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The Robert McLaughlin Gallery



Art & Science

Lesson Plan for Grade 4-8



William Ronald, 1953 , Slow Movement, casein duco graphite on masonite., Purchase, 1971.

How Is Art A Part Of Science?

Art is a powerful tool for telling a scientific story.

- It can help us visualize things from scientific discovery that we can not see.
- It makes the abstract parts of science more explainable.
- It helps us see possibilities of things that no longer exist.
- It creates excitement and interest for scientific knowledge.

Art even influences how scientists do science.

- Both art and science involves observation. Understanding spatial relationships, patterns and shapes helps scientists make better observations.
- Science and art both rely on observation and synthesis: taking what is seen and creating something new from it.
- Both use the process of discovery and learn through experimentation.

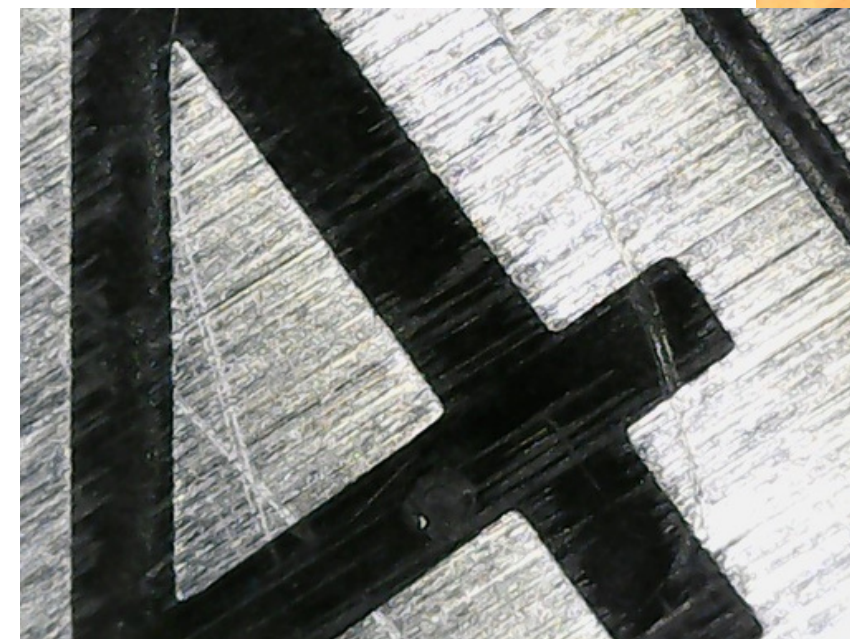
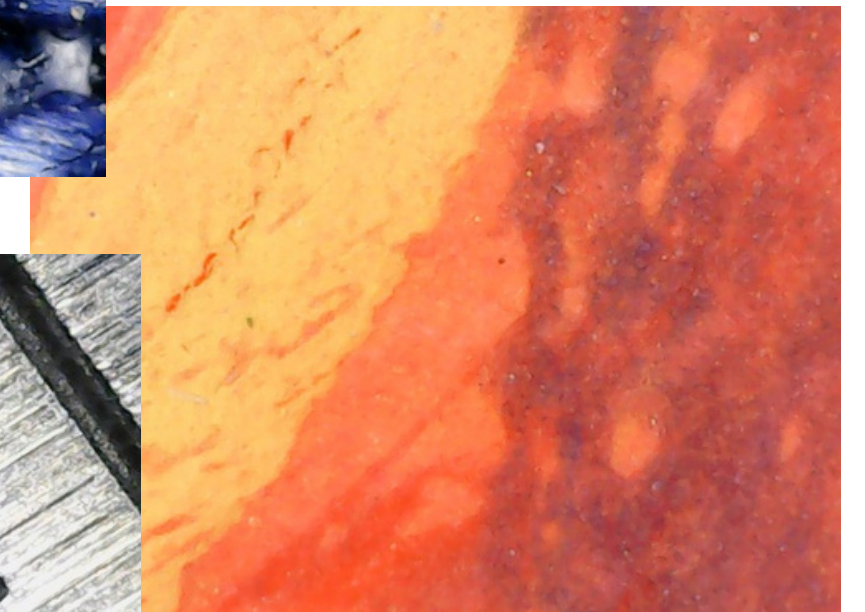
Warm Up Game : Describe and Draw

1. Have students pair up.
2. One student in each pair will draw, one student will describe what to draw.
3. Hand out one of the Scientific Images to one person in each pair.
4. This student will describe the image to their partner without telling them what it is. Describe only the shapes, lines, sizes etc...not the names, materials or uses.
5. The student without the card will try drawing what the student with the card is describing to them.

The printable is at the end of the presentation (do not show to students beforehand)

Science and Art Connections

- Electron Microscopy - looking at objects magnified under a microscope or an electron microscope that we could never see with our own eyes.
- Photography - using photography to capture intriguing things all around us.
- Illustration - using art to illustrate science, like a bird identification book.
- Diagrams - using art to help clarify and give visuals to a scientific explanation.



Can you think of any other way science and art are used together?

Jock Macdonald

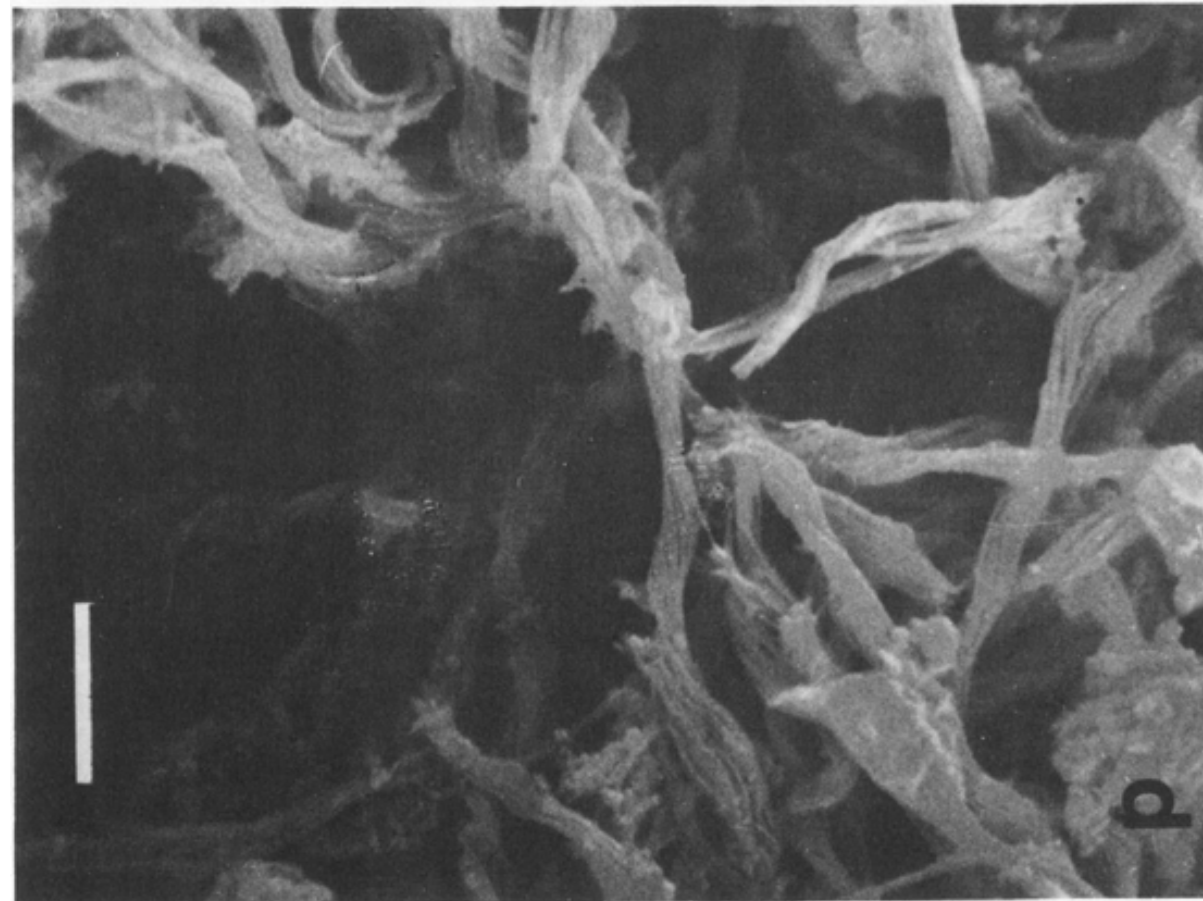
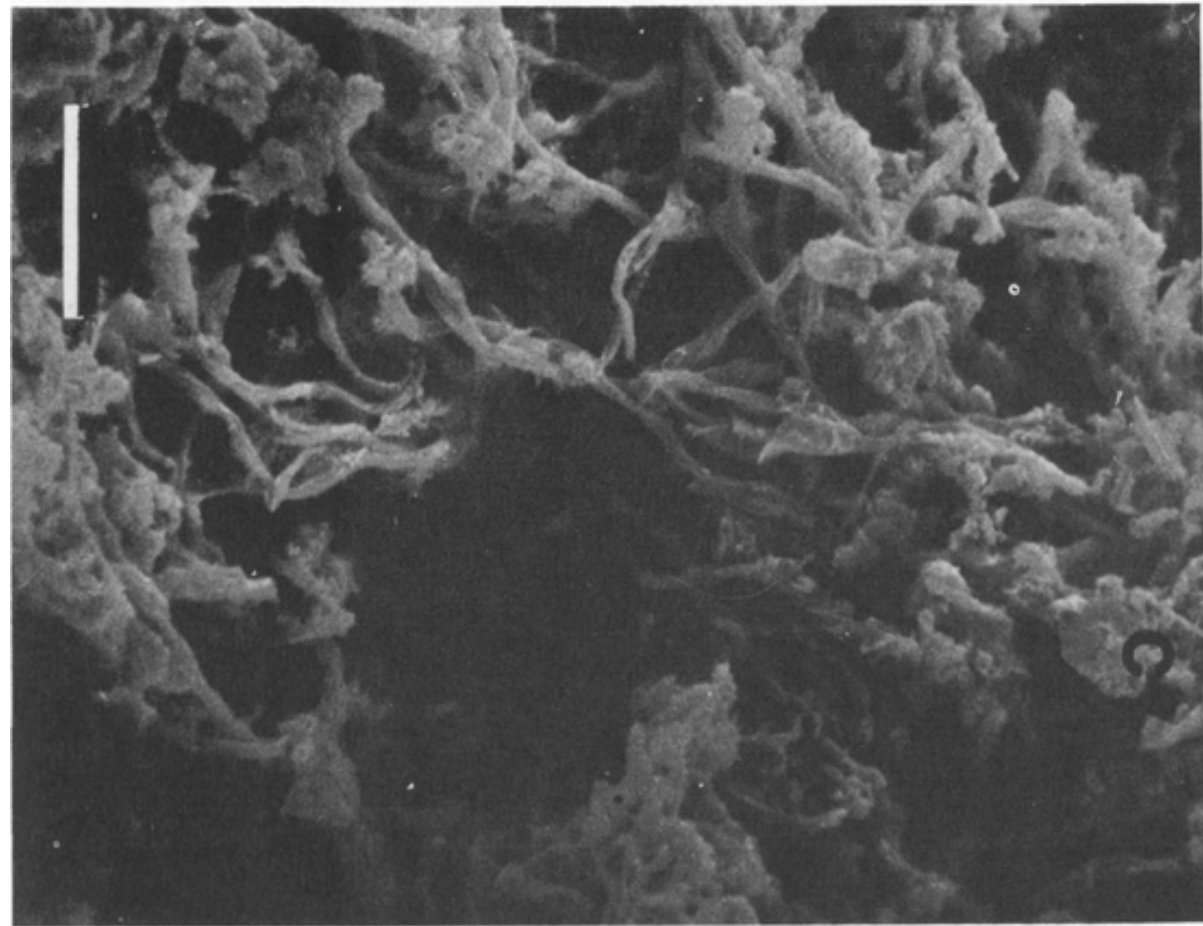
Macdonald was a highly respected, influential teacher and a member of the Painters Eleven, Toronto's first abstract art society.

"Artists must discover idioms which interpret man`s new concepts about nature, especially about the interrelationship of all things, the energies of motion, new spatial concepts."

What does this image look like to you?



Jock Macdonald, Rust of Antiquity, 1958, oil, Lucite 44 on masonite. Gift of Alexandra Luke, 1967.



Art inspired by Science



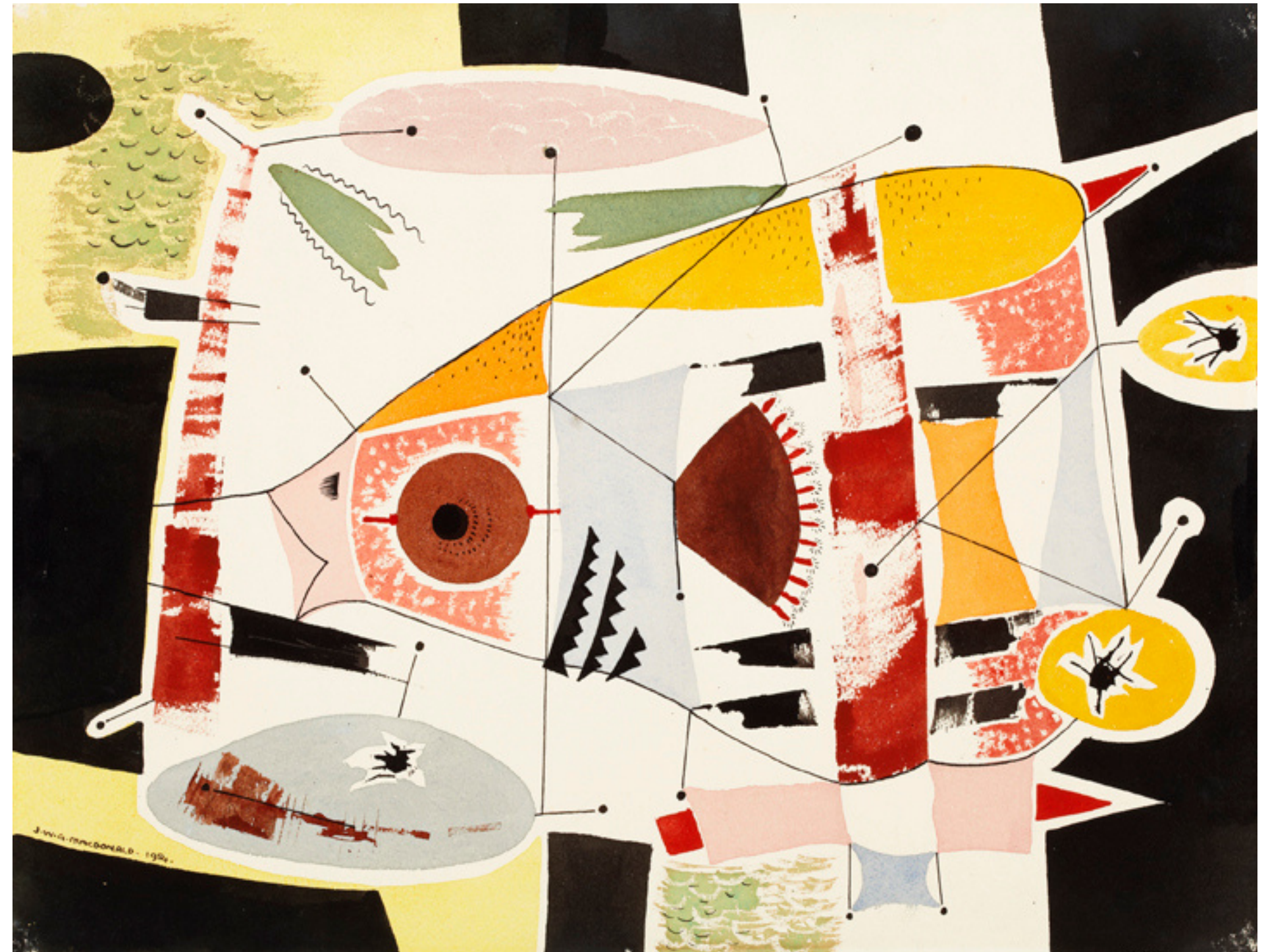
Jock Macdonald, *Rust of Antiquity*, 1958, oil, Lucite 44 on masonite. Gift of Alexandra Luke, 1967.

Jock Macdonald

What does this image look like to you?

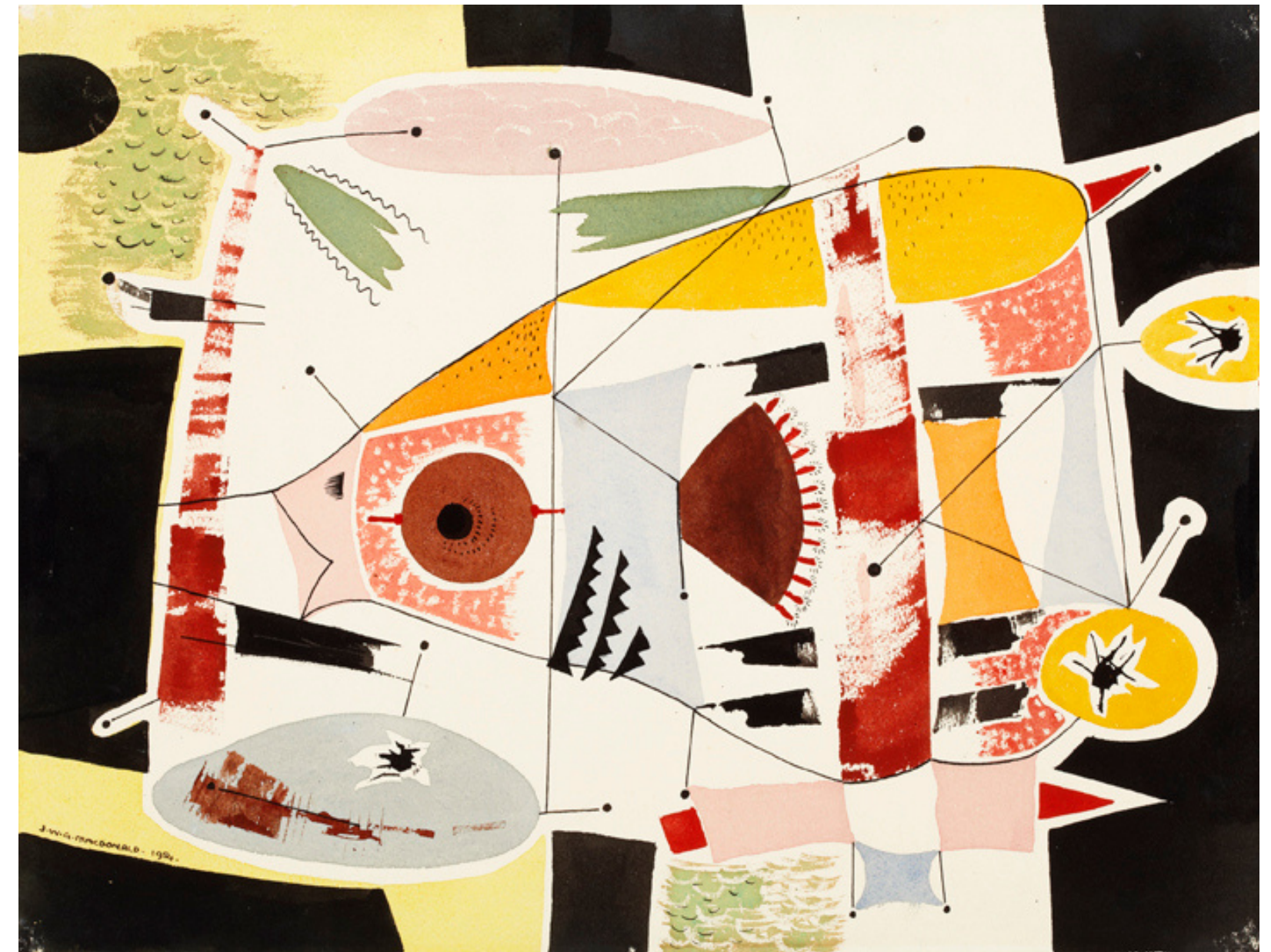
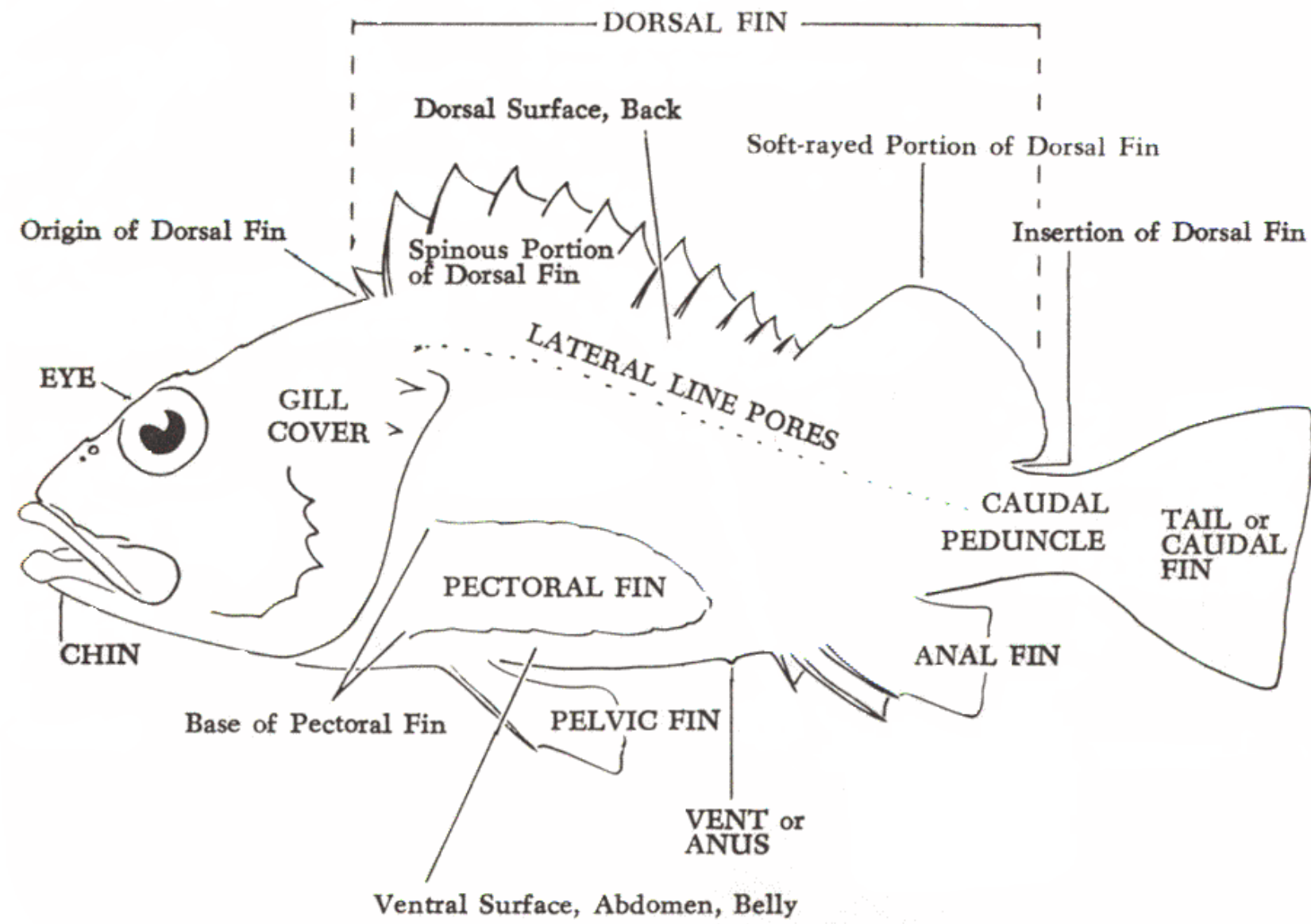
Does it feel natural or human made?

In what ways do you believe this image is related to science and serves as a source of inspiration?



Jock Macdonald, Untitled, 1954, watercolour, ink on paper. Gift of Mary Hare, 1990.

Can you see a similarity?



Jock Macdonald, Untitled, 1954 ,watercolour; ink on paper. Gift of Mary Hare, 1990.

Harold Town

Town was another member of Oshawa's Painter's 11 and drew inspiration for mechanical forms and scooping curves that illustrated forces of nature and the human intellect.

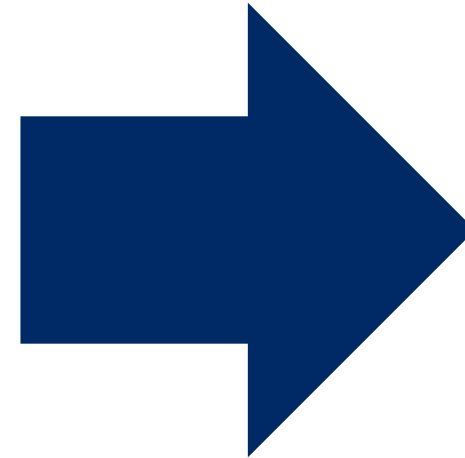
Can you describe what you see in this image?

In what ways do you believe this image is related to science and serves as a source of inspiration?



Harold Town, Untitled, 1959, graphite, oil, Lucite 44. Gift of the artist's estate, 1994.

Did anyone think of this?



What other things could this be?



Harold Town, Untitled, 1959, graphite, oil, Lucite 44. Gift of the artist's estate, 1994.

Harold Town

What does this remind you of?

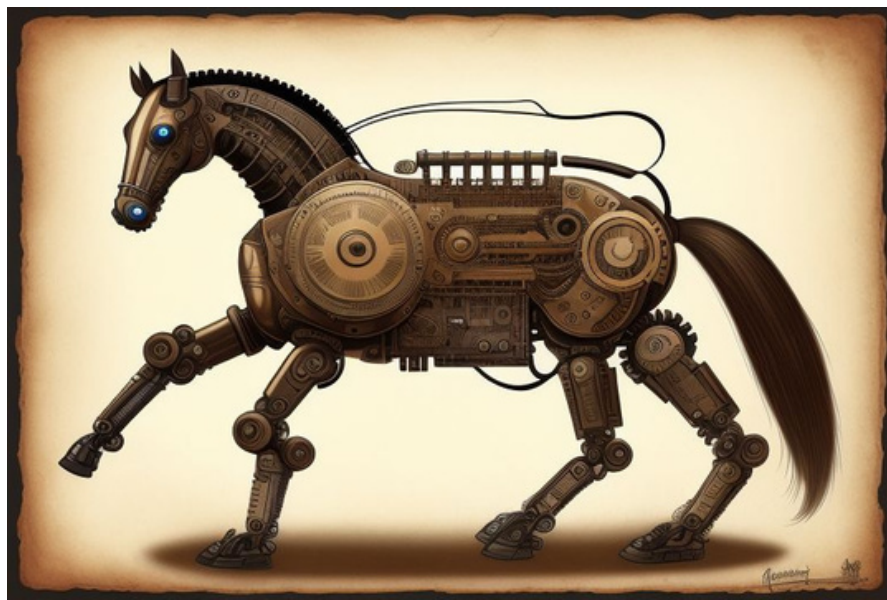
Do the colours chosen by the artist support or contradict your idea?

If you were going to give this painting a title what would it be?



Harold Town, Untitled (Toy Horse Series) , 1981-82, acrylic, ink. Gift of the estate of Isabel McLaughlin.

Did anyone think of this?



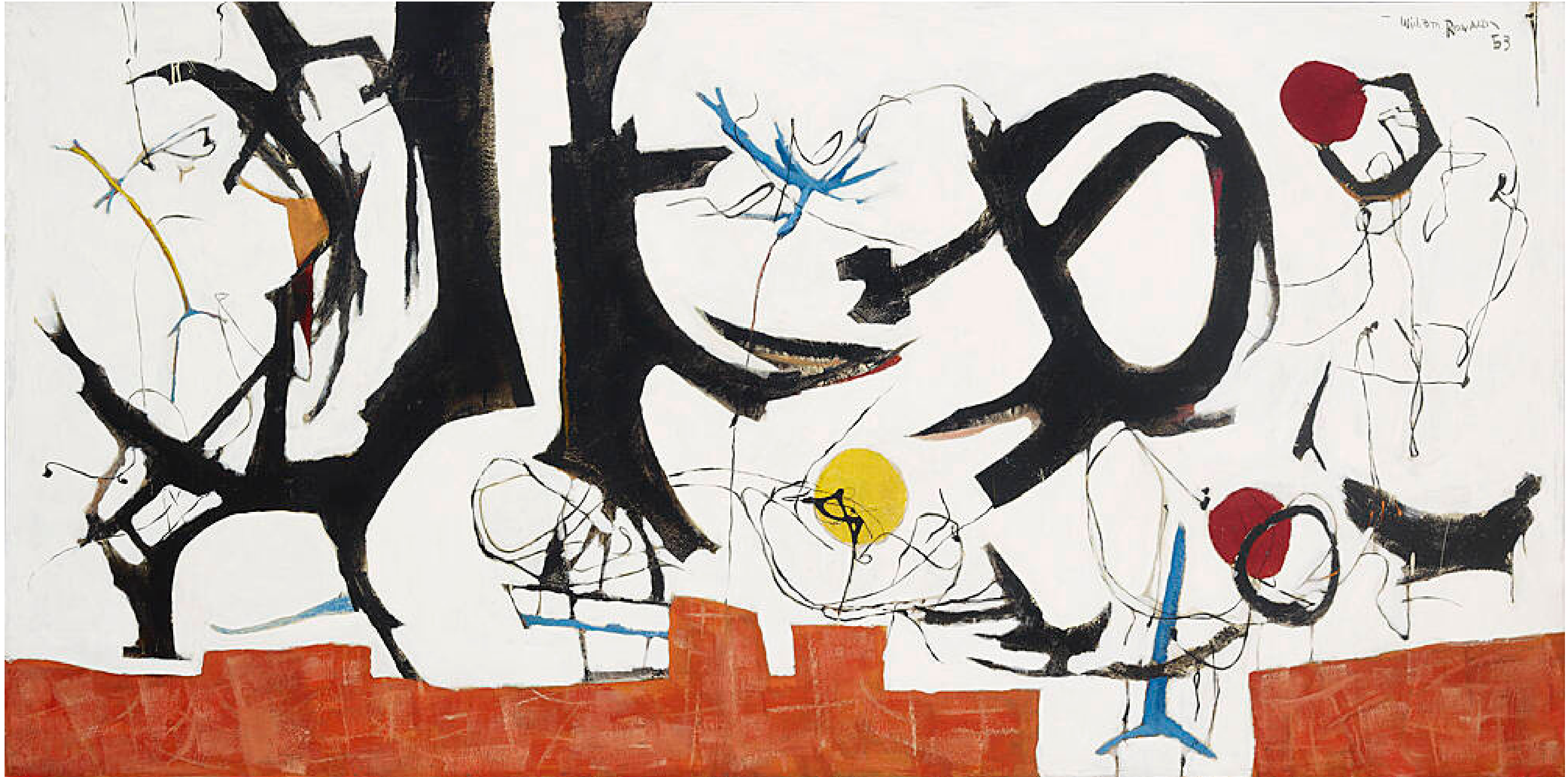
What other things
could this be?



Harold Town, Untitled (Toy Horse Series) , 1981-82, acrylic, ink,. Gift of the estate of Isabel McLaughlin.

William Ronald

Does the title or the artwork fit your interpretation of this image?



William Ronald, 1953 , Slow Movement, casein duco graphite on masonite. Purchase, 1971.

Putting the S.T.E.A^{rt}.M in S.T.E.M

Objective : To create a working automata of a character or design. To learn how to construct the parts that will add motion to the character.

Simple motions to experiment with...

UP/DOWN

SPIN

UP/DOWN/SPIN



Materials Needed

Foam Core or Cardboard

BBQ Skewers

Straws

Paper

Scissors

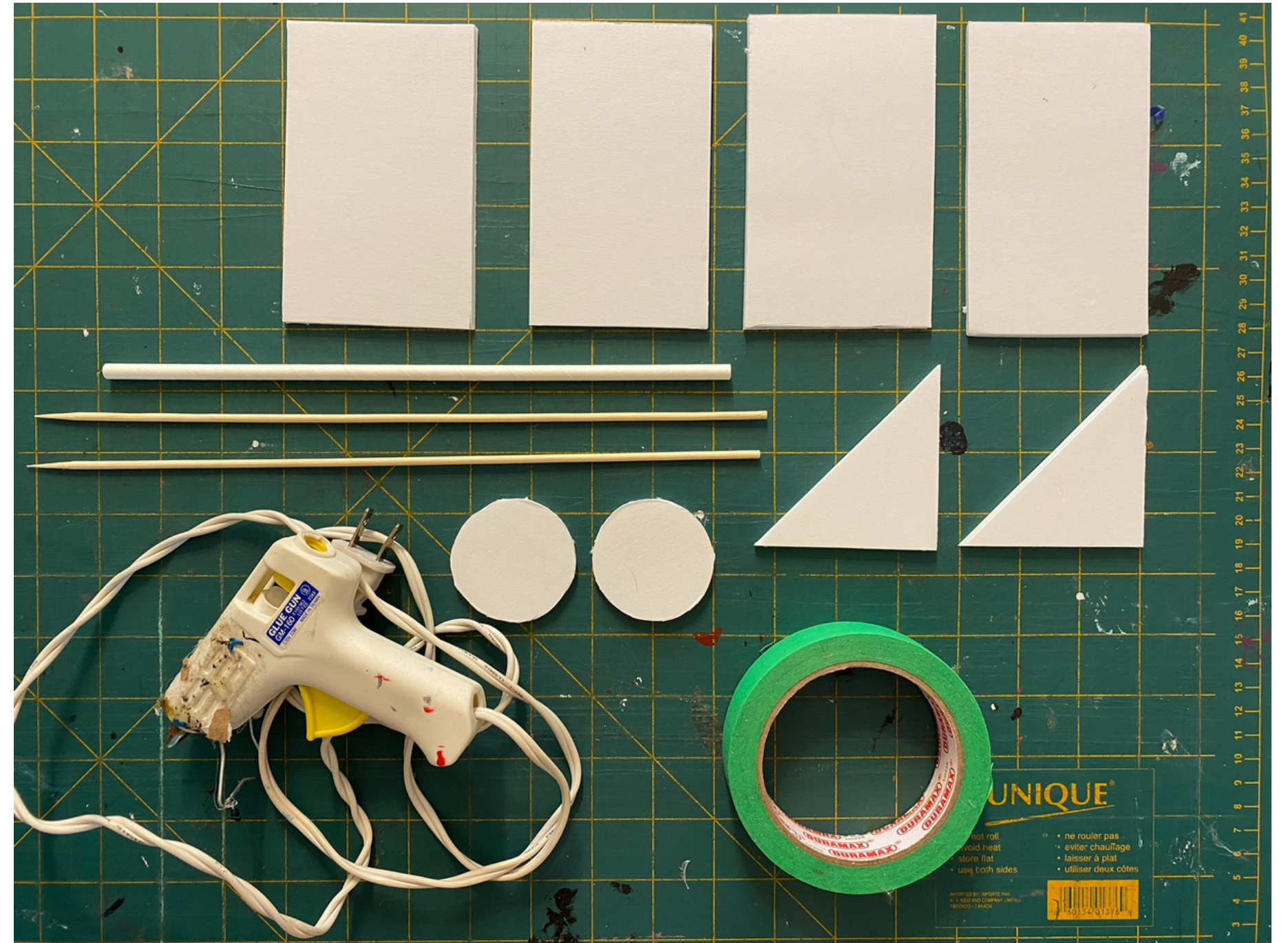
Glue gun and glue gun sticks

Tape

Paper

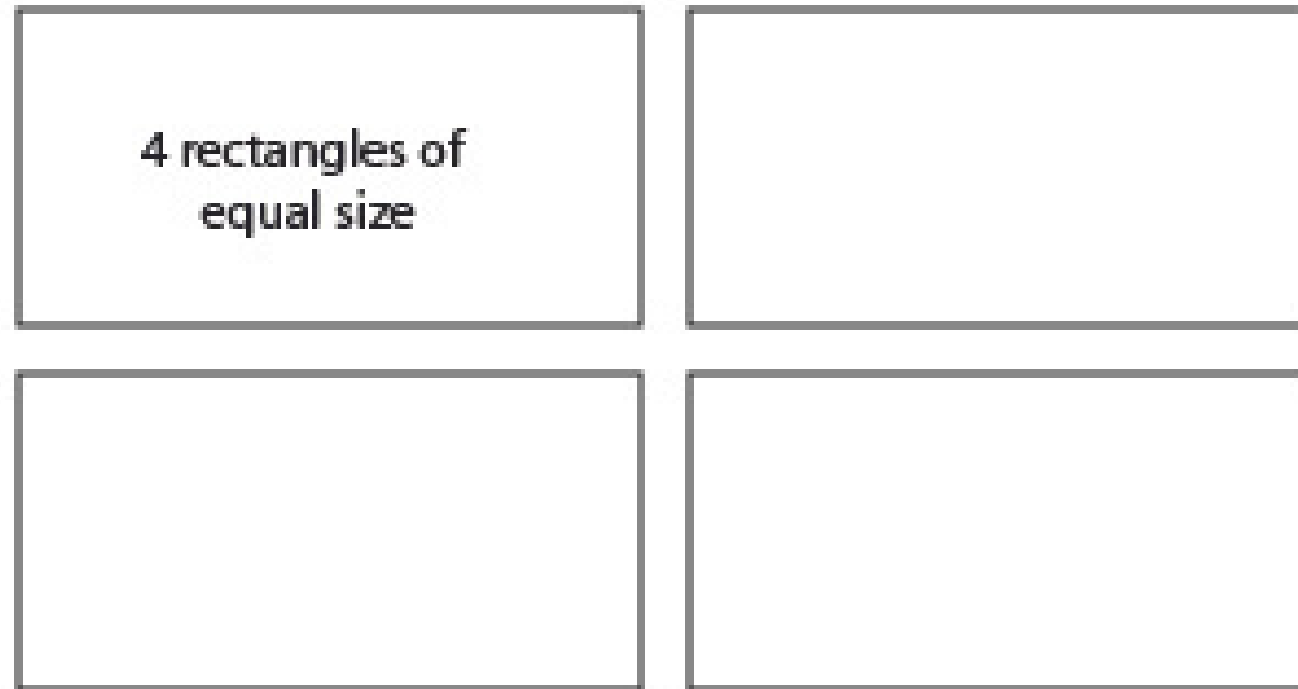
Markers/coloured Pencils

Scissors



1

Cutting the pieces



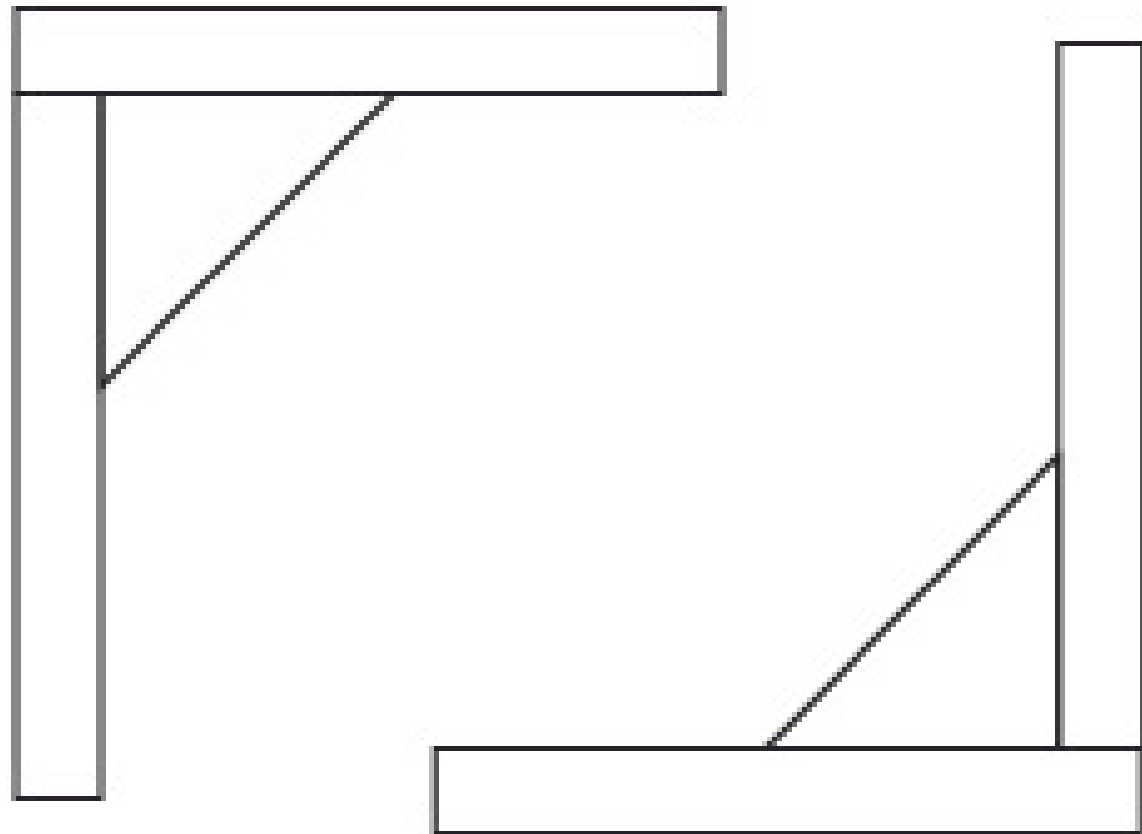
Using cardboard or foam core, measure and cut 4 rectangles of equal size. In my example I cut 3"x5" pieces.

Cut two circles of equal size. I cut the example pieces 1.5" diameter.

Cut two right angle triangles of the same size. I cut the examples at 3". You could cut a square as well and then cut it diagonally in half.

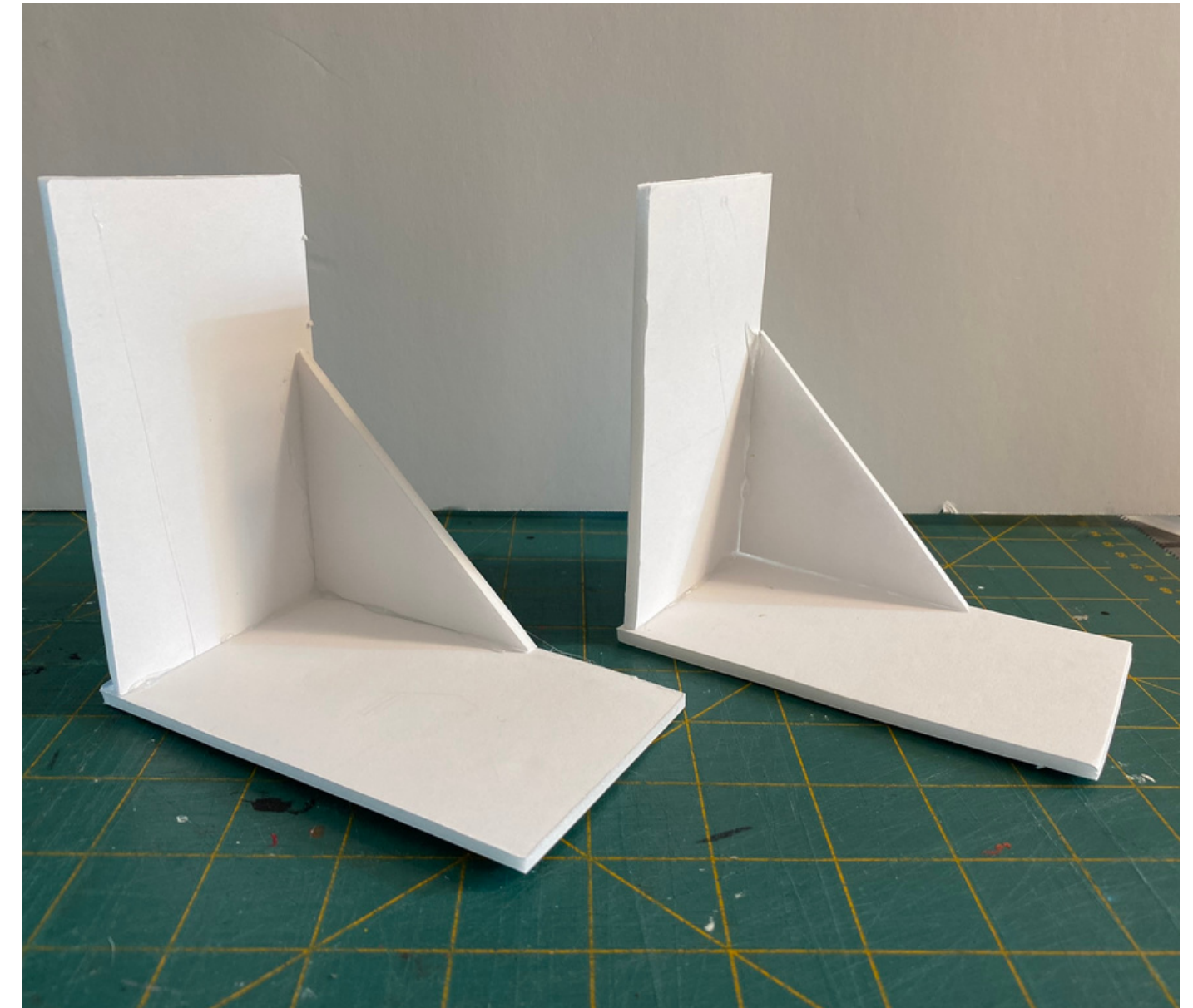
2

Gluing/Taping the frame

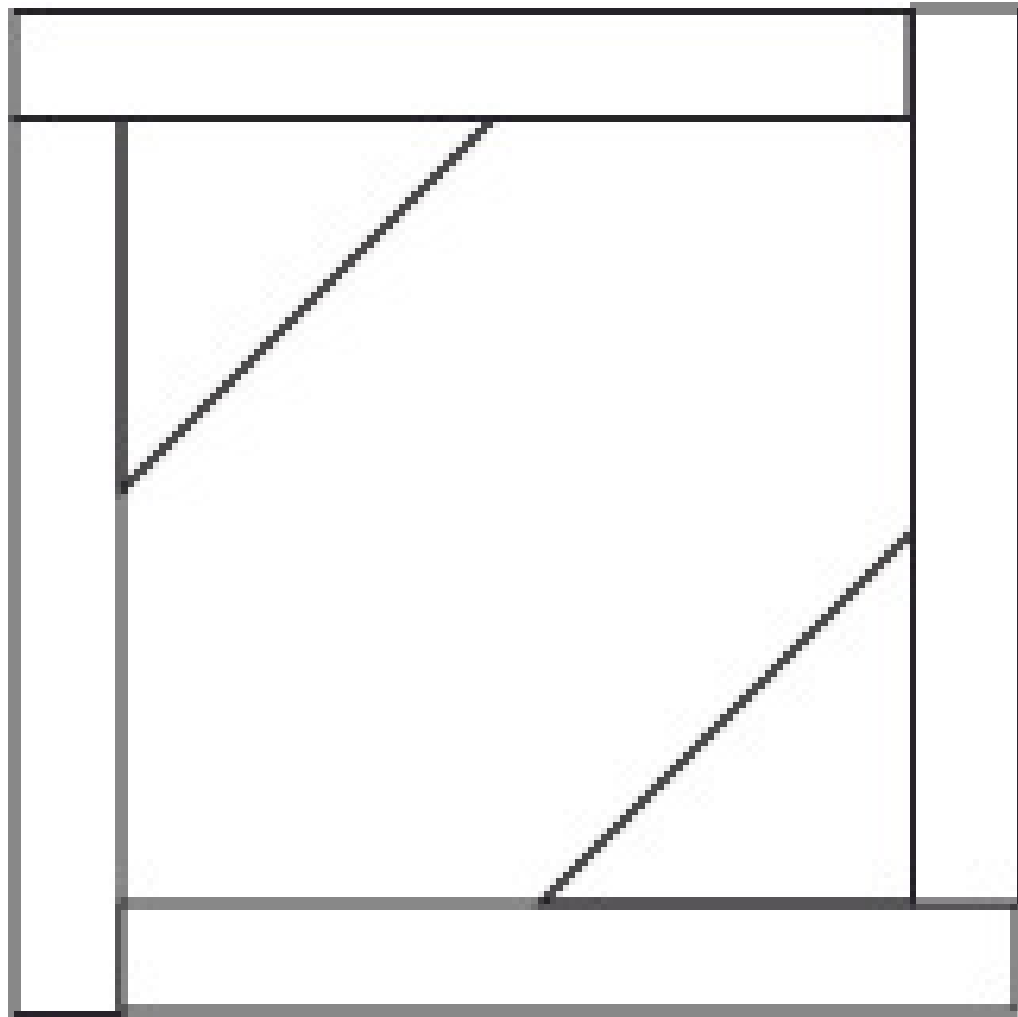


Using tape or a hot glue gun, attach two rectangles together anchored with one of the right angle triangles.

Repeat with the other two rectangles and right angle triangle. Then attached both pieces together

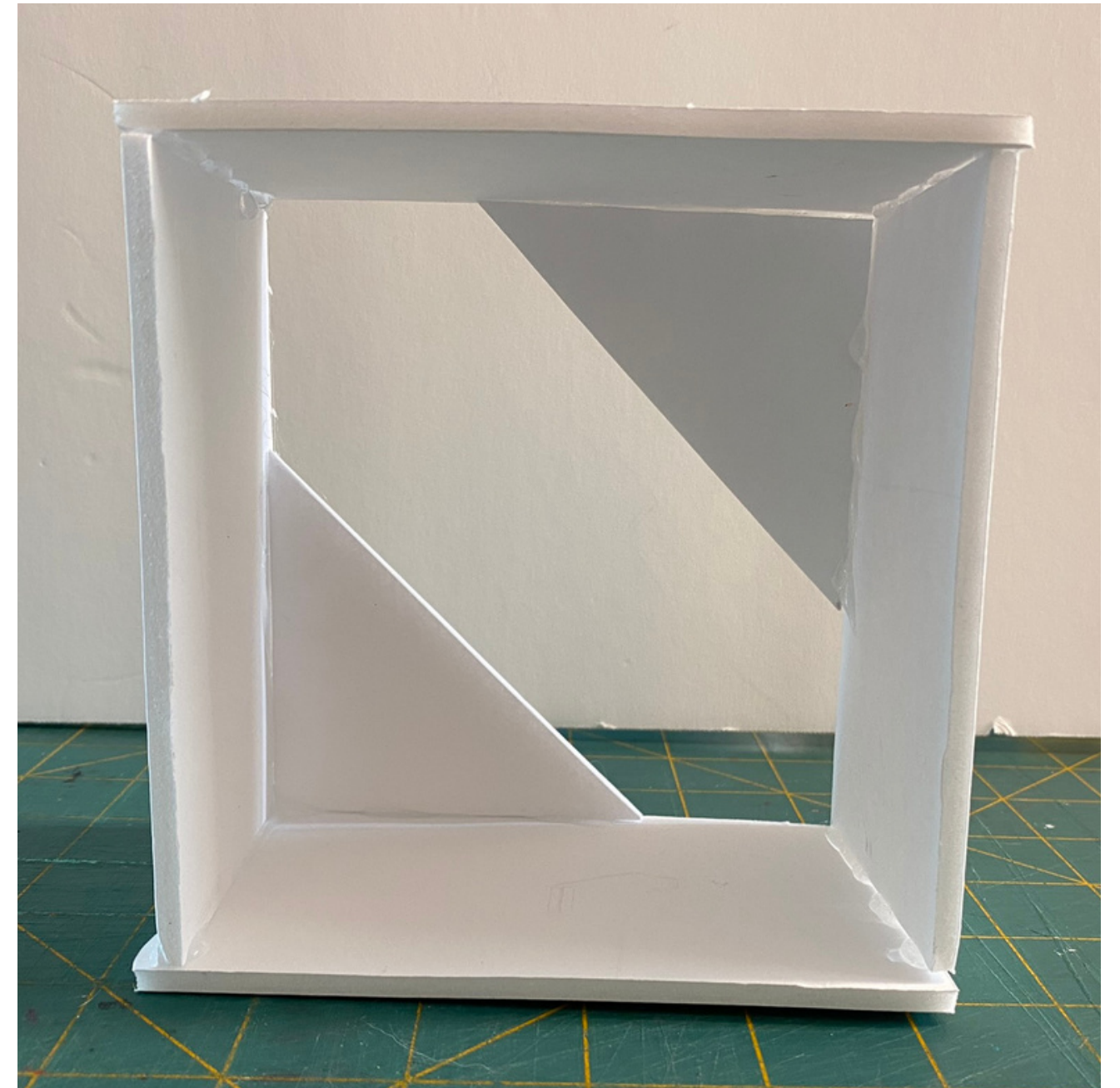


2 Gluing/Taping the frame continued



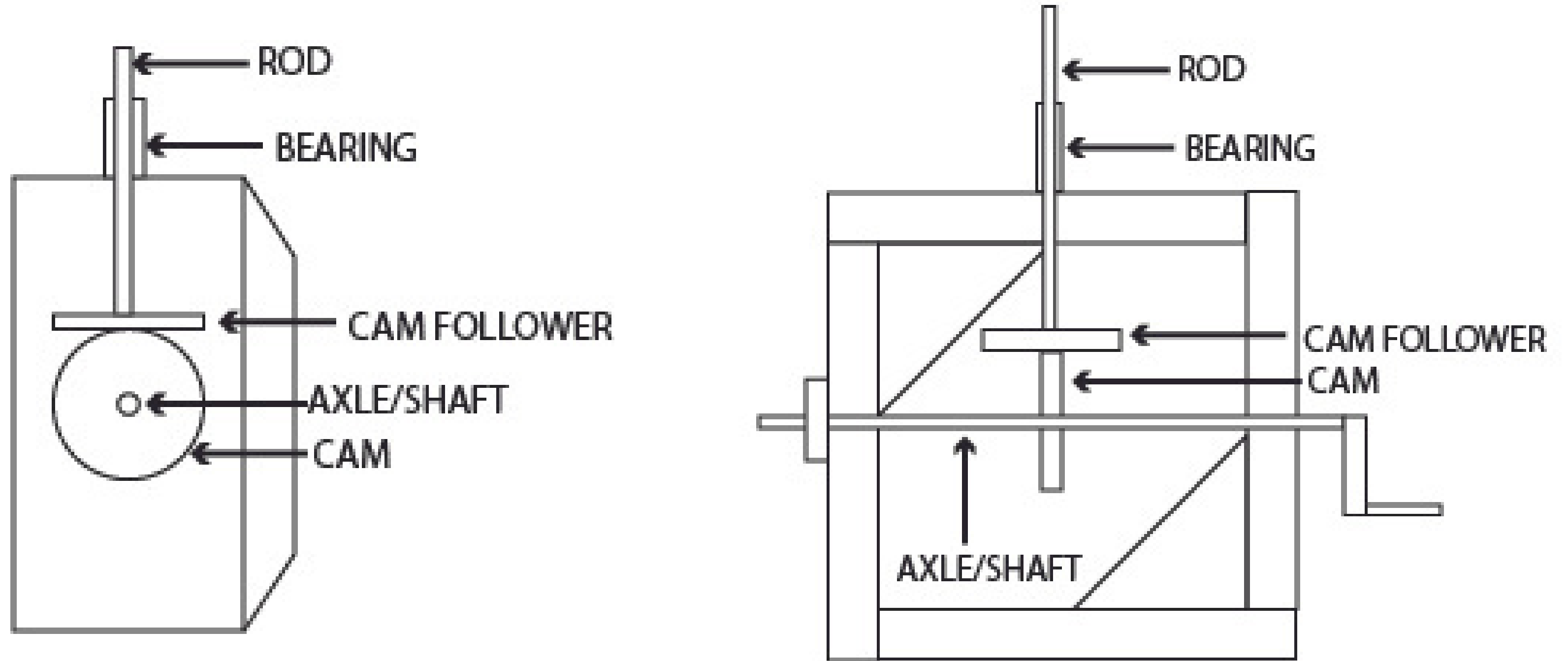
Glue/tape the two parts together to form the box.

The box needs to be firmly built. Poor construction will make the automata less functional.

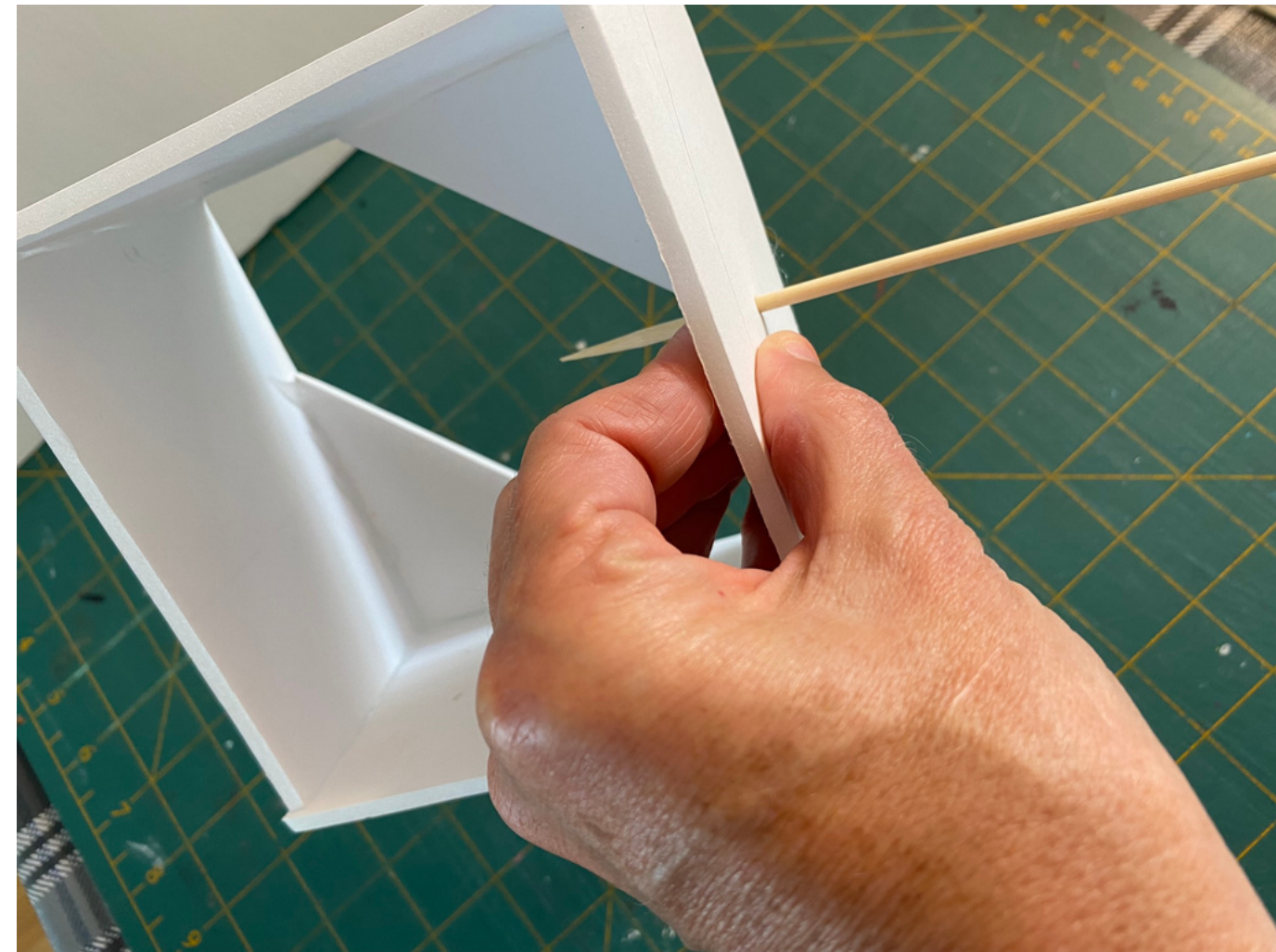
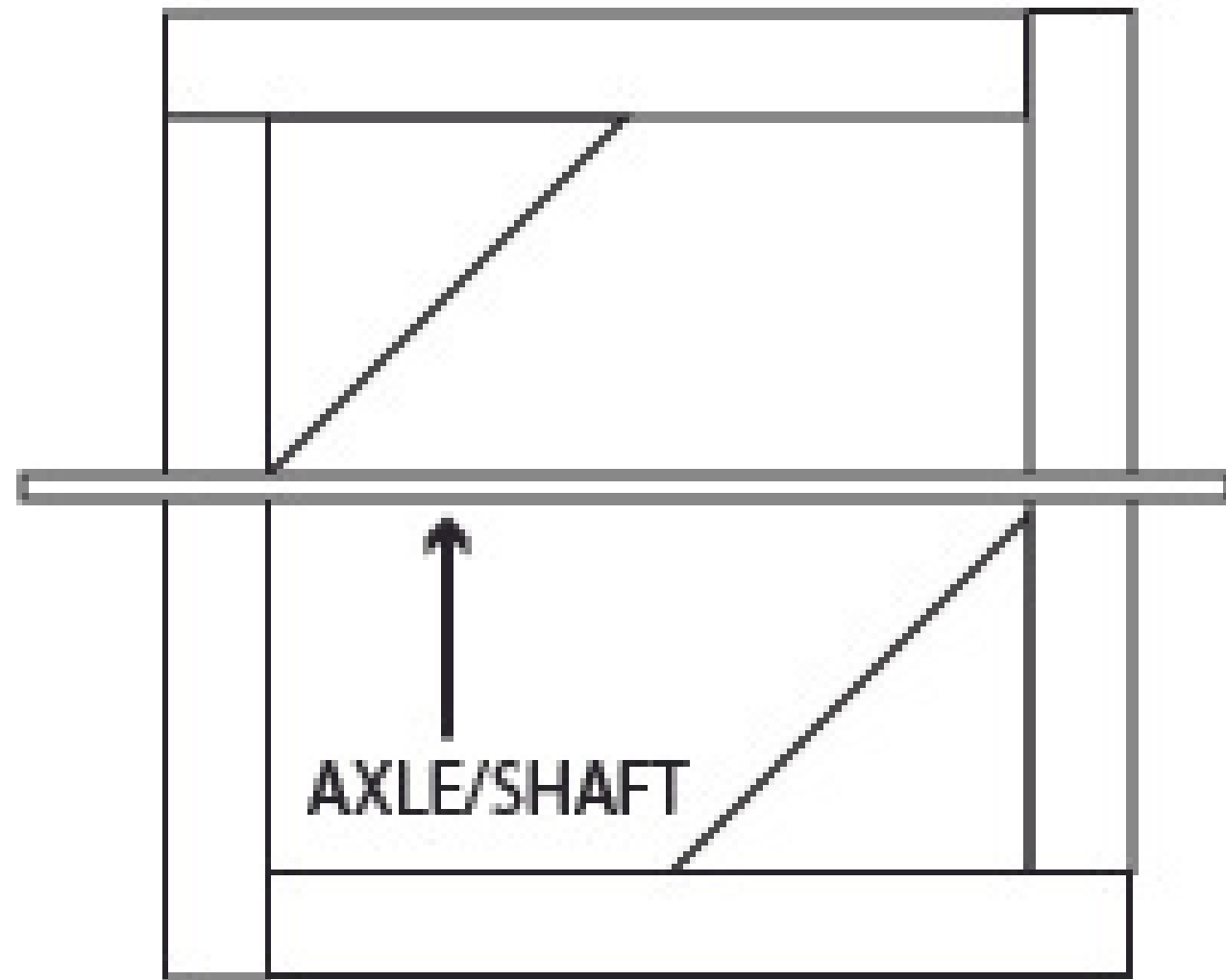


3

Overview and names of the pieces

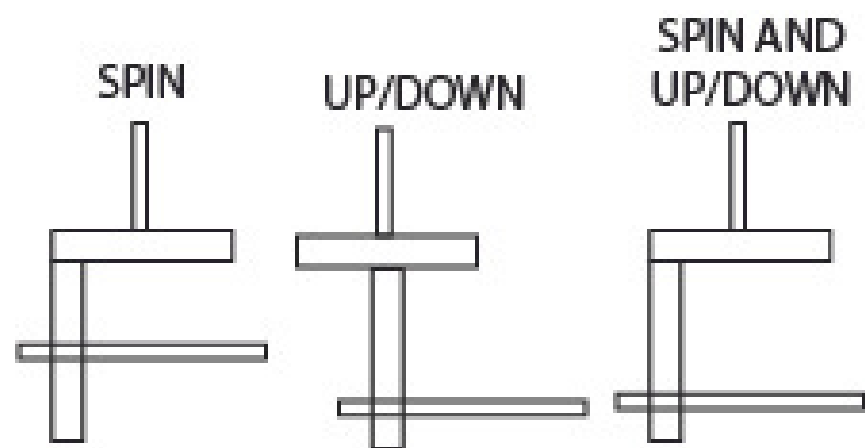
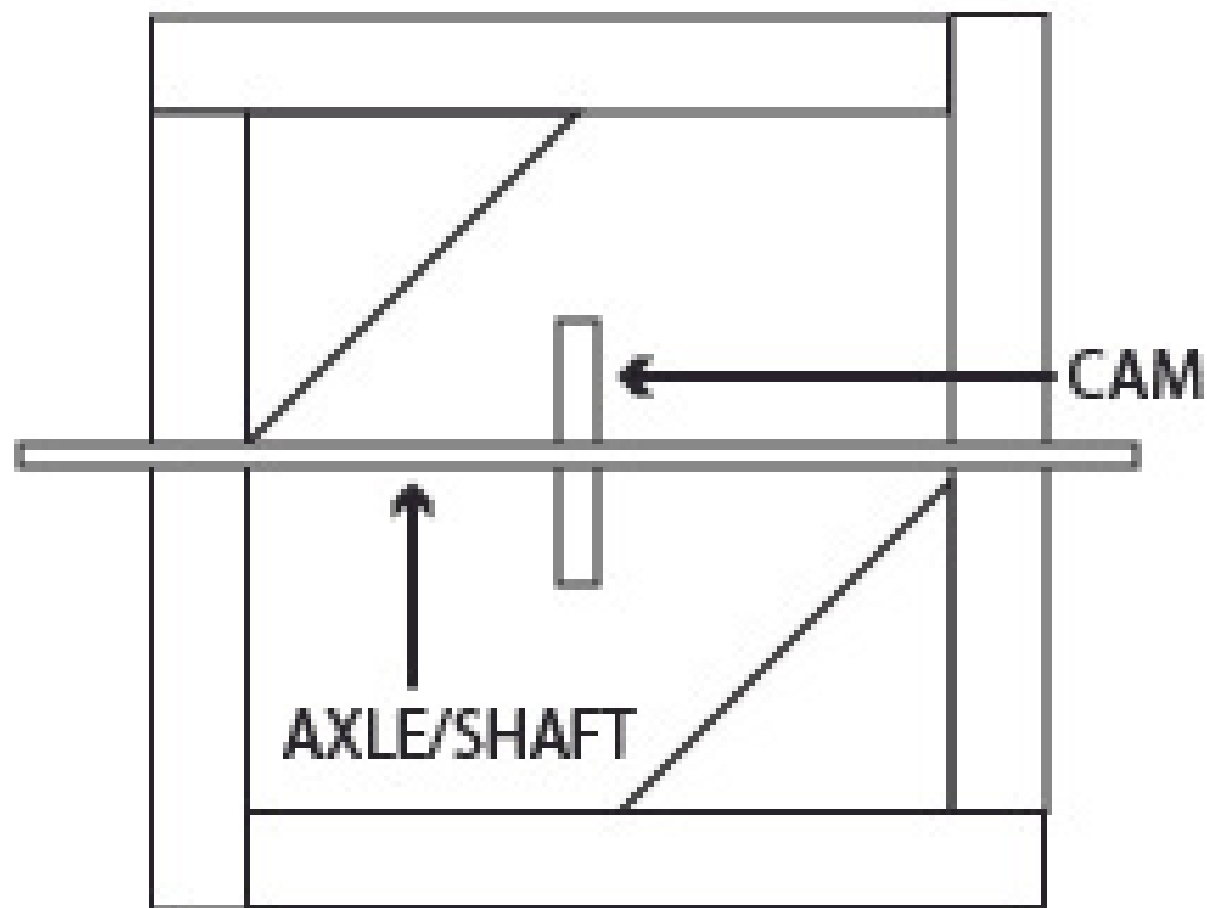


4 Adding the Axle



Poke the sharp end of the skewer through the side of the box at the midway point right through to the other side of the box. Be sure to make the axle as level as possible.

5 Adding the Cam

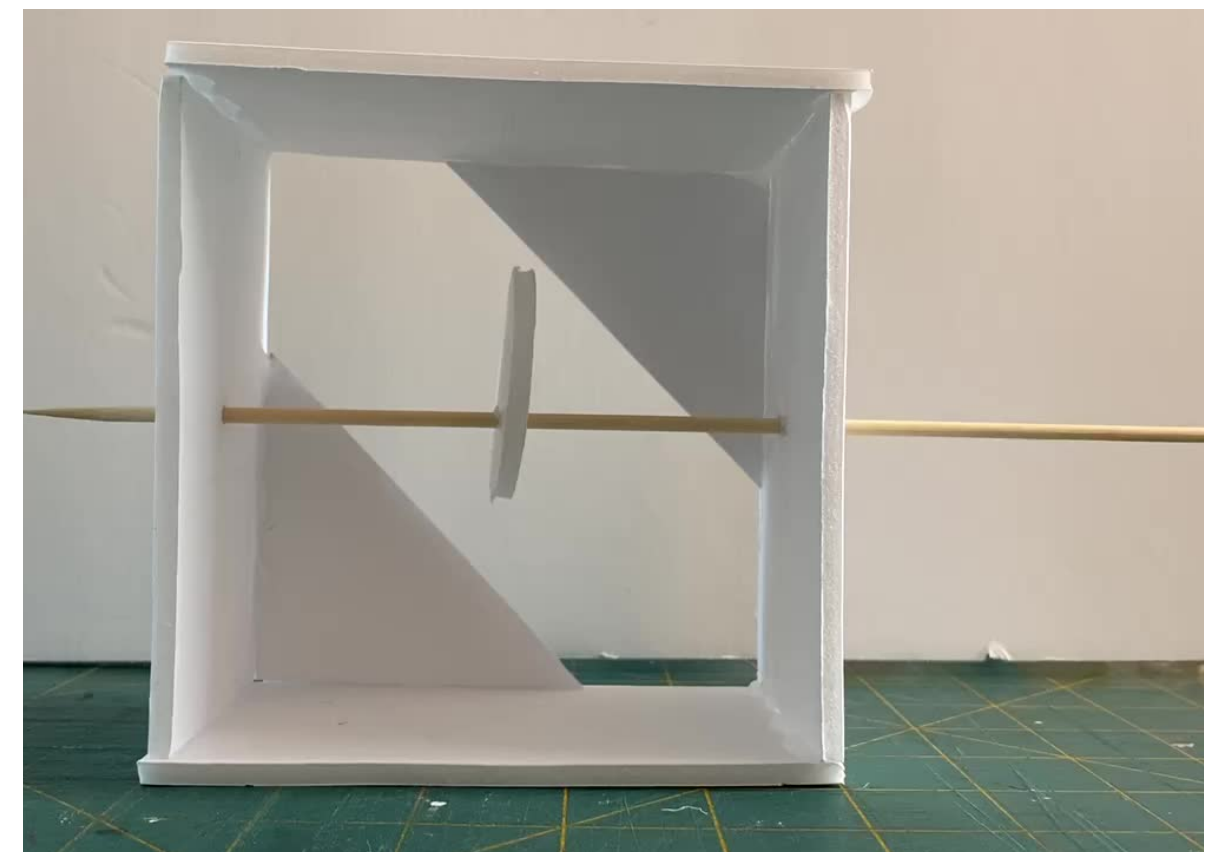


Types of cam/followers

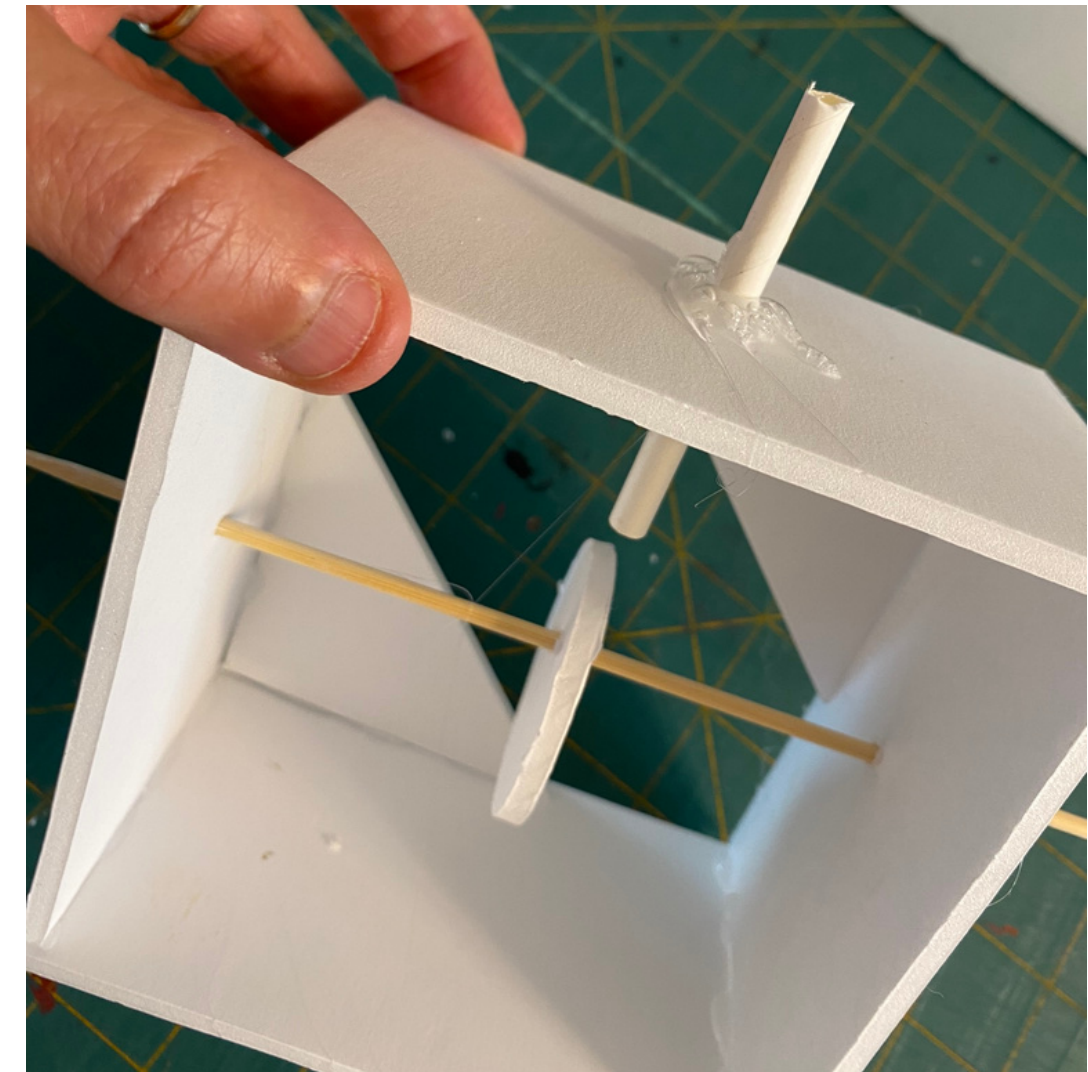
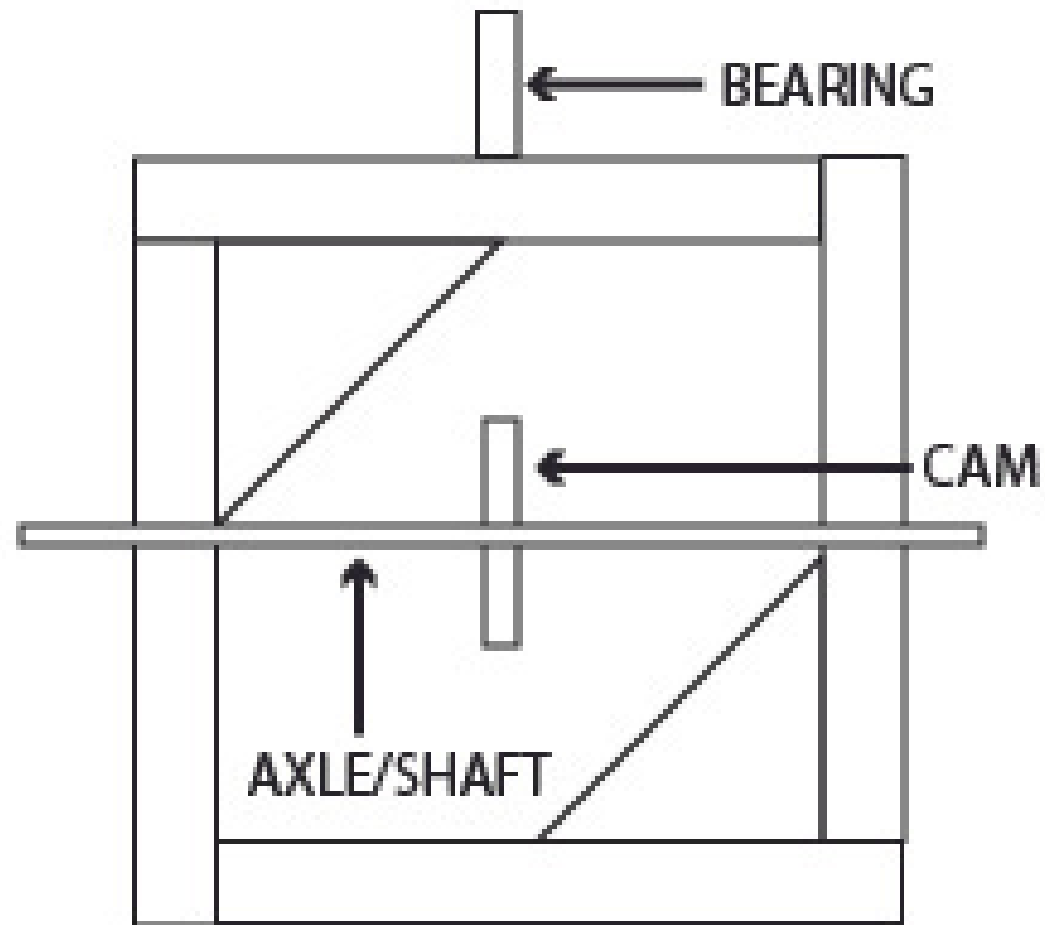
Remove the axle and poke the axle through the cam.

The placement of the hole will determine part of the movement of the automata.

Test the motion to make sure the axle turns the cam.



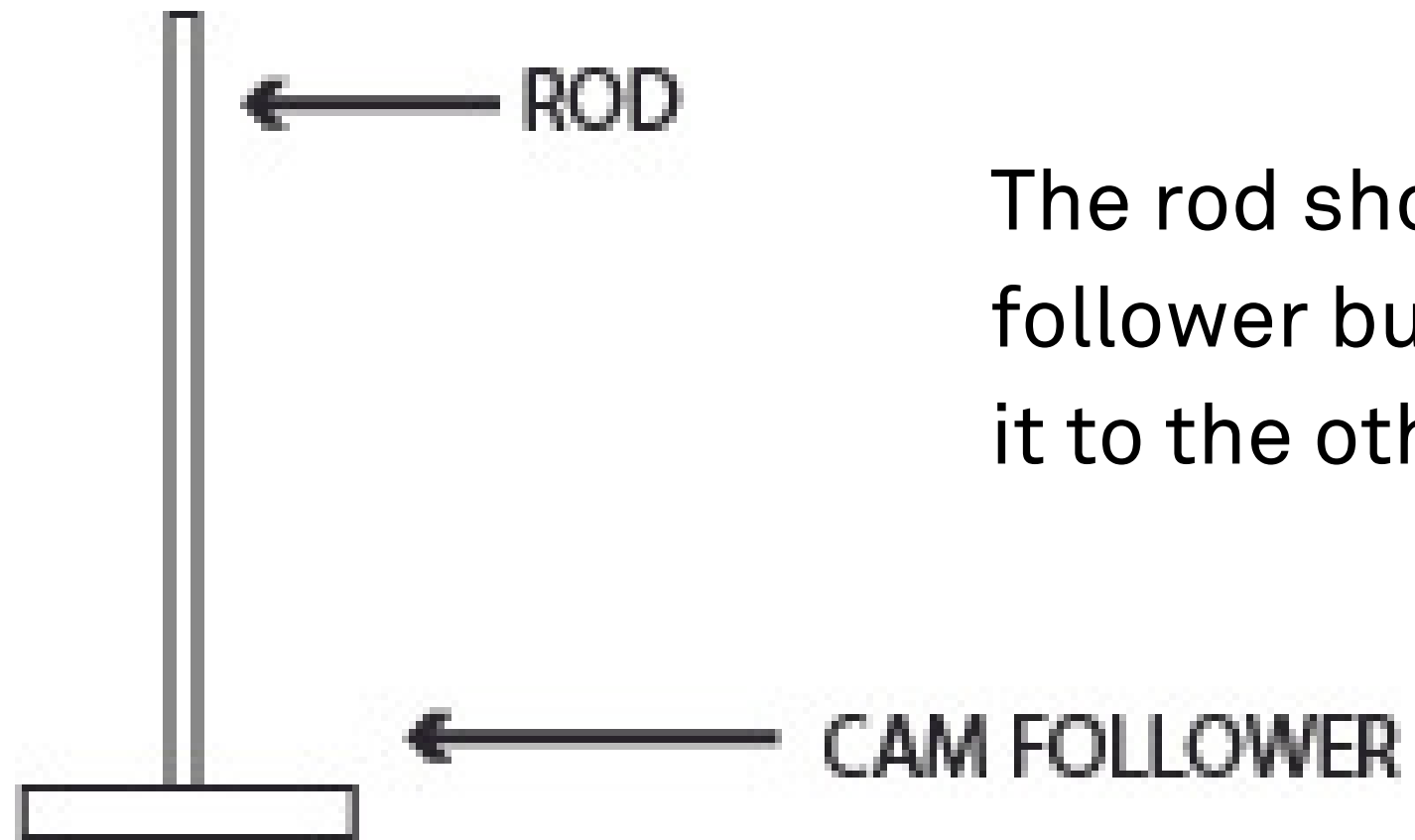
6 Adding the Bearing



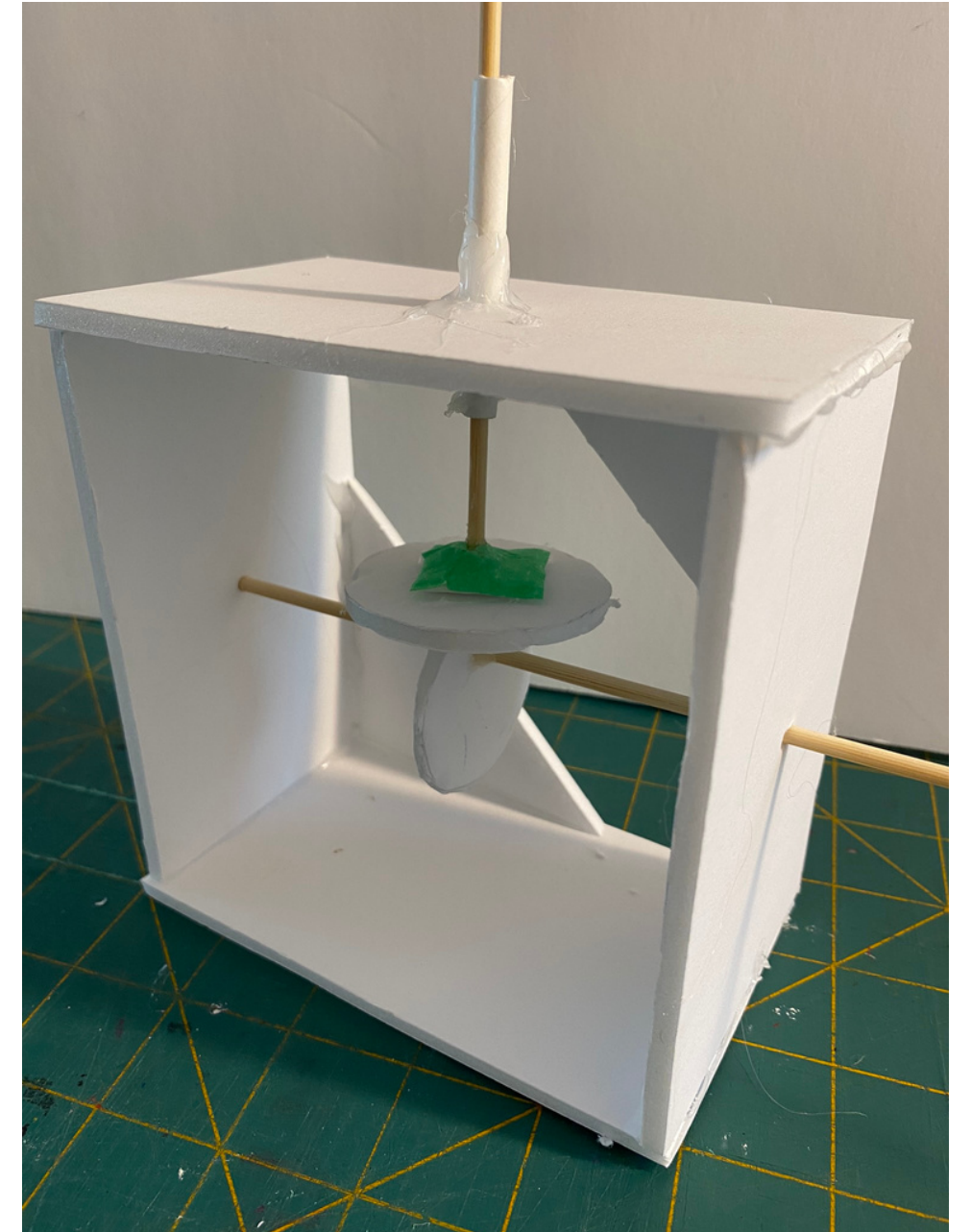
Using a pencil, poke a hole in the top of the box. Then glue or tape a short piece of a straw on the top of the box through the pencil hole.

7 Building the Cam Follower

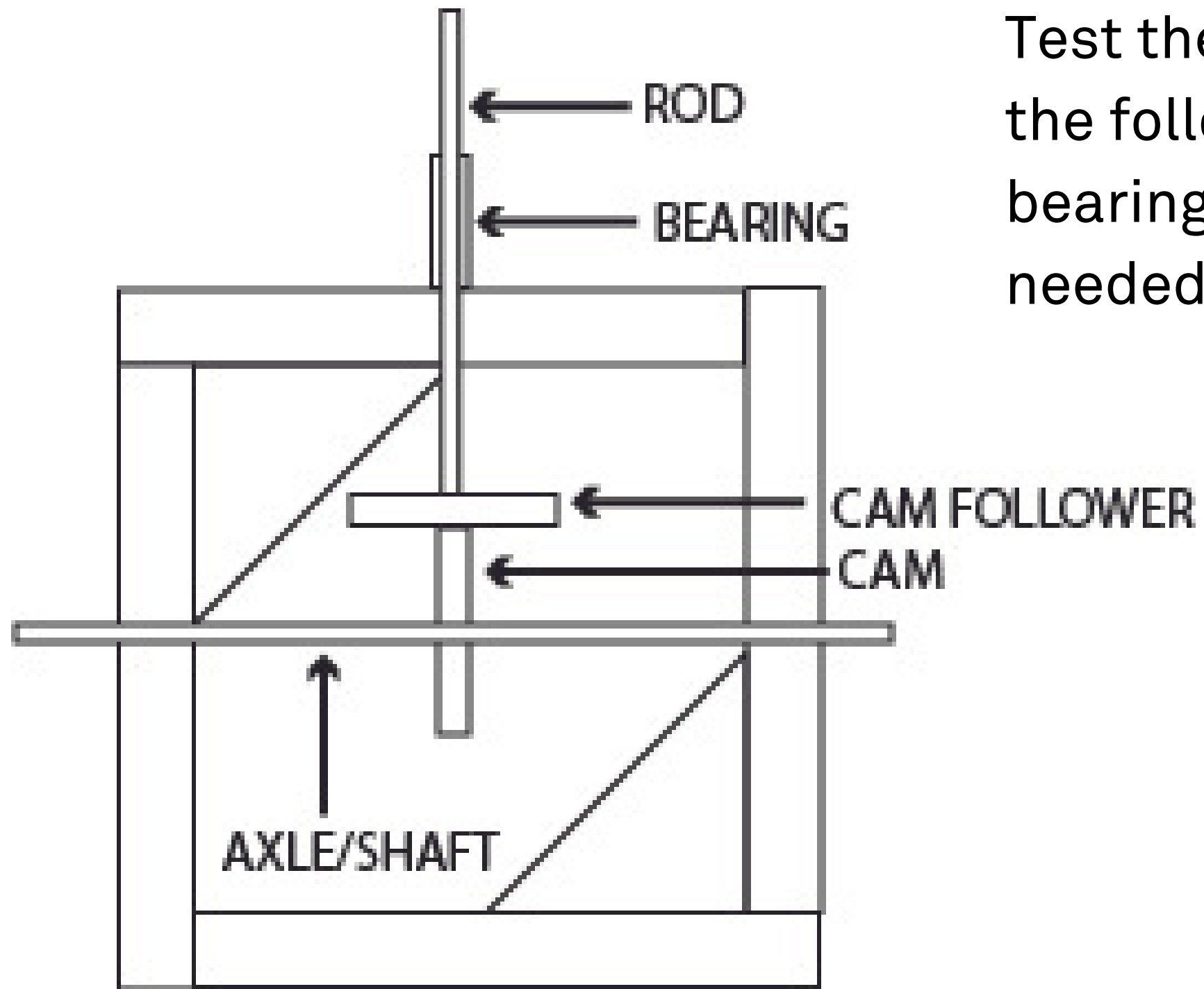
Tape or hot glue the cam follower to the rod (BBQ skewer). You can reinforce the rod with an additional piece of foam core or cardboard on top.



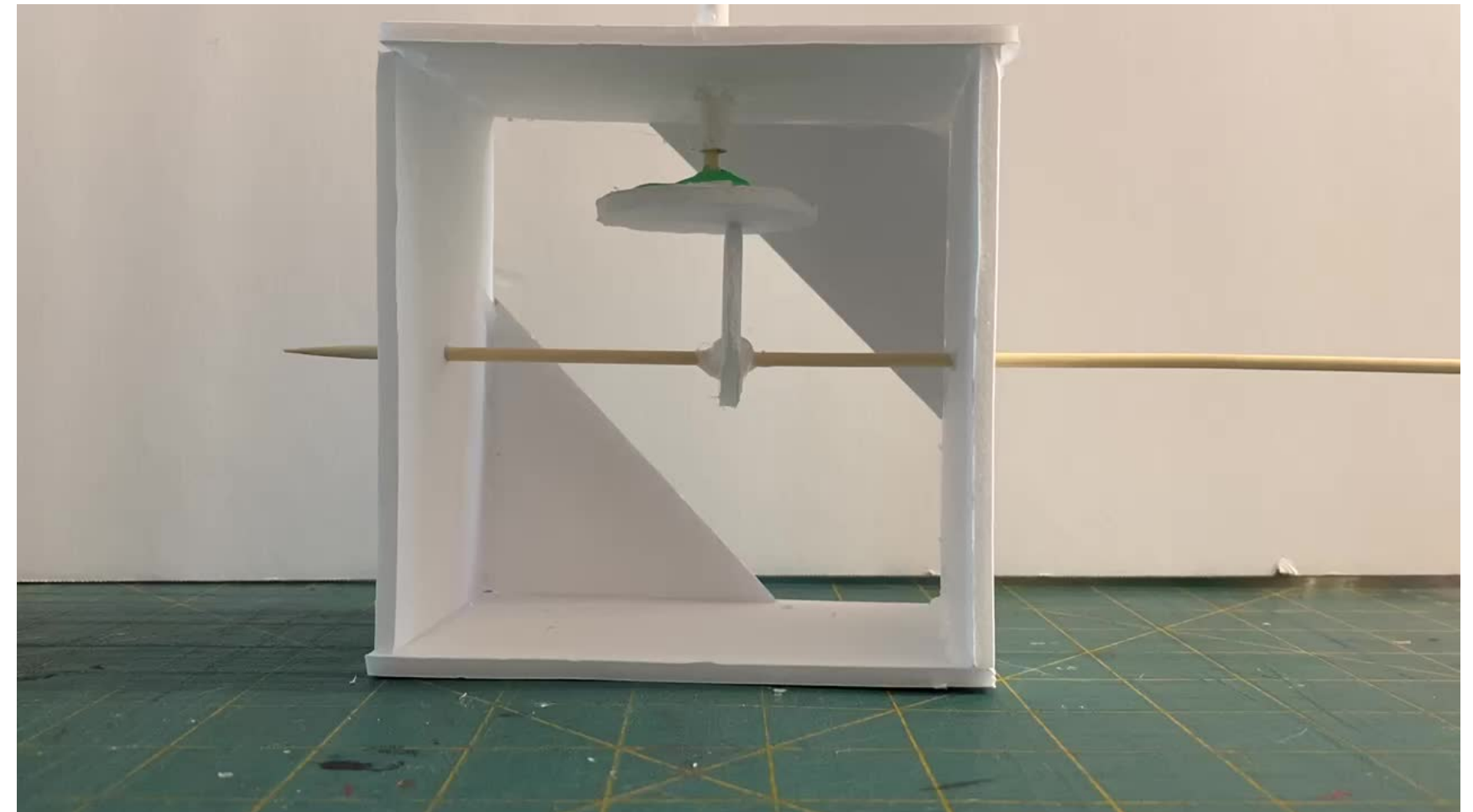
The rod should meet the cam follower but not stick through it to the other side.



8 Testing the mechanism

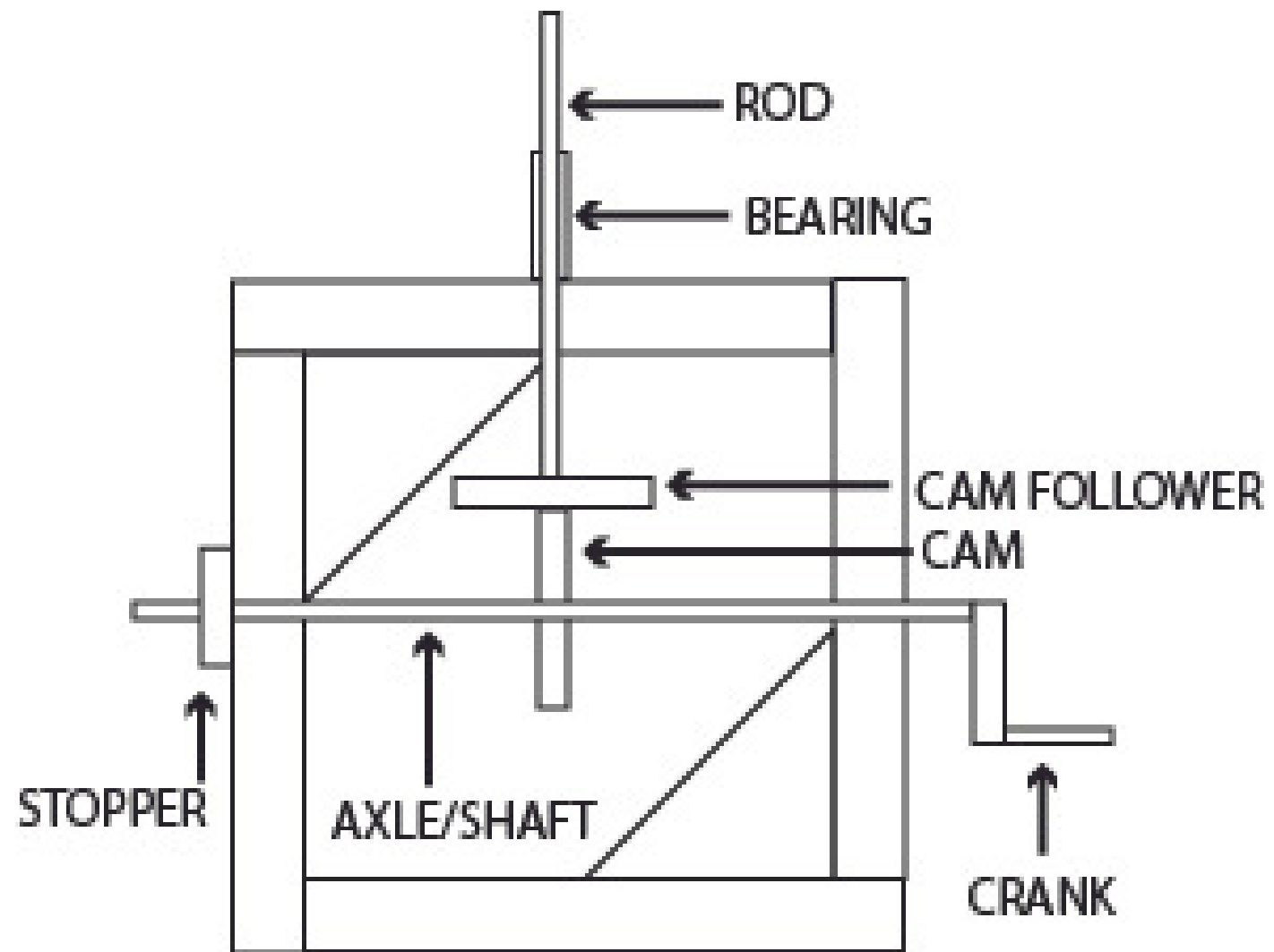


Test the mechanism to make sure the cam pushes the follower, which moves the rod through the bearing. The motion should be smooth. Adjust if needed.

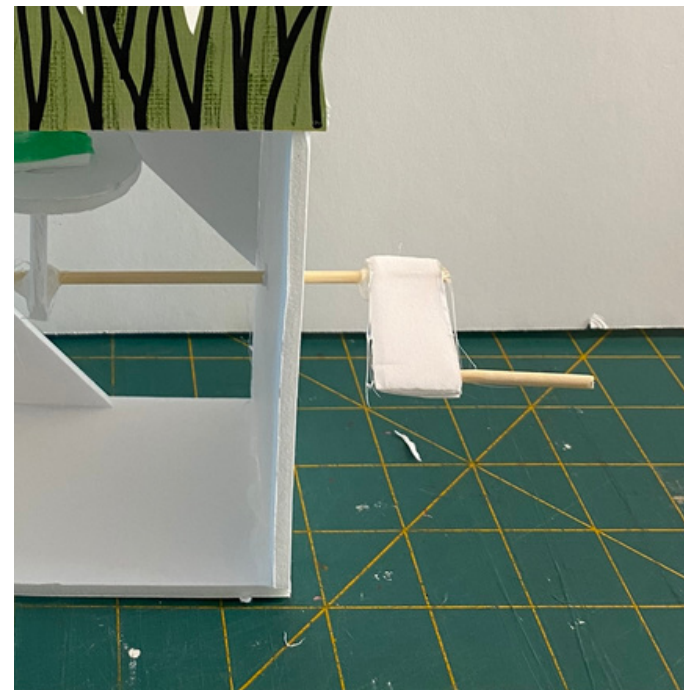


9

Adding on the crank and stopper

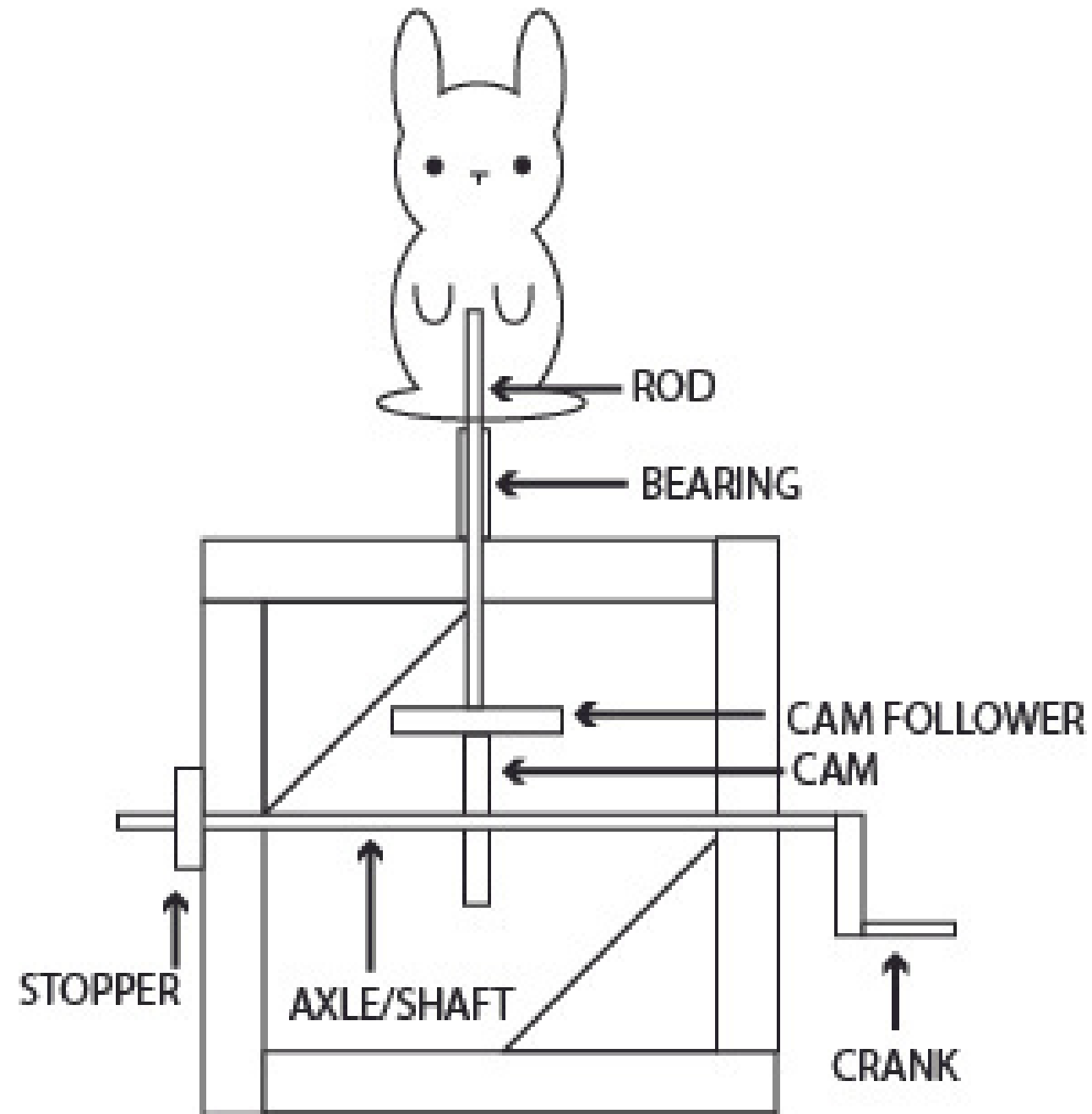


Glue or tape a stopper to the end of the axle to prevent the axle from being pulled out of the box.



Explore ways to build a crank using cardboard/foam core and pieces of BBQ skewer or other material. This will make turning the axle easier.

10 Create your topper (the "art" part)



Using paper, markers, coloured pencils or other materials, draw out your character and cut out two identical pieces (one for the front and one for the back of the character).

Glue the front and back of the character together with the rod in between.



Classroom Post-Activity Discussion

Have the students do a walk around the classroom and test out the different automata's their classmates have made.

- What part of the project was the most challenging?
- Which cam mechanism did you pick and why?
- Do you think you could create an axle with multiple cam and followers moving multiple toppers?

Additional Automata Resources

https://tinker-studio.weebly.com/uploads/7/2/6/3/7263961/automata_in_curriculum.pdf

<https://www.exploratorium.edu/tinkering/blog/2014/08/19/automata-examples>

<https://tinker-studio.weebly.com/automata.html>

Bibliography

<https://www.tandfonline.com/doi/pdf/10.1080/00131857.2018.1434076#:~:text=Therefore%2C%20national%20identity%20refers%20to,national%20sovereignty%2C%20and%20so%20on.>

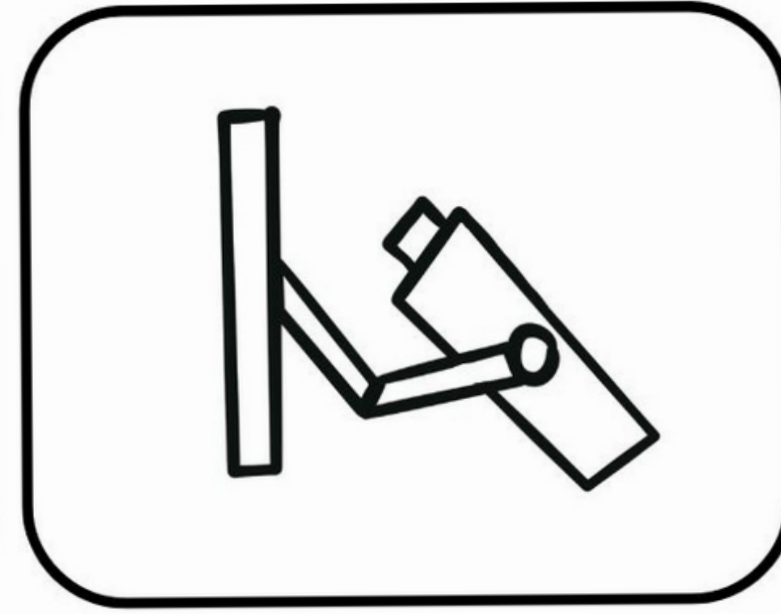
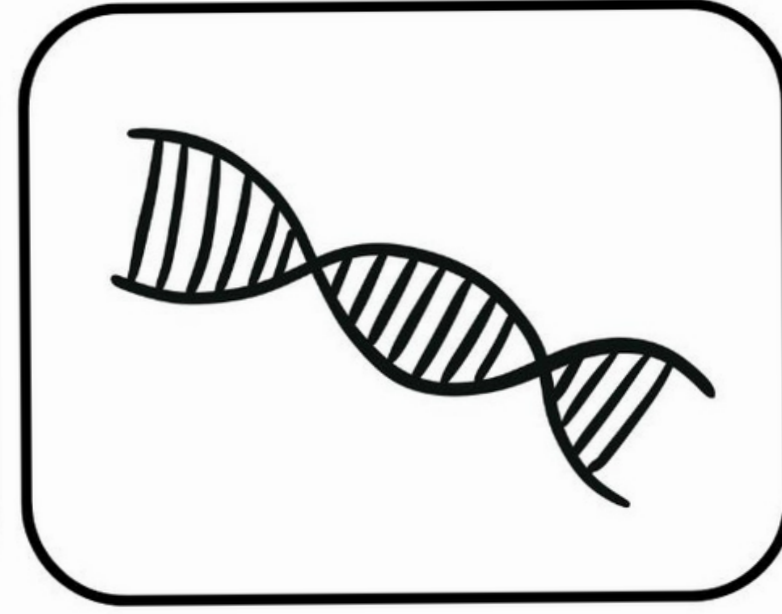
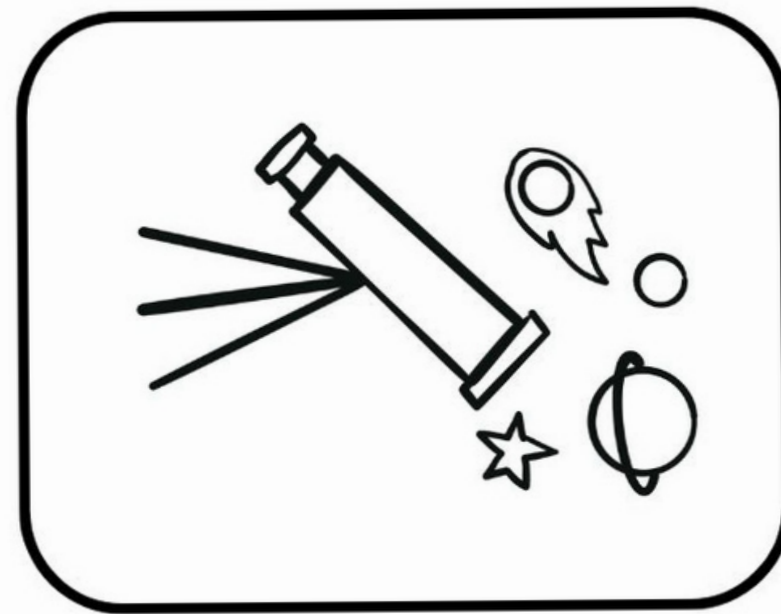
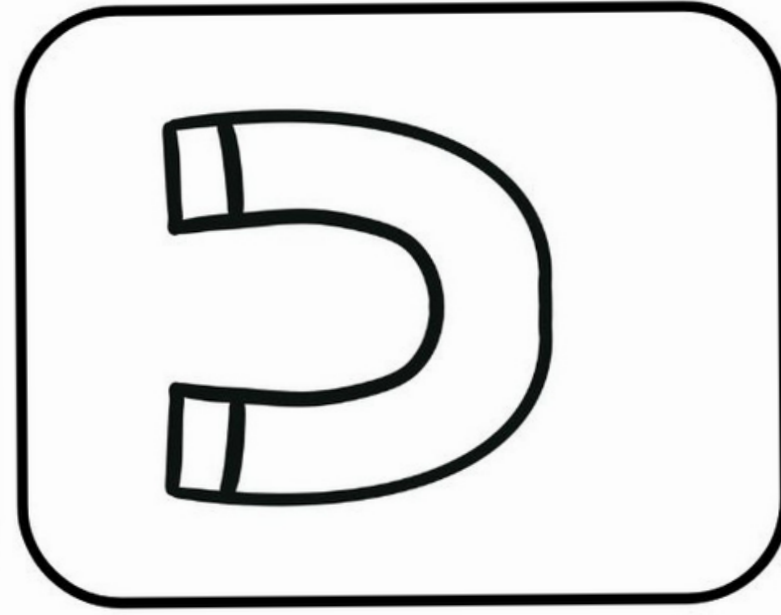
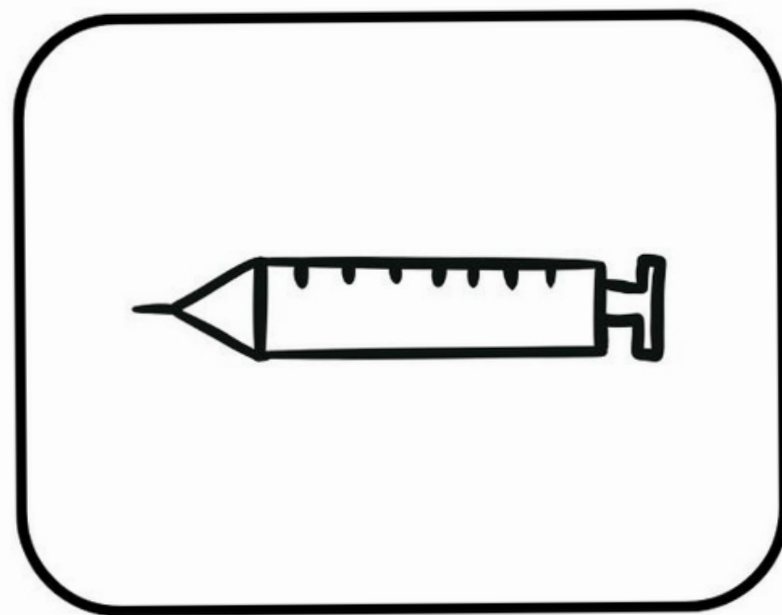
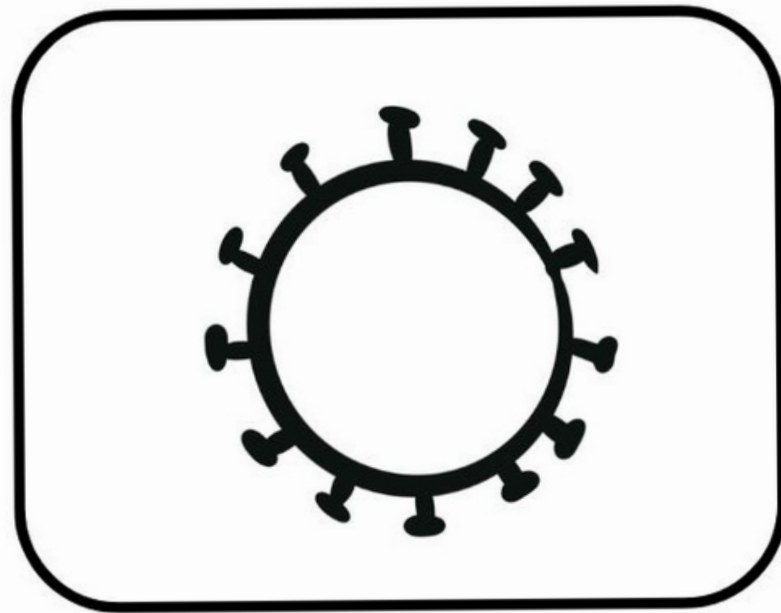
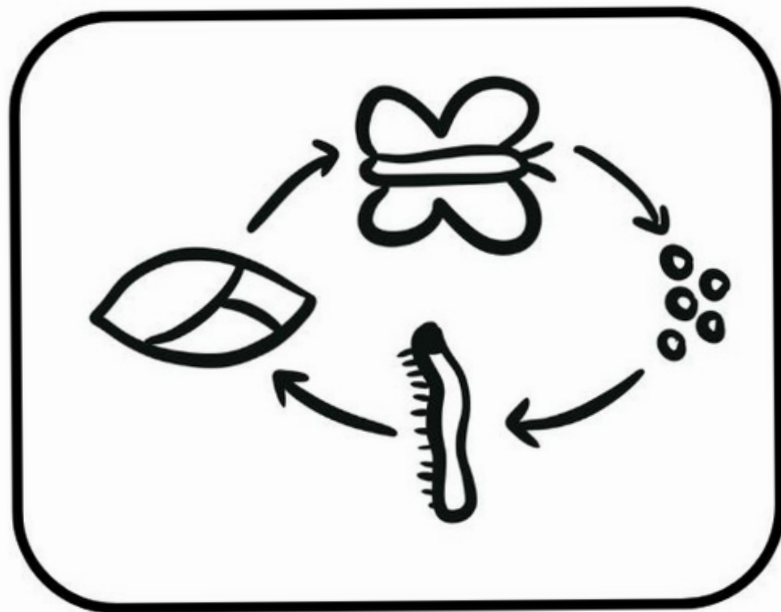
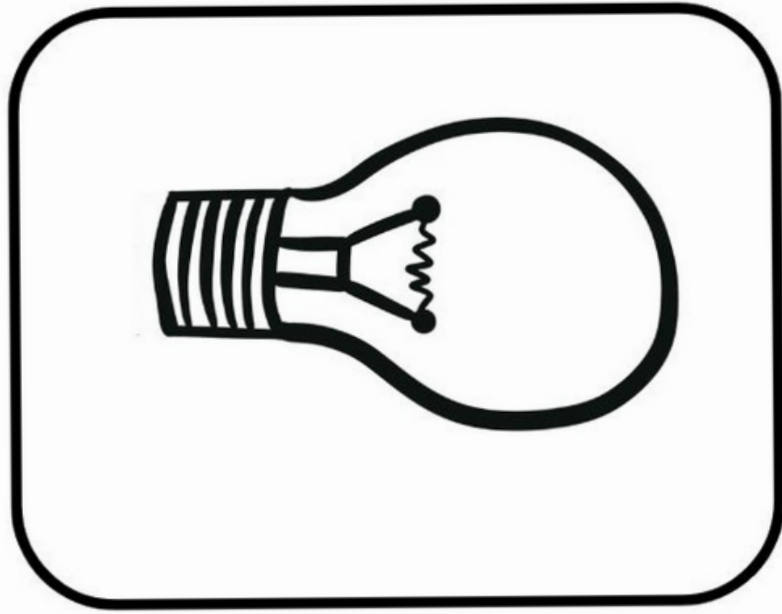
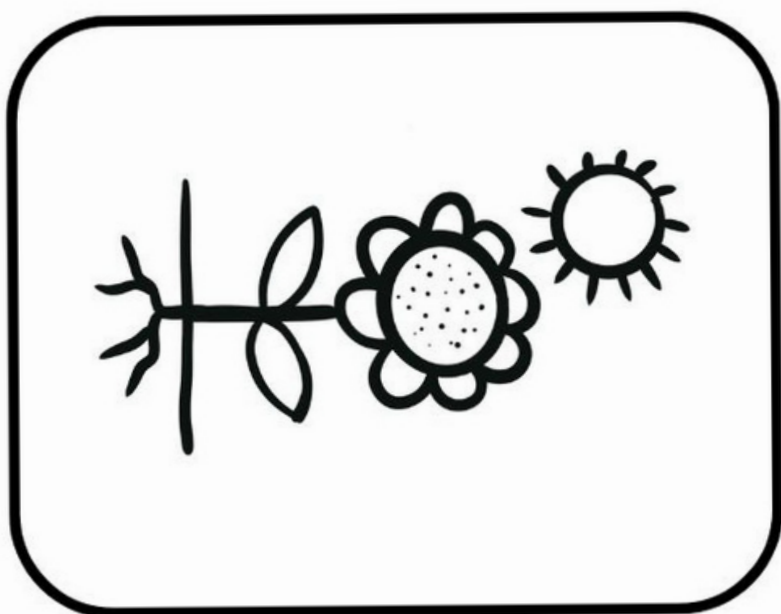
https://www.researchgate.net/figure/View-of-the-surface-of-a-rust-colored-nodule-from-galvanized-iron-pipe-showing_fig1_7423799

<https://www.gallery.ca/collection/artist/jock-macdonald>

Bates, Maxwell (March 1982). "Jock Macdonald, Painter-Explorer". Artscanada. 38 (244/245): 79. Retrieved 17 April 2021.



Art and Science Drawing Game



- Print out 2-3 copies of this page.
- Cut the cards out.
- Once students are with a partner or small group have one student in the pair/group select a card to describe to the others who will be drawing the image being describe.
- The students describing is the only one to see the card and know what the object is.
- See whether their drawing resembles the object being described.
- Take turns describing ad drawing as many time as you want.

Have Fun!