By: Darby Feldwinn

Target Grade: 1st

Teacher Prep Time: 20 minutes

Lesson Time: 3 hour

### Learning Goals:

- Students will know that humans mimic properties/traits of plants and animals to improve our lives.
- Students will engage in argument from evidence to come to a class consensus.

# NGSS:

- 1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.\*
- K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- Science and Engineering Practice
  - #7 Engaging in argument from evidence
    - Engaging in argument from evidence in K-2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).
      - Construct an argument with evidence to support a claim.
- Disciplinary Core Ideas
  - LS1.A Structure of Function
    - All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air.
       Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.
  - LS1.D Information Processing
    - Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.
- Cross Cutting Concepts
  - Structure and Function
    - The shape and stability of structures of natural and designed objects are related to their functions(s).

# CCSS:

- SL-1-b: Participate in collaborative conversation with diverse partners about grade 1 topics and texts with peers and adults in small and large groups.
  - Build on others' talk in conversations by responding to the comments of others through multiple exchanges.

# Where this lesson fits in:

• This lesson provides a great ending activity to performance expectation 1-LS1-1 (from molecules and organisms). During the activity students identify external parts

(adaptations) that help animals survive, grow, and meet their needs for the environment. In addition, students are challenged to think about external features that animals and plants have that humans have copied. Students then apply their engineering skills to design a jacket using external features from animals that help to keep animals warm. In addition, this activity introduces students to scientific argumentation and allows students multiple opportunities to practice these skills.

- Before this activity students should review kindergarten performance expectation (K-LS1-1) which requires them to determine what living things need to survive. They should then expand on these ideas by observing both plants and animals and identify their external parts (example: birds -wings). In addition, they should identify how these external parts allow the plants/animals to survive, meet their needs, and grow in their native habitats. An example of an external feature that animals have that allows them to grow is a mouth which is used for eating and for gas exchange. Roots are leaves are examples of external features that plants have that allow them to grow. Roots are used for absorbing water, and leaves are used to absorb sunlight and CO<sub>2</sub>.
- If desired, a similar design activity can be included that focuses on features that humans take from plants.

#### Materials Needed:

- Plant/animal/human cards
- Craft Feathers (down and large)
- Cotton (Synthetic Down) (get from a pillow)
- Shammy pieces
- Thick Felt
- Thin Felt
- Ziploc baggies with Crisco
- Ziploc baggies
- Masking tape
- Thermometers
- Butter knife or piece of metal about the size of a butter knife with a smiley face sticker on the handle (this helps students understand that these devices are mimicking metal people)
- 800 mL beakers with hot water
- Timer

#### **Teacher Prep:**

- Print out and cut up enough plant/animal/human cards so each group (~3 students) can have a set.
- Tape the thermometers to the butter knives as seen in the picture on the right. Make sure that the tape does not cover the 40°C mark.
  - It is helpful to put a smiley face sticker on the knives to help students understand that the knife/thermometer is a "metal person."
- Put each of the animal materials (cotton, craft feathers, fat, shammy thick felt, thin felt) into bowls and set centrally on a table.
- Set out 1 bag, 1 role of masking tape, and 1 timer for each group.
- Heat water up. Make sure that the water is hot but not boiling (this ensures that students will not burn themselves if they touch the water).



minutes       • Have students seated in groups of 3.         • Pass out one set of plant/animal/human cards to each group and Beginning Thoughts handout to each student. (page 1)         • Tell students that they need to take the cards and match them into pairs. Each card must only be matched to one other card and they must be able to explain why the two cards match together. Once they have decided on their matches they should draw lines between the pictures on the Beginning Thoughts handout.         • Each student in the group should pick one pair and fill out the sentence frame: The picture of the goes with the picture of the because       • Note students in the same group should pick different pairs.         • Put the following handout under a document camera (below left). Tell students that they will now discuss what pictures form pairs using the sentence frames. Show students how to use the sentence frames and how to respond to each other. Tell students to pay attention to the groups that they agree/disagree with so that they uill be able to record this at the end of the debate. Then allow students to debate the pairs. It is helpful to keep notes for students on the board so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).         • Use the Following Sentence Frames to Discus       Group Sugest Apair         • Bird       Bird       Bird       Bird         • Shower Straw       Rat       Sugested Pair       Play         • Bird Scussion of a pair       Planet       Play       Play       Planet         • Bird Scussion	60	Beginning Thoughts			
<ul> <li>Pass out one set of plant/animal/human cards to each group and Beginning Thoughts handout to each student. (page 1)</li> <li>Tell students that they need to take the cards and match them into pairs. Each card must only be matched to one other card and they must be able to explain why the two cards match together. Once they have decided on their matches they should draw lines between the pictures on the Beginning Thoughts handout.</li> <li>Each students in the group should pick one pair and fill out the sentence frame: The picture of the goes with the picture of the because         <ul> <li>Note students in the same group should pick different pairs.</li> </ul> </li> <li>Put the following handout under a document camera (below left). Tell students that they will now discuss what pictures form pairs using the sentence frames. Show students to pay attention to the groups that they agree/disagree with so that they will be able to record this at the end of the debate. Then allow students to debate the pairs. It is helpful to keep notes for students on the board so that they camere for back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).</li> <li>Use the Following Sentence Frames to Discuss Nich Pictures Make A Pair Vish Pictures of themaxe. Boes with the picture of themaxe. Boes with them because</li></ul>	minutes	• Have students seated in groups of 3			
Thoughts handout to each student. (page 1)         • Tell students that they need to take the cards and match them into pairs. Each card must only be matched to one other card and they must be able to explain why the two cards match together. Once they have decided on their matches they should draw lines between the pictures on the Beginning Thoughts handout.         • Each student in the group should pick one pair and fill out the sentence frame: The picture of the goes with the picture of the because       • Note students in the same group should pick different pairs.         • Note students in the same group should pick different pairs.       • Note students in the same group should pick different pairs.         • Note students in the same group should pick different pairs.       • Note students in the same group should pick different pairs.         • Note students in the same group should pick different pairs.       • Note students in the same group should pick different pairs.         • Note students in the same group should pick different pairs.       • Note students in the same group should pick different pairs.         • Note students in the same group should pick different pairs.       • Note students to value the sentence frames and how to respond to each other. Tell students to pay attention to the groups that they agree/disagree with so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).         Use the following Sentence Frames to Discuss       Which Pictures Make A Pair       1       Why         Which Pictures of the so its sould can		• Pass out one set of plant/animal/hu	ıman cards to	each group and Beg	ginning
<ul> <li>Tell students that they need to take the cards and match them into pairs. Each card must only be matched to one other card and they must be able to explain why the two cards match together. Once they have decided on their matches they should draw lines between the pictures on the <i>Beginning Thoughts</i> handout.</li> <li>Each student in the group should pick one pair and fill out the sentence frame: The picture of the goes with the picture of the because         <ul> <li>Note students in the same group should pick different pairs.</li> <li>Put the following handout under a document camera (below left). Tell students that they will now discuss what pictures form pairs using the sentence frames. Show students how to use the sentence frames and how to respond to each other. Tell students to pay attention to the groups that they agree/disagree with so that they will be able to record this at the end of the debate. Then allow students to debate the pairs. It is helpful to keep notes for students on the board so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).</li> </ul> </li> <li>Use the following Sentence Frames to Discuss Which Pictures Make A Pair         <ul> <li>Bird Storting Sentence Frames to Discuss Shower Straw Raft picture of thegoes with the picture of thegoes with the picture of thegoes with then picture of thegoes with then picture of thegoes with then because</li></ul></li></ul>		Thoughts handout to each student.	(page 1)		
card must only be matched to one other card and they must be able to explain why the two cards match together. Once they have decided on their matches they should draw lines between the pictures on the Beginning Thoughts handout.         • Each student in the group should pick one pair and fill out the sentence frame: The picture of the goes with the picture of the because       • Note students in the same group should pick different pairs.         • Put the following handout under a document camera (below left). Tell students that they will now discuss what pictures form pairs using the sentence frames. Show students how to use the sentence frames and how to respond to each other. Tell students to apa attention to the groups that they agree/disagree with so that they valle be able to record this at the end of the debate. Then allow students to debate the pairs. It is helpful to keep notes for students on the board so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).         Use the Following Sentence Frames to Discuss       Group Suggested Pair Uhy Add Suba Gear Boots Staw Baft Fish       Group Suggested Pair Uhy Add Suba Gear Boots Staw Baft Fish       Suggested Pair Uhy pad Planets         Storting a discussion of a pair I think the picture of the		• Tell students that they need to take	the cards and	match them into pa	airs. Each
<ul> <li>why the two cards match together. Once they have decided on their matches they should draw lines between the pictures on the <i>Beginning Thoughts</i> handout.</li> <li>Each student in the group should pick one pair and fill out the sentence frame: The picture of the goes with the picture of the because <ul> <li>Note students in the same group should pick different pairs.</li> </ul> </li> <li>Put the following handout under a document camera (below left). Tell students that they will now discuss what pictures form pairs using the sentence frames. Show students how to use the sentence frames and how to respond to each other. Tell students to pay attention to the groups that they agree/disagree with so that they vall be able to record this at the end of the debate. Then allow students to debate the pairs. It is helpful to keep notes for students on the board so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).</li> </ul> Use the Following Sentence Frames to Discuss Which Pictures Make A Pair <ul> <li>Which Pictures Make A Pair</li> <li>Bird Elephant Plane</li> <li>Bird Elephant Plane</li> <li>Bird Elephant Plane</li> <li>Bird Elephant Plane</li> <li>Bird Subs Gear Roots</li> <li>Shower Straw Rat</li> <li>Fish</li> </ul> Storting a discussion of a pair <ul> <li>I think the picture of the</li></ul>		card must only be matched to one o	ther card and	they must be able t	o explain
<ul> <li>they should draw lines between the pictures on the Beginning Thoughts handout.</li> <li>Each student in the group should pick one pair and fill out the sentence frame: The picture of the goes with the picture of the because <ul> <li>Note students in the same group should pick different pairs.</li> </ul> </li> <li>Put the following handout under a document camera (below left). Tell students that they will now discuss what pictures form pairs using the sentence frames. Show students how to use the sentence frames and how to respond to each other. Tell students to pay attention to the groups that they agree/disagree with so that they will be able to record this at the end of the debate. Then allow students to debate the pairs. It is helpful to keep notes for students on the board so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).</li> </ul> Use the Following Sentence Frames to Discuss Which Pictures Make A Pair Pictures Bird Elephant Plane Bird Elephant Plane Bird Elephant Plane Shower Straw Raft Fish Storting a discussion of a pair I think the picture of the goes with the picture of the		why the two cards match together.	Once they have	ve decided on their	matches
<ul> <li>handout.</li> <li>Each student in the group should pick one pair and fill out the sentence frame: The picture of the goes with the picture of the because <ul> <li>Note students in the same group should pick different pairs.</li> </ul> </li> <li>Put the following handout under a document camera (below left). Tell students that they will now discuss what pictures form pairs using the sentence frames. Show students how to use the sentence frames and how to respond to each other. Tell students to pay attention to the groups that they agree/disagree with so that they will be able to record this at the end of the debate. Then allow students to debate the pairs. It is helpful to keep notes for students on the board so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).</li> <li>Use the following Sentence Frames to Discuss <ul> <li>Which Pictures</li> <li>Bird</li> <li>Biephant</li> <li>Pictures</li> <li>Bird</li> <li>Storting a discussion of a pair</li> <li>I think the picture of themaxe_ goes with the picture of themaxe_ and i agree with them because</li></ul></li></ul>		they should draw lines between the	pictures on tl	he <i>Beginning Thoug</i>	hts
<ul> <li>Each student in the group should pick one pair and fill out the sentence frame: The picture of the goes with the picture of the because         <ul> <li>Note students in the same group should pick different pairs.</li> </ul> </li> <li>Put the following handout under a document camera (below left). Tell students that they will now discuss what pictures form pairs using the sentence frames. Show students how to use the sentence frames and how to respond to each other. Tell students to pay attention to the groups that they agree/disagree with so that they will be able to record this at the end of the debate. Then allow students to debate the pairs. It is helpful to keep notes for students on the board so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).</li> </ul>		handout.	-		
The picture of the goes with the picture of the because       • Note students in the same group should pick different pairs.         • Put the following handout under a document camera (below left). Tell students that they will now discuss what pictures form pairs using the sentence frames. Show students how to use the sentence frames and how to respond to each other. Tell students to pay attention to the groups that they agree/disagree with so that they will be able to record this at the end of the debate. Then allow students to debate the pairs. It is helpful to keep notes for students on the board so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).         Use the Following Sentence Frames to Discuss Which Pictures Make A Pair       Groop Suggested Pair Why       Why         I lephant Piane Bird Elephant Piane Stows Straw Rat Fish       Pictures for stude Gener the sentence frames to Discuss for stude of the sentence frames to Discuss and i agree with them because		• Each student in the group should pi	ck one pair an	d fill out the senter	nce frame:
<ul> <li>Note students in the same group should pick different pairs.</li> <li>Put the following handout under a document camera (below left). Tell students that they will now discuss what pictures form pairs using the sentence frames. Show students how to use the sentence frames and how to respond to each other. Tell students to pay attention to the groups that they agree/disagree with so that they will be able to record this at the end of the debate. Then allow students to debate the pairs. It is helpful to keep notes for students on the board so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).</li> <li>Use the following Sentence Frames to Discuss Which Pictures Make A Pair</li> <li>Pictures</li> <li>Bird Elephant Plane Shows Traw Raft</li> <li>Storting a discussion of a pair</li> <li>I think the picture of the many because for a pair goes with the picture of a pair goes with the picture of a pair goes with them because or a discussion of a pair</li> <li>Group said</li></ul>		The picture of the goes with the	picture of the	because	
<ul> <li>Fut the following function under a document contering (below fet). Tell students that they will now discuss what pictures form pairs using the sentence frames. Show students how to use the sentence frames and how to respond to each other. Tell students to pay attention to the groups that they agree/disagree with so that they will be able to record this at the end of the debate. Then allow students to debate the pairs. It is helpful to keep notes for students on the board so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).</li> <li>Use the following Sentence Frames to Discuss Which Pictures Make A Pair Pietures Bird Elephant Plane Shower Straw Rat Fish</li> <li>Storting a discussion of a pair fish</li> <li>Storting a discussion of a pair fish</li> <li>Storting a discussion of a pair or group</li></ul>		O Note students in the same g	loup should p	ick unierent pairs.	_11
Students that they will how discuss what pictures form pairs using the         sentence frames. Show students how to use the sentence frames and how to         respond to each other. Tell students to pay attention to the groups that they         agree/disagree with so that they will be able to record this at the end of the         debate. Then allow students to debate the pairs. It is helpful to keep notes for         students on the board so that they can refer back to them. As groups suggest a         pair, record their suggested pair as well as why they think the pair go together         (example below right).         Use the Following Sentence Frames to Discuss         Which Pictures Make A Pair         Pictures         Bird       Pienes         Bird       Pienes         Fish       Plane         Storting a discussion of a pair       Think the picture of the         I think the picture of the       Piscase         Group       said         Group       said         Starting a discussion of a pair       Storting and i agree with them         because       Or         Group       said         Group       said         Storting a discussion of a pair         I think the picture of the       ges with them         because       Or		<ul> <li>Put the following handout under a c students that they will now diagons</li> </ul>	iocument cam	lera (below left). Te	
Sentence frames. Show students how to use the sentence frames and now to respond to each other. Tell students to pay attention to the groups that they agree/disagree with so that they will be able to record this at the end of the debate. Then allow students to debate the pairs. It is helpful to keep notes for students on the board so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).            Use the Following Sentence Frames to Discuss         Which Pictures Make A Pair         Pictures         Bird         Elephant         Pictures         Bird         Elephant         Pictures         Shower         Straw         Raft         Fish         Storting a discussion of a pair         I think the picture of the         recard because         Or         Group         Said         not and i agree with them         because         Or         Group         Said         not and i respectfully         disagree with them because         Or         Group         Said         not and i respectfully         disagree with them because         Or         Group         Said         not and i respectfully         disagree with them         because         Or         Group         Said		students that they will now discuss	what pictures	antonin pairs using u	le
respond to each other. Tell students to pay attention to the groups that they agree/disagree with so that they will be able to record this at the end of the debate. Then allow students to debate the pairs. It is helpful to keep notes for students on the board so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).         Use the Following Sentence Frames to Discuss       Group Suggested Pair       Why         Which Pictures Make A Pair       Plane       I       Hilly pad/raft       Ploat         Bird       Elephant       Plane       I       Hilly pad/raft       Ploat         Bird       Elephant       Plane       Responding to a discussion of a pair       Storting a discussion of a pair       Fish       Storting a discussion of a pair       Fish       I       Hilly pad       Plane         Storting a discussion of a pair       Group saidmane_and I agree with them because       Group saidmane_and I agree with them because       I       Cashi Hily pad       Plane       Hilly pad       Plane         Group said		sentence frames. Snow students no	w to use the s	entence frames and	
agree/disagree with so that they will be able to record this at the end of the debate. Then allow students to debate the pairs. It is helpful to keep notes for students on the board so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).         Use the Following Sentence Frames to Discuss       Group Suggested Pair       Why         Which Pictures Make A Pair       Pictures       Hilly pad/raft       Float         Bird       Elephant       Plane       Value       Plane/bind       Float         Storting a discussion of a pair       I think the picture of the goes with the picture of the goes with the picture of the main _ and I agree with them because       Group said and I agree with them because       I       Cent 1kk pad had       Incuster         Group		respond to each other. Tell student	s to pay attent	tion to the groups the	hat they
debate. Then allow students to debate the pairs. It is helpful to keep hotes for students on the board so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).         Use the Following Sentence Frames to Discuss Which Pictures Make A Pair       Group Suggested Pair       Why         Which Pictures Make A Pair       Pictures       I       Use the Following Sentence Frames to Discuss         Which Pictures Make A Pair       Pictures       I       Use the Following Sentence Frames to Discuss         Bird       Elephant       Plane       Float       Suggested Pair       Why         I       Use the Following Sentence Frames to Discuss       I       Use the Following Sentence Frames to Discuss       I       Plane       Plan		agree/disagree with so that they wi	If be able to re	cord this at the end	1 of the
Students on the board so that they can refer back to them. As groups suggest a pair, record their suggested pair as well as why they think the pair go together (example below right).         Use the Following Sentence Frames to Discuss Which Pictures Make A Pair         Pictures         Bird       Elephant         Pictures         Bird       Elephant         Plane       Discuss         Which Pictures Make A Pair         Pictures         Bird       Elephant         Plane       Discussion of a pair         Storting a discussion of a pair       Storting a discussion of a pair         I think the picture of the       Responding to a discussion of a pair         Group       Starting a said and I agree with them         because       Or         Group       said and I respectfully         disagree with them because       -         0r       Group       said and I respectfully         disagree with them because       -       -         0r       Stracul root+3       Suck up         Useer       Suck up       Suck up		debate. Then allow students to deba	ate the pairs.	It is helpful to keep	notes for
pair, record their suggested pair as well as why they think the pair go together (example below right).         Use the Following Sentence Frames to Discuss Which Pictures Make A Pair Pictures Bird Elephant Plane Lily Pads Scuba Gear Roots Shower Straw Raft Fish       Group Suggested Pair Why I ly pad/raft Elephantshower Spray work Plane/bird Pictures Storting a discussion of a pair I think the picture of the goes with the picture of the goes with the because Or Group said and I respectfully disagree with them because       I so the picture is a said the picture is a said so the picture is a said		students on the board so that they c	an refer back	to them. As groups	suggest a
Image: state below right).         Use the Following Sentence Frames to Discuss Which Pictures Make A Pair         Which Pictures Make A Pair         Pictures         Bird       Elephant         Bird       Elephant         Shower       Straw         Responding to a discussion of a pair         Ithink the picture of the		pair, record their suggested pair as	well as why th	iey think the pair go	o together
Use the Following Sentence Frames to Discuss Which Pictures Make A Pair         Which Pictures Make A Pair       Pictures         Bird       Elephant       Plane         Bird       Elephant       Plane         Lilly Pads       Scuba Gear       Roots         Shower       Straw       Raft         Fish       Responding to a discussion of a pair       Fish         Group       Said		(example below right).	1		
Which Pictures Make A Pair       Pictures         Bird       Elephant       Plane         Bird       Elephant       Plane         Lily Pads       Scuba Gear       Roots         Shower       Straw       Raft         Fish       Q       Plane/bird       Plane         Storting a discussion of a pair       Think the picture of the       Plane       Q       Plane/bird       Plane         Storting a discussion of a pair       Think the picture of the       goes with the picture of the       Plane       Q       Plane/bird       Plane       Plane         Responding to a discussion of a pair       Group and Lagree with them because       Or       Group and Lagree the them because       Q       Plane       Plane       Plane         Or       Group said and Lagree them because		Use the Following Sentence Frames to Discuss	Group	Suggested Pair	Why
Pictures       Pictures         Bird       Elephant       Plane         Lily Pads       Scuba Gear       Roots         Shower       Straw       Raft         Fish       Q       Piane/bind       Phy         Storting a discussion of a pair       Pish       Q       Piane/bind       Phy         Ithink the picture of the		Which Pictures Make A Pair		lily pad/raft	float
Bird       Elephant       Plane         Lily Pads       Scuba Gear       Roots         Shower       Straw       Raft         Fish       Q       Plane/ bird       Plan         Starting a discussion of a pair       I think the picture of the goes with the miscarry because       A       Ash / Gouba gear       Direction discussion of a pair         Responding to a discussion of a pair       Group said and I agree with them because       A       Centr Irly pad plants.       Direction gear         Or       Group said and I respectfully disagree with them because       G       Elephant/ birol suck up       A         Group said and I respectfully disagree with them because       G       Elephant/ birol       Avait up         Group said and I respectfully disagree with them because       B       Centr Irly pad       Avait up         Mathematical and I respectfully disagree with them because		(Notice and Notice and	1	elephont/shower-	Spray wooder
Shower     Straw     Raft     Responding to a discussion of a pair     Fish     Image: A shower     Image: A shower <th></th> <th>Bird Elephant Plane</th> <th></th> <th></th> <th></th>		Bird Elephant Plane			
Fish     A     Valid / Illy pad     Float       Starting a discussion of a pair     I think the picture of the		Shower Straw Raft	2	plane. ( blind	₽kj
Starting a discussion of a pair       I think the picture of thegoes with the picture of thebecause       3       Fish / scuba_gear       Supervised provide pr		Fish	ď	var+/ IIIy pad	Fleat
I think the picture of the goes with the picture of the goes with the picture of the goes with the picture of the because     3     Shower/Elephant Spray user       Responding to a discussion of a pair     Group said and I agree with them because     4     roots/ lily pad plants       0r     Or     Group said and I respectfully disagree with them because     5     Centr lily pad lin water       6     elephant/ bind sud, up water		Starting a discussion of a pair		September and	presser)
picture of thebecause     in usater       picture of thebecause     in usater       Responding to a discussion of a pair     in usater       Group saidand I agree with them     5     Genty Tily pad     plants       Dr     Or     5     Genty Tily pad     in usater       Group said and I respectfully     6     elephant/ bird     Fly       disagree with them because     in usater     suder     suder		I think the picture of the goes with the	3	Shower/Riephont	Presentation
Image: second decays     Image: second decays <th></th> <th>sisters of the heating</th> <th>5</th> <th>Conceptar ( Cicking )</th> <th>Spring Serve</th>		sisters of the heating	5	Conceptar ( Cicking )	Spring Serve
Responding to a discussion of a pair     4     Fish/ scuba gear     breath inderwater       Group said     Or     5     Geni iily pad plane/ bird     in water       Or     Group said and I respectfully disagree with them because     6     elephant/ bird Stroub/roots     animals sud, op water		picture of the because		risots/ /ilu paa	plants
Group said and I agree with them     5     Cahi illy pad plane     in water       Or     0r     5     Cahi illy pad plane     fly       Group said and I respectfully     6     Stroug/roots     such of a glane			4	Detal scuba agar	breath .
Group		Responding to a discussion of a pair	S	ran coon yo	materwater.
Or     5     plane./ bind     Fly       Group said and I respectfully     6     etephnant/ bind     sud, op       disagree with them because     1     6     stroup/roots     sud, op		Group sand and Tagice with them	-	Capit silve pad	in water
Or Group said and I respectfully disagree with them because		because	5	plane, 1 bird	Fly
Group said and I respectfully disagree with them because		Or		******	
disagree with them because		Group said and I respectfully	1	elephant/ orrol	awimals
		disagree with them because	6	Straw (roots	sudy, up
					SP CONT
		• By the end of the conversation mak	e sure uidt stu	ar animal card mat	u uie
• By the end of the conversation make sure that students have matched the cards so that each human card has either a plant or animal card matched with		them that students can explain who	et the plant (ar	Ji allillal caru llau	
• By the end of the conversation make sure that students have matched the cards so that each human card has either a plant or animal card matched with them, that students can explain what the plant (apimal is doing that humans		connot and what we have done to a	at the plant and	innai is uonig ulat i	Iumans
• By the end of the conversation make sure that students have matched the cards so that each human card has either a plant or animal card matched with them, that students can explain what the plant/animal is doing that humans		Calliful, and what we have done to c	opy mem.		
• By the end of the conversation make sure that students have matched the cards so that each human card has either a plant or animal card matched with them, that students can explain what the plant/animal is doing that humans cannot, and what we have done to copy them.		• ESR (expected student respo	onsej:	to drink	
<ul> <li>By the end of the conversation make sure that students have matched the cards so that each human card has either a plant or animal card matched with them, that students can explain what the plant/animal is doing that humans cannot, and what we have done to copy them.</li> <li>ESR (expected student response):</li> </ul>		<ul> <li>IOUL/SULAW: ADDILLY UL</li> <li>fish (aguba goor: shill)</li> </ul>	ity to broatho	underwater	
<ul> <li>By the end of the conversation make sure that students have matched the cards so that each human card has either a plant or animal card matched with them, that students can explain what the plant/animal is doing that humans cannot, and what we have done to copy them.         <ul> <li>ESR (expected student response):                  <ul> <li>root/straw: ability to take in liquid to drink</li> <li>fish (equipa goar ability to breathe underwater</li> </ul> </li> </ul> </li> </ul>		<ul> <li>IISII/SCUDA geal. abili</li> <li>alaphant bathing ( ab</li> </ul>	ity to Dieathe	unuer water	
<ul> <li>By the end of the conversation make sure that students have matched the cards so that each human card has either a plant or animal card matched with them, that students can explain what the plant/animal is doing that humans cannot, and what we have done to copy them.         <ul> <li>ESR (expected student response):                 <ul> <li>root/straw: ability to take in liquid to drink</li> <li>fish/scuba gear: ability to breathe underwater</li> <li>alonbart bathing (shower shility to show a surgely as a surgely</li></ul></li></ul></li></ul>		<ul> <li>elephant bathing/ sn</li> <li>binds flying / planas</li> </ul>	ower: addity to	to clean ourselves	
<ul> <li>By the end of the conversation make sure that students have matched the cards so that each human card has either a plant or animal card matched with them, that students can explain what the plant/animal is doing that humans cannot, and what we have done to copy them.         <ul> <li>ESR (expected student response):                 <ul> <li>root/straw: ability to take in liquid to drink</li> <li>fish/scuba gear: ability to breathe underwater</li> <li>elephant bathing/ shower: ability to clean ourselves</li> <li>birda fiving ( plane: ability to five</li> </ul> </li> </ul> </li> </ul>		<ul> <li>Dirus liying/ plane: a</li> <li>water liliog / refusch</li> </ul>	billity to floot are	wator	
<ul> <li>By the end of the conversation make sure that students have matched the cards so that each human card has either a plant or animal card matched with them, that students can explain what the plant/animal is doing that humans cannot, and what we have done to copy them.         <ul> <li>ESR (expected student response):                 <ul> <li>root/straw: ability to take in liquid to drink</li> <li>fish/scuba gear: ability to breathe underwater</li> <li>elephant bathing/ shower: ability to clean ourselves</li> <li>birds flying/ plane: ability to fly</li> <li>water bility of the clean ourselves</li> </ul> </li> </ul> </li> </ul>		• water lilles/ raft: abl	incy to noat on	water	
<ul> <li>By the end of the conversation make stree that students have matched the cards so that each human card has either a plant or animal card matched with them, that students can explain what the plant/animal is doing that humans cannot, and what we have done to copy them.         <ul> <li>ESR (expected student response):                 <ul> <li>root/straw: ability to take in liquid to drink</li> <li>fish/scuba gear: ability to breathe underwater</li> <li>elephant bathing/ shower: ability to clean ourselves</li> <li>birds flying/ plane: ability to fly</li> <li>water lilies/ raft: ability to float on water</li> </ul> </li> </ul> </li> </ul>		<ul> <li>Pass out page 2 of the activity and h</li> </ul>	ave students	iii in the sentence f	rames
<ul> <li>By the end of the conversation make sure that students have matched the cards so that each human card has either a plant or animal card matched with them, that students can explain what the plant/animal is doing that humans cannot, and what we have done to copy them. <ul> <li>ESR (expected student response):</li> <li>root/straw: ability to take in liquid to drink</li> <li>fish/scuba gear: ability to breathe underwater</li> <li>elephant bathing/ shower: ability to clean ourselves</li> <li>birds flying/ plane: ability to fly</li> <li>water lilies/ raft: ability to float on water</li> </ul> </li> <li>Pass out page 2 of the activity and have students fill in the sentence frames about atudents that they are a dwith and the set that they dimensed with</li> </ul>		about students that they agreed wit	.n and those th	ial liev disagreed v	vitti.

• Put the following handout (below) under the document camera. As a class fill
out the sentence frames.
• ESR:
Birds have wings that allow them to fly but humans cannot do
this without <b>a plane</b> .
<ul> <li>Flenhants have trunks that allow them to snrav water but</li> </ul>
humans cannot do this without a shower
Fish have gills that allow them to breathe under water but
• Fish have gins that allow them to breathe muel water but
numans cannot do this without <b>scuba gear</b> .
Lily pads have flat bottoms that allow them to float but
humans cannot do this without <b>a raft</b> .
<ul> <li>Roots have many small tubes that allow them to suck up</li> </ul>
water but humans cannot do this without a straw.
Sinth here
(What have we) that else them to
animals? } but harmons served do this without
à
C Deptartshow
En a v a v a v a v a v a v a v a v a v a
B Bahne
that allow them to
but humans samet do this without
(What have up)
learned from Uky tests have
plants? / that allow them to
but hareases cannot do this without
Roots have
that allow them to
but humans cannot do this without
00
• Show students the picture of the penguins (below). Ask students if a human
could survive in this environment without any external help. Students should
realize that humans would not be able to survive in the cold without external
help. Ask students what external parts (adaptations) penguins have that help
them to survive in a cold environment. Students should point out the
penguins' feathers help keep them warm. Then have them fill out the sentence
frame at the bottom of page 2
$\circ$ Penguins have <b>feathers</b> that allow them to <b>keen warm in the cold</b>
humans cannot do this without a <b>jacket</b>
numans cannot do tins without a <b>jacket</b> .
La alle March C (March
• Ask students if there are other animals that survive in sold environments and
Ask students in there are other annuals that survive in cold environments and     if foothors are the only external parts (adapted are) that allow ariticals to
in reacher's are the only external parts (auaptations) that allow annuals to

	<ul> <li>survive in these environments. Students other mammals)/fur and whales/bl</li> <li>Tell students that engineers are peor Many times engineers look at things problems. Tell students that today t problem of how to stay warm in the jacket to keep a metal person warm</li> </ul>	dents n ubber. ple wh in nat hey wi cold. 7	night bring sugge to design solution cure to give them Il be an engineer Fherefore, they an	st: pola is to pr ideas to and try re going	or bears (or oblems. o solve to solve the g to design a
60 minutos	Jacket Lab				
minutes	<ul> <li>Pass out page 3 of the activity.</li> <li>Show students each of the materials what the material is mimicking. The document camera (below left).         <ul> <li>Cotton / Inner feathers (dow</li> <li>Shammy / hide/skin from m</li> <li>Craft feathers/outer feathers</li> <li>Fat/blubber from whales</li> <li>Thick felt/ Long fur from ma</li> <li>Thin felt/ Short fur from ma</li> </ul> </li> </ul>	s that then on put the amma s of bir ammals mmals	hey will have acco the materials pag birds ls rds	ess to a e unde	nd ask them r the
		Group	Materials Used	Time to get to 40°C	Notes
		1 (	Cotton Shammy Graft Feathers (Fat) Thick Felt (Thin Felt)	Smin 7s	temp dvopped Fost at
	Cotton Shammy	z	Cotton Sharring Craft Feathers Fat Thick Felb Thin Felt	6 min 23 5	
		3	Cotton Shammy Graft Feathers Fat Thick Feit Chin Feit	7min as	
		4	Cotton Shammy Craft Feathers Fat Thick Felt Thin Felt	ц min ФS	
	Craft Feathers Fat	s	Cotton Shammy Craft Feathers (Fat) Thick Felty Thin Felt	3 min 475	droppied Cast at Girst
		6	Cotton Shammy Craft Feathers Fat	1 msins 595	disopped fast-ad first
		7	Cotton Shammy Craft Feathers Fat Thick Felt (Thin Felt)	5 min 53 5	
	Thick Felt Thin Felt "				22
	<ul> <li>Read/go over the procedure at the t</li> <li>Tell students that they will get 20 m their metal person. The jacket that i use any three of the above materials</li> <li>Once they have completed their jack their metal person and place it in a l</li> <li>While waiting for the butter knives list the materials used and draw a p Then have each group explain their will be effective. Record the materia</li> <li>Tell students that the next step need person and have them insert it into should stop the timer when the tem record the time on their worksheet.</li> </ul>	top of p inutes they m s. ket, hav beaker to war icture design ils on t ls to be their ja peratu	bage 3. to design a jacke ake must be rem- ve them remove t of hot water. m up (~10 minut of the jacket on th is and why they th he group data page done fast. Give acket and start th are gets to 40°C. T	t that g ovable. heir jao es) hav ne worl hink th ge (abo each gr eir tim 'hey wi	oes over They can cket from ve students ksheet. eir jackets ove right). roup a metal er. Students ll then

	• Have each group tell how much time it took for the jacket to get to 40°C and
	record it on the group data page along with any notes that they have.
60	Discussion Questions
minutes	<ul> <li>Put the following handout on the document camera.         <ul> <li>It is helpful for students to be able to see both the group data and the discussion handout. Therefore, if possible have the discussion handout written on the board or on a separate chart that can be hung on the board.</li> </ul> </li> </ul>
	Use the Following Sentence Frames to Discuss How Well the Materials Functioned <u>Materials</u> Shammy Thick Felt Fat Craft Feathers Thin Felt Cotton <u>Animal Structures</u> Blubber Long Fur Outer Feathers Short Fur Skin Inner Feathers
	Starting a discussion of a pair I think which mimicked worked the because Responding to a discussion of a pair Group said and I agree with them because Or Group said and I respectfully disagree with them because
	<ul> <li>Pass out page 4. Have students individually fill in the summary sentence frames using the word bank to help them.</li> <li>Tell students that they will now discuss which materials worked the best/worst using the sentence frames. Show students how to use the sentence frames and how to respond to each other.</li> </ul>
	<ul> <li>Have students debate which materials worked the best/worst.</li> <li>Go over each of the discussion questions and have students fill them out. See example student work below.</li> </ul>

#### **Example Student Work:**



No	A Gad	HUS (	sun igo	6395	hoot u	ater	3
Ser	- loc	ger	than	a,	ham	0.0	
2. What	t is one featu	re of an ani	mail that you	mimicke	t in your jack	et?	
41	ii -						
1. What	is one artim	al that has t	tra feature be	nidet pe	ngutra?		
	alau-	hear		0.000			
- 201	01001	41884					
4. Whit	is somethin	g she harra	ins mirrie frui	m plants	ar animah?		
			the star -	1		1.20	222
The second			10.50.5	2/30.025	OR HODT		065
Dea	Address we are	Mericking	Fialt we	are Lopy	ne.	invel	tion.
Don Nava	Annual we are	Mericling organ?	Fian we	are Copy	NCOUR	Tradi	act
Doct Nava 5. Why d	Associat we are to scientists	Merichag organ?	Fiatwo Crient G	we Capy	ne Nrgue	1000 142	get get
Dog Rurat 5. Why e 40	Second are an to scientists In Scientists	nguit <u>s</u> 1585	hanna Clientis t- pici	niekani Se i Se i Ole	ne Xrgue 2 an	ra swerj	per per Solutio
Dog Ravia 5. Why e	Second we are to scientists Struct	ministry ingun?S bress	tara Icientia to pol	ine Calay Se : Se : (1) (	s an Nuãos	ra swerj	per- per- (solutio
Dog Rured 5. Why e 40	Shinal we are to scientists W.C.	Wriding ingun7S b.eS	tanw Icientia t par	1990 Calif 25 (1) (4 25 (1) (4	s an	ta Swerj	pet Solutio
Dog Rava 5. Why e +0	S Alicad we an Ito scientists With	nteristing ngun7S b.eS		25 (U) 25 (U) 25 (U)	n NUĈUS NUĈUS	1000 5008()	ettee grizit- (Soliuttic)
Dog Nara 5. Why d	Stand we and	Neiteng ingun7S https:/	Transie C.(C.) + S + pC + pC + pC + pC + pC + pC + pC + pC		n Krąpe Bin	1000 50087)	pet- Solutio
<u>Dog</u> Ryrg/ 5. Why e +0	ि Alianal we are to scientists चन् <u>र</u> ाह्य	Weiting ingur <u></u> <u>D</u> ES	Transie Color + S + pol		a Nutitions Mutitions	ഷ ടംപങ്ങ	<u>pet</u> Solutio
<u>Dog</u> Ryra 5. Why e <u>+0</u>	Solicitad we are to scientistis 3000	http://www.cling argun7S http://signature.com				100 SW&	ette PET Solutio