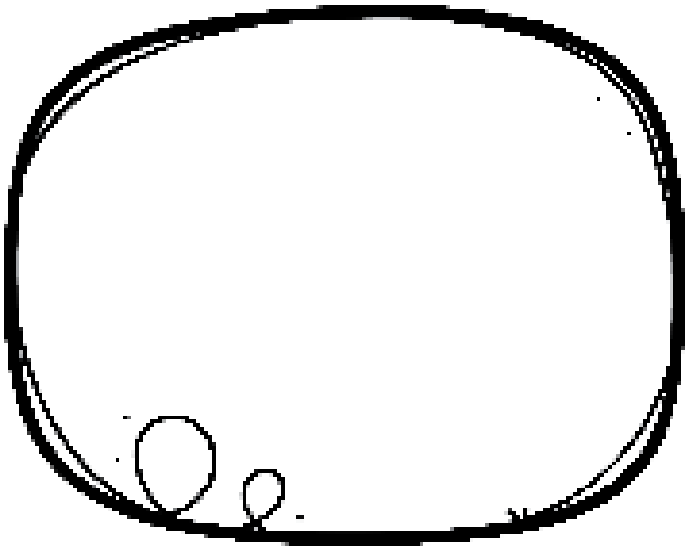
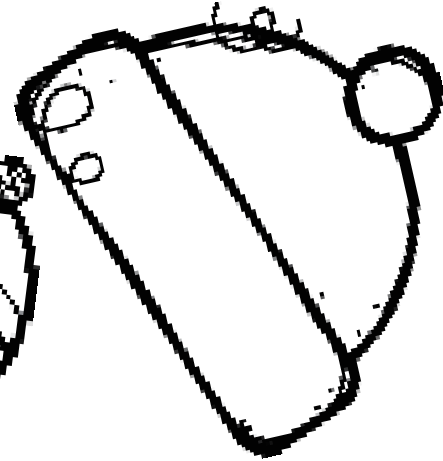
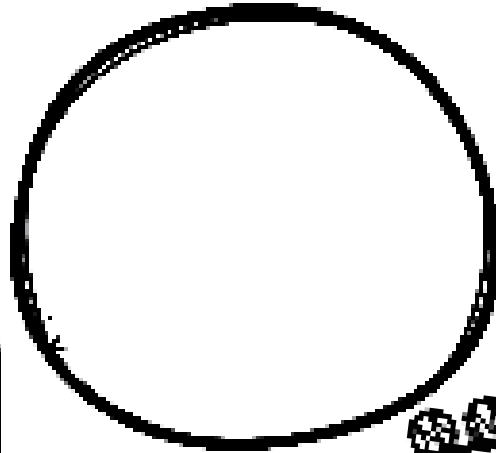
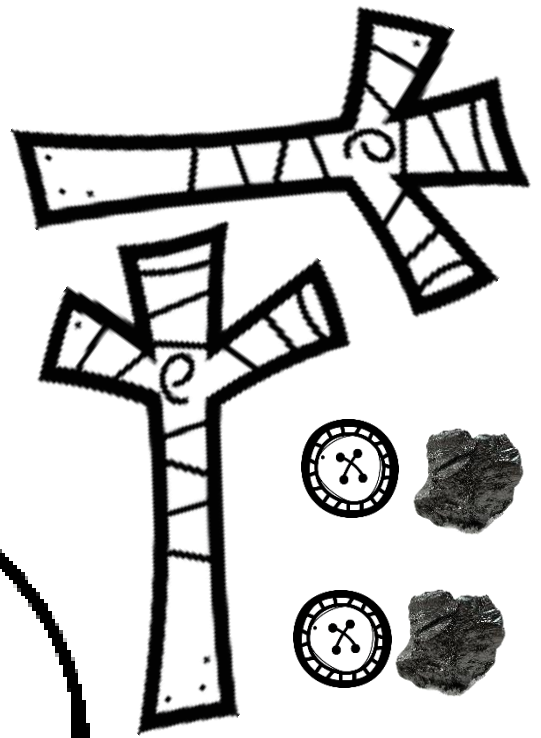
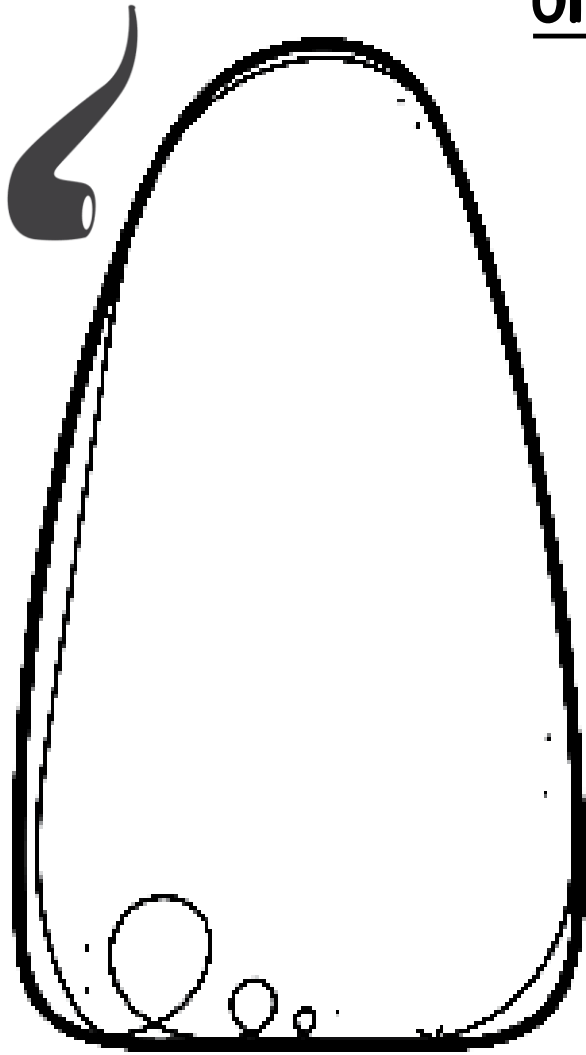


key

<input type="checkbox"/> Dominant	<input type="checkbox"/> Recessive	<input type="checkbox"/> Inc/Codominant
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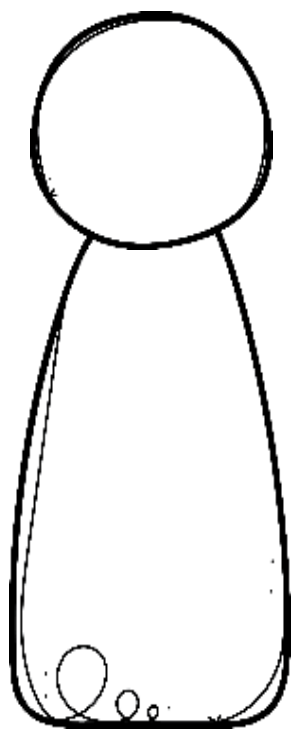


Snowman Parts

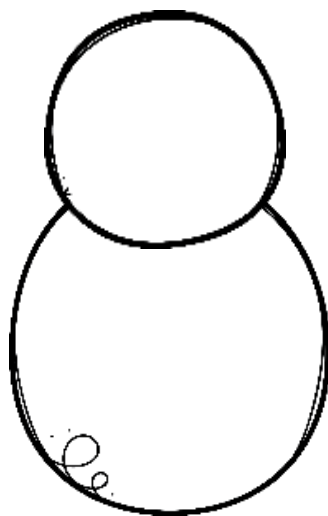


Which Snowballs should students use?

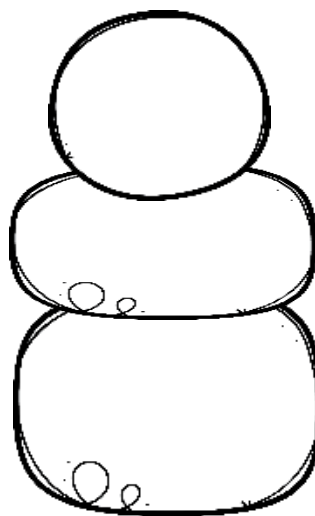
For my lower level students, I show the next slide (without these notes) to help them figure out how to start their snowman. For my advanced students, I don't give much direction at all.



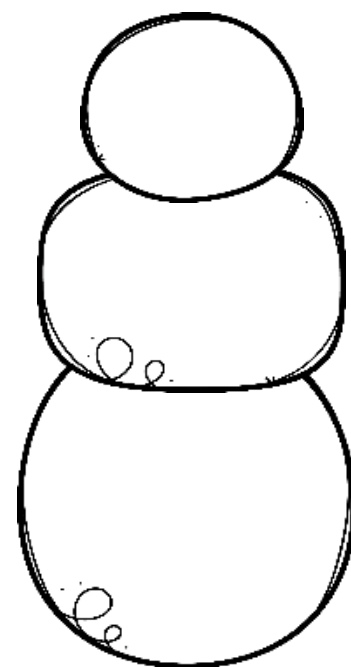
Two snowballs
Tall



Two snowballs
Short

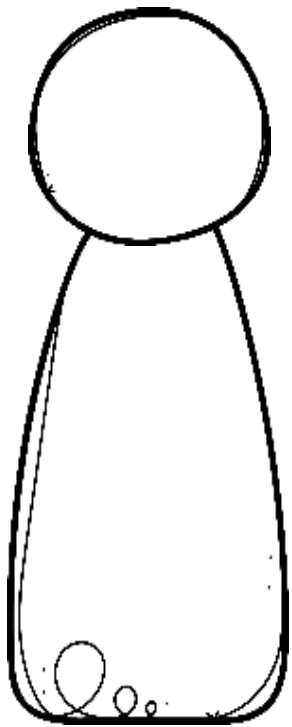


Three snowballs
Short

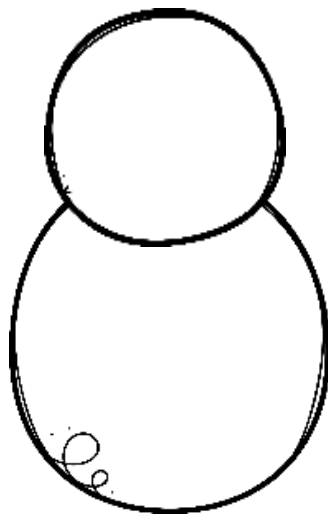


Three snowballs
Tall

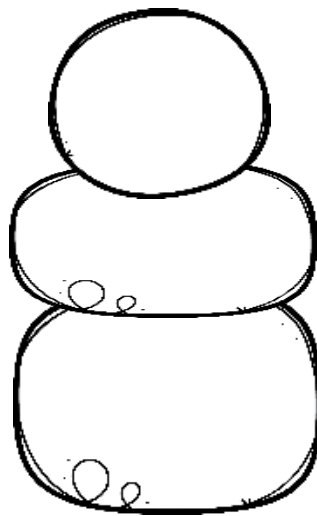
Which Snowballs should I use?



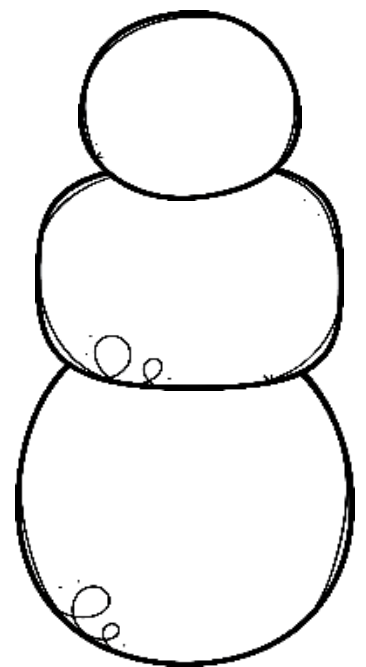
Two snowballs
Tall



Two snowballs
Short



Three snowballs
Short



Three snowballs
Tall

Do You Want to Build a Snowman?

Dominant & Recessive Traits

Your objective is to create your own snowman by determining the traits that it has inherited from its parents.

Step 1—Obtain two coins; one for each parent. Parents are heterozygous for all traits

Step 2—Flip coins for each trait. Heads = dominant & tails = recessive**. Circle the correct allele to determine the genotype and the phenotype for each trait.

<u>Trait</u>	<u>Parent 1</u>	<u>Parent 2</u>	<u>Genotype</u>	<u>Phenotype</u>
# of Snowballs	S s	S s	SS	Three
Height	H h	H h	Hh	Tall
Nose	N n	N n	Nn	Carrot
Pipe	P p	P p	pp	Has a pipe
Eyes	C B	C B	CC	Coal
Arm Length	L S	L S	SL	Medium
Button Shape	S T	S T	TT	Triangle
Clothing	H S	H S	HS	Hat/scarf

**Some traits are represented by incomplete dominance or codominance, resulting in a third phenotype

Vocabulary — write the definition for each word and give one example from our snowman traits

Dominant The stronger allele that is expressed when one or more copies are present – 3 snowballs is dominant

Recessive The weaker allele that is expressed only when two copies are present – 2 snowballs is recessive

Genotype The genetic makeup of an organism, expressed as a combination of letters – Carrot nose = genotype NN or Nn

Phenotype The physical characteristics expressed through alleles – Phenotype for HH is a tall snowman

Homozygous Both alleles for a trait are identical – CC, HH, and ss are all homozygous

Heterozygous The alleles for a trait are different – CB, Hh, and Ss are all heterozygous

Allele Different versions of a gene – N and n are two alleles for nose

Incomplete Dominance Neither allele is completely dominant & offspring are a blend of both – Medium arms are inc dom.

Codominance Both alleles are dominant and offspring show both alleles at the same time – Eye CB is cod

My Snowman

My Snowman's Name Chilly-Dawg

Directions: In the space below, draw the snowman that you created by flipping coins. Use the snowman phenotype chart to determine your snowman characteristics.



Snowman Traits Class Data

Fill in the chart below with class data and answer the questions at the bottom of the page.

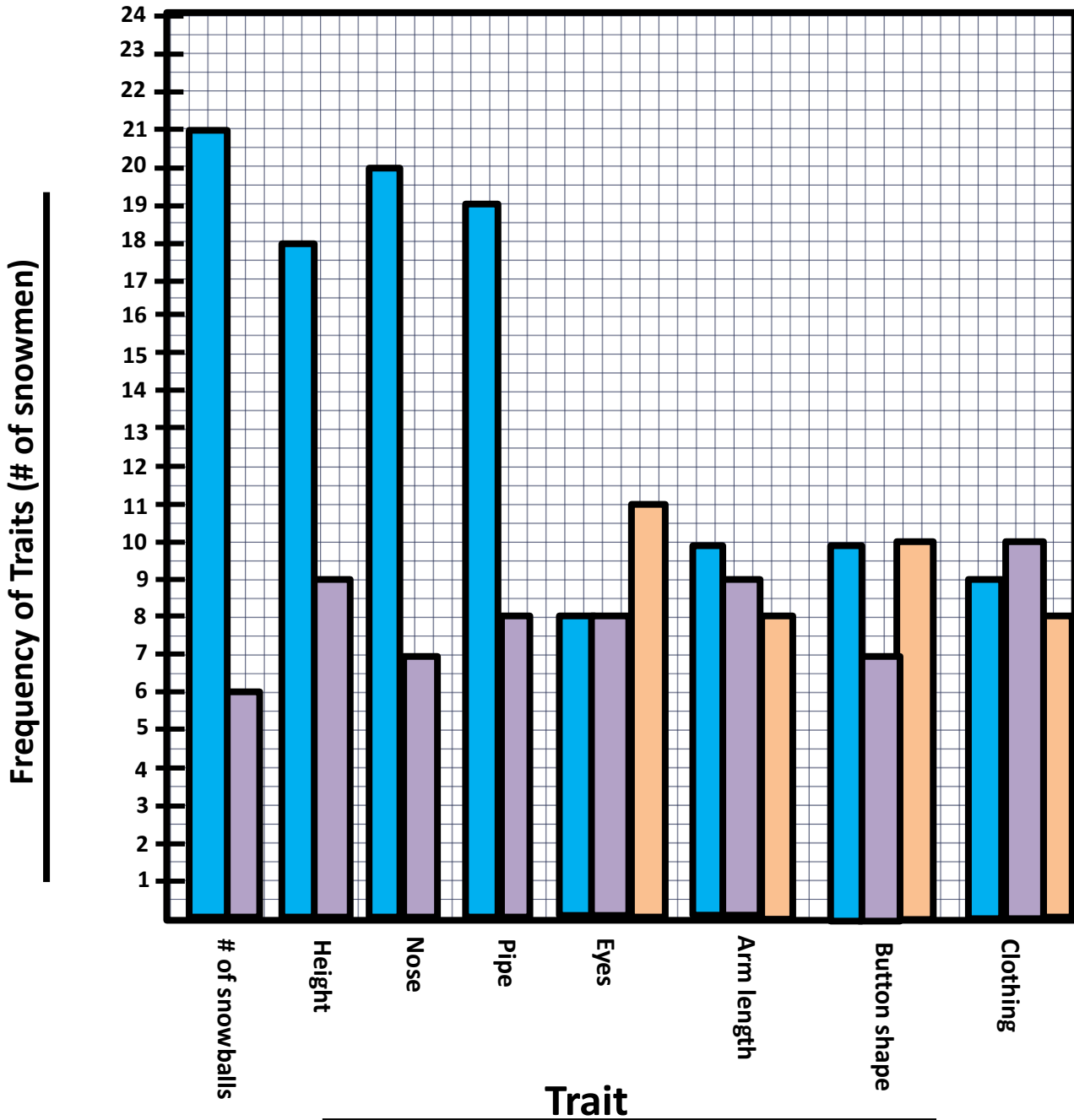
Trait	# Dominant	# Recessive	Incomplete/ codominant	Total	% Dominant		% Recessive
# of Snowballs	21	6	N/A	27	78%		22%
Height	18	9	N/A	27	67%		33%
Nose	20	7	N/A	27	74%		26%
Pipe	19	8	N/A	27	70%		30%
Eyes**	8	8	11	27	30%	30%	40%
Arm Length**	10	9	8	27	37%	33%	30%
Button Shape**	10	7	10	27	37%	26%	37%
Clothing**	9	10	8	27	33%	37%	30%

- How many alleles does a snowman have for each trait? Where do they come from?
A snowman has two alleles for each trait. They get one allele from each parent when we flipped the coins.
- Describe the difference between a dominant trait and a recessive trait.
A dominant trait is the stronger allele and the recessive is the weaker allele. A dominant trait can show up if just one allele is present because it covers up the recessive allele.
- Would you expect to see more tall snowmen or short snowmen? Explain why.
Tall, since tall is the dominant height in snowmen and it can show up with a HH or Hh genotype.
- For which traits is your snowman dominant? Recessive? Neither?
Dominant – Three snowballs, Tall, Carrot nose, coal eyes
Recessive - Pipe, button shape
Neither – Arm length, clothing (hat/scarf)
- What is the only way that a snowman can have a recessive phenotype?
A snowman can only have a recessive phenotype if it has two copies of the recessive allele – one from each parent
- Explain why there are three different options for some traits but not others.
In these traits, one gene is not dominant over another, so there is no recessive allele to cover up. The heterozygous versions create a third phenotype called incomplete or codominance
- Describe how this activity represents real life. Use evidence from your coin flips to explain how traits can be inherited in humans. Use at least one real, human example in your explanation.
This activity represents real life because humans have many traits with dominant and recessive alleles. We get our alleles from our parents, just like our snowmen. For example, brown eyes in humans are the dominant color and we definitely see more brown-eyed people in the world, just like we saw mostly tall snowmen in our class since tall is dominant over short.

Graphing Snowman Class Data

Directions Use our class data to create a bar graph below. Make sure to identify which color is which on the key at the bottom.

Frequency of Snowman Traits in our Class

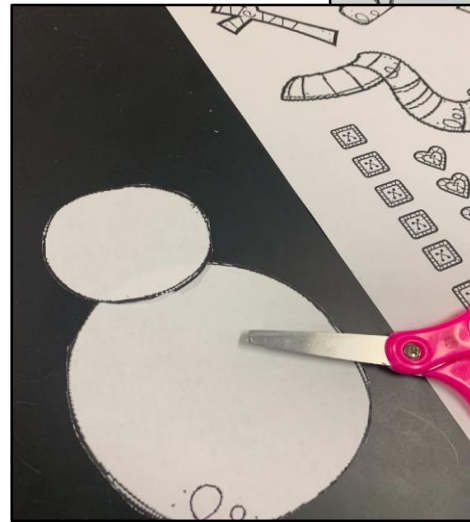
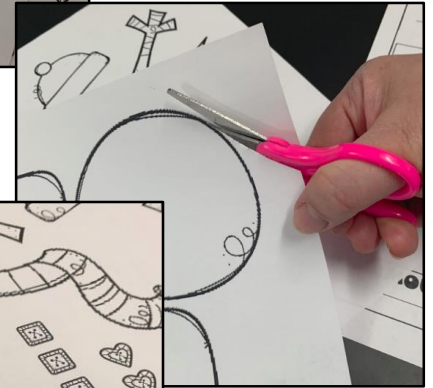
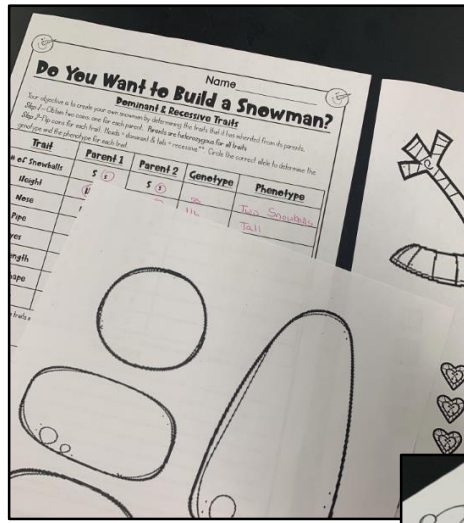
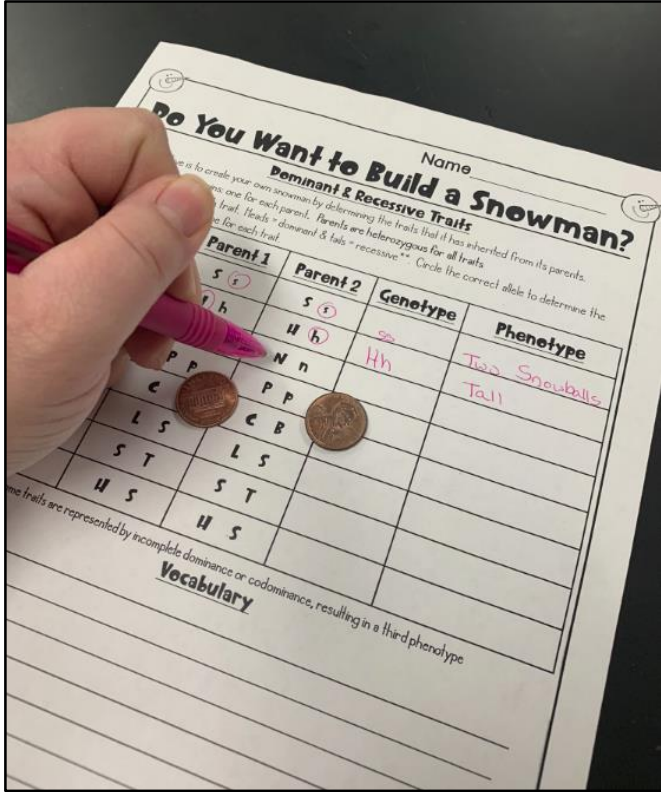


key

Dominant **Recessive** **Inc/Codominant**

Flipping for traits

The creation process



Our classroom snowmen

