

3D Flower EDC

Grade Level: Fourth Grade

By Michelle Roberts

LESSON CONTENT

- **Learning Objectives**

Students will

- Work as a team to design and construct a 3D reproductive model of a flower from various materials using a \$50 materials budget.
 - Identify processes of sexual reproduction in flowering plants, including pollination and fertilization (seed production).
 - Identify the reproductive parts of a flower including the male stamen parts and the female pistil parts.
 - Select materials from a set materials list for use in the construction of a flower that includes the reproductive parts and calculate the total cost of all the materials.
 - Fluently add and/or subtract multi-digit whole numbers using the standard algorithm.
- **Prior Knowledge**
 - SC.3.L.14.1 Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.
 - SC.3.L.14.2 Investigate and describe how plants respond to stimuli (heat, light, gravity), such as the way plant stems grow toward light and their roots grow downward in response to gravity.
 - SC.3.L.15.2 Classify flowering and nonflowering plants into major groups such as those that produce seeds, or those like ferns and mosses that produce spores, according to their physical characteristics.
 - SC.3.L.17.2 Recognize that plants use energy from the Sun, air, and water to make their own food.
 - MAFS.3.NBT.1.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
 - MAFS.2.NBT.2.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
- **Materials**
 - Computer with Internet & speakers
 - Projector
 - Flower playing cards
 - Scissors

- Tape
 - Glue
 - Construction Paper
 - Tissue Paper, various bright colors
 - Pipe Cleaners
 - Rubber Bands
 - Yarn
 - Craft Foam
 - 3D Flower EDC presentation
 - 3D Flower EDC Materials & Cost List
 - 3D Flower Reproductive Model Diagram Sheet
 - Pencils
 - Colored Pencils
- **Vocabulary**
 - Parts of a plant (**seed, roots, stem, leaves, flower**)
 - **Pollination**
 - **Fertilization**
 - **Sexual reproduction**
 - Parts of a flower (**petal, sepal, stamen, anther, filament, pistil, stigma, style, ovule, ovary**)
- **Instructional Suggestions**
- Part 1:**
1. After a lesson about the sexual reproduction in flowering plants (along with a review of the parts of a plant and their functions), have the students take an envelope with a flower playing card sealed inside (unknownst to them, and prepared ahead of time). Have the students open their envelope when everyone has an envelope, take out the flower playing card, and find their matching cards. (Four like cards to each flower.) This now becomes the teams for the EDC. (This step can be skipped if working teams are already in place.) (Don't forget to collect your cards once the teams are formed.)
 2. Assign team roles or allow students to pick their roles. (Can use a Kagan spinner to assign roles to seat numbers.)
 3. Use the PowerPoint to introduce the 3D Flower engineering design challenge – the students will be working in teams to design and construct a 3-dimensional flower that includes all of the reproductive parts of a flower. Tell the students that in addition to designing and constructing the flower, they will be responsible for staying within the confines of their team budget of \$50 to cover the cost of the materials. Show the students the materials list and prices so they know what is available for them to build the flower from. Give each student a copy of the Materials & Cost list for their ISNs.

4. Have the students draw the EDP 2x3 table in their ISNs, then allow them time to discuss and brainstorm ideas for their 3D flower.
5. Once they have brainstormed ideas in the Imagine cell in their table, have the students talk and narrow down the ideas, and then comparing the ideas to the cost list to see which idea would be the most feasible for their budget.
6. Students should blueprint their designs for the flower in their ISN and label the materials they will be using in their flower build. They should be specific and include colors of the materials.
7. Have the students complete their Materials & Cost list (including colors), and add up the cost to make sure they are within their budget. Once the materials list and cost sheet has been signed off by the teacher, have the team's Materials Supervisor go shop for the materials.

Part 2:

1. Begin construction of 3D Flowers according to blueprints working in teams.
2. Allow a set time, like 15-30 minutes, for the construction phase of this challenge.
3. Monitor that students are on-task, working safely, and working as a team.
4. Signal when time is up (or have timer set), and have all students/teams stop construction.
5. Teams should present their 3D Flowers to the class, identifying each of the flower parts, and explaining flower pollination and fertilization.
6. Have student reflect on their work, and working as a team, in their ISNs. Students should complete the Reproductive Model Diagram Sheet in their notebooks, labeling all parts of the flower.

Optional Part:

1. Have the teams create labels for the flower parts in their 3D Flower and attach the labels to the parts. (Especially if you are using the 3D flowers in a bulletin board or word wall.)

• Supplemental Resources

Videos

- SciShow Kids: Look Inside a Flower!
 - <http://safeYouTube.net/w/RFwb>
- BrainPop Pollination video
 - <https://www.brainpop.com/science/cellularlifeandgenetics/pollination/>
- Discovery Education videos about flowers and pollination

Websites

- Mystery Science – Power of Flowers Unit

- <https://mysteryscience.com/flowers/life-cycle-traits-heredity>
- Easy Science for Kids – Pollination and Fertilization of Plants
 - <http://easyscienceforkids.com/all-about-pollination/>
- Kids Growing Strong - Pollination
 - <https://kidsgrowingstrong.org/pollination/>
- Britannica Kids – How Flowering Plants Reproduce
 - <http://kids.britannica.com/comptons/art-53831/Reproduction-in-flowering-plants-begins-with-pollination-the-transfer-of>
- BBC Bite Size – Plant Reproduction
 - <http://www.bbc.co.uk/education/guides/zs7thyc/revision>

• Guiding/Reflective Questions

1. How do flowers reproduce? Describe the process of sexual reproduction and seed fertilization in a flower.
2. What are the parts of a flower? What does each part do?
3. How can you construct a 3D model of the reproductive parts of a flower with the materials that are available? Which materials would work the best? Why do you think so?
4. How can your team construct a 3D reproductive model of a flower on a budget?

ACCOMMODATIONS & RECOMMENDATIONS

• Accommodations:

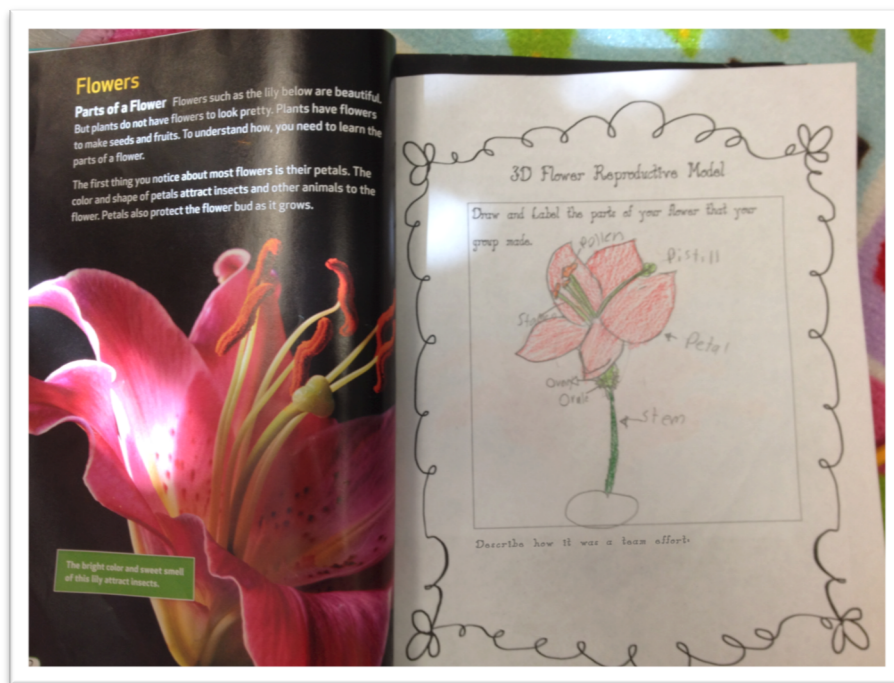
For ESE: Students work together as a team to calculate the cost of their materials. Students can use the anchor charts and/or their science textbook (and notes) to help them identify the parts of a flower, and for their diagram in their reflection. If needed, some students can have a reduced vocabulary list with pistil and stamen, and not the parts they contained within in them,

• Extensions:

- Students could have a minimum number of materials they must use in their flower, like at least 4 different types of materials, not including the tape.

Related Standards

Name	Description
Particular alignment to:	
SC.4.L.16.1:	Identify processes of sexual reproduction in flowering plants, including pollination, fertilization (seed production), seed dispersal, and germination.
MAFS.4.NBT.2.4:	Fluently add and subtract multi-digit whole numbers using the standard algorithm.



3D Flower EDC Materials and Costs

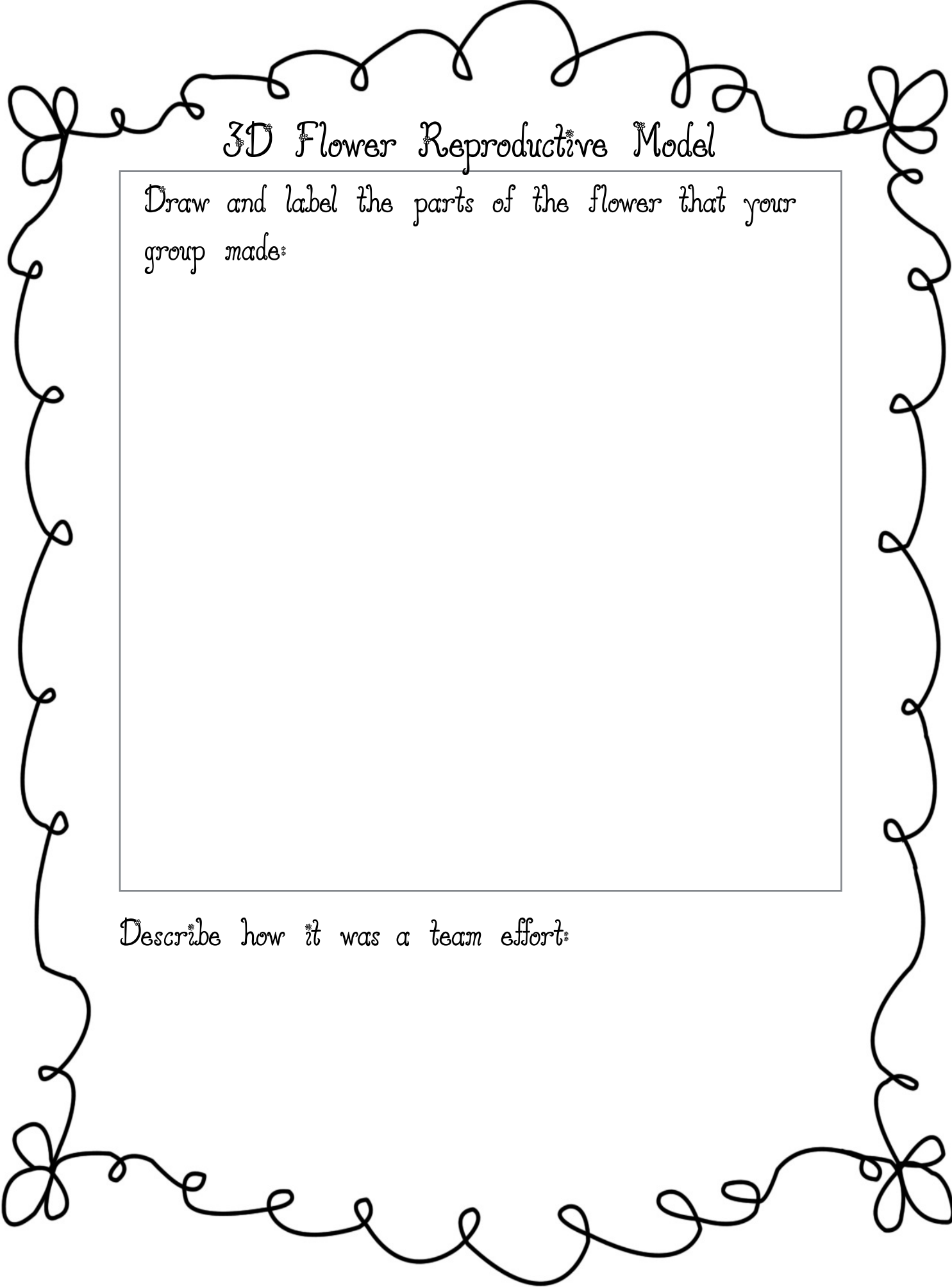
3D FLOWER BUDGET

Total amount available to spend per flower is \$50.00

Material	Cost per item
Tissue Paper, various colors	\$7 each
Pipe Cleaners, various colors	\$8 each
Cotton ball, triple size	\$1 each
Yarn, various colors	\$3/6 inches
Craft Foam, various colors, half sheet	\$6/sheet
Construction Paper, 12" x 18"	\$4 each
Scotch Tape, 1 foot	\$6 each
Rubber Bands, colored	\$5 each

Table with list of items for your flowers

Material List	Color	Quantity	Cost per item	Total for item
Total for all items =				



3D Flower Reproductive Model

Draw and label the parts of the flower that your group made:

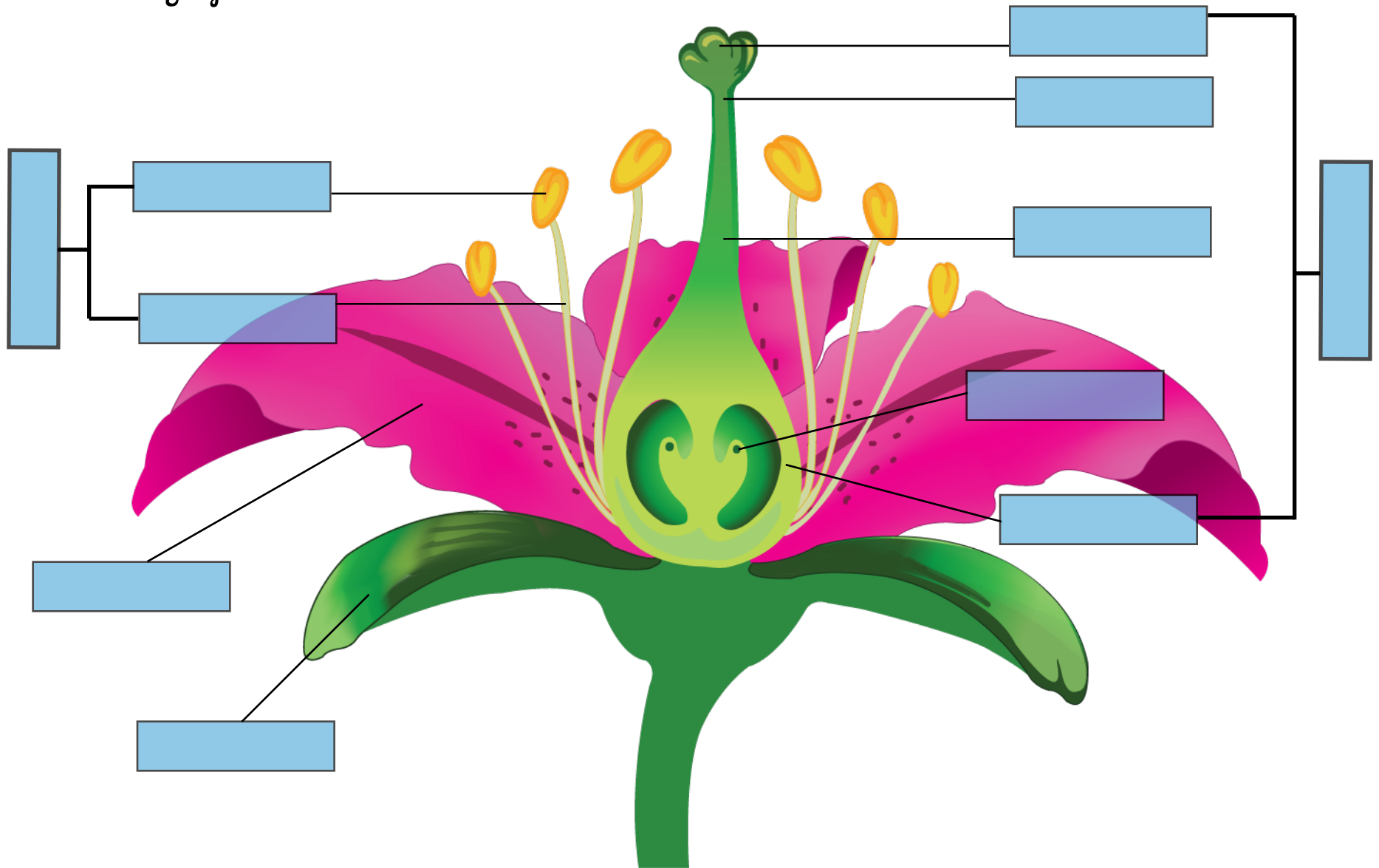
Describe how it was a team effort:

3D Flower Challenge

	Proficient - 3 pts.	Developing - 2 pts.	Beginning - 1 pt.
Creativity	• Flower design shows creativity. • Construction of flower shows creativity.	• Flower design is somewhat creative. • Construction process of the flower was somewhat creative.	• Flower design shows minimal creativity. • Construction process showed minimal creativity.
Attractiveness	• Flower was colorful and resembled design drawing. • Flower construction was attractive and neat/ tidy. • Tissue paper and pipe cleaners were well used in design. (Shows great thought went into the design.)	• Flower somewhat resembled the design drawing. • Flower construction was somewhat neat or tidy. • Some thought was put into the construction design with the tissue paper and pipe cleaners.	• 3D flower does not resemble the design. • Flower construction is sloppy. • Flower looks like it was thrown together. • Little thought went into the construction design of the tissue paper and pipe cleaners.
Content Knowledge	• Showed clear evidence of content knowledge about the parts of the flower. • Called the parts of the flower by name. • Displayed all parts of the flower. • Design drawing included all parts of the flower clearly labeled.	• Some knowledge of the parts of the flower is evident. • Called most of the parts of the flower by name. • Missing one or two parts of the flower. • Design drawing had most of the parts of the flower labeled.	• Little to no knowledge about the parts of the flower were evident. • Forgot most of the parts of the flower during identification. • Missing three or more parts of the flower. • Design drawing had little to no parts of the flower labeled.
Teamwork	• Worked well with team mates • Shared equal responsibility for the project • Contributed equally to the design and construction of the project.	• Worked okay with team mates. • Did some of the work on the project, but not equal share. • Contributed somewhat to the design and construction of the project.	• Did not work as a team, or worked against team mates. • Tried to do all of the work, or very little of the work on the project. • Tried to take over the design or construction of the project.

Name: _____ Score: _____

Directions: Label the parts of the flower. (Hint, look closely at what is being pointed to!)



Parts of a Flower

anther	filament	ovary
ovule	petal	pistil
pollen tube	sepal	stamen
stigma	style	

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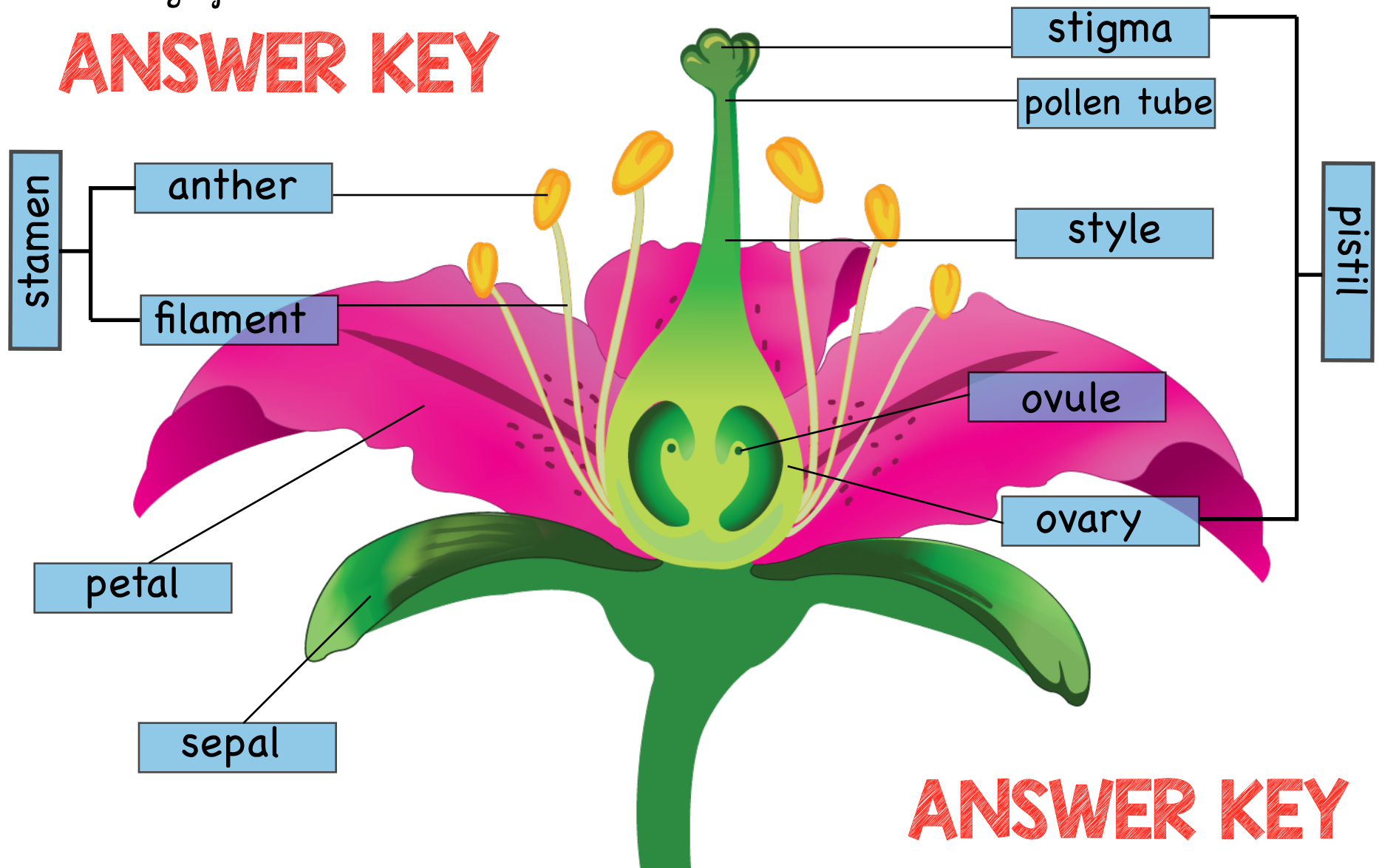
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Directions: Copy page for the amount you need - 1 set of labels per Parts of a Flower sheet. Can be laminated and cut out. Match labels with the parts of a flower on the Parts of a Flower sheet.

Directions: Label the parts of the flower. (Hint, look closely at what is being pointed to!)

ANSWER KEY



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Parts of a Flower

Resources

- * teachengineering.org (search Life Science under Curricular Units)
- * tryengineering.org (search for Human Body, or Plants)
- * <http://teachers.egfi-k12.org/category/lessons/grades-k-5-lessons/>
- * <http://www.childrensengineering.com/freeresources.htm> (K-2 lessons on birdhouses, and plants)
- * <https://eie.org/eie-curriculum> (search under Life Science)
- * <http://awim.sae.org/curriculum/enginspiredbynature/>
- * <http://www.auburn.edu/~cgs0013/engineering.htm>
- * <http://www.stemmom.org/p/lessons.html>

Other Life Science EDC Ideas

- * Use Kid K'Nex for life cycles, label stages with Post-its
- * Models of plant cells, and animal or human cells
- * Plant packaging for transport or shipping
- * Plant pollinators, seed dispersal
- * Models of organs and skeleton, robotic hands
- * Prosthetics (adaptive technology, Winter the dolphin, knee brace, casts, biomedical)
- * shoe/sneaker designs
- * Egg warmers, egg drop
- * Animal shelters, animal feeders