

Art Meets Math – Drawing with Graphs

Group: _____ Members: _____

Math class isn't just about math, and graphs can be used for non-mathematical purposes.

For this activity, I want you to create a drawing with the graphs of algebraic expressions. You have learned about some of them in detail, and you will need to explore properties of other expressions during this activity. I have provided a list of algebraic expressions and their corresponding general transformation equations. You can choose at least **4** different algebraic expressions, and you need to apply some transformations to each of them. You will also need to produce a written list of equations that correspond to the graphs you have drawn. An example of what is expected of you is attached to this activity on pages 5 – 7.

I have attached a few images that you can choose to recreate with these algebraic expressions on pages 8 - 15. You can pick and choose part of the image to draw then hand draw the rest. If you want to create an original image, you can sketch it out and get it approved by either Mr. Chan or Ms. Zhang.

You will use **desmos.com** as a tool to help you visualize the graphs of different algebraic expressions and the entirety of your image. You can print off the drawing from desmos then outline the drawing with marker. You are welcome to colour the drawing and make it look pretty.

You will be working in groups of **4-5** people. A group leader will be chosen, and the leader is responsible for keeping the group on task. Each group must distribute the workload evenly and make sure that everyone is involved in the decision making process.

Checklist to Success

- We worked as a team.
- We have used at least 4 DIFFERENT algebraic expressions. List them.
 1. _____
 2. _____
 3. _____
 4. _____
- We have applied transformation to all the expressions.
- List of equations.
- All graphs and corresponding equations are labeled.
- The drawing looks like the original image.

List of algebraic expressions, and their general transformation equation:

Linear:

$$y = x$$

$$y = mx + b$$

Even:

$$y = x^2, y = x^4, \text{ etc.}$$

$$y = a[k(x-d)^2] + c, \quad y = a[k(x-d)^4] + c$$

Odd:

$$y = x^3, y = x^5, \text{ etc.}$$

$$y = a[k(x-d)^3] + c, \quad y = a[k(x-d)^5] + c$$

Horizontal Line:

$$y = a$$

Change a

Vertical Line:

$$x = a$$

Change a

Square Root Function:

$$y = \sqrt{x}$$

$$y = a\sqrt{k(x-d)} + c$$

Exponential:

$$y = b^x$$

$$y = a(b^{k(x-d)}) + c$$

Absolute Value Function:

$$y = |x|$$

$$y = a|k(x-d)| + c$$

Inverse Functions:

$$y^2 = x$$

$$a(y-b)^2 = k(x-d)$$

Sine Function:

$$y = \sin x$$

$$Y = a \sin[k(x-d)] + c$$

Equation of a Circle:

$$x^2 + y^2 = r^2$$

$$p(x-a)^2 + q(y-b)^2 = r^2$$

Centre of the circle will be translated from the origin $(0, 0)$ to (a, b) .

p and q stretches the circle into oval shaped.

Play around with equations on desmos.com to see the transformations look like for each expression.

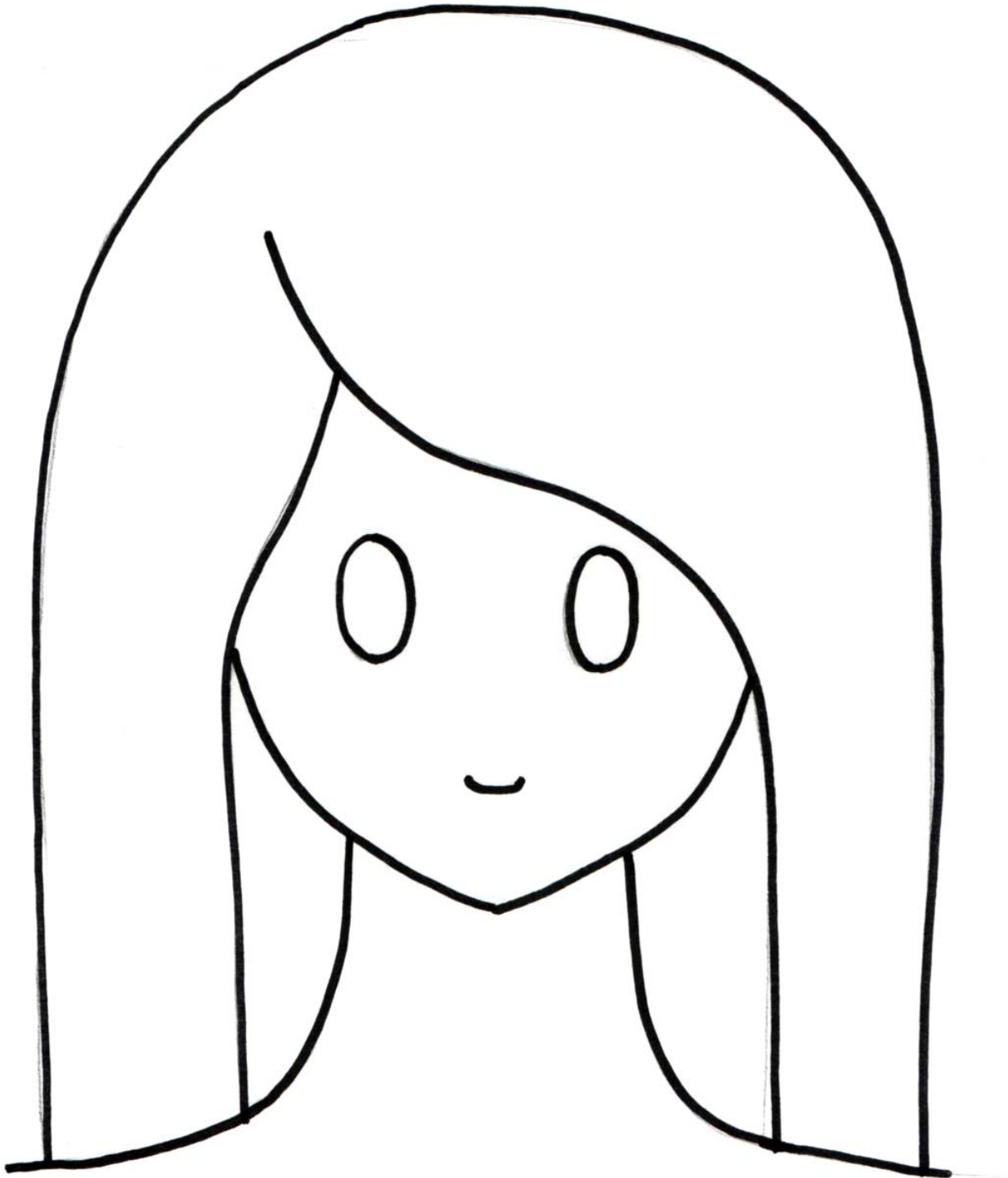
Instructions

1. Get into your assigned groups and get your assigned laptop(s).
2. Launch calculator at **Desmos.com**
3. Sign in using gmail account
 - Email: **zhangsmathclass@gmail.com**
 - Password: *********
 - i. I have saved the sample work in Google drive for your reference.
 - ii. A graph of the batman symbol has also been saved to show you how extensively you can use desmos.com.
4. Save the graph using your group number.
 - Example: “Group 3”
 - Check the box “send a copy to google drive”
 - Double check in **zhangsmathclass@gmail.com**’s Google drive to make sure a PDF file of your desmos file has been saved
5. Input different expressions to familiarize yourselves with desmos.com
 - $y = x$
 - $y = x^2 \rightarrow y = x^2$
 - $y = (x + 2)^2 \rightarrow$ desmos inserts closing bracket automatically
 - $y = 2^{x+1}$
6. Choose an image as a group and be creative! Think about which expression is the best fit for which type of line.
7. Remember to save your progress regularly
8. Once you have finished your drawing, either Mr. Chan or Ms. Zhang will print it out for you to outline and label.
 - You can either label directly on the drawing, OR you can create a small thumbnail of the drawing and label on that instead.

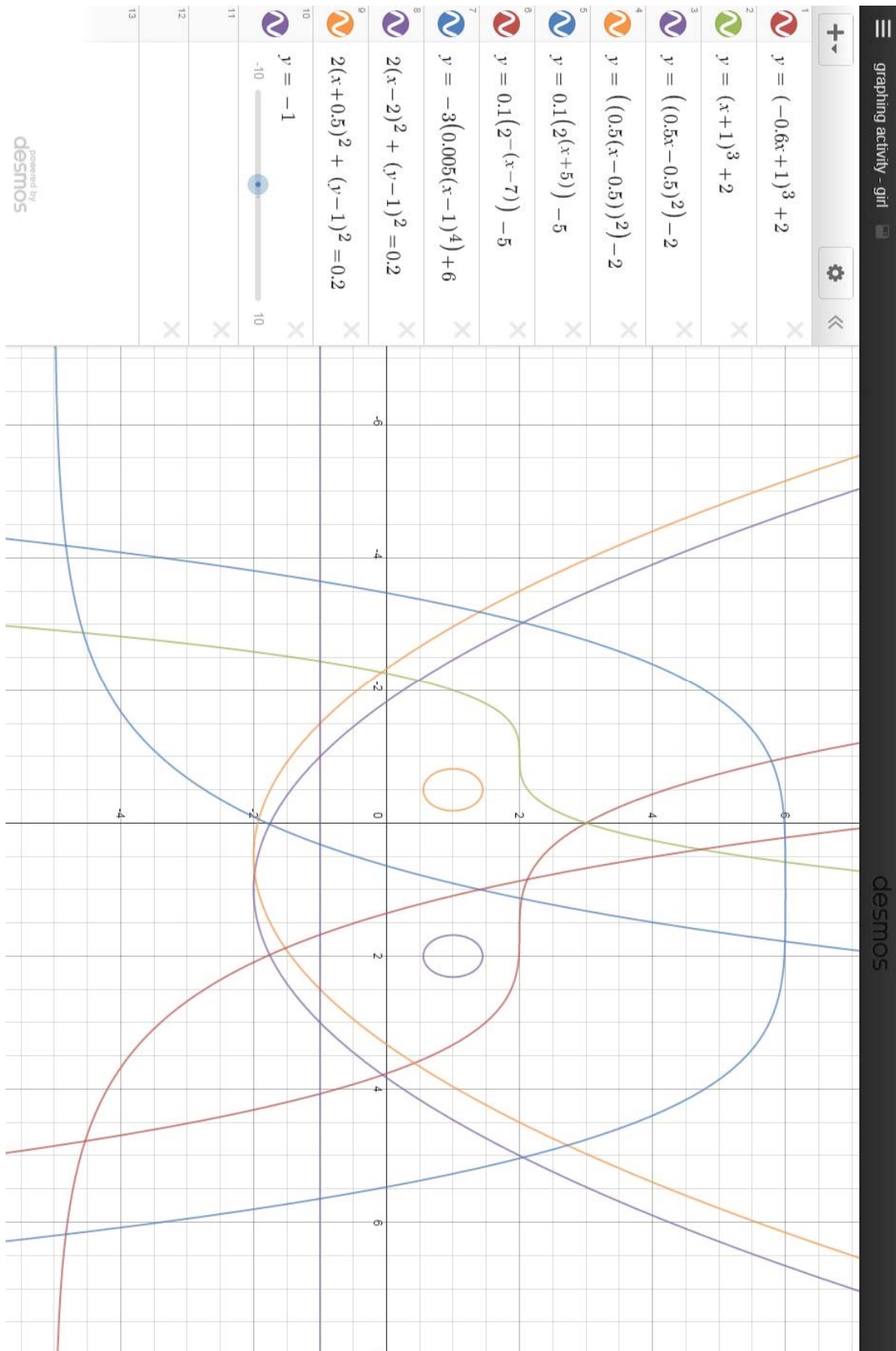
<p>RUBRIC FOR Art Meets Math – Drawing with Graphs</p> <p>Group: _____</p> <p>Names: _____</p> <p>_____</p>	<p>Total</p> <hr/> <p>100</p>
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Categories	Level 0	Level 1	Level 2	Level 3	Level 4
Knowledge & Understanding 25%	Did not use any of the provided algebraic expressions.	Used 1 algebraic expressions with transformations applied it.	Used 2 different algebraic expressions with transformations applied to each one.	Used 3 different algebraic expressions with transformations applied to each one.	Used 4 different algebraic expressions with transformations applied to each one.
Application 25%	No equations match up to their corresponding graphs.	Most of the listed equations do not match up to their corresponding graphs.	Some listed equations match up to their corresponding graphs.	Most listed equations match up to their corresponding graphs.	All listed equations match up to their corresponding graphs.
Communication 5%	Equations and their corresponding graphs are not labeled.	Most listed equations and their corresponding graphs are not labeled clearly or easily identifiable.	Some listed equations and their corresponding graphs are labeled clearly and easily identifiable.	Most listed equations and their corresponding graphs are labeled clearly and easily identifiable.	All listed equations and their corresponding graphs are labeled clearly and easily identifiable.
	Group did not work together.	Group demonstrated limited teamwork skills.	Group demonstrated some teamwork skills.	Group demonstrated good teamwork skills.	Group demonstrated exceptional teamwork skills.
Thinking & Inquiry 40%	The graphed drawing does not resemble the original image.	The graphed drawing mostly does not resemble the original image.	The graphed drawing resembles the original image to a degree.	The graphed drawing resembles the original image.	The graphed drawing highly resembles the original image.
BONUS 5%	The image created is original. OR Used more than 4 different algebraic expressions with transformations.				

Sample Work – Girl
Original Image



Desmos.com



Final Product

***the list of equations on the side on desmos.com will also be printed.

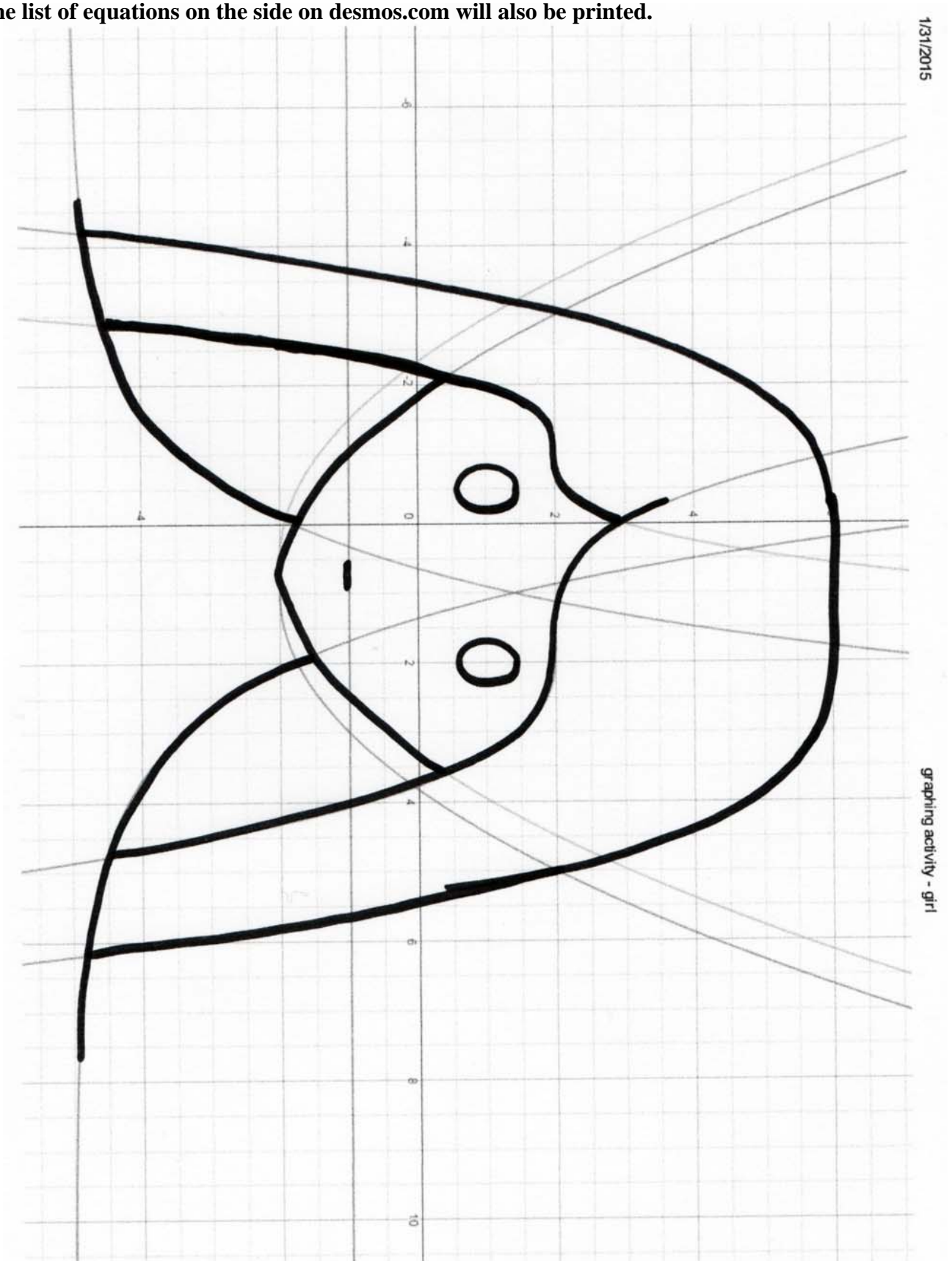


Image 1

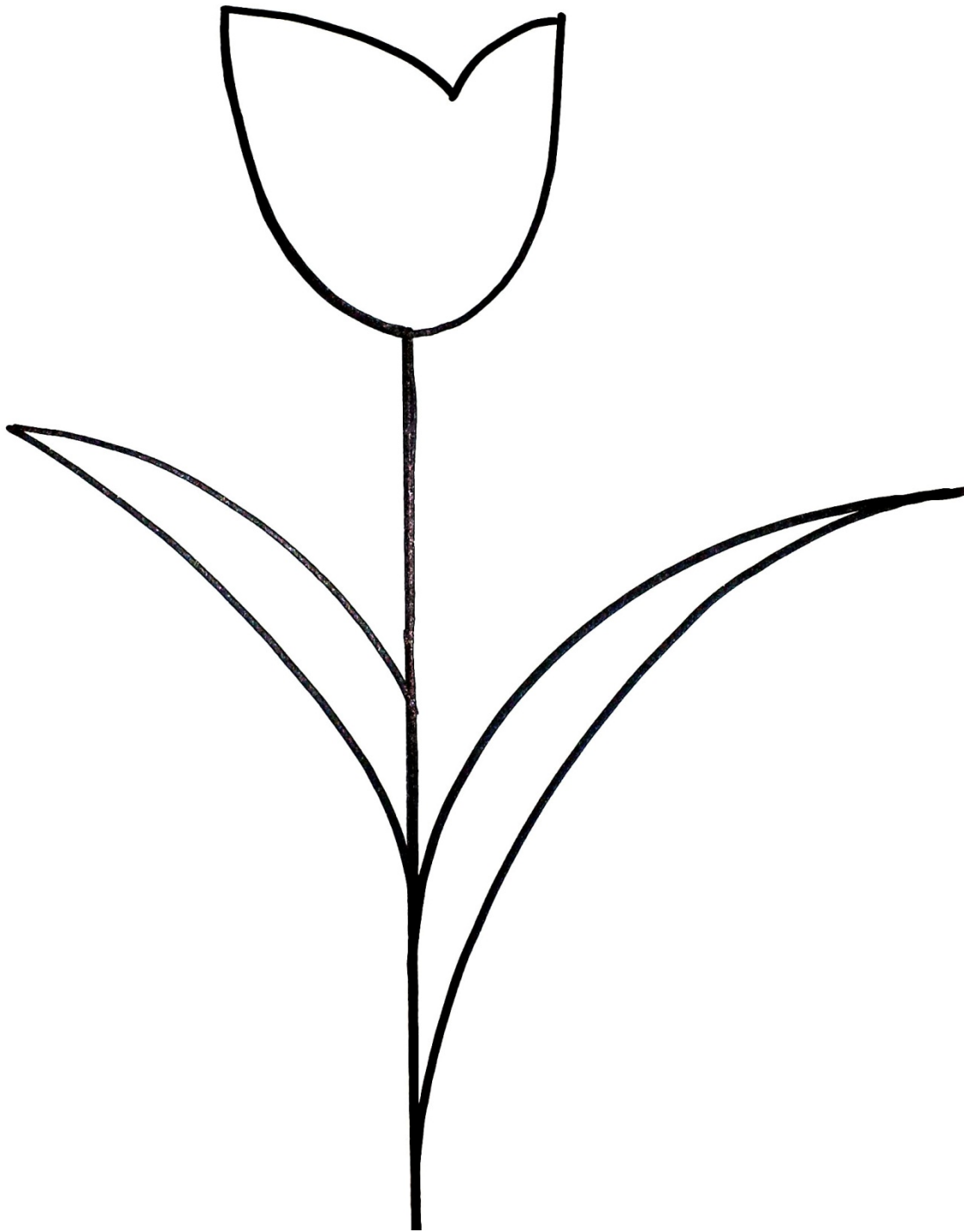


Image 2

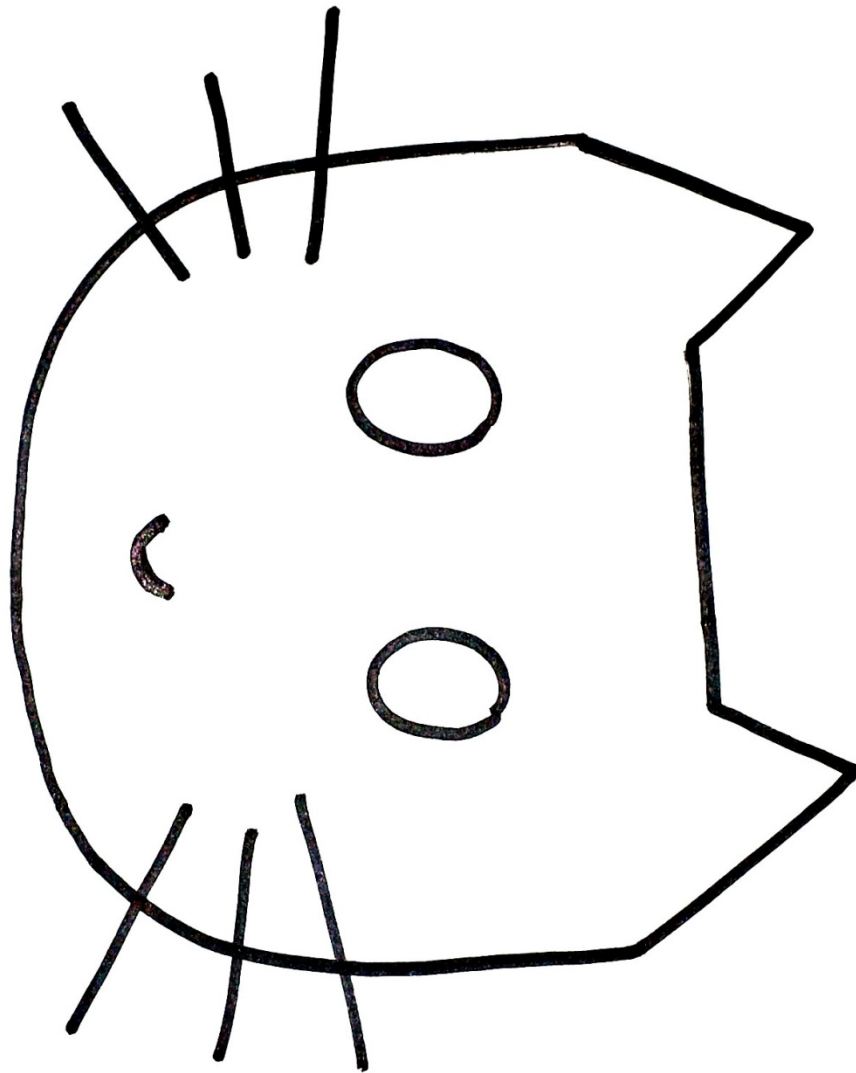


Image 3

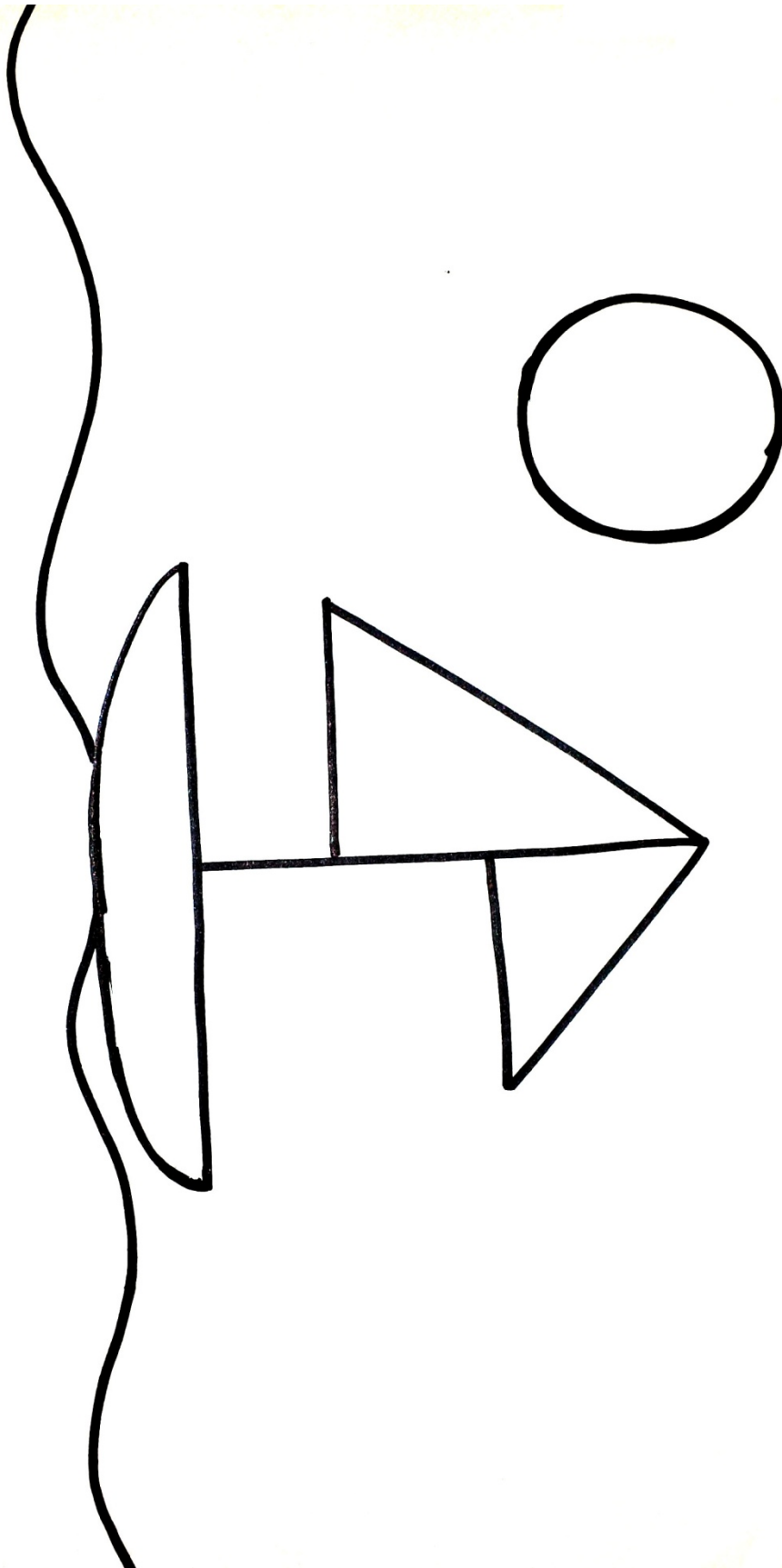


Image 4

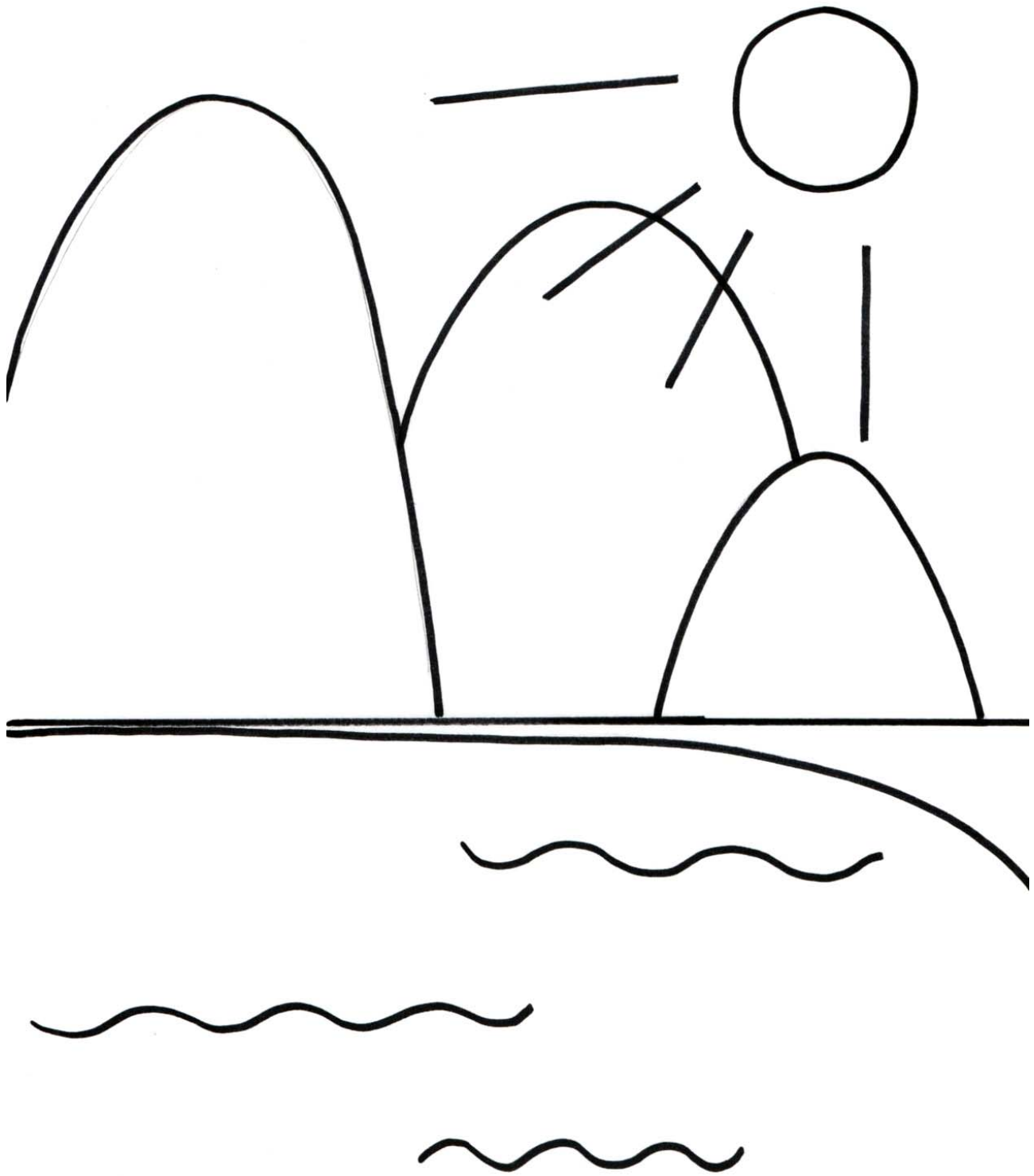


Image 5

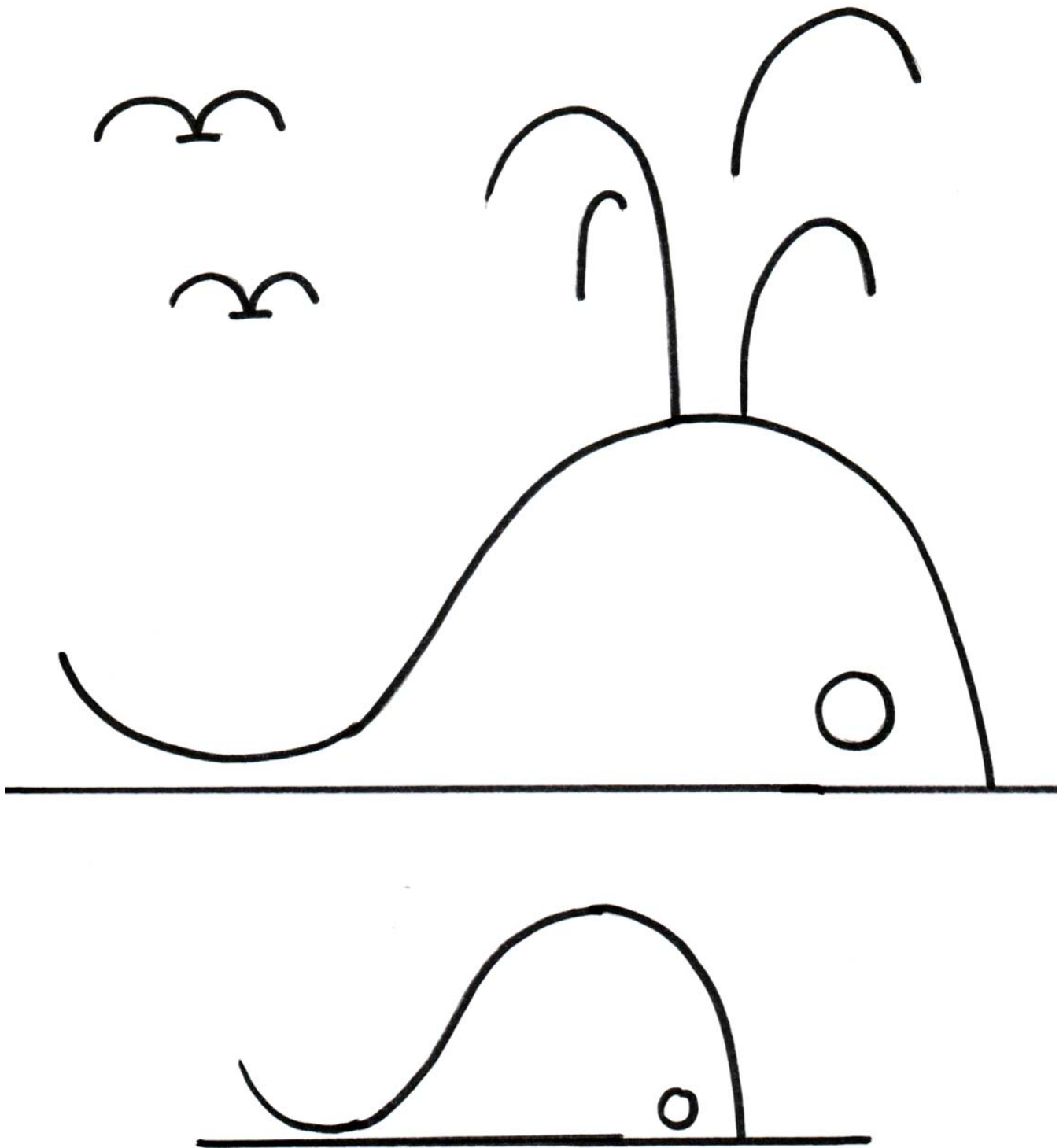


Image 3

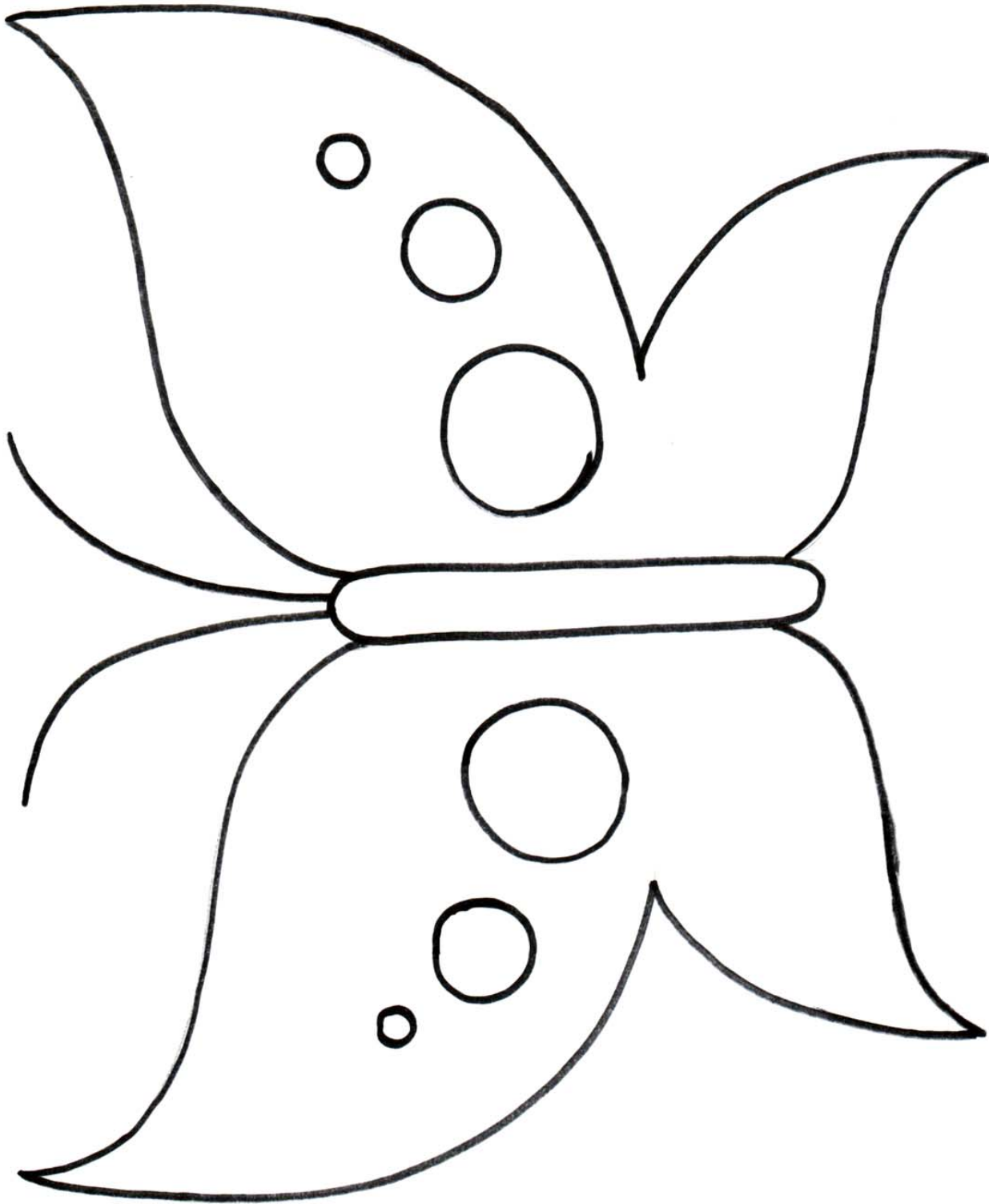
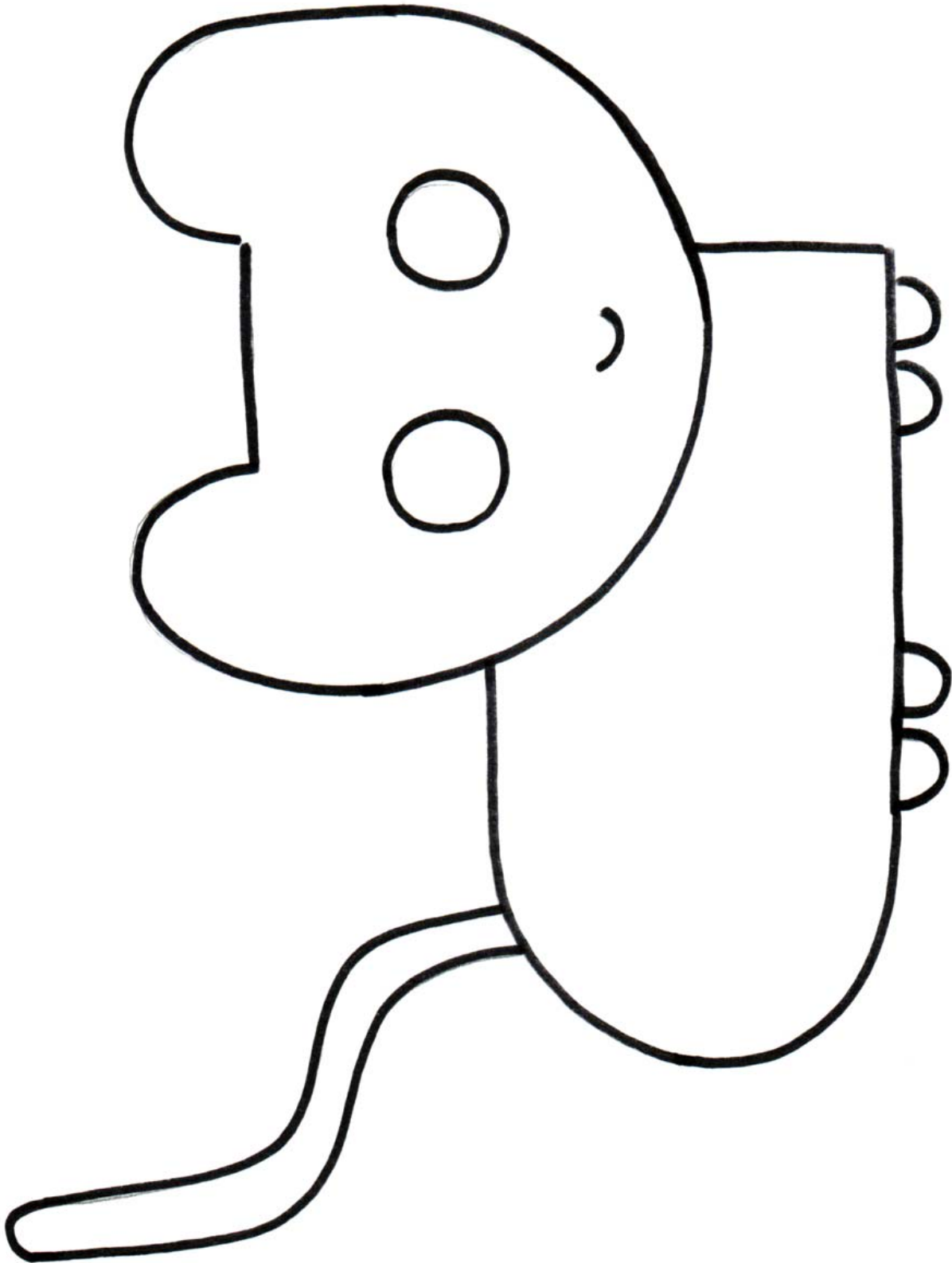


Image 6



Image 7



Student Works 2015

Image 1

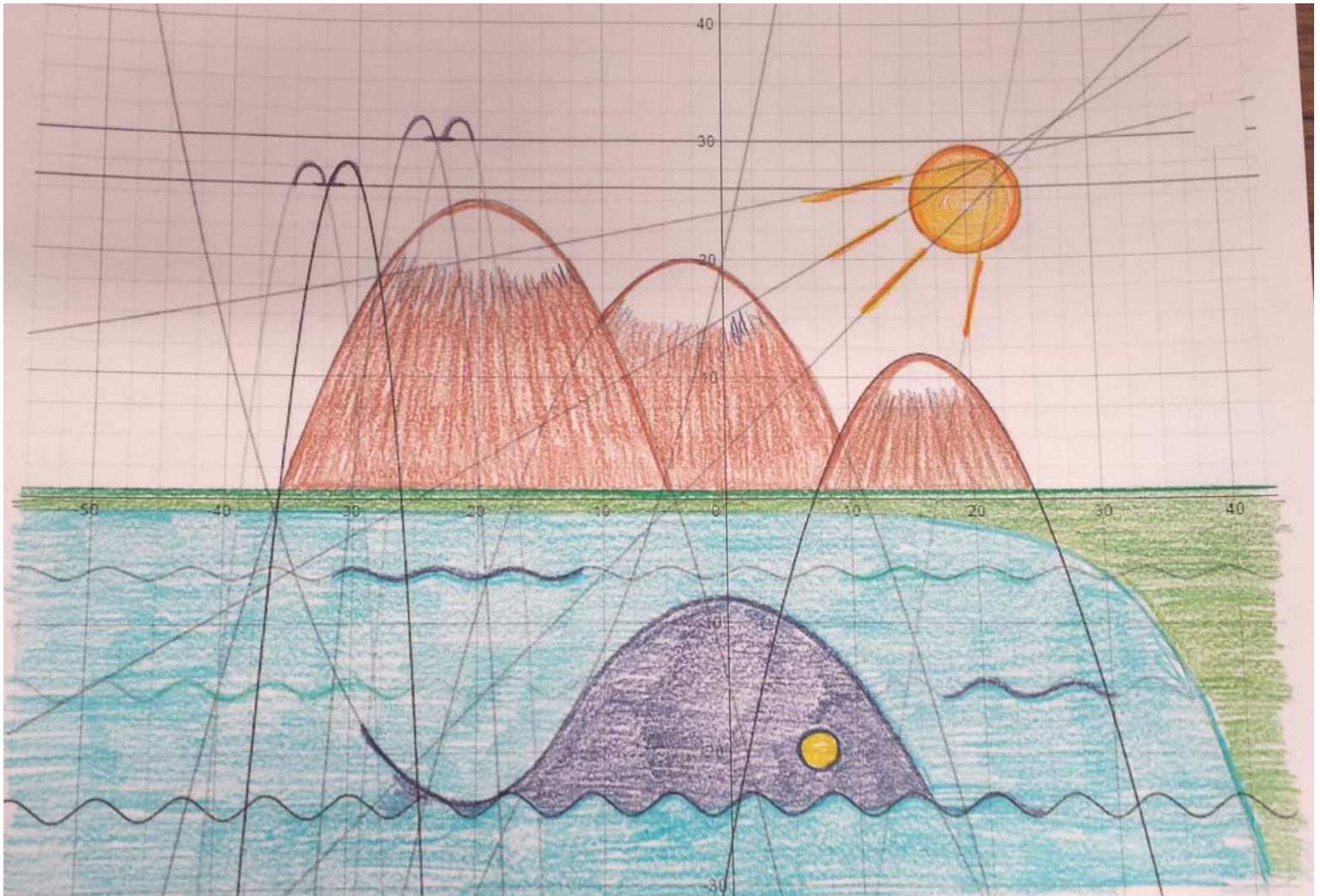


Image 2

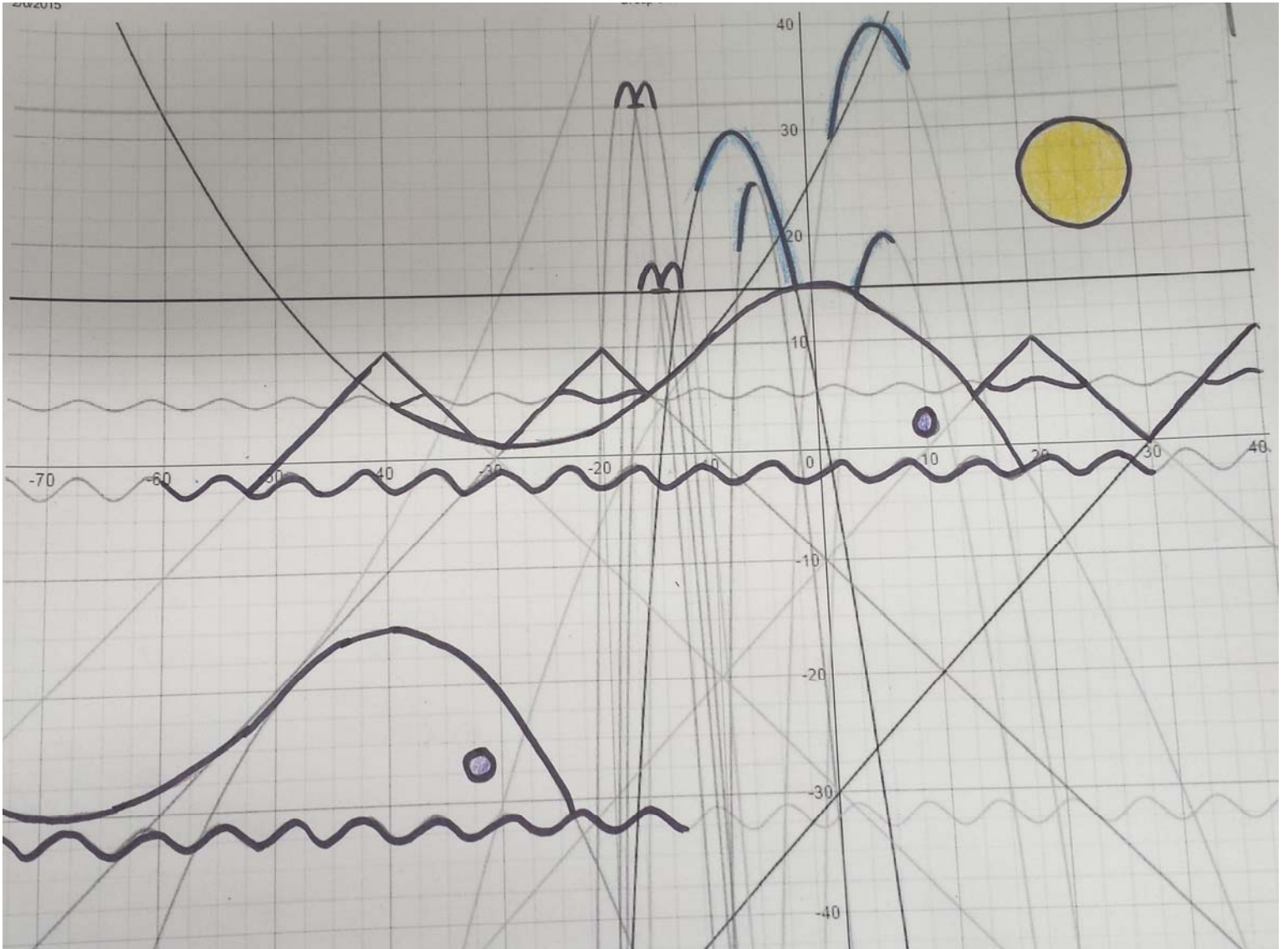


Image 3

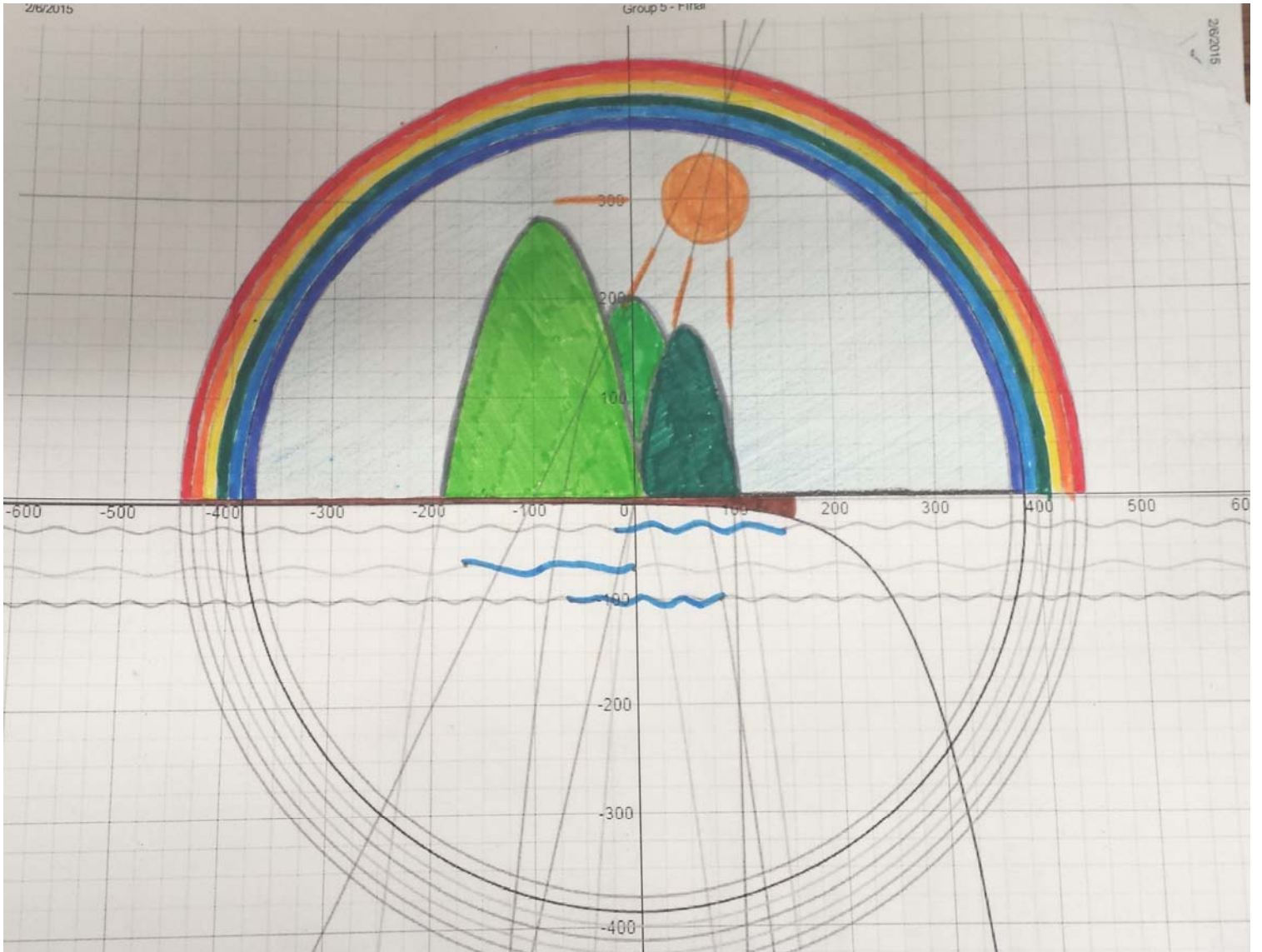


Image 4

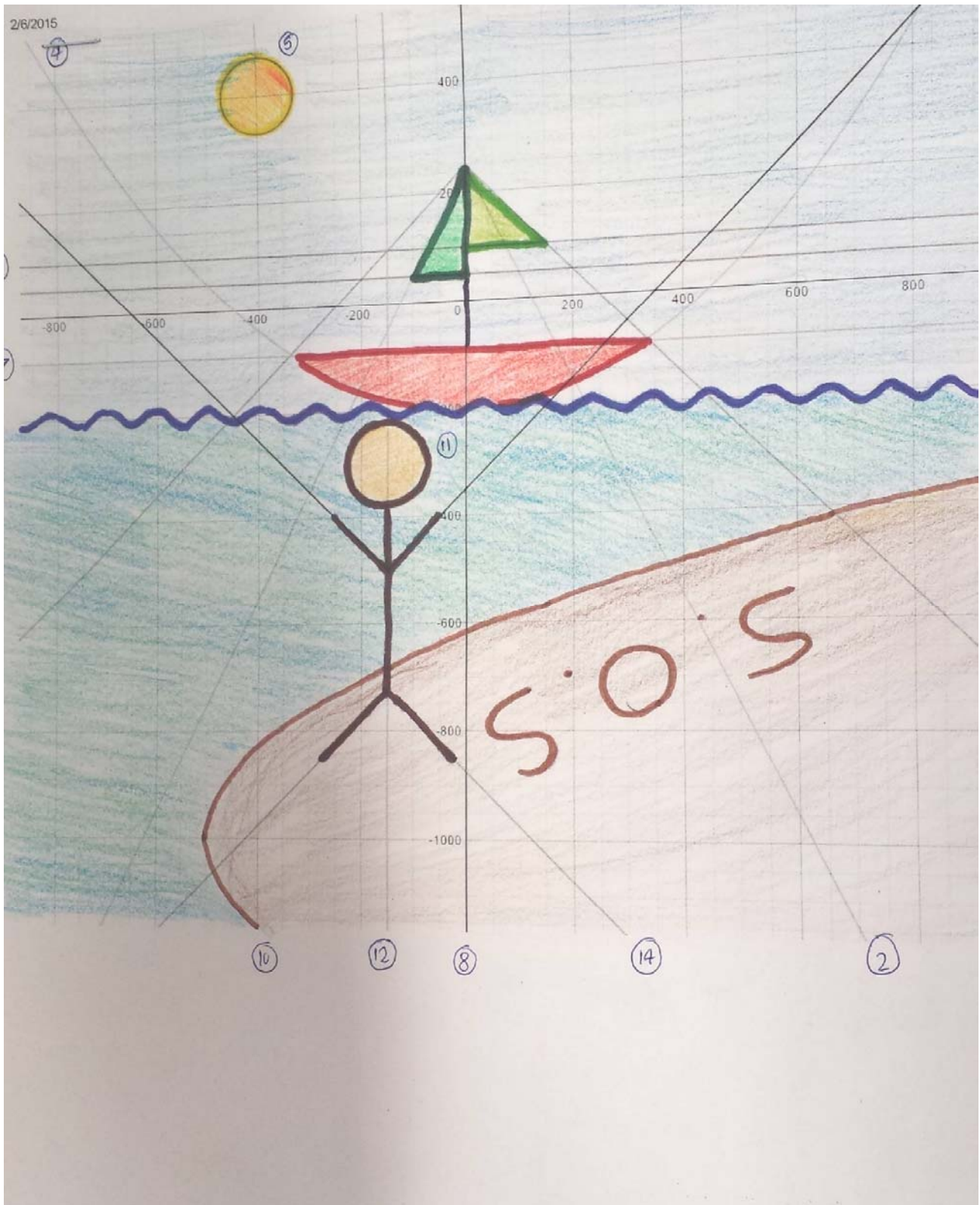


Image 5

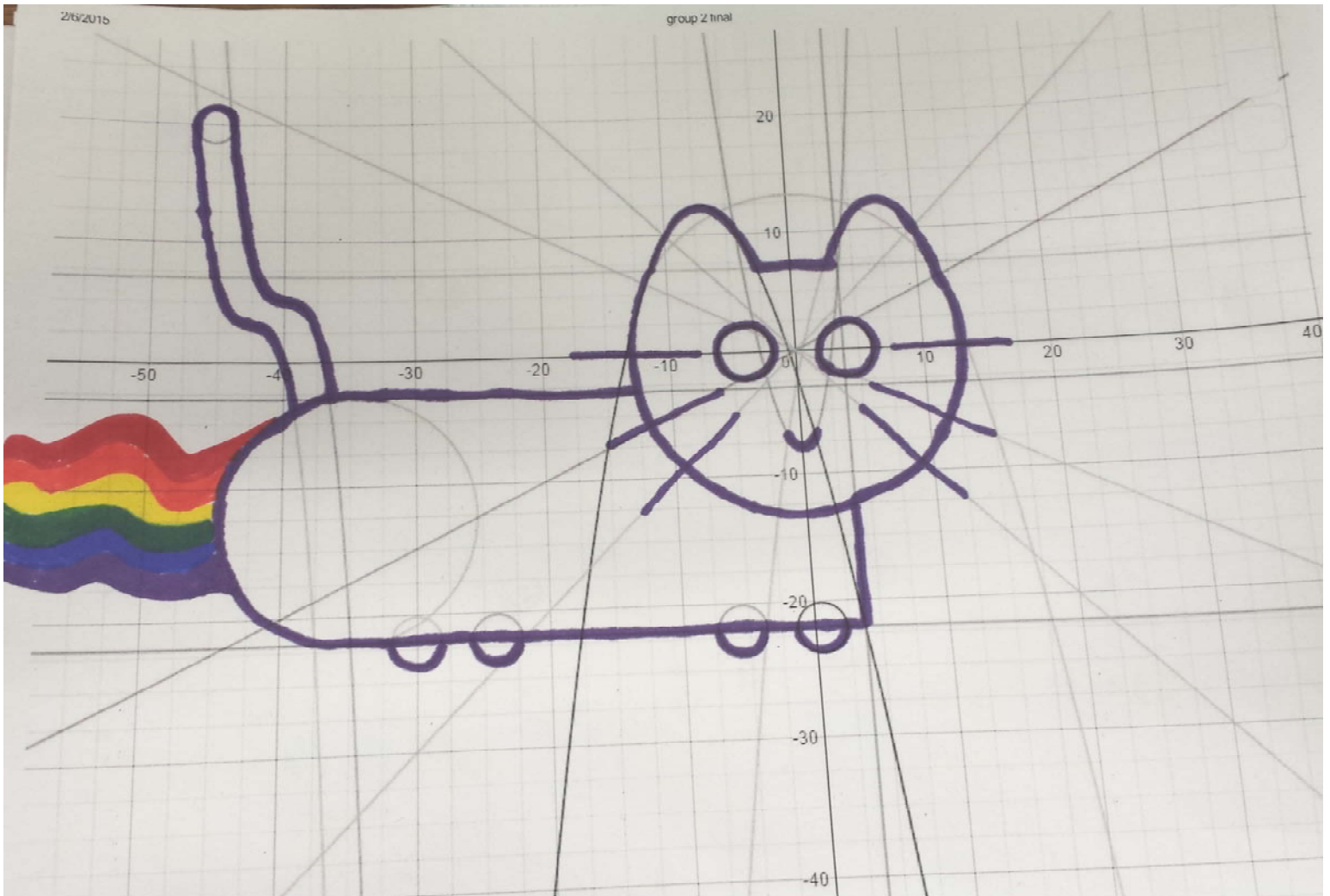


Image 6

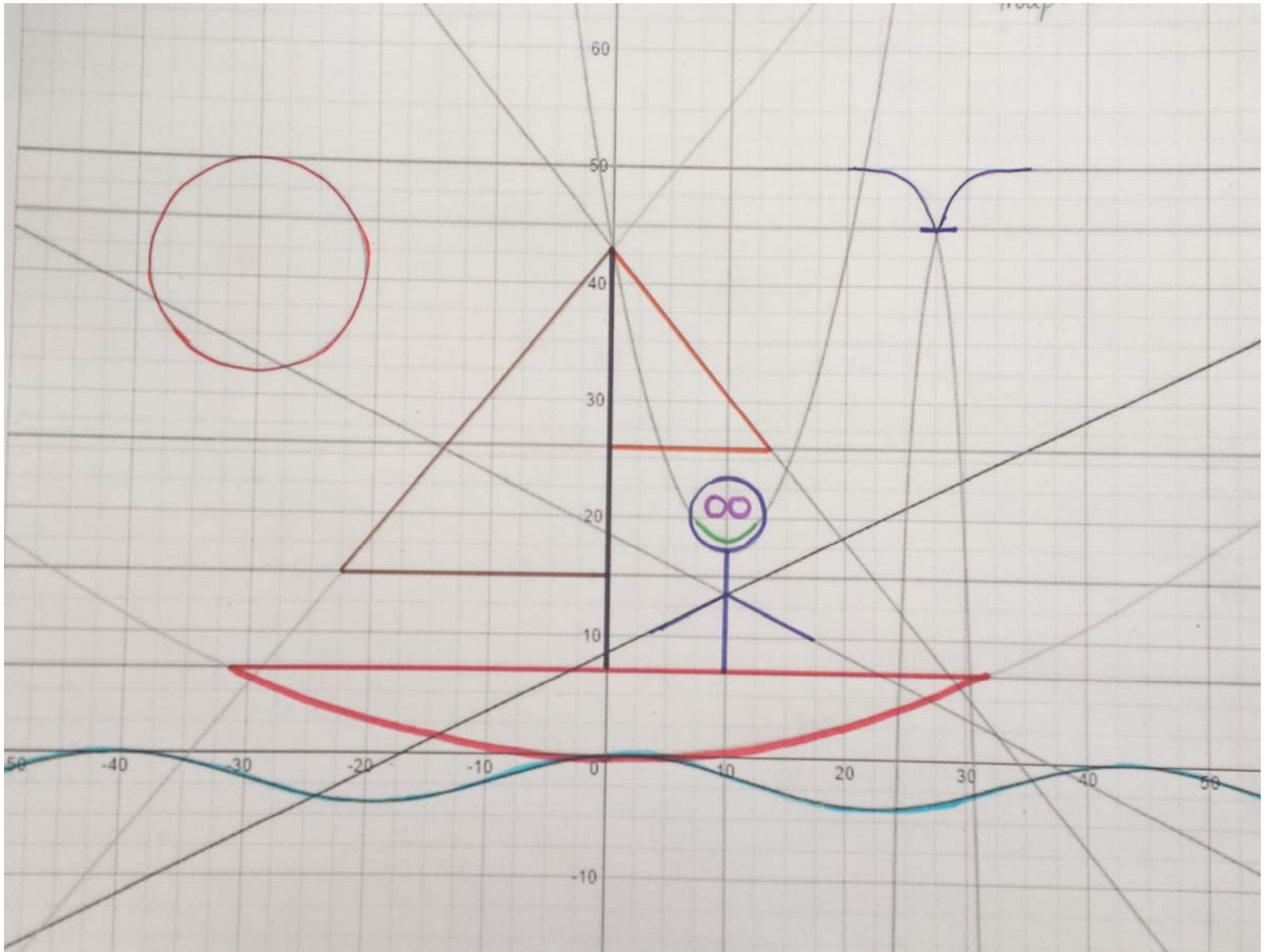


Image 7

