Unit 8, Lesson 5

Simetría de figuras (parte 2)

Standards

Addressing **4.G.A.1, 4.G.A.3, 4.NBT.B**

Instructional Routines

- Number Talk

Goals

- Critique (orally and writing) drawings of figures that claim to have line symmetry.
- Draw figures with line symmetry given half of the figure and a line of symmetry.

Student Facing Learning Goals

Dibujemos algunas figuras que tienen líneas de simetría.

Lesson Purpose

The purpose of this lesson is for students to identify figures with line symmetry and to complete line-symmetric figures.

Narrative

Previously, students learned to identify figures with line symmetry and drew lines of symmetry. In this lesson, students deepen their understanding of symmetry by reasoning about what the whole figure would look like when given half of a figure and a line of symmetry.

The work of this lesson helps students develop mental images of figures with lines of symmetry. Students also consider how to use what they know about drawing line segments, points, and angles to complete their drawings. Students make strategic decisions about how to use available tools to complete the figures or justify how they know their figures are symmetrical (MP5). Students may copy the figure to another piece of paper, and follow with folding, cutting, or tracing. They may also use rulers or protractors to measure distances and angles.

Access for Students with Disabilities

- Representation

Access for English Learners

- MLR8

Required Materials

Materials to Gather

- Patty paper: Activity 1, Activity 2, Activity 3
- Rulers or straightedges: Activity 1, Activity 2, Activity 3
- Paper: Activity 2
- Protractors: Activity 2, Activity 3
- Scissors: Activity 2, Activity 3

Materials to Copy

- What Could the Whole Figure Be Triangle Shapes (1 copy for every 2 students): Activity 3

Required Preparation

Lesson Timeline

Warm-up	10 min
Activity 1	15 min
Activity 2	20 min
Activity 3	10 min
Synthesis Estimate	10 min
Actividad de cierre	5 min

Teacher Reflection Questions

What connections did students make between the different strategies shared? What questions did you ask to help make the connections more visible?

Warm-up

10 min

Conversación numérica: Llevemos la cuenta

Standards

Addressing **4.NBT.B**

Instructional Routines

- Number Talk

This *Number Talk* encourages students to think about place value and to rely on the structure of multi-digit numbers and properties of operations to mentally add multiple addends. The strategies elicited here help students develop fluency in adding multi-digit numbers. They will also be helpful when students reason about the perimeter and angles in line-symmetric figures.

Student Task Statement

Encuentra mentalmente el valor de cada expresión.

- $43 + 57 + 50 + 7 + 3 + 40$
- $243 + 57 + 43 + 257$
- $1{,}043 + 257 + 57 + 200 + 43 + 1{,}000$
- $1{,}943 + 257 + 1 + 257 + 1{,}000 + 943$

Student Response

- 200: There are two sets of $43 + 57$, one of them is written in expanded form. $43 + 57 = 100$, because $40 + 50 = 90$, $7 + 3 = 10$, and $90 + 10 = 100$. Two times 100 gives 200.
- 600: $43 + 57 = 100$, so $243 + 257$ is $200 + 200 + 100$, which is 500. Adding another $43 + 57$ to 500 makes 600.
- 2,600:
  - The expression has two sets of $257 + 43$ (just written differently), plus two 1,000s. $257 + 43 = 300$, and twice 300 is 600. Adding

Launch

- Display one expression.
- *"Hagan una señal cuando tengan una respuesta y puedan explicar cómo la obtuvieron"* // "Give me a signal when you have an answer and can explain how you got it."
- 1 minute: quiet think time

Activity

- Record answers and strategy.
- Keep expressions and work displayed.
- Repeat with each expression.

Activity Synthesis

- *"¿Cómo usaron la primera expresión como ayuda para resolver las siguientes expresiones?"* // "How did you use the first expression to help solve the expressions that follow?" ($43 + 57 = 100$, so anywhere we see numbers with that combination

the 2,000 and 600 makes 2,600.

- $257 + 243 = 500$, $57 + 43 = 100$, and $1{,}000 + 1{,}000 = 2{,}000$, so $2{,}000 + 500 + 100 = 2{,}600$.

- 4,401:
  - The expression is symmetrical, with 1 in the middle and $1{,}943 + 257$ (written in different forms) on either side. We know that $43 + 257 = 300$, and $1{,}900 + 300 = 2{,}200$. Twice 2,200 is 4,400. Adding the middle 1 gives 4,401.
  - $943 + 257 = 1{,}200$, and $1{,}943 + 257 = 2{,}200$. Adding 1,200 and 2,200 gives 3,400. Adding $1{,}000 + 1$ to 3,400 makes 4,401.

being added, we can add 100 instead.)

- Consider asking:
  - *"¿Alguien puede expresar el razonamiento de _____ de otra forma?"* // "Who can restate _____'s reasoning in a different way?"
  - *"¿Alguien usó la misma estrategia, pero la explicaría de otra forma?"* // "Did anyone have the same strategy but would explain it differently?"
  - *"¿Alguien pensó en la expresión de otra forma?"* // "Did anyone approach the expression in a different way?"
  - *"¿Alguien quiere agregar algo a la estrategia de _____?"* // "Does anyone want to add on to _____'s strategy?"

Activity 1

15 min

Figuras dibujadas hasta la mitad

Standards

Addressing **4.G.A.1, 4.G.A.3**

In an earlier lesson, students observed that a line of symmetry decomposes a figure into two halves that match up exactly if the figure is folded along the line. This activity highlights that having two identical halves on each side of a line doesn't necessarily make a figure symmetrical. It encourages students to use their understanding of symmetry and the line of symmetry to articulate why this is so as they critique supplied reasoning (MP3).

The given grid enables students to reason about the size and position of the attributes of each figure and provides structure for drawing the vertices and segments of each missing half.

Access for Students with Disabilities

Representation: Internalize Comprehension. Synthesis: Use multiple examples and non-examples to reinforce the concept of line symmetry. Offer students 10 or more cutout figures, some of which have line symmetry and some of which do not. A few of the figures that do not have line symmetry should still have equivalent halves like Clare's drawings. Create a visual display titled *"Simetría con respecto a una línea"* // "Line Symmetry" with a two-column chart labeled *"Ejemplos"* // "Examples" and *"No-ejemplos"* // "Non-examples." Invite students to examine and manipulate the figures, then sort them into the correct columns on the display.
Supports accessibility for: Visual Spatial Processing, Memory, Fine Motor Skills

Required Materials

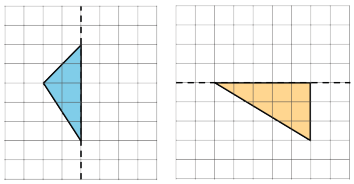
Materials to Gather

- Patty paper: Activity 1

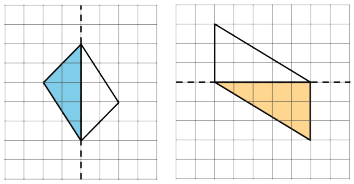
- Rulers or straightedges: Activity 1

Student Task Statement

Cada triángulo coloreado es la mitad de una figura completa que es simétrica con respecto a la línea punteada.



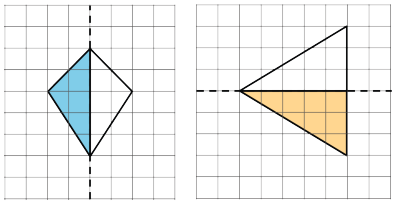
Clare dibujó algunos segmentos para mostrar la mitad que le hace falta a cada figura.



Para cada figura que completó Clare, ¿estás de acuerdo con que la línea punteada es una línea de simetría? Explica cómo razonaste. Si no estás de acuerdo con lo que hizo Clare, muestra una forma de completar el dibujo para que la línea punteada sea una línea de simetría.

Student Response

Disagree. Sample response: In each drawing, the part Clare drew matches the triangle on the other side of the line. The line splits her figures into halves, but one triangle cannot be folded across the line to fit right on top of the other. So, the line is not a line of symmetry.



Launch

- Groups of 2
- Give patty paper and a ruler or straightedge to each student.

Activity

- 2 minutes: quiet think time
- 3 minutes: partner discussion
- As students work, take note of students' language when describing why Clare's figures are incorrect.
- 3 minutes: independent work time

MLR 1 Stronger and Clearer

- *"¿Cómo saben que sus dibujos tienen una línea de simetría?"* // "How do you know that your drawings have line symmetry?"
- *"Compartan su explicación con 2 o 3 compañeros diferentes. Si es necesario, ajusten sus ideas para que su explicación sea cada vez más sólida"* // "Share your explanation with 2–3 different partners. Revise your thinking, if needed, to make your explanation stronger each time."
- 3–5 minutes: structured partner discussion

Activity Synthesis

- Invite 1–2 students to share their completed drawings. Compare and contrast them to Clare's drawings.
- *"¿Cuál podría ser una razón para pensar que los dibujos de Clare muestran las figuras completas correctas?"* // "What might be a possible reason for thinking that Clare's drawings show the correct whole figures?" (The new halves are exactly the same figure and size as the given halves.)
- *"¿Cómo podemos saber que las figuras completas de Clare no son simétricas con respecto a una línea?"* // "How can we tell that Clare's completed figures do not have line symmetry?" (The given half and the new half don't match up when the figure is folded along the line.)

Advancing Student Thinking

If students agree with Clare's drawings or create another figure that has no line of symmetry, consider asking:

- *"¿Cómo decidiste si Clare dibujó una línea de simetría?" //* "How did you decide if Clare drew a line of symmetry?"
- *"¿Cómo podemos usar las estrategias de la lección de ayer para comprobar si las figuras de Clare tienen una línea de simetría? ¿Cómo podrías usar esas estrategias para crear una figura que tenga una línea de simetría?" //* "How can we use the strategies from yesterday's lesson to check if Clare's figures have a line of symmetry? How could you use those strategies to create a figure with a line of symmetry?"

Activity 2

20 min

¿Cuál es la figura completa?

Standards

Addressing **4.G.A.1, 4.G.A.3**

In this activity, students continue to reason about the missing half of a line-symmetric figure given half of the figure and a line of symmetry. A grid is given in some cases, but in others, students may choose an appropriate tool (MP5)—patty paper, paper cutouts, rulers, or protractors—to help them draw whole figures with some precision.

In the first problem, students use patty paper to help them draw line-symmetric figures. For some figures, students may rotate and slide—instead of reflect or flip—a traced figure to show the missing half. During the *Activity Synthesis*, highlight that sliding and rotating are not reliable for completing all line-symmetric figures. (For example, it is not possible to slide a copy of the half-star figure to show the full star.) Students learn that flipping the given half across the line of symmetry will consistently complete the symmetrical figure.

Access for English Language Learners

MLR8 Discussion Supports. Use multimodal examples to show the meaning of symmetry. Use verbal descriptions along with gestures, drawings, or concrete objects to show how the students used the patty paper to draw the whole figure.
Advances: Listening, Representing

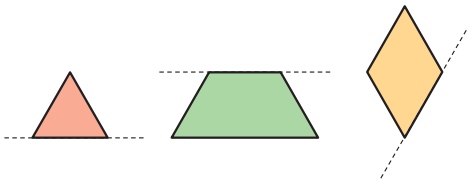
Required Materials

Materials to Gather

- Paper: Activity 2
- Patty paper: Activity 2
- Protractors: Activity 2
- Rulers or straightedges: Activity 2
- Scissors: Activity 2

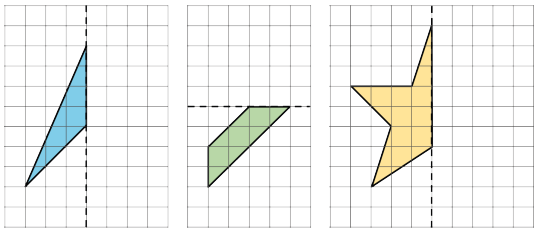
Student Task Statement

1. Estas son 3 figuras. Cada figura es la mitad de una figura completa. La línea punteada es una línea de simetría de la figura completa.

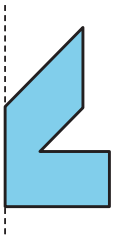


Usa papel transparente como ayuda para dibujar la figura completa.

2. Cada figura dibujada en la cuadrícula es la mitad de una figura completa. La línea punteada muestra la línea de simetría de la figura completa. Usa la cuadrícula como ayuda para dibujar la figura completa. Trata de ser muy preciso.



3. Esta es la mitad de otra figura completa que tiene una línea de simetría vertical. Dibuja la figura completa. Trata de ser muy preciso.



Student Response

1.

Launch

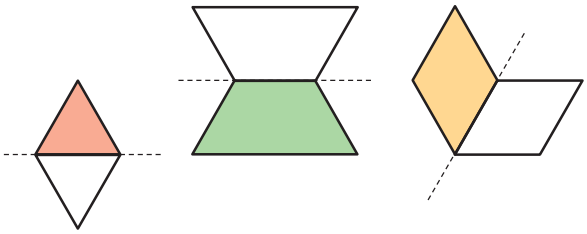
- Groups of 2
- Give a ruler or straightedge to each student.
- Provide access to patty paper, paper for cutting, protractors, and scissors.

Activity

- 6–8 minutes: independent work time
- Monitor for students who use tools to complete their drawings more precisely.
- 5–7 minutes: group discussion

Activity Synthesis

- Invite previously identified students to share how they used the patty paper and other tools to complete the figures with the triangle, trapezoid, and rhombus halves.
- *"¿Cómo los ayudaron las herramientas al dibujar las figuras completas?"* // "How did the tools support you in drawing the whole figures?" (I traced or cut out one half of the figure and flipped it across the line of symmetry to make the whole figure. I measured the lengths and distances of different segments and copied the measurements to the other side to be sure the parts were equal.)
- *"¿Usaron herramientas al dibujar las figuras completas que estaban en la cuadrícula? ¿Por qué sí o por qué no?"* // "Did you use tools when drawing the whole figures that were on the grid? Why or why not?" (No, because the figures are on a grid. I could count the number of units to draw each missing half.)



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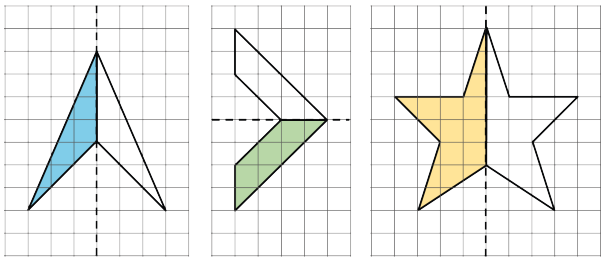

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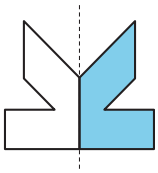


Advancing Student Thinking

If students draw freehand to complete the figures on the grid, consider asking:

- *"¿Cómo te aseguras de que la figura completa que haces sea simétrica con respecto a una línea?"* // "How are you making sure the whole figure you create will have line symmetry?"
- *"¿Cómo puedes dibujar segmentos de recta usando la cuadrícula para hacer que tu figura sea simétrica con respecto a una línea?"* // "How can you use the grid to draw line segments so that your figure will have line symmetry?"

Activity 3: Optional

10 min

¿Cuál podría ser la figura completa?

Standards

Addressing **4.G.A.3**

In the previous activities, students completed drawings of line-symmetric figures given half of each figure and a line of symmetry. In this optional activity, students complete drawings of line-symmetric figures given half of each figure, but no lines of symmetry are given. Students are likely to find it intuitive to choose a side of the given shape—a triangle—and use it as a line of symmetry. The task prompts them to consider something less intuitive—that there may be multiple possible whole figures they could draw given half a figure.

A cutout of the triangle is given to encourage students to physically flip the shape along its different sides and trace the

reflection, though students could also use other tools or methods to complete the task.

Required Materials

Materials to Gather

- Patty paper: Activity 3
- Protractors: Activity 3
- Rulers or straightedges: Activity 3
- Scissors: Activity 3

Materials to Copy

- What Could the Whole Figure Be Triangle Shapes (1 copy for every 2 students): Activity 3

Required Preparation

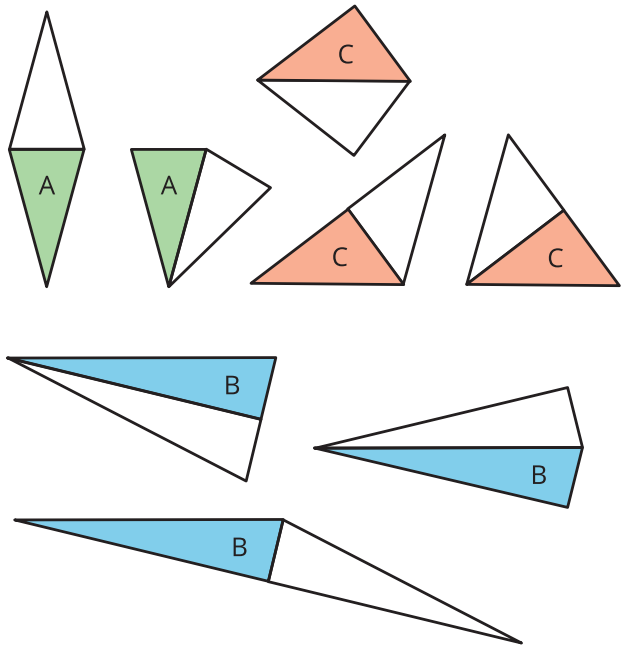
- Create a set of triangle cutouts from the blackline master for each group of 2.

Student Task Statement

Dibuja un triángulo con el recorte que te dio tu profesor.

El triángulo es la mitad de una figura completa que tiene una línea de simetría. ¿Cómo se vería la figura completa? ¿Puedes mostrar dos posibilidades?, ¿tres posibilidades? Muestra cómo pensaste. Organiza tus ideas para que los demás puedan entenderlas.

Student Response



Launch

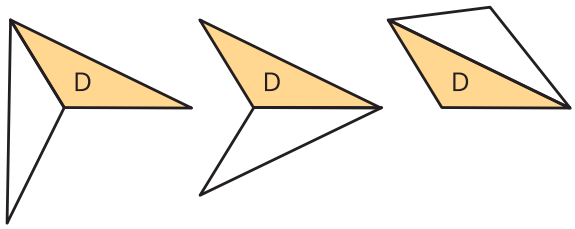
- Groups of 2–4
- Give a set of triangle cutouts from the blackline master to each group.
- Give a ruler or straightedge to each student.
- Provide access to patty paper, rulers, protractors, and scissors, in case requested.

Activity

- 4 minutes: independent work time
- 2 minutes: group discussion

Activity Synthesis

- Invite students to share their completed drawings and their strategies.
- For each triangle, ask: *"¿Es posible que haya otras figuras completas que aún no se hayan mostrado?"* // "Are there other possible whole figures that are not yet shown?" Encourage students to identify any missing possibilities.
- *"¿Alguien usó una estrategia que no fuera darle la vuelta al recorte a lo largo de un lado y dibujarlo? ¿Cuál fue esa estrategia? ¿Les ayudó?"* // "Did anyone use a strategy other than flipping the cutout along one side and tracing it? What was the strategy? How did it help you?"
- *"¿Dónde está la línea de simetría de cada dibujo que completaron?"* // "Where is the line of symmetry in each completed drawing?" (It is the side used to

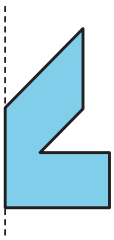


reflect the given triangle, or the side shared by the two triangles.)

Lesson Synthesis

"Hoy vimos que si nos dan la mitad de una figura y una línea de simetría, podemos dibujar una figura completa. Si queremos, podemos hacerlo con mucha precisión" // "Today we saw that, if given half of a figure and a line of symmetry, we can draw a whole figure. We can draw the whole figure precisely."

Display the last image from the second activity:



"Esta es la mitad de una figura que vieron antes. ¿De qué formas se puede encontrar la otra mitad para que la figura completa sea simétrica con respecto a la línea?" // "Here's half of a figure you saw earlier. What are some ways to find the other half so that the whole figure has line symmetry?" (Trace the half-figure on patty paper and flip it over along the line of symmetry. Cut out the half-figure, flip it over along the line of symmetry, and trace the figure. Measure how far the points at each angle are from the line of symmetry and draw them on the other side of the line. Measure the lengths and angles in the half-figure and draw a mirror image with those lengths and angles.

"¿Cómo sabrían si su dibujo se hizo correctamente?" // "How would you know if your drawing is correctly drawn?" (If we fold the drawing along the line of symmetry, the two halves would match up perfectly.)

Suggested Centers

- Symmetrical Designs (4) , Stage 1: Lines of Symmetry (Addressing)
- Which One? (K–5), Stage 4: Grade 3 Shapes (Supporting)
- Can You Draw It? (1–5), Stage 4: Area and Perimeter (Supporting)

Cool-down

5 min

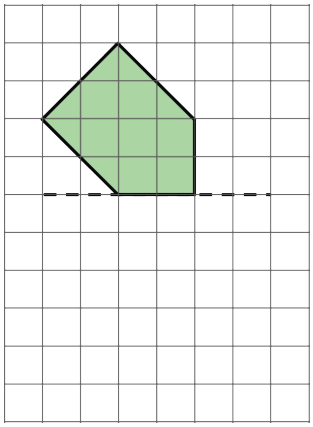
Completémoslas

Standards

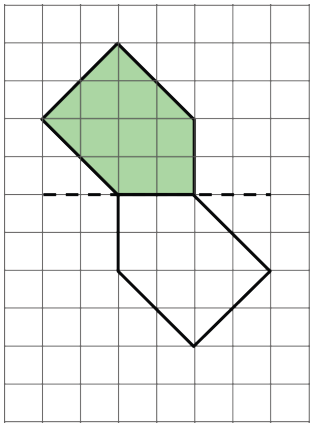
Addressing **4.G.A.3**

Student Task Statement

La figura coloreada es la mitad de una figura completa que tiene como línea de simetría a la línea punteada.



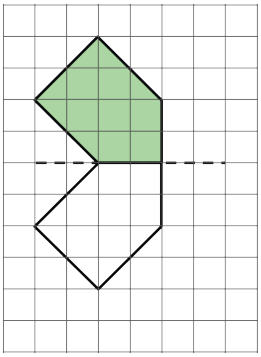
Kiran hizo este dibujo para mostrar la figura completa.



¿Estás de acuerdo con que el dibujo de Kiran muestra la figura completa correcta? Explica o muestra cómo razonaste. Si no estás de acuerdo, podrías mostrar un dibujo de la figura completa.

Student Response

Disagree. Sample response: If Kiran's drawing is folded along the dashed line, the two halves don't match up exactly. The correct whole figure should look like this:



Responding to Student Thinking

Students agree with Kiran or draw another figure that does not show the whole figure with the given line of symmetry.

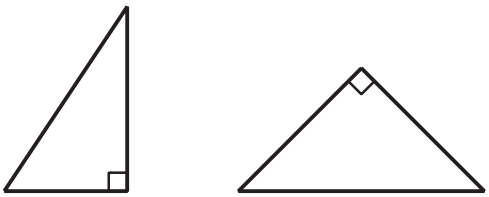
Next Day Supports
Launch the *Warm-up* or activities by highlighting important representations from previous lessons.

Section A Summary

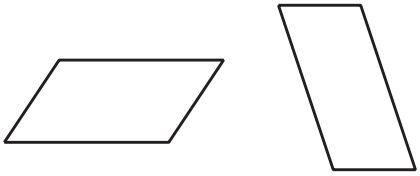
Examinamos diferentes características de las figuras, como el número de lados y sus longitudes, la medida de los lados y de los ángulos, y si las figuras tenían lados paralelos o perpendiculares.

Después usamos estas características para clasificar cuadriláteros y triángulos.

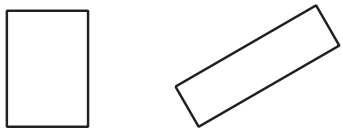
Los triángulos rectángulos tienen 1 ángulo recto.



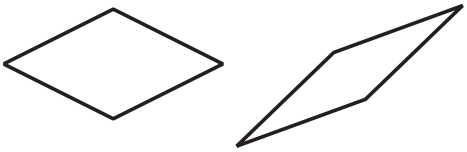
Los paralelogramos tienen 2 pares de lados paralelos.



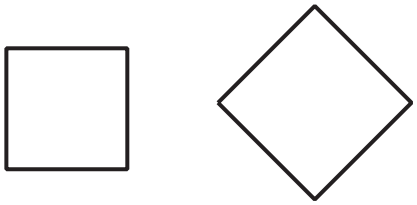
Los rectángulos tienen 2 pares de lados paralelos y 4 ángulos rectos.



Los rombos tienen 4 lados iguales.



Los cuadrados tienen 4 lados iguales y 4 ángulos rectos.



También aprendimos sobre simetría. Una figura tiene **simetría** si sus partes coinciden exactamente después de doblarla o girarla. Una figura que tiene una **línea de simetría** se puede doblar por esa línea para formar dos mitades que coinciden exactamente.