

Teacher's card



POINT-LINE-SHAPE-PUPPET

Learning objectives

- Abstract thinking
- Geometry
- Language
- Puppet theatre

Modalities of the activity

8-12 years old

In the classroom

Group work - In pairs

Materials needed

- A4 white paper sheets 80 gr/m²
- A4 white paper sheets 200 gr/m²
- Colour markers
- Scissors
- Standing frame with stretched cloth
-2 m²



Printable resources attached

- Curve with Intersection points
- Human body scheme
- Instructions for Act 4
- Geometrical shapes

Acts

Act 1: POINT-LINE-...

Act 2: Dance of the Marionettes

Act 3: The Best of the Best

Act 4: Geometrical Puppets

Difficulty and targeted school level

Easy - Medium

Primary

Introduction to the activity



Summary of the activity

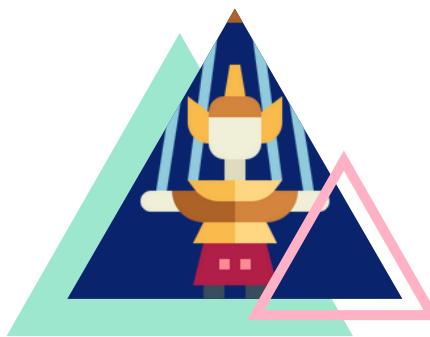
Through the POINT-LINE-SHAPE-PUPPET activity, we aim to make children explore basic mathematical concepts through physical and puppet theatre techniques. These activities, divided into 4 actions, resemble the composition of a play and offer different approaches to acquire skills to understand and apply the abstract geometric terms "point", "line", "angle", "shape", etc. in a broad context.

These activities allow students to develop their knowledge through their bodies and space. Further, the students go through a sequential process of familiarisation with acting tools in the puppet theatre, creating improvised puppets and a script for a theatrical performance based on a given plot structure. This playful approach will facilitate students in solving more complex mathematical problems through visualisation, bodily experience and a creative attitude.

Sequencing the activity



ACT 1: POINT-LINE-...



ACT 2: DANCE OF
THE MARIONETTES



ACT 3: THE BEST OF THE
BEST



ACT 4: GEOMETRICAL
PUPPETS

Introduction to the activity



Overall learning objectives of the whole sequence

The activity extends the context of learning geometry in elementary school and gives children the opportunity to discover geometry in themselves and the space around them. It helps teachers to bring the often crude theory of mathematical subject to life. In this activity, students learn to discover connections between different academic disciplines, develop spatial visual thinking, kinesthetic awareness and the ability to transfer theoretical information to practical experience. In Act 1 students go through a playful learning of geometric terms and shapes, actively participating with their bodies, interacting with space and the bodies of their partners. Act 2 relates the study of geometry to the structure of the human body. Students learn about horizontal and vertical lines and develop their sense of three-dimensional space. In Act 3 and Act 4, students work in teams to consolidate and expand their knowledge of the three basic sets of geometric shapes.

Overall theatrical objectives of the whole sequence

In this activity students go through a series of games specific to acting training, which activate the body, develop its reflection, spatial orientation and non-verbal communication. In small groups, they learn to build short stage performances, develop partnering, communication and teamwork skills. In Act 2 and Act 4, students are introduced to puppetry, learn how to manipulate different types of puppets, develop coordination and fine motor skills, imagination and creativity.

Skills developed throughout the whole sequence

- Developing cognitive skills - thinking, learning, remembering
- Analytical and abstract thinking
- Body flexibility, coordination and reactivity
- Kinesthetic awareness
- Spatial orientation
- Body - mind integration
- Interpreting mathematical concepts through the body
- Non verbal communication and teamwork
- Enriching vocabulary and written expression skills
- Fine motor skills
- Boosting imagination and creativity
- Development of skills for self presentation and observation.



Summary of the activity - Act 1: Point-Line-...

Warm-up.

The teacher invites the group to walk in the space. Everyone moves at their own moderate pace and explores the space, trying to walk as many lines in it as possible. Students try to move carefully, keeping quiet and without interacting with each other.

Point-Line game.

The teacher asks the students to stay in their place and explains the game. Here are the different commands:

- On the teacher's command "POINT" they have to curl up into a ball and freeze.
- On the command "STRAIGHT (line)" they should lie on the floor on their stomachs with their bodies stretched out and arms above their heads.
- On the command "CURVE (line) they should lie on the floor again but portray a curve with their bodies, arms and legs together.
- On the command "GO" they stand up and continue to walk in space. The teacher gives the commands in a scrambled order.

Point-Ray-Segment-Angle game.

Similar to the previous game, students must follow commands, but this time they are performed individually, in pairs and in trios. Here are the different commands:

- Command "POINT" - everyone alone in position from the previous game.
- Command "RAY" - in pairs with contact, Student A takes the "point" position, and Student "B" the "straight" position from the previous game.
- Command "SEGMENT" - in a trio with contact, Student A and Student B are in the "point" position, and student "C" is in the "straight" position between them.
- Command "ANGLE" - in a trio with contact, Student A is in the "point" position and Students B and C are in the "straight" position.
- Command "GO" everyone quickly stands up and continues walking into the space. Again, the commands are given in a shuffled manner.

Ending.

While walking students are asked to look around the space and try to find as many angles as possible. On a command from the teacher, they stop and each answers how many angels they have managed to find. The activity ends with additional questions like; Did anyone have noticed what kind of angles they have managed to find? Are right angles predominant, have they been able to detect an acute angle or obtuse angle anywhere, why do they think right angles predominate?



Physical theatre



Duration of the Act :
30 minutes



Geometry in space



Spatial orientation,
Cognitive abilities



Phases of activity

1

Rearrange the space and introduce students to the topic and the terms.

2

Let the students explore the space in a warm-up activity.

3

Lead two games in succession for physical exploration of basic geometry terms.

4

Lead the final activity and feedback through guiding questions.

Tips

PREPARATION

It is important that you have secured enough free space for the activity before the start. It is also good to make sure that the students are familiar with the topic and with the terms that you are going to use in the games.

PLAYING THE GAMES

During the performance make sure that the commands are executed accurately and that the students have contact with their bodies to portray a continuous figure on the floor. It is also a good idea to encourage pairs and trios to be formed every time by different participants and for one participant to take different positions.

INCREASING CONCENTRATION

Introducing a competitive element into children's play usually helps the group mobilise and focus. It can also be used in this activity. In the first game, you can introduce an element of elimination of the last to perform a command or in case of confusion in the execution, until only two players are left and only one of them "wins" the game. The same element can be introduced in the second game as well.



The strange case of the number Pi

Every single continuous line is a curve: <https://www.khanacademy.org/math/geometry-home/geometry-shapes/geometry-curves-and-polygons/v/intro-to-curves-basic-geometrical-ideas-class-6-india-khan-academy>.

This mathematical postulate is a good opportunity to create a situation in which students can discover and explore the idea of continuity. There are plenty of possibilities. Here we propose 2 of them. Continuity is associated with infinity. Arouse children's curiosity about interesting and fun facts in mathematics by introducing them to the number Pi - <https://www.piday.org/pi-facts/>

Intersections Points = Action Points

Difficulty: Medium/Hard; **Age:** 10-12 and above; **Material:** A4 white sheets and colour markers

This activity starts with a brief discussion on the difference between an open and closed curve. Continuity is strongly present in theatre and cinema. For an actor, building continuity in the behaviour and consistency of the character's actions is of particular importance.

The teacher presents a pre-prepared example (drawn complex closed curve) and connects the mathematical meanings of the figures, with theatrical language, noting the following reference points:

- Curved line - a continuous line of motion of an actor in the stage space
- A closed curve with the same starting and ending point - entry and exit of the stage
- A complex curve with three intersection points - three points at which the actor stops and performs specific actions.
- In the theatre there is always a unity of time, place and action.

Each student draws his curve on a piece of paper and marks with a different color "enter", "exit" and numbers the crossing points: "1, 2 and 3" according to the time of passing through them.

Students then begin to trace their curves in space. The teacher guides the process:

- Take time to visualize the line from the sheet of paper onto the actual stage space designated for the purpose. Determine the point of entry and exit of the scene
- Start walking in space following your own drawn curve until you memorize it.
- Repeat walking the curve several times, this time without looking at the sheet, calmly observing the space, objects and other participants around you...



Intersections Points = Action Points - Continuation and end

Once everyone has memorized their line on the stage, the focus shifts to what happens at the intersections - the action points. The teacher continues with the instructions:

- Every time you as actors reach one of the three action points on the stage, something must happen, For example: you stop and think about something; react suddenly to something you saw or felt; you suddenly express a strong emotion (pain, surprise, joy...); you perform a simple physical action like tying a shoe, for example.

In the next part, students have the freedom to unleash their imagination and improvisational talent by rehearsing their lines and trying different actions at the intersection points. In cases where some of the students have difficulties, the teacher can help with guiding questions and hints:

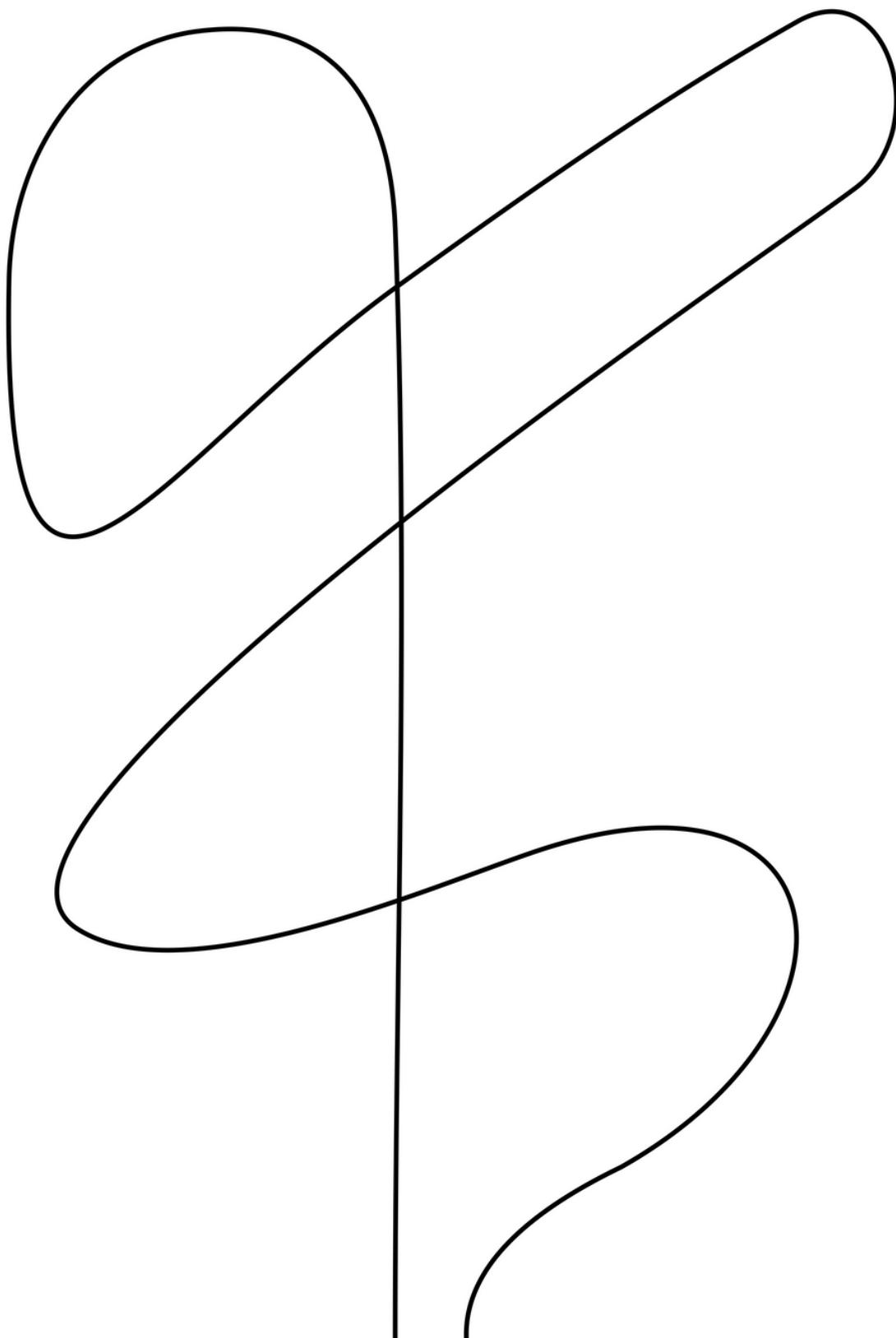
- Samples of simple actions: scratch the head, catch a fly, tie my shoe, yawn with a sound, stop and look around...
- Samples with reactions: angry foot stomping, timid looking around, joyful jumping, haughty arms crossed...

Presentation: The teacher divides the students into pairs. Participants perform the walking line a minimum of 3 times without interruption and are free to repeat the same actions at the intersection points or to improvise with something new each time. The presentation in pairs provides opportunities for developing the game in communication and creating improvised theatrical situations in which dialogue between the actors could be included.

The activity ends with feedback from the students on how they felt, what they have learned and what new they have discovered.

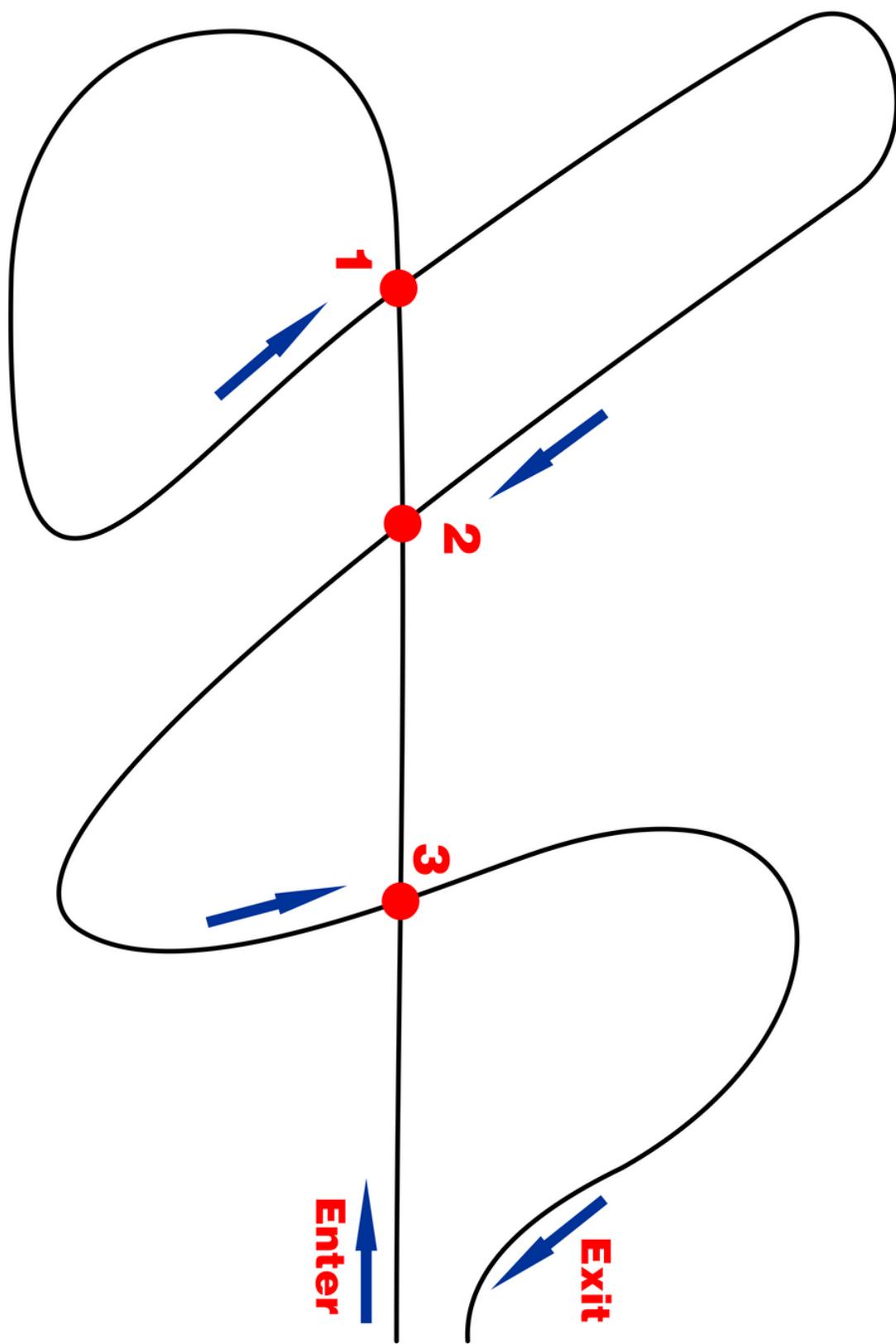


Printable: Intersections Points = Action Points - 1





Printable: Intersections Points = Action Points - 2



Act 2: Dance of the Marionettes



Summary of the activity - Act 2: Dance of the Marionettes

Act 2 consists of introduction, movement exploration and creative work in pairs.

Introduction.

- The teacher gives the students a sheet of paper with a human body scheme and a marker.
- In a discussion with guiding questions, the students name the different lines in the body, starting with the main vertical line - our spine and the two main horizontal lines - the pelvis and shoulder girdle.
- The teacher then draws attention to a third imaginary horizontal line that passes through the ears. Students determine the points where the lines cross by first touching the corresponding places on their own bodies and then marking them on the scheme.

The process continues in the same way with the main joints - the points where the bones of the upper and lower limbs connect to the horizontal lines and to each other.

Exploration through movement.

TEACHER. - What would we look like if we imagined that our body was wooden and made out of straight lines?

STUDENTS. - We will be like puppets.

TEACHER. - That's right, in the puppet theatre such a puppet is called a marionette. Do you want to try moving like a puppet?

The students, led by the teacher, go through sequential movement of all intersection points in all possible directions. Simultaneously with the movement, the students observe that with each movement the lines always form angles. When the movement is freer they can form straight and obtuse angles, but when it is restricted the angles are acute.

Creative work in pairs.

The teacher divides the children into pairs. In the pair, Student A is a puppet (marionette) and Student B is the puppeteer. Student B guides the puppet from a distance with imaginary strings. The puppeteer stands facing the puppet and gives a clear indication of which part he wants to move by touching a certain intersection of his partner (puppet) from which the imaginary thread begins. At the teacher's signal, the participants in the pair exchange their roles.

Presentation to the audience.

3 to 4 couples are presented simultaneously to a suitable musical background. The activity ends with short feedback from the students.



Puppet theatre
Dance



Duration of the Act :
60 minutes



Horizontal and
vertical lines, angles



Analytical thinking,
Focusing, Body-
mind integration

Act 2: Dance of the Marionettes



Phases of activity

1

Explore together with your students the lines and the intersections on the scheme and on own bodies simultaneously.

2

Go together with your students through sequential movement of all intersection points in all possible directions.

3

Support students in their creative work in pairs.

4

Let the students presents their dances of the marionettes.

5

Initiate feedback from the audience and the participants.

Tips

DIAGONALS

In addition to basic horizontal and vertical lines, this activity provides an opportunity to introduce students to some basic diagonals that are easy to perform with a body:

- left hand (left and up) - right hand (right and down) and vice versa
- left hand (forward and up) - right hand (back and down) and vice versa

INVITE ARTISTS TO YOUR CLASS AND WORK TOGETHER

It will be helpful if a guest artist puppeteer is invited. They could demonstrate how they manipulate a puppet in a professional puppet theatre. They would also help in a more precise and detailed study of the movement of individual parts of the body.

USE OF MUSIC

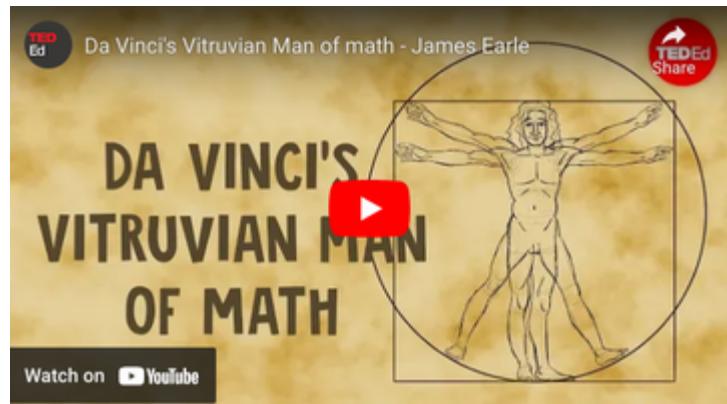
The creative process and the final presentation can take place under the accompaniment of appropriate music. This will create an atmosphere, calm communication in couples, maintain concentration and enhance creative flow.



Geometry and human proportions in art

Leonardo Da Vinci's Vitruvian Man is one of his most famous works. Studying geometry through the body is a great opportunity to introduce to children interesting facts about the meaning of his work:

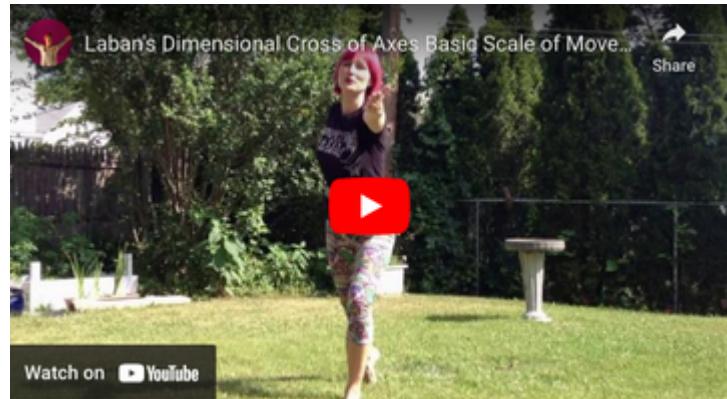
- https://kids.kiddle.co/Vitruvian_Man
- <https://www.kidpid.com/da-vinci-and-the-vitruvian-man/>
- <https://www.youtube.com/watch?v=aMsaFP3kggQ&t=1s>



Laban Mouvement Method

To deepen the kinesthetic sense of the body as three-dimensional in three-dimensional space, various relevant ideas can be taken from Laban movement analysis:

- <https://www.youtube.com/watch?v=KB30hsI7UYg>
- https://www.youtube.com/watch?v=rtnlfsls5800&list=PLcVGfP7YFLa9HmVYWudKI_AOCSJGo4WL0&index=1



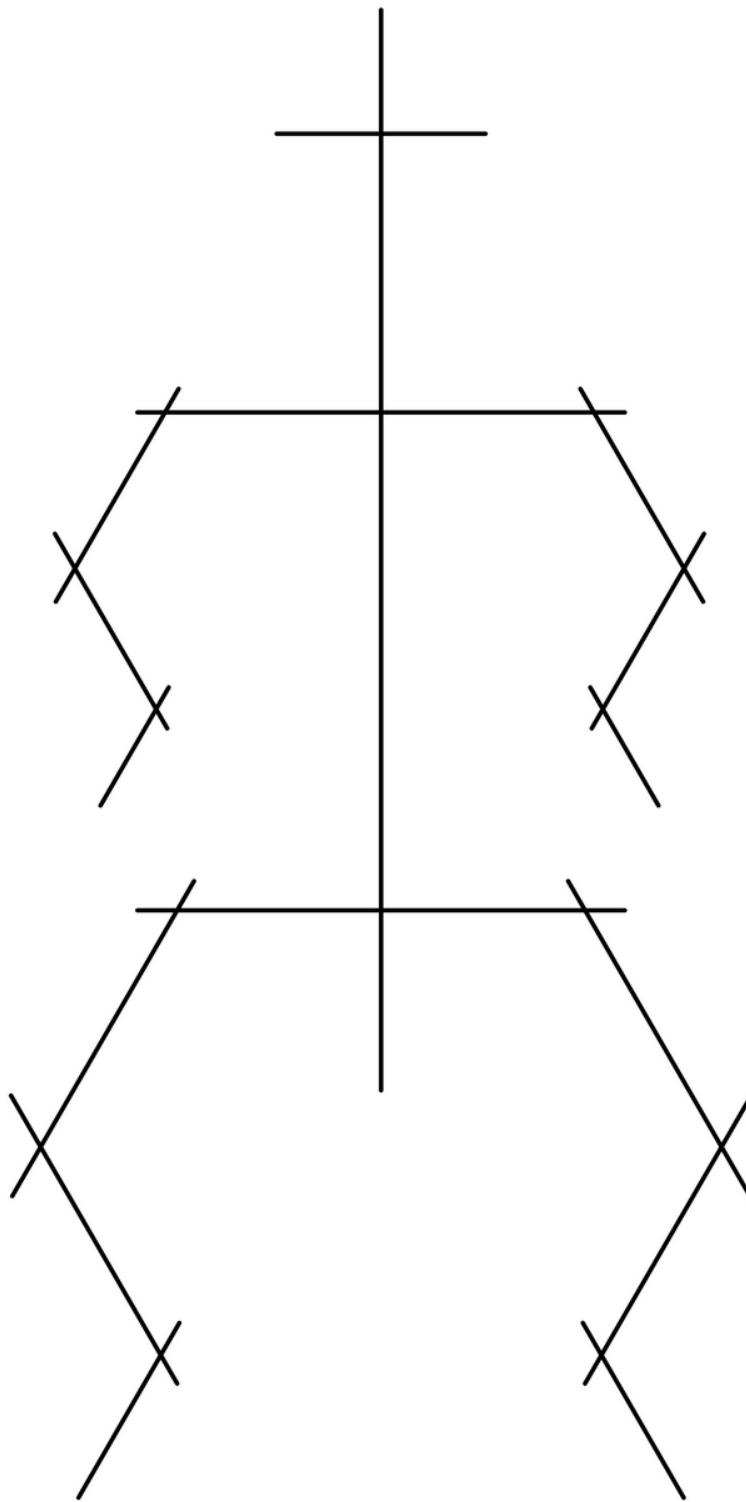
Geometry in Dance

Appropriate examples of how the geometry of the body and space are used in dance choreography can be selected. For example, it will be fun and useful for students to discover and draw the geometric lines and shapes that dancers create with their bodies and movements:

- <https://www.youtube.com/watch?v=cSGLGnHJDSQ>
- <https://www.youtube.com/watch?v=ZThM3dRp7ml>
- <https://www.youtube.com/watch?v=zW40Su5m0rl&t=31s>

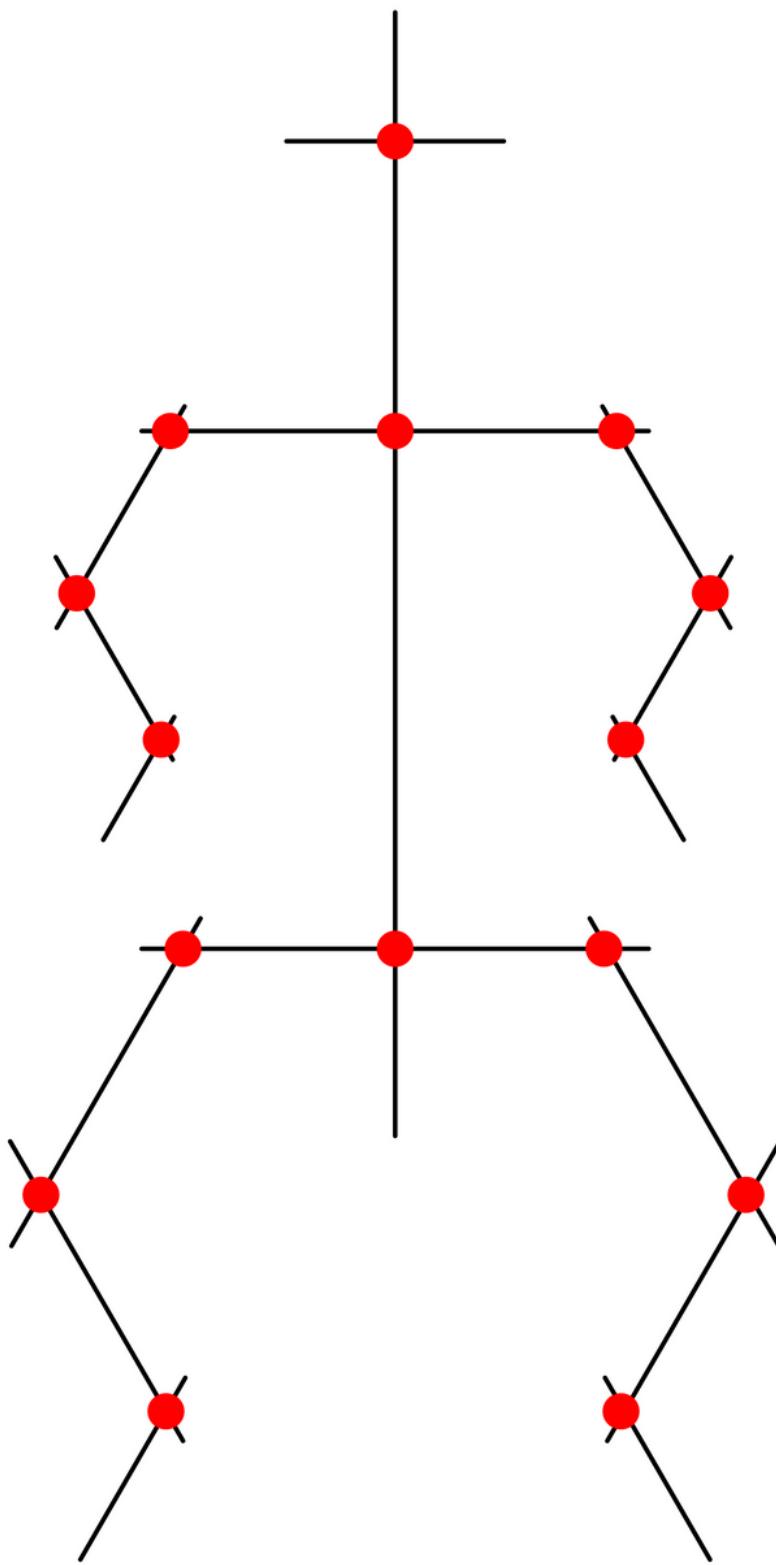


Human Body Scheme - 1





Human Body Scheme - 2



Act 3: The Best of the Best



Summary of the activity - Act 3: The best of the best

Act 3 consists of a warm-up in the form of a game and group work. Students explore 3 geometric sets - triangles, quadrilaterals and ovals.

Beginning.

The teacher asks the students to focus on their bodies main parts: head, torso, arms and legs, and imagine what kind of geometric shape each of them could represent. A mandatory condition is that they use at least one representative from the three groups of geometric figures. For example: my arms are triangles, my legs are rectangles, my torso is an ellipse, my head is a square.

The game.

Like the Act 1 games, in this one the students respond to commands given by the teacher as they move through the space. The commands are: "quadrangle", "triangle", "oval". The execution of the commands involves the rapid formation of pairs with contact with the corresponding part of the bodies. At the command "go" they separate and continue walking in space. Commands are submitted in a scrambled order.

Group work.

The teacher divides the students into three groups: triangles, quadrilaterals and oval shapes.

Each group has the task of coming up with a performance in which they emphasize that they are the best and superior to the other two groups in a fun theatrical way To do this, they are expected to use as much information as possible about their group of geometric shapes. For example - a quadrilateral - everything is always four - vertices, angles, sides (e.g. a rectangle, a square, or a diamond); diversity - different angles, different side lengths, etc. (e.g. rectangle, trapezoid) Students can also point out the benefits and uses of these shapes, where these shapes can be found in our surroundings...

The teacher participates in the process with questions, additional information about the geometric shapes and ideas for the final presentation. If necessary, the groups may be offered supporting materials - white sheets of paper, pencils, scissors...

Each presentation ends with bows and applause from the audience (the other two groups). Finally, the students share what they learned, if they encountered any challenges, and in which part of the activity.



Improvisation



Duration of the Act :
30 minutes



Geometrical shapes



Reasoning, Memory,
Presentation, Creativity

Act 3: The Best of the Best



Phases of activity

1

Introduce students to the topic and the terms.

2

Lead a warm-up game.

3

Explain the rules and divide students in 3 groups.

4

In groups, let the students discuss and create their theatrical presentation.

5

Lead the groups' presentations with a feedback session.

Tips

MORE FIGURES

This activity is a great opportunity to introduce students to more of the shapes they already know. For example, you can name triangles that are defined by their sides and angles. Quadrilaterals are extremely rich as a variety set. With oval shapes, you can help students learn to distinguish between an ellipse and an oval as two separate shapes, etc.

ENCOURAGE FANTASY AND IMAGINATION

During the discussion and creation, in addition to using already acquired knowledge, students may come up with all sorts of strange ideas about where these shapes came from, or what they are for, or where they can be found..... Let their imagination run wild and help them make connections between science facts and fantasy.

PROPOSE FORM AND STYLE OF PRESENTATION

Support students in choosing the format of their presentation by offering options. This can be in the form of a pantomime, a dance, a song, a poem, a theatrical skit, fashion show, combination of these or something completely different.

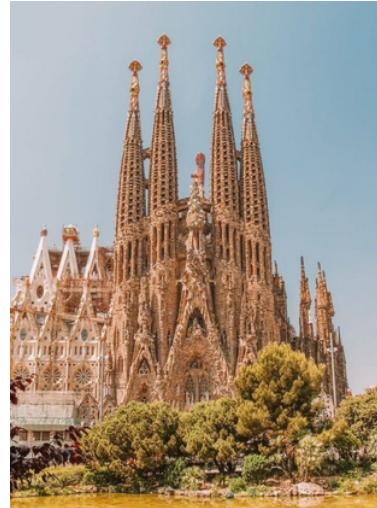


Geometry in Architecture

Geometry is a fundamental basis of architecture, and architecture is all around us. Introduce children to some of the achievements of architecture from antiquity to modern times. Take a walk in the urban space, discover the forms that prevail in one or another building or architectural complex. Source: <https://archi-monarch.com/geometry-in-architecture/>



Taj Mahal - India



Sagrada Família - Spain



The-LeaningTower - Italy



Egyptian-pyramid



Cube houses - Nederland



Amazon sphere- USA



The Gherkin, London - UK



Geometry in Paintings

There are so many famous artists, representatives of styles such as cubism, abstractionism, and suprematism, who use geometry in their paintings. Inspire your students with their artwork and create your geometric paintings. Discover more:

- <https://www.youtube.com/watch?v=uEl3clnsyyU>
- <https://www.youtube.com/watch?v=1sfZ2gPGOW4>



Guernica, Pablo Picasso, 1937



Girls in the fields, Kazimir Malevich, 1932



Studio with black vase, George Braque, 1938

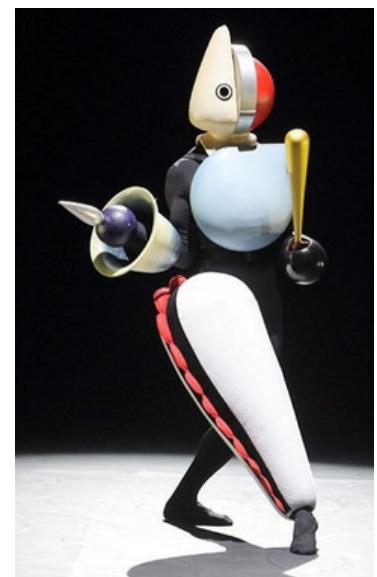


Senecio 2, Paul Klee, 1922



Geometry in Theatre Costumes

Theatrical costumes can be made from different types of materials. Those for recycling are particularly suitable. Improvised costumes can be made from different types of paper, cardboard, balloons, hoops, plastic bottles, metal hoops, etc. Students can be introduced to Oskar Schlemmer's Triadic Ballet and take inspiration from his geometric theatre costumes: <https://www.youtube.com/watch?v=mHQmnumnNgo>. Here is another example of geometric costumes: <https://www.youtube.com/watch?v=FmThAic44GI>.



Oscar Schlemmer's geometric costumes

Act 4: Geometrical Puppet



Summary of the activity - Act 4: Geometrical Puppet - Show Time

ACT 4 is a complex activity with several consecutive tasks in which geometric shapes are the main tool.

Students are divided in groups of three. The teacher announces that all groups of three are now becoming creative theatre teams who will have to create their own puppets and short puppet-theatre performances. The teacher hands out pre-prepared envelopes to each group. Each envelope contains 3 geometric shapes /1 quadrilateral, 1 triangles, 1 oval shape / and a sheet with instructions /see printable resources attached/.

The instructions include three tasks for the groups to complete. For each task the teacher gives a start and an end signal. After the end of each task, there is a moment of feedback on the performance and transition to the next one.

FIRST TASK.

The first task is for speed and serves to warm up and unite the team. The groups are asked to create as many images (human figure, natural and non-natural creature, human maded objects etc.) as possible from three geometric shapes. At the end of the task, the groups indicate the number of images created.

SECOND TASK.

Students must bring to life three of the images from the previous task and transform them into puppets, through coordinated and synchronised manipulation of their parts by the three participants. At the end of the task, there is a demonstration by each group with one of their puppets.

THIRD TASK.

Students create a short script and an improvised puppet show with the participation of the three puppets. The third task ends with a theatrical performance of all the created stories.



Puppets
Script writing



Duration of the Act :
120 minutes



Geometric shapes



Abstract thinking,
Imagination,
Coordination

Act 4: Geometrical Puppet



Phases of activity

- 1 Print and cut the geometric shapes to prepare the envelopes according to the number of students.
- 2 Divide students in groups of three and explain the process step by step.
- 3 Let the students complete task one and announce their results at the end.
- 4 Launch the creative process in groups to choose the three best combinations of shapes (task 2).
- 5 Organise the demonstration of puppet manipulation.
- 6 Launch the creative process in groups to come up with puppet storyline (task 2).
- 7 Organise the Puppet show presented by the students.

Tips

IMPROVISE A STAGE FOR THE PUPPET SHOW

For the final performance, it is good to set aside a stage on which the puppets will act. It is appropriate to prepare a frame with stretched fabric, behind which the puppeteers can "hide", and only the puppets are visible from above. This way, the audience only watches the puppet action and the experience is more exciting. Depending on the possibilities, a larger cloth-covered table can also be used.

INVITE ARTISTS TO YOUR CLASS AND WORK TOGETHER

Take the opportunity to invite a guest artist to the class. It will support you in the creative process of task 2 and task 3, where more individual guidance may be needed. This will stimulate the achievement of more precise coordination in puppet manipulation and the creation of richer, original and better-structured plots.



Puppet theatre

Puppetry is fascinating for children of all ages and offers many opportunities to learn and develop skills. See more here: <https://www.twinkl.bg/teaching-wiki/puppet>

Shadow Theatre from Geometric Forms

You can hang the different geometric shapes on a stick /wooden skewers are very suitable for this purpose/. In this way, each of the figures can become independent puppet and offer a new kind of manipulation and play. Then you can easily create your shadow theatre using empty cardboard boxes, parchment (baking paper) and flashlights. See inspiration here: <https://www.youtube.com/watch?v=YOtHfxbae-o&t=8s>

More possibilities

Finger Puppets are easy to make with very few and readily available materials. See examples here: <https://www.youtube.com/watch?v=NsjTXXzIXEk>

Marionettes

If you want to challenge yourself and the students, create your marionettes. The proposed video offers a great opportunity to study the structure of the human skeleton by creating a marionette with readily available and recyclable materials. See here: <https://www.youtube.com/watch?v=6JExdmnD6xE>





Instructions

Task 1

Within 5 minutes, create as many images as possible from the combination of the three geometric figures and illustrate them on a sheet of paper. The images can be of people, representatives of living and non-living nature and those created by man.

Task 2

Create three puppets from the list of your images - one puppet of a person; one puppet - representative of living nature; one puppet - representative of our surroundings /natural or man-made/

CONDITIONS: While creating the puppets you must pay attention to the following

1. Each puppet must be composed of all three geometric figures
2. Each of you must hold only one geometric figure /body part of the puppet/
3. Discover how these puppets come to life through your manipulation - how they move, act and react.
Find a way to coordinate your movements and work in synchronization.

Time for puppets creation - 15 min

Task 3

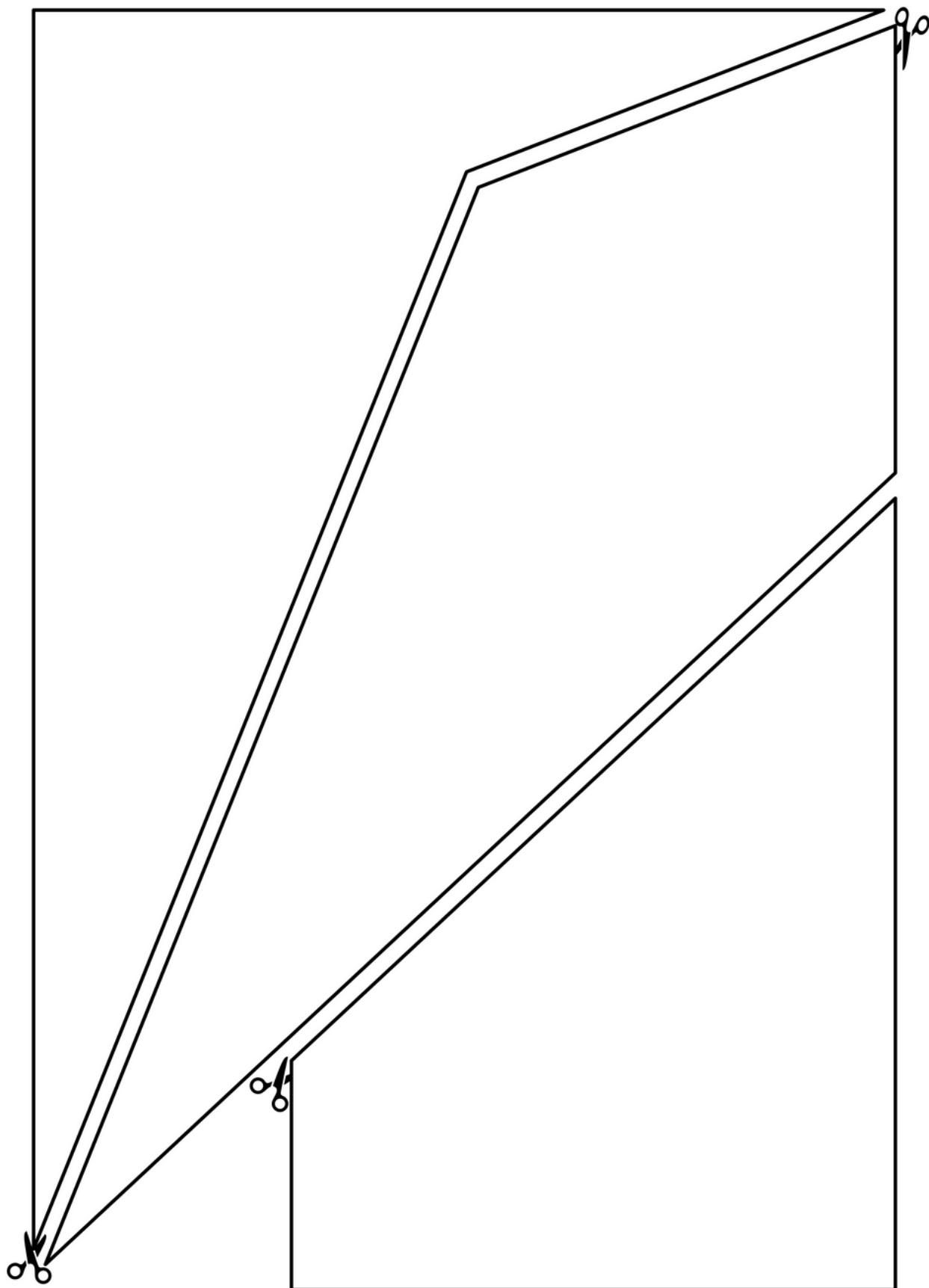
Create a short improvised story by following the conditions:

- Come up with a name and a short story for each of the three puppets /Where does the puppets live? What is their dream? What are their strengths? What are they afraid of..?/.
- Decide who the main character is, what happens to them and how the other characters are involved in the story.
- Come up with the story title.
- Rehearse the story with the puppets, paying attention to how the different parts of the puppet relate, how it moves and how you make the transition from one puppet to the other.
- Have fun

Time for story creation - 20 min

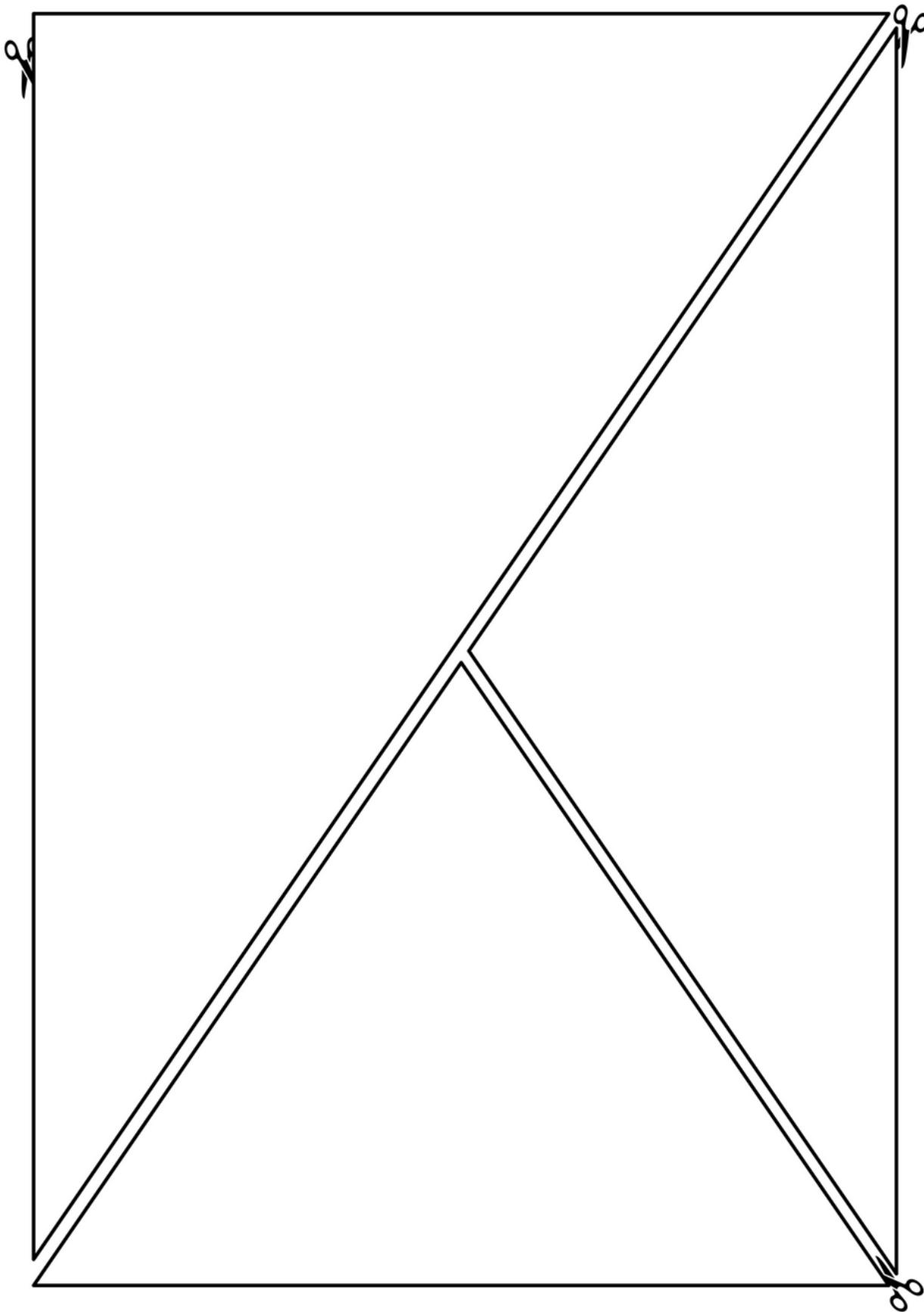


Geometric Shapes Page



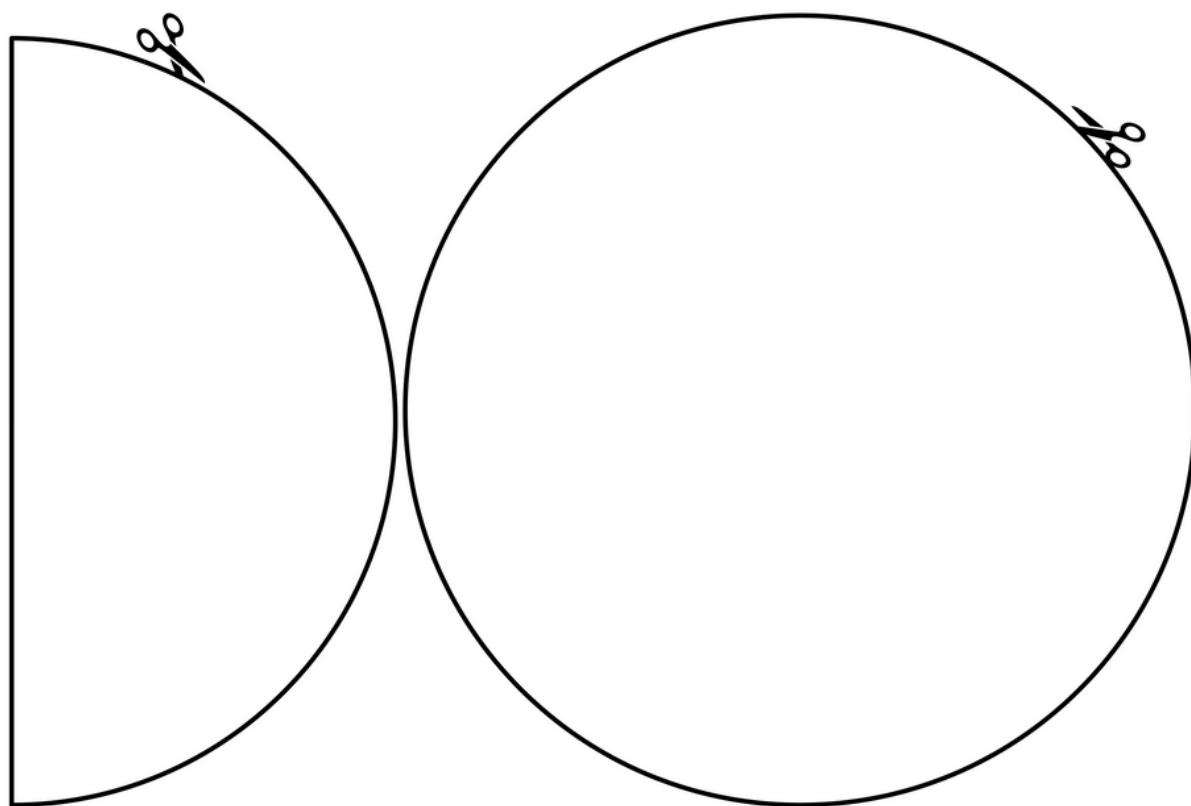
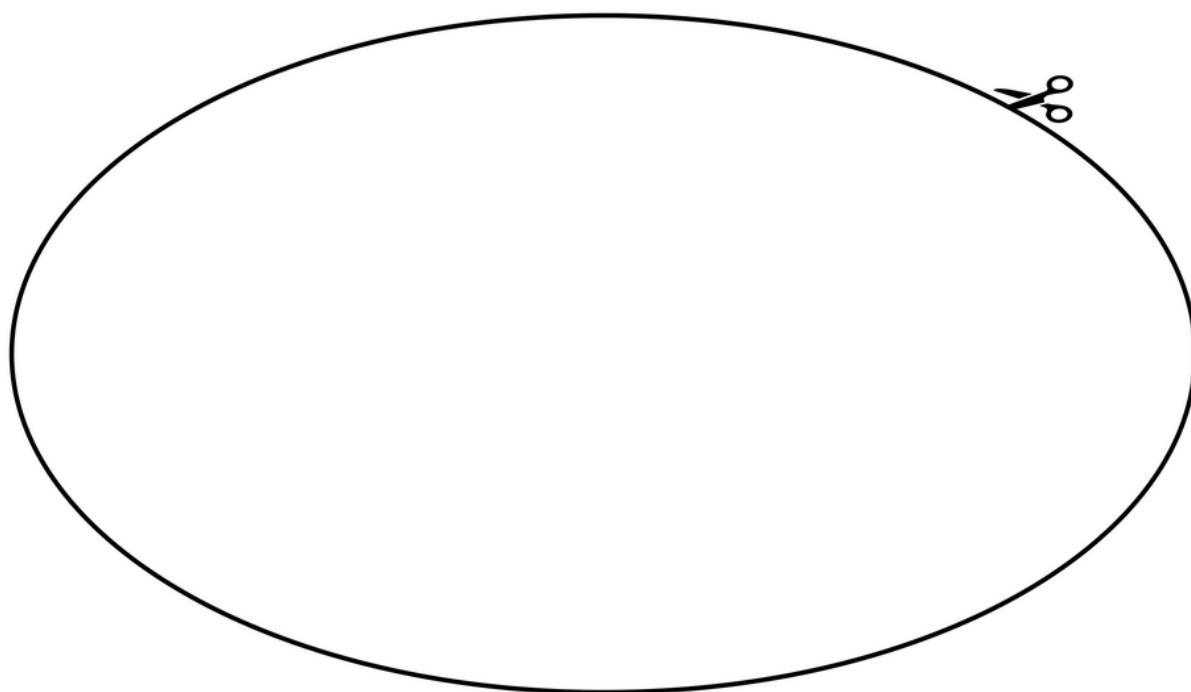


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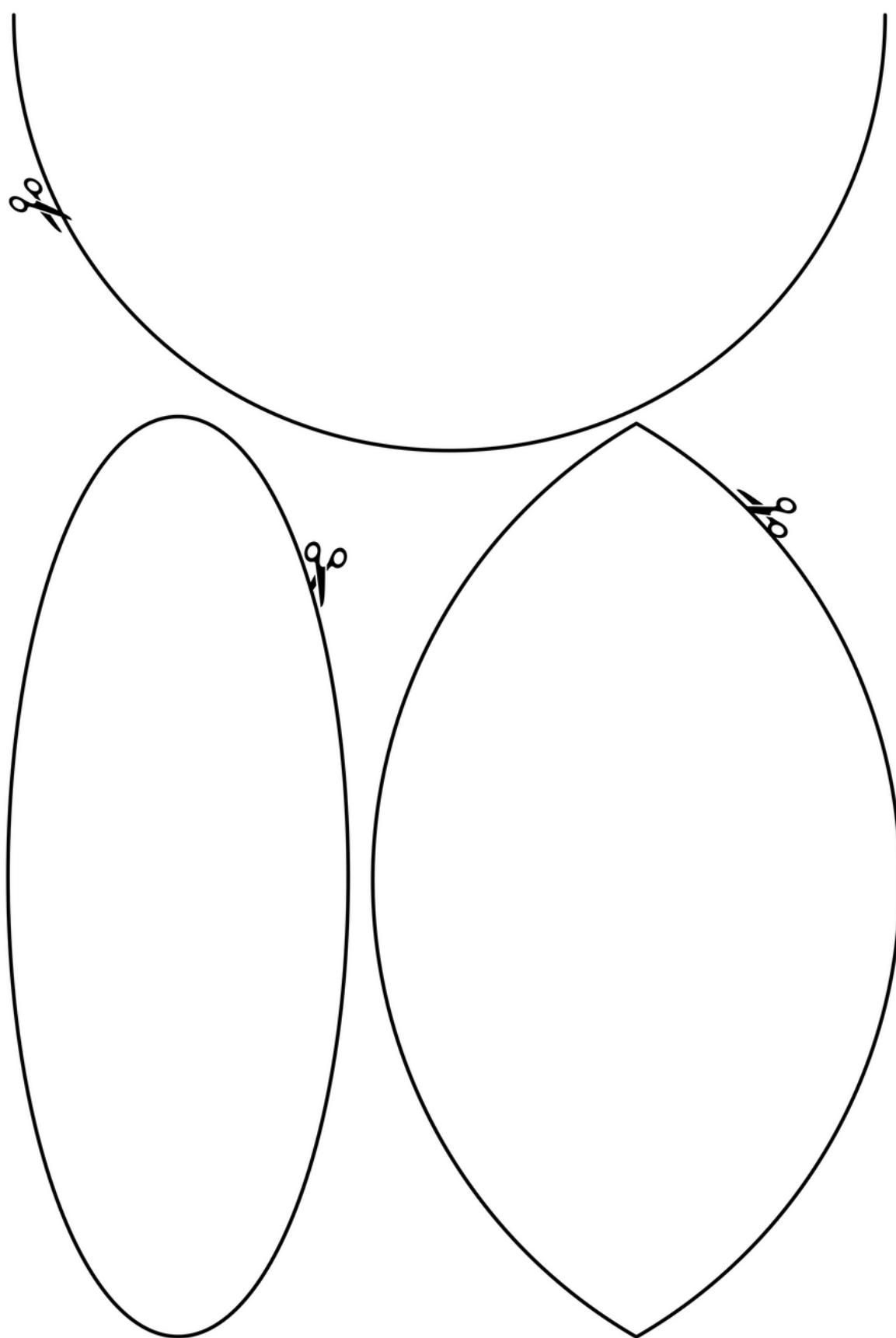


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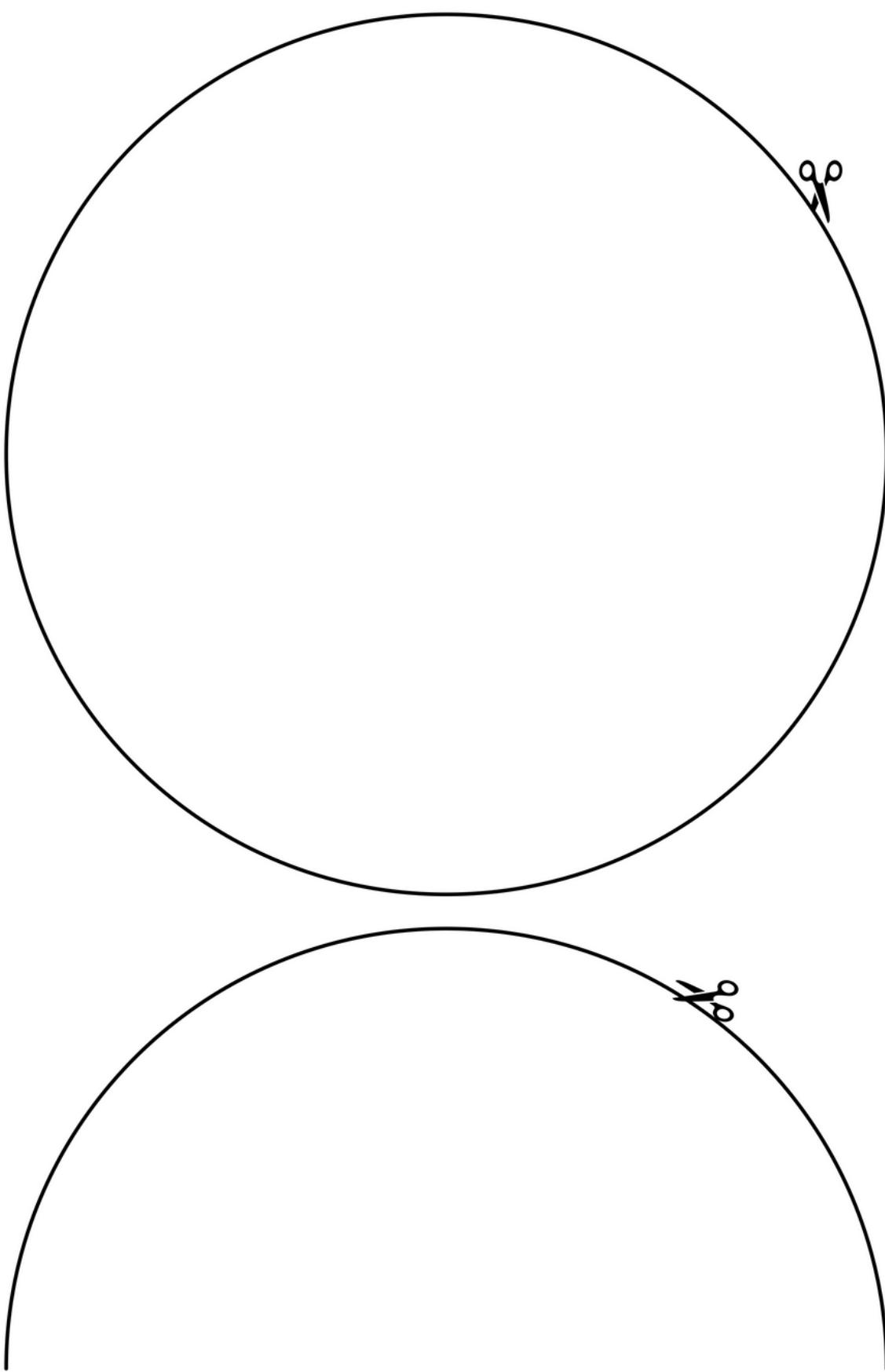


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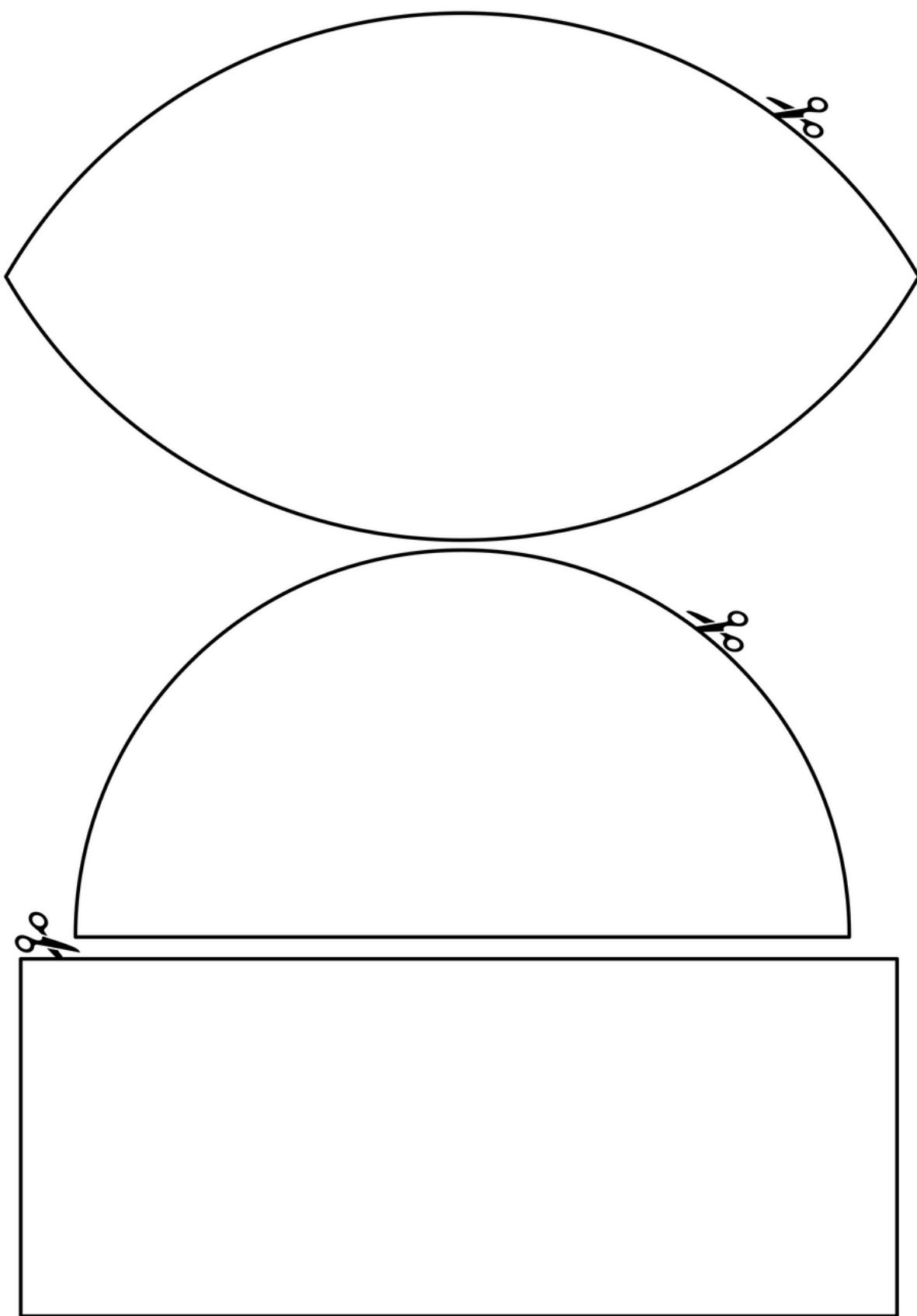


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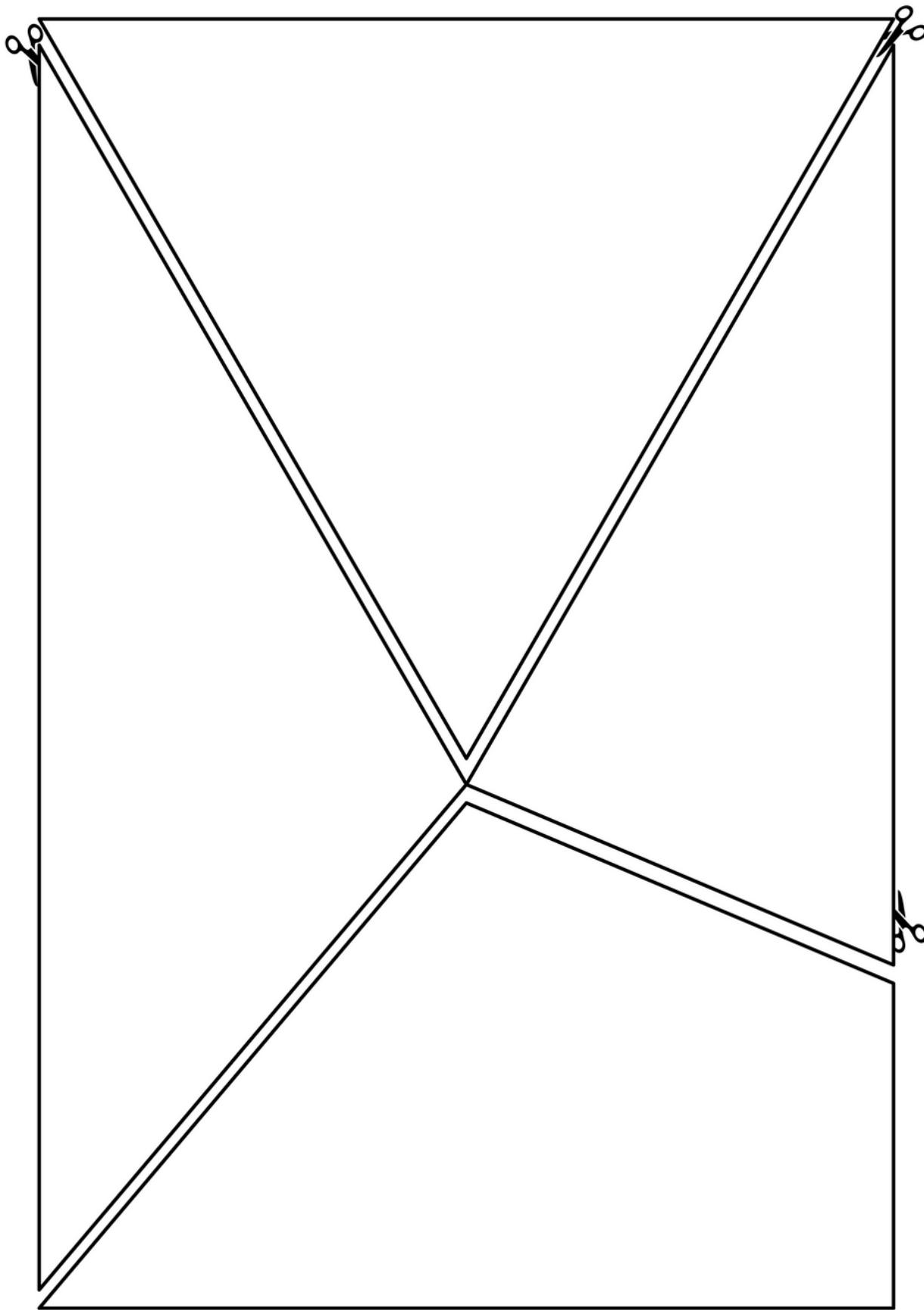


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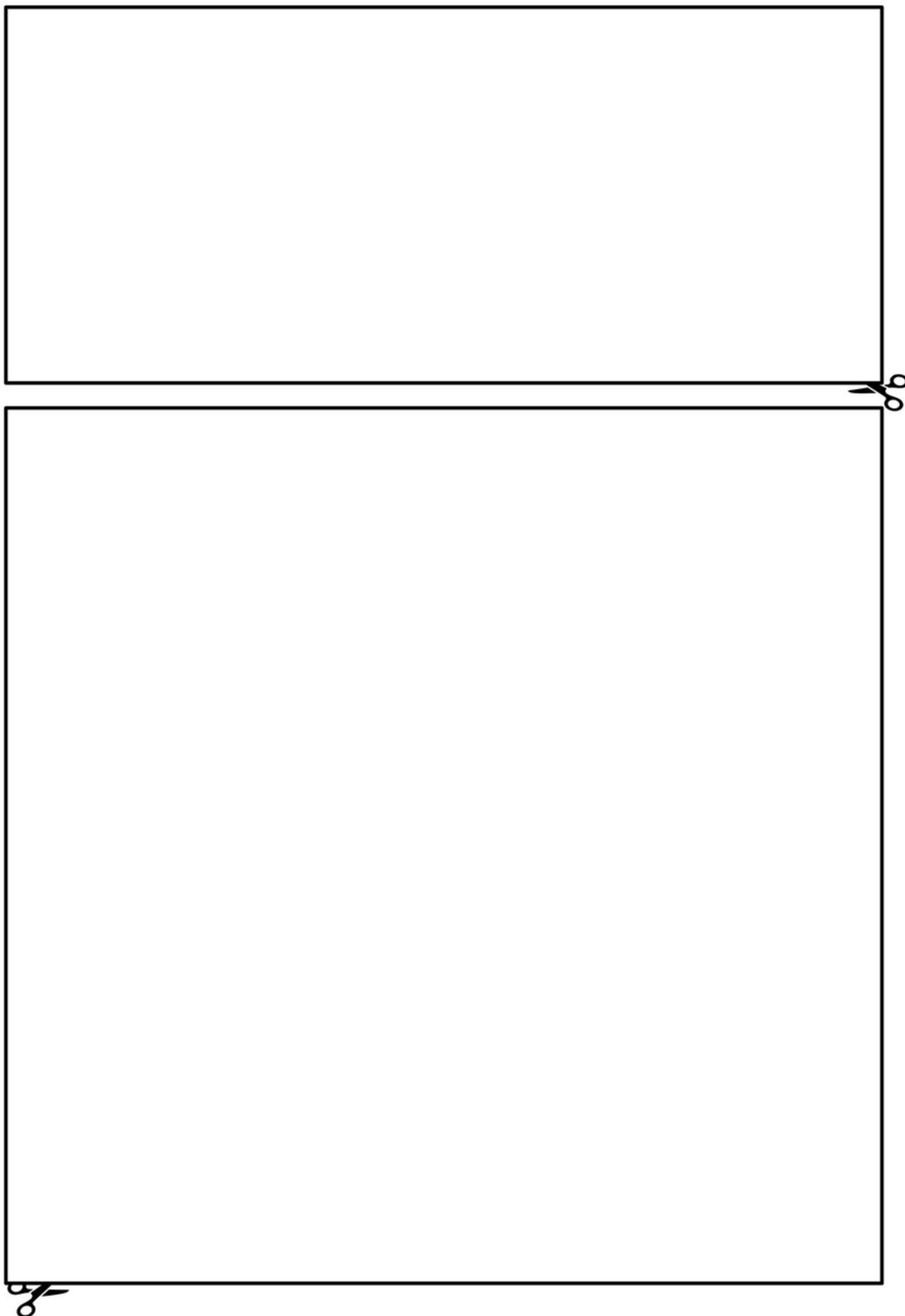


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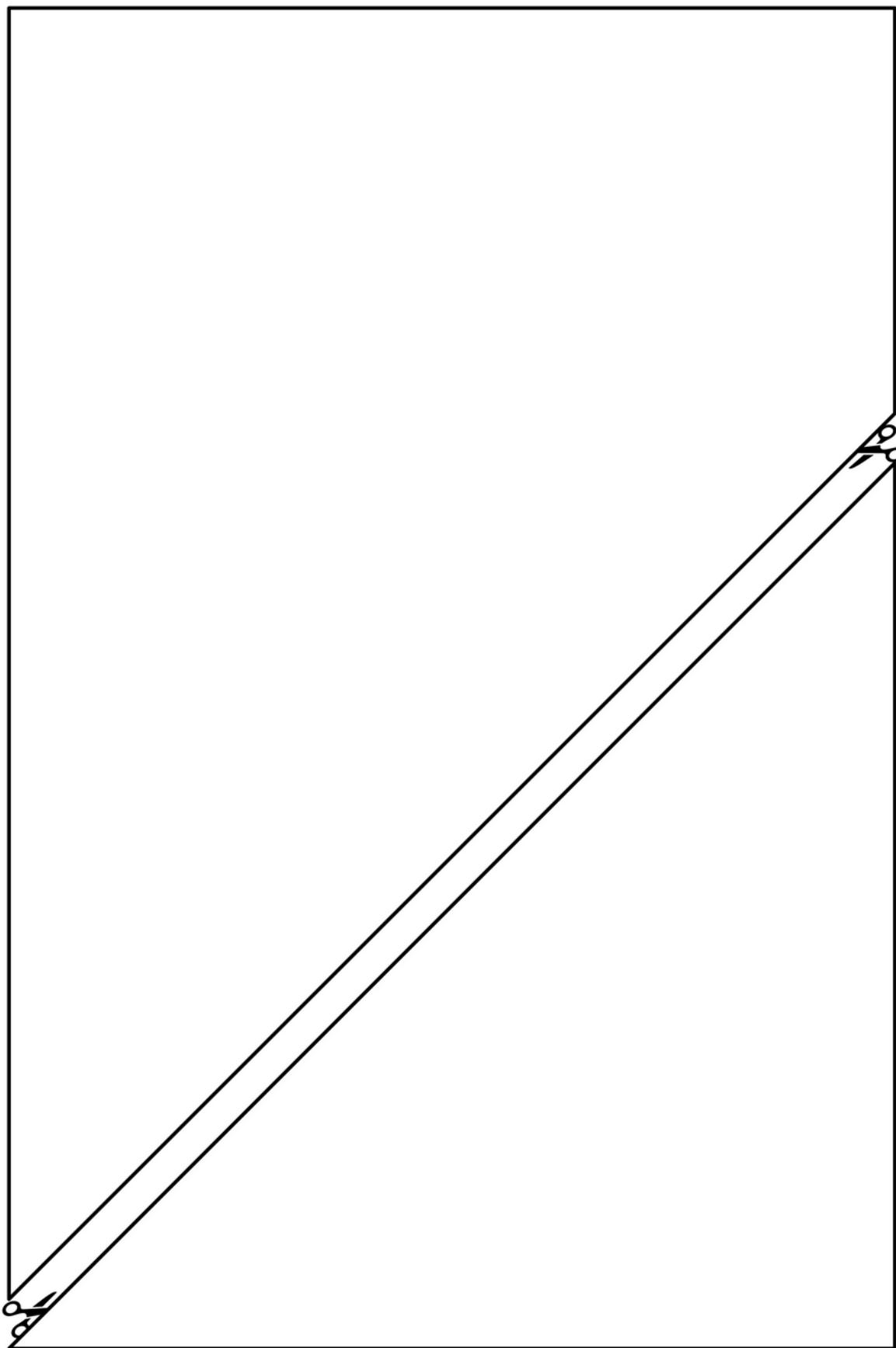


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