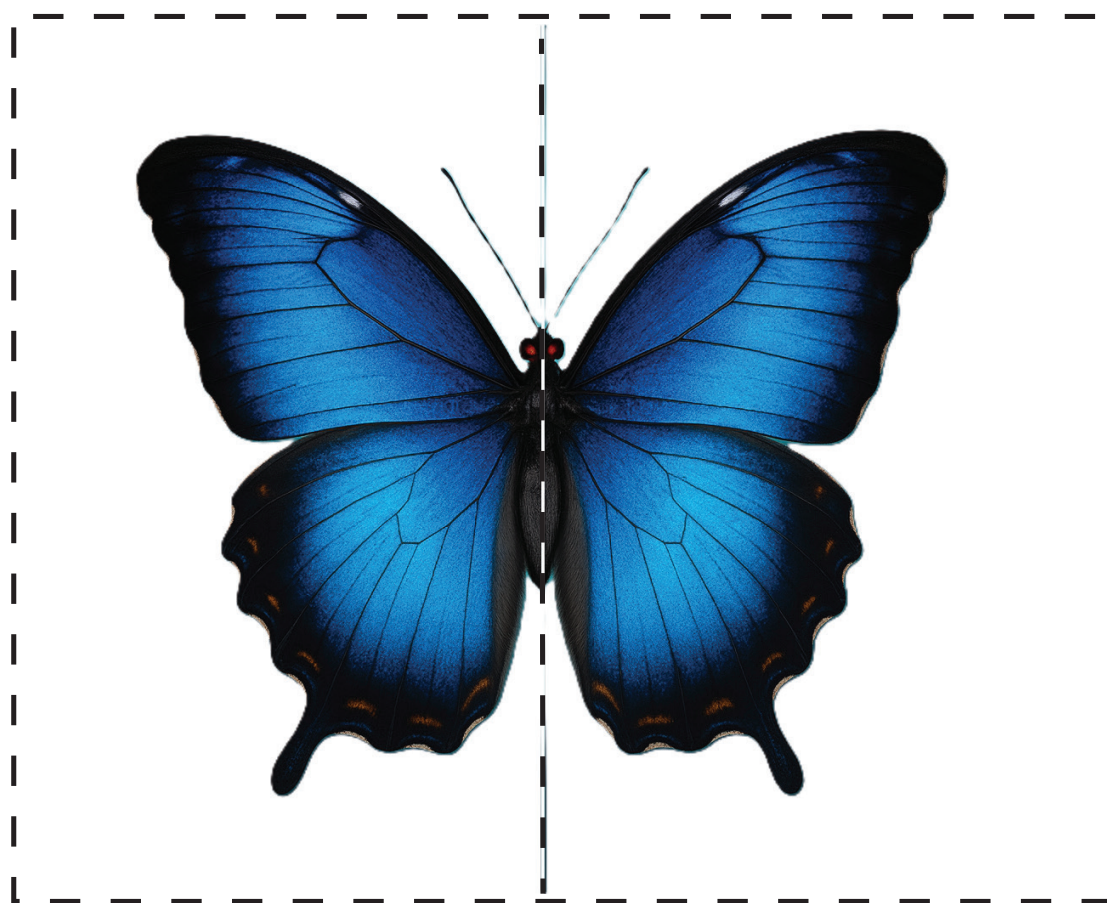


SEEING SYMMETRY

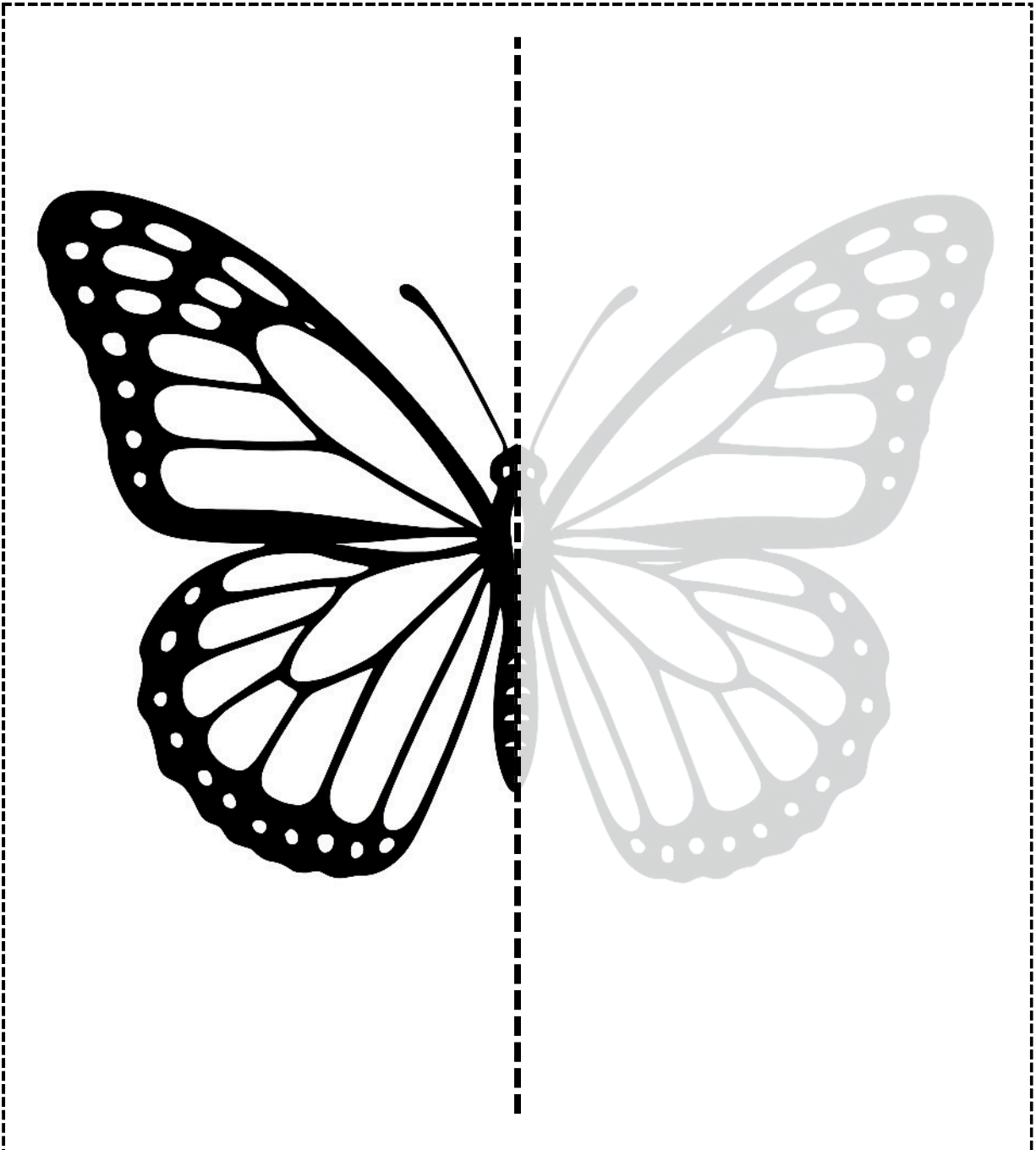


Learning About Balance, Beauty, and Design

Finish the Picture

Most people think symmetry is when you split something in half and both sides match, like looking into a mirror. This kind is called **reflective or bilateral** symmetry, and it shows up in butterfly wings, leaves, and even our faces. When you split a shape into two matching halves, the line you draw down the middle is called the **axis** of symmetry (or **line** of symmetry), both halves are **balanced**.

Activity: Finish the symmetrical picture.



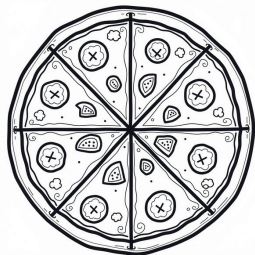
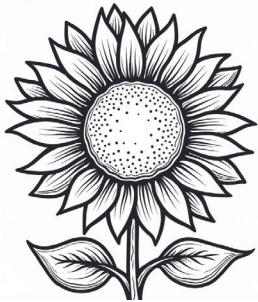
Types of Symmetry

Symmetry means a shape stays the same after a flip, turn, or slide. **Reflective** symmetry is only one type.

Rotational Symmetry-

A shape looks the same after you turn it.

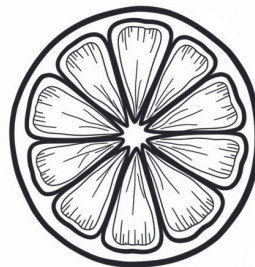
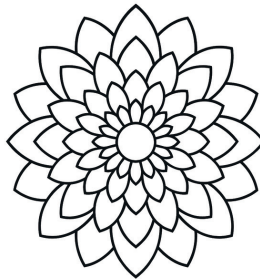
Examples: sunflower face, wheels, pizza.



Radial Symmetry-

A design spreads out from a center point.

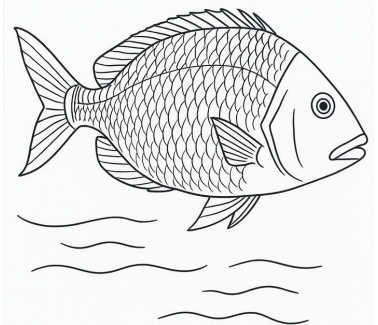
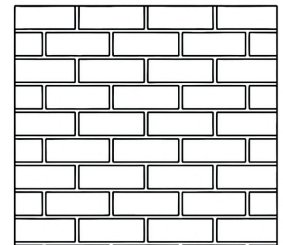
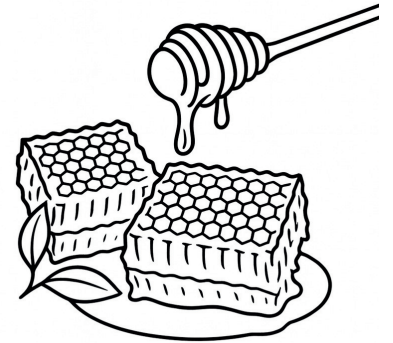
Examples: flowers, orange slices, starfish



Translational Symmetry-

A pattern repeats as it moves forward.

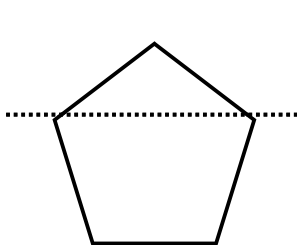
Examples: honeycomb, bricks, fish scales.

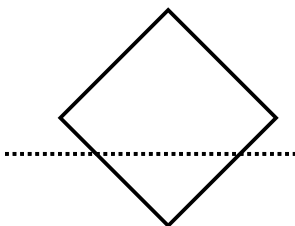


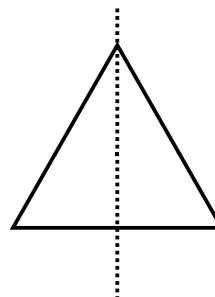


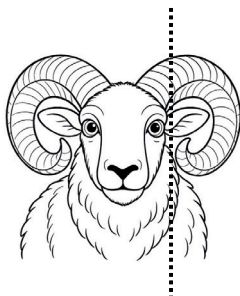
Is It Symmetrical?

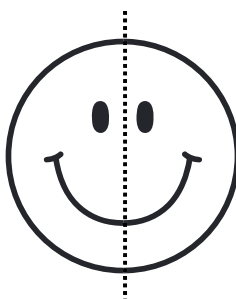
Does the dotted line create a symmetrical image?

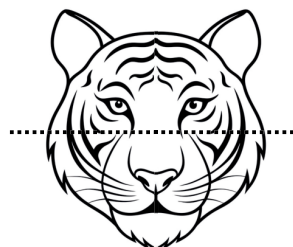


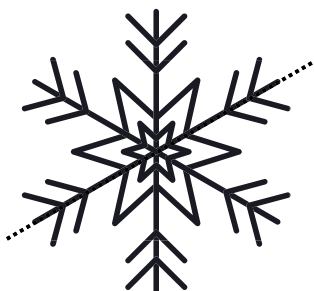


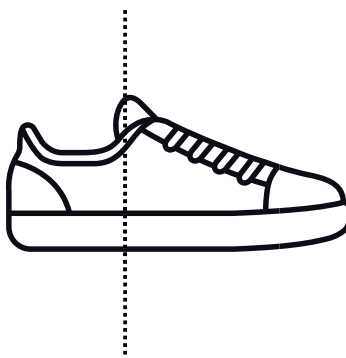


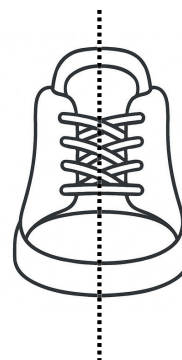












Symmetry True or False

Read each statement about symmetry. Decide if it is True or False based on what you learned

1. Reflection symmetry means one half matches the other half like a mirror.

TRUE or FALSE

2. If you draw a line down a butterfly, both sides look the same.

TRUE or FALSE

3. Rotational symmetry means a shape stays the same when you turn it around a center point.

TRUE or FALSE

4. A flower with petals arranged in a circle is an example of radial symmetry.

TRUE or FALSE

5. Translational symmetry happens when a pattern repeats as it moves forward, like bricks in a wall.

TRUE or FALSE

6. A shape must have a mirror line to be symmetrical.

TRUE or FALSE

7. An orange slice shows radial symmetry because all the sections spread out from the center.

TRUE or FALSE

8. If you flip a shape and it still looks the same, that's mirror (reflective) symmetry.

TRUE or FALSE

9. A wheel has rotational symmetry because turning it doesn't change how it looks.

TRUE or FALSE

10. All symmetry types are the same and do not need different names.

TRUE or FALSE





SCIENCE: Symmetry as a Pattern of Design

Symmetry shows up in living things because balanced shapes follow the built-in rules of how life grows and because those balanced shapes work well for survival.

Matching wings help a butterfly, a bird, a bat even an insect fly straight and steady.

Question 1- Same Pattern

Which idea is true for birds, bats, and insects?

- A) All their wings are shaped the same
- B) All their wings are symmetrical
- C) All their wings are made of feathers
- D) All their wings glow in the dark



Question 2 – Different Designs

How are bird wings, bat wings, and insect wings different?

- A) Only birds and bats can fly
- B) Birds have feathers, bats have skin, and insects have thin membranes
- C) Bats have no bones in their wings
- D) Insects have fur on their wings



Question 3 – Why Symmetry Matters

Why do all these animals have matching wings on both sides?

- A) It makes flying steady and balanced
- B) It keeps them warm in winter
- C) It helps them hide from rain
- D) It lets them swim underwater



Question 4 – Big Idea

What does the symmetry in all wings show us?

- A) Flying is impossible without feathers
- B) Every flying animal is the same
- C) Different creatures can use the same pattern in different ways
- D) Only insects really need symmetry



Imagine

What do you think would happen, if the wings were NOT symmetrical?

TECHNOLOGY: Symmetry in Machines

Symmetry helps more than living creatures — people use it when building machines too. Airplanes have matching wings so they can fly straight and steady, just like the symmetrical wings of birds and bats.

Cars are built with even frames and wheels on both sides so they can steer smoothly and stay balanced on the road. When machines are symmetrical, they're safer, stronger, and easier to control.

Question 1 — Airplanes

Why do airplanes have matching wings?

- A) To look fancy
- B) To help the plane fly straight and balanced
- C) So one wing can be huge
- D) To hold more paint



Question 2 — Comparing Nature and Technology

How are bird wings and airplane wings alike?

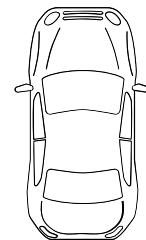
- A) Both flap
- B) Both are symmetrical to help with steady flight
- C) Both fold into pockets
- D) Both glow in the dark



Question 3 — Cars

Why do cars need symmetry?

- A) So the seats match
- B) It keeps the car stable and helps it steer correctly
- C) To make them look cool
- D) So one wheel can be bigger



Question 4 — Big Idea

What does symmetry in airplanes and cars show us?

- A) Humans copy useful patterns they see in nature
- B) Only animals need symmetry
- C) Cars don't need balance
- D) Airplanes would fly fine with crooked wings



Can you list three more machines or technology that use symmetry?

- _____
- _____
- _____

Engineering: Why Bridges and Buildings Need Symmetry

Engineers use symmetry when designing bridges and buildings because balanced shapes are strong and dependable. When both sides match, the whole structure can handle weight, weather, and movement much more safely.

- Symmetry spreads weight evenly across the structure.
- Symmetry keeps bridges and buildings from tipping or leaning.
- Symmetry helps structures stay steady during wind, weather, and vibrations.
- Symmetry makes large structures more stable and balanced.
- Symmetry allows engineers to repeat strong shapes on both sides.
- Symmetry makes construction easier and safer because pieces match.
- Symmetry helps buildings stand taller without wobbling.
- Symmetry lets bridges carry heavier loads by sharing the weight.
- Symmetry follows patterns found in nature that already work well.
- Symmetry helps structures stay strong, steady, and safe over time.

Fill in the blanks based off of the information above

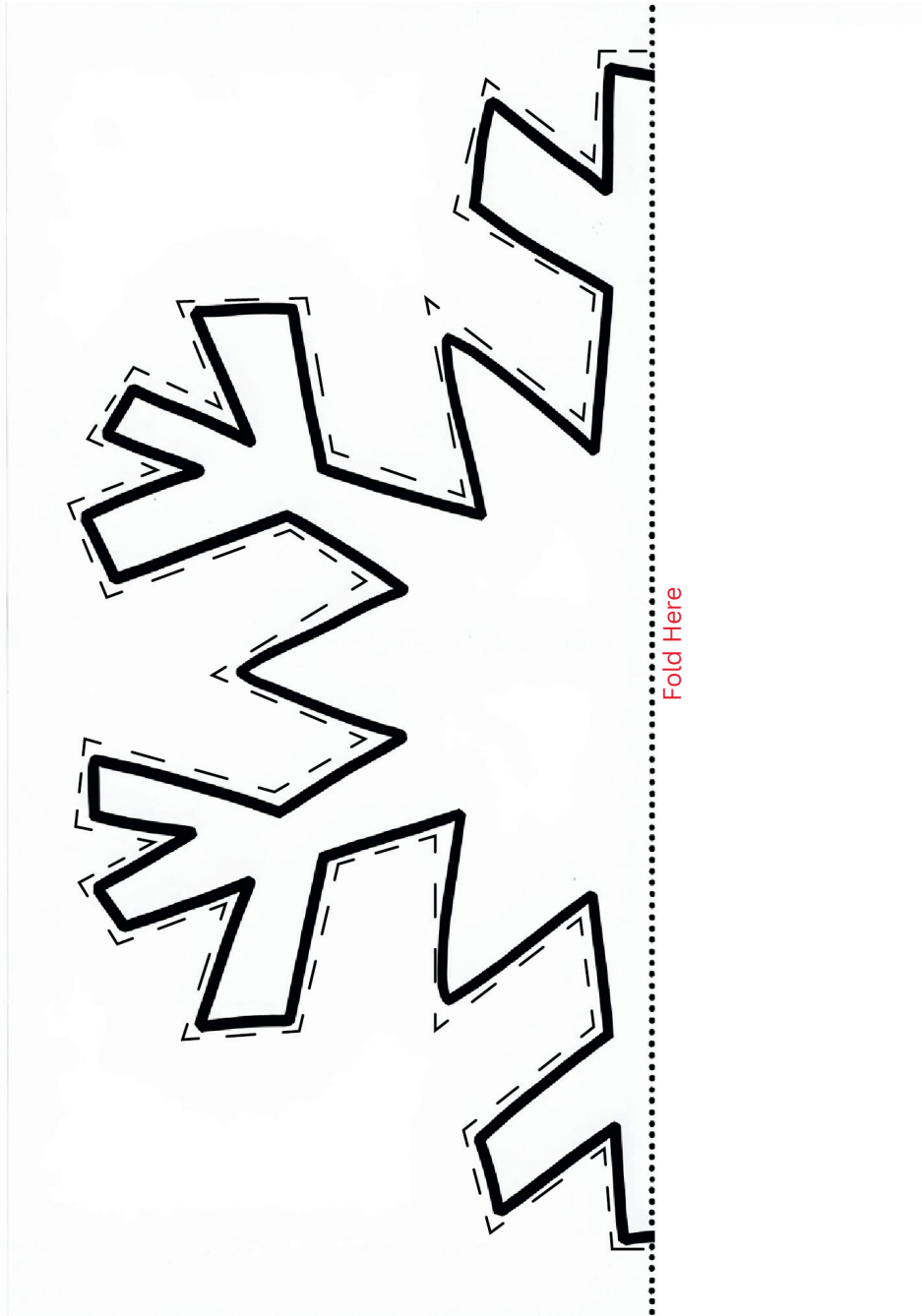
1. Engineers use _____ because balanced shapes make bridges and buildings strong.
2. When both sides of a structure match, the weight is _____ across the whole design.
3. Symmetry helps bridges and buildings stay steady during _____, weather, and vibrations.
4. Symmetry keeps big structures from tipping or _____ because each side supports the other.



ART: Symmetry-The Beauty of Balance

Artists use symmetry to create shapes that feel balanced and beautiful. Snowflakes are a perfect example — when you fold and cut paper, every snip makes matching shapes on both sides. This is symmetry you can hold in your hands.

- Fold the square paper in half.
 - Make sure the edges line up neatly.
 - Use the dotted guide on the page to place your cuts.
 - Carefully unfold your paper.
- (Your snowflake will open into a perfectly symmetrical design)

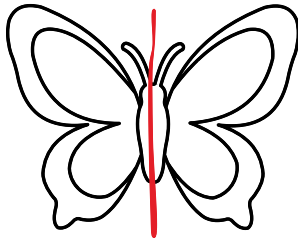


MATH: Symmetry You Can Measure

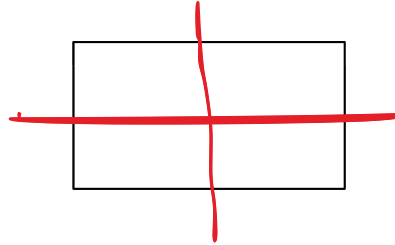
Symmetry isn't just in nature or art — it's a mathematical idea. When a shape can be folded into two matching halves, we say it has a **line of symmetry**. Some shapes have one line of symmetry, some have many, and some have none at all.

Math helps us find, count, and name these lines so we can understand how patterns are built.

Directions- Draw the lines of symmetry and circle the correct answer, follow the examples

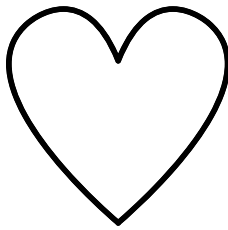


- a. 0
- ☒ b. 1
- c. 2
- d. 3

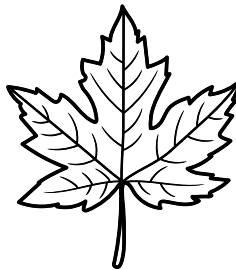


- a. 0
- b. 1
- ☒ c. 2
- d. 3

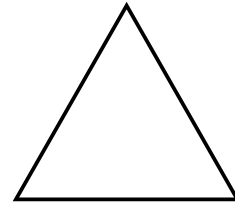
Now you try!



- a. 0
- b. 1
- c. 2
- d. 3



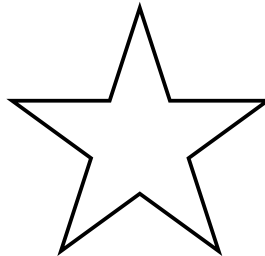
- a. 1
- b. 2
- c. 3
- d. 4



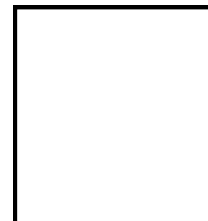
- a. 1
- b. 2
- c. 3
- d. 4



- a. 0
- b. 1
- c. 2
- d. 3



- a. 2
- b. 3
- c. 4
- d. 5



- a. 2
- b. 3
- c. 4
- d. 5

Symmetry Multiple Choice

Page 1 of 2

Choose the best answer for each multiple choice question. Write the best answer on the line. _____

1. What is a line of symmetry?

- A. A line that measures angles
- B. A line that divides a shape into two matching halves
- C. A line used only in art class
- D. A line that makes shapes bigger

2. A butterfly shows which kind of symmetry?

- A. No symmetry
- B. Rotational symmetry
- C. Bilateral (reflective) symmetry
- D. Horizontal growth symmetry

3. If you fold a shape along its line of symmetry, the halves should:

- A. Look completely different
- B. Match perfectly
- C. Get bigger
- D. Disappear

4. Which object is MOST likely to have exactly one line of symmetry?

- A. A heart
- B. A rectangle
- C. An octagon
- D. A snowflake

5. A circle has how many lines of symmetry?

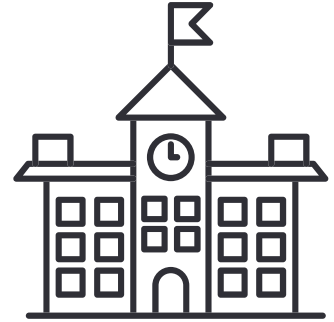
- A. Zero
- B. One
- C. Four
- D. Many

6. When the wings of a dragonfly match on both sides, this shows:

- A. Balance
- B. Rotation
- C. Chaos
- D. Texture

7. Which shape has more than one line of symmetry?

- A. A heart
- B. Rectangle
- C. Letter F
- D. A handprint



Symmetry Multiple Choice

Page 2 of 2

Choose the best answer for each multiple choice question. Write the best answer on the line. _____

8. Radial symmetry means a design repeats:

- A. From side to side
- B. In a circle around a center point
- C. Only on the bottom
- D. In straight lines only

9. An axis of symmetry is:

- A. A tool used to measure heat
- B. The center of a mirror reflection
- C. A pattern with no order
- D. A shadow on the ground

10. Which object below shows radial symmetry?

- A. A leaf
- B. A snowflake
- C. A shoe
- D. A pencil

11. A shape with more than one line of symmetry usually has what kind of design?

- A. A repeating pattern
- B. A random pattern
- C. A tilted pattern
- D. A faded pattern

12. Which statement about symmetry is TRUE?

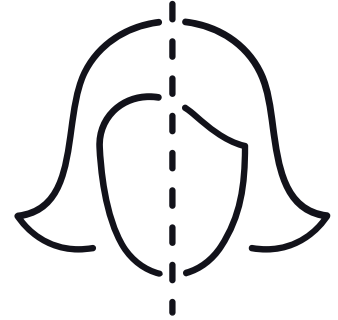
- A. Only insects have symmetry
- B. Symmetry helps designs look balanced
- C. Symmetry means “messy and uneven”
- D. Symmetry is only found in art

13. A star has lines of symmetry because:

- A. Its points repeat evenly around a center
- B. It is made of gas
- C. It glows
- D. Its shape changes every day

14. When you look in a mirror, you see:

- A. A random pattern
- B. A symmetrical reflection
- C. A rotated copy
- D. A giant shadow



SYMMETRY CROSSWORD

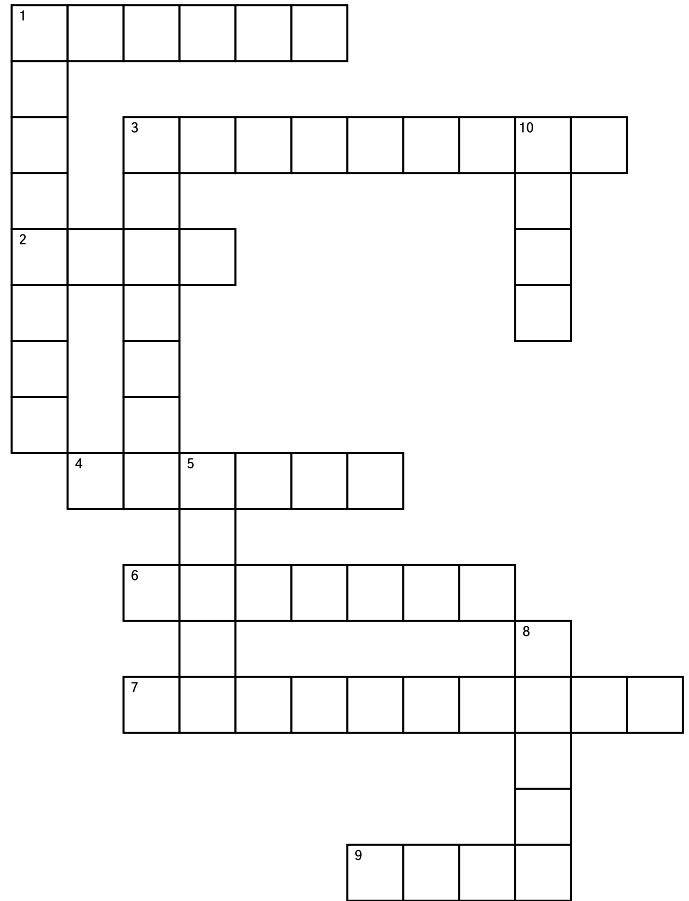
Use the clues to fill in the crossword. Each word is part of the patterns and symmetry we explore in this workbook.

Down:

1. Looking exactly alike in size, shape, or position
3. When both sides of something look even and not heavier on one side
5. The outline of something, like a circle, triangle, or butterfly wing
8. The matching left and right sides of insects and birds that show symmetry
10. A straight path we draw to show where a picture can be split into equal parts

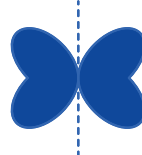
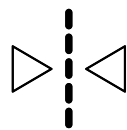
Across:

1. Something that shows a backwards copy of whatever is in front of it
2. One of two equal parts of a whole
3. An animal with two wings that look the same on both sides
4. A planned arrangement of shapes or lines that creates a balanced look
6. A design that repeats in a clear, organized way
7. The flipped image you see in a mirror or in still water
9. The imaginary line that runs down the middle, where two sides mirror each other



WORD BANK

line	design
mirror	butterfly
balance	axis
reflection	matching
pattern	half
shape	wing



SYMMETRY WORD SEARCH

V	J	N	T	Q	X	C	P	M	E	L	J	E	P
G	L	R	D	G	V	E	N	E	I	C	I	A	N
P	F	E	U	Q	R	O	R	R	I	M	T	N	D
C	W	F	G	S	H	A	P	E	G	T	E	Y	E
A	S	L	S	N	A	E	T	N	E	D	J	J	W
W	I	E	K	M	A	T	C	R	M	H	R	T	I
L	X	C	Q	D	A	H	N	N	O	U	F	P	N
I	A	T	T	S	J	T	X	B	A	L	V	K	G
S	E	I	I	S	X	P	C	K	A	L	V	D	S
Y	F	O	G	L	H	G	B	H	W	A	A	C	P
P	M	N	I	E	U	C	K	D	I	Y	M	B	T
Z	G	O	T	Q	P	Y	Y	Y	V	N	L	O	B
K	Y	L	F	R	E	T	T	U	B	K	G	B	V
S	A	D	E	S	I	G	N	E	W	R	A	E	D

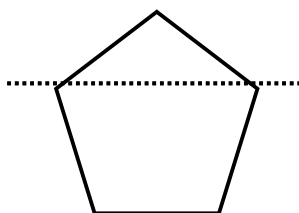
DESIGN
BUTTERFLY
PATTERN
MIRROR
SHAPE
AXIS

REFLECTION
MATCHING
BALANCE
WINGS
HALF
LINE

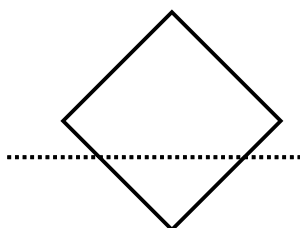


Is It Symmetrical?

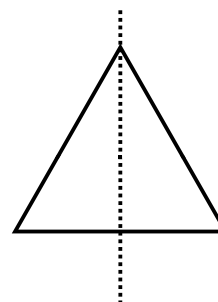
Does the dotted line create a symmetrical image?



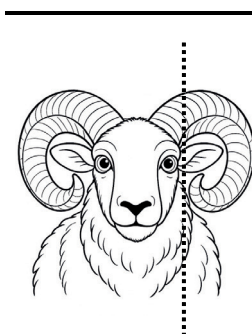
Pentagon (horizontal line) — **NOT** symmetrical
The dotted line cuts across the upper third of the pentagon, not through its center.
The top half is much smaller than the bottom half, so the sides don't match.



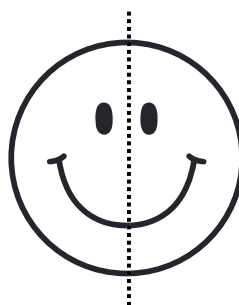
Diamond (horizontal line) — **NOT** symmetrical
The line is placed too low.
The top triangle is larger than the bottom triangle, so the halves are not equal.



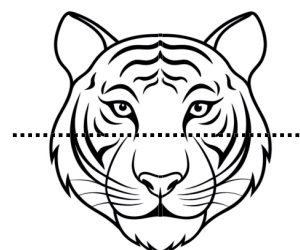
Yes



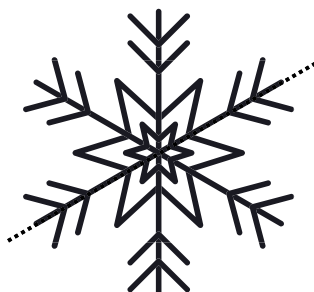
Ram head (vertical line) — **NOT** symmetrical
The horns curve differently on each side, and the face is slightly turned.
Because the head is not facing perfectly forward, the two halves don't match.



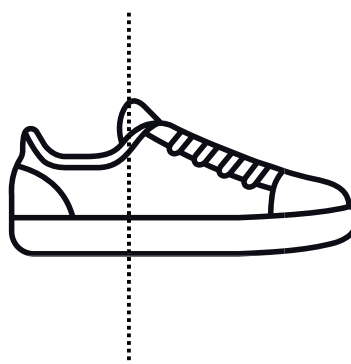
Yes



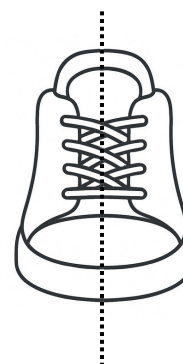
Tiger head (horizontal line) — **NOT** symmetrical
A horizontal line cuts the tiger across the middle. The top of the head and the bottom of the head are not mirror images of each other. Mirror symmetry requires a vertical line for a forward-facing animal.



Yes



Side-view sneaker (vertical line) — **NOT** symmetrical
A side view of a shoe shows only one side of the sneaker. There is no way a vertical mirror line can reflect the unseen side, so the halves don't match.



Yes

Symmetry True or False

Read each statement about symmetry. Decide if it is True or False based on what you learned

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☒ TRUE or ☐ FALSE

2. If you draw a line down a butterfly, both sides look the same.

☒ TRUE or ☐ FALSE

3. Rotational symmetry means a shape stays the same when you turn it around a center point.

☒ TRUE or ☐ FALSE

4. A flower with petals arranged in a circle is an example of radial symmetry.

☒ TRUE or ☐ FALSE

5. Translational symmetry happens when a pattern repeats as it moves forward, like bricks in a wall.

☒ TRUE or ☐ FALSE

6. A shape must have a mirror line to be symmetrical.

☐ TRUE or ☒ FALSE Not all symmetry uses a mirror line. Rotational, radial, and translational don't.

7. An orange slice shows radial symmetry because all the sections spread out from the center.

☒ TRUE or ☐ FALSE

8. If you flip a shape and it still looks the same, that's mirror (reflective) symmetry.

☒ TRUE or ☐ FALSE

9. A wheel has rotational symmetry because turning it doesn't change how it looks.

☒ TRUE or ☐ FALSE

10. All symmetry types are the same and do not need different names.

☐ TRUE or ☒ FALSE There are different kinds of symmetry with different names and rules.





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Symmetry shows up in living things because balanced shapes follow the built-in rules of how life grows and because those balanced shapes work well for survival.

Matching wings help a butterfly, a bird, a bat even an insect fly straight and steady.

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How are bird wings, bat wings, and insect wings different?

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- C) Bats have no bones in their wings
- D) Insects have fur on their wings



Question 3 – Why Symmetry Matters

Why do all these animals have matching wings on both sides?

- ☒ A) It makes flying steady and balanced
- B) It keeps them warm in winter
- C) It helps them hide from rain
- D) It lets them swim underwater



Question 4 – Big Idea

What does the symmetry in all wings show us?

- A) Flying is impossible without feathers
- B) Every flying animal is the same
- ☒ C) Different creatures can use the same pattern in different ways
- D) Only insects really need symmetry



Imagine

What do you think would happen, if the wings were NOT symmetrical?

TECHNOLOGY: Symmetry in Machines

Symmetry helps more than living creatures — people use it when building machines too. Airplanes have matching wings so they can fly straight and steady, just like the symmetrical wings of birds and bats.

Cars are built with even frames and wheels on both sides so they can steer smoothly and stay balanced on the road. When machines are symmetrical, they're safer, stronger, and easier to control.

Question 1 — Airplanes

Why do airplanes have matching wings?

- A) To look fancy
- ☒ B) To help the plane fly straight and balanced
- C) So one wing can be huge
- D) To hold more paint



Question 2 — Comparing Nature and Technology

How are bird wings and airplane wings alike?

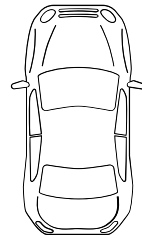
- A) Both flap
- ☒ B) Both are symmetrical to help with steady flight
- C) Both fold into pockets
- D) Both glow in the dark



Question 3 — Cars

Why do cars need symmetry?

- A) So the seats match
- ☒ B) It keeps the car stable and helps it steer correctly
- C) To make them look cool
- D) So one wheel can be bigger



Question 4 — Big Idea

What does symmetry in airplanes and cars show us?

- ☒ A) Humans copy useful patterns they see in nature
- B) Only animals need symmetry
- C) Cars don't need balance
- D) Airplanes would fly fine with crooked wings



Can you list three more machines or technology that use symmetry?

*Just a few examples

- bicycles boats
- helicopters drones
- roller skates scooters

Engineering: Why Bridges and Buildings Need Symmetry

Engineers use symmetry when designing bridges and buildings because balanced shapes are strong and dependable. When both sides match, the whole structure can handle weight, weather, and movement much more safely.

- Symmetry spreads weight evenly across the structure.
- Symmetry keeps bridges and buildings from tipping or leaning.
- Symmetry helps structures stay steady during wind, weather, and vibrations.
- Symmetry makes large structures more stable and balanced.
- Symmetry allows engineers to repeat strong shapes on both sides.
- Symmetry makes construction easier and safer because pieces match.
- Symmetry helps buildings stand taller without wobbling.
- Symmetry lets bridges carry heavier loads by sharing the weight.
- Symmetry follows patterns found in nature that already work well.
- Symmetry helps structures stay strong, steady, and safe over time.

Fill in the blanks based off of the information above

1. Engineers use symmetry because balanced shapes make bridges and buildings strong.
2. When both sides of a structure match, the weight is even across across the whole design.
3. Symmetry helps bridges and buildings stay steady during wind, weather, and vibrations.
4. Symmetry keeps big structures from tipping or leaning because each side supports the other.



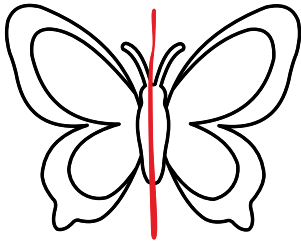
ANSWERS

MATH: Symmetry You Can Measure

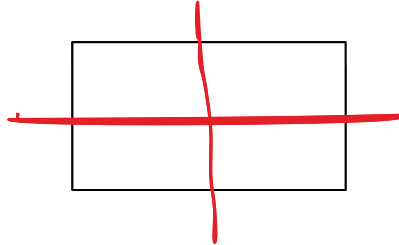
Symmetry isn't just in nature or art — it's a mathematical idea. When a shape can be folded into two matching halves, we say it has a **line of symmetry**. Some shapes have one line of symmetry, some have many, and some have none at all.

Math helps us find, count, and name these lines so we can understand how patterns are built.

Directions- Draw the lines of symmetry and circle the correct answer, follow the examples

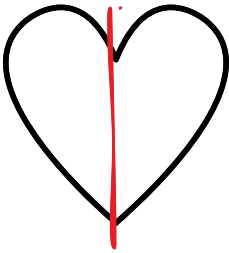


- a. 0
- ☒ b. 1
- c. 2
- d. 3

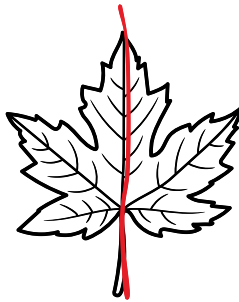


- a. 0
- b. 1
- ☒ c. 2
- d. 3

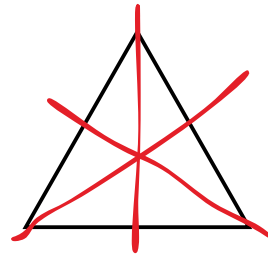
Now you try!



- a. 0
- ☒ b. 1
- c. 2
- d. 3



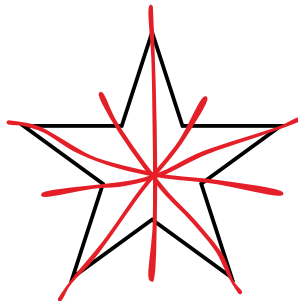
- ☒ a. 1
- b. 2
- c. 3
- d. 4



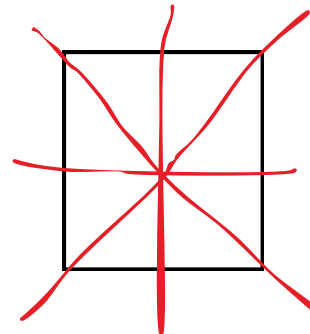
- a. 1
- b. 2
- ☒ c. 3
- d. 4



- ☒ a. 0
- b. 1
- c. 2
- d. 3



- a. 2
- b. 3
- c. 4
- ☒ d. 5



- a. 2
- b. 3
- ☒ c. 4
- d. 5

Symmetry Multiple Choice

Page 1 of 2

Choose the best answer for each multiple choice question. Write the best answer on the line. _____

B

1. What is a line of symmetry?

- A. A line that measures angles
- B. A line that divides a shape into two matching halves
- C. A line used only in art class
- D. A line that makes shapes bigger

C

2. A butterfly shows which kind of symmetry?

- A. No symmetry
- B. Rotational symmetry
- C. Bilateral (reflective) symmetry
- D. Horizontal growth symmetry

B

3. If you fold a shape along its line of symmetry, the halves should:

- A. Look completely different
- B. Match perfectly
- C. Get bigger
- D. Disappear

A

4. Which object is MOST likely to have exactly one line of symmetry?

- A. A heart
- B. A rectangle
- C. An octagon
- D. A snowflake

D

5. A circle has how many lines of symmetry?

- A. Zero
- B. One
- C. Four
- D. Many

A

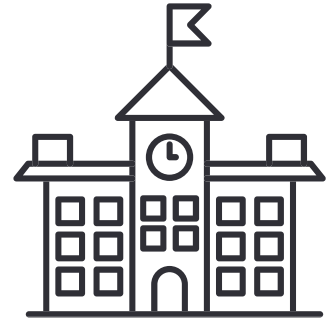
6. When the wings of a dragonfly match on both sides, this shows:

- A. Balance
- B. Rotation
- C. Chaos
- D. Texture

B

7. Which shape has more than one line of symmetry?

- A. A heart
- B. Rectangle
- C. Letter F
- D. A handprint



ANSWERS

Symmetry Multiple Choice

Page 2 of 2

Choose the best answer for each multiple choice question. Write the best answer on the line. _____

B

8. Radial symmetry means a design repeats:

- A. From side to side
- B. In a circle around a center point
- C. Only on the bottom
- D. In straight lines only

B

9. An axis of symmetry is:

- A. A tool used to measure heat
- B. The center of a mirror reflection
- C. A pattern with no order
- D. A shadow on the ground

B

10. Which object below shows radial symmetry?

- A. A leaf
- B. A snowflake
- C. A shoe
- D. A pencil

A

11. A shape with more than one line of symmetry usually has what kind of design?

- A. A repeating pattern
- B. A random pattern
- C. A tilted pattern
- D. A faded pattern

B

12. Which statement about symmetry is TRUE?

- A. Only insects have symmetry
- B. Symmetry helps designs look balanced
- C. Symmetry means “messy and uneven”
- D. Symmetry is only found in art

C

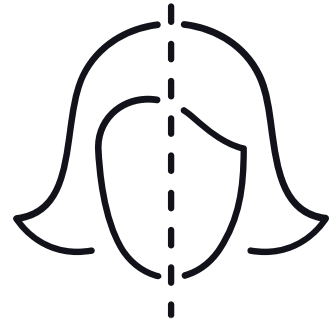
13. A star has lines of symmetry because:

- A. It glows
- B. It is made of gas
- C. Its points repeat evenly around a center
- D. Its shape changes every day

D

14. When you look in a mirror, you see:

- A. A random pattern
- B. A giant shadow
- C. A rotated copy
- D. A symmetrical reflection



ANSWERS

SYMMETRY CROSSWORD

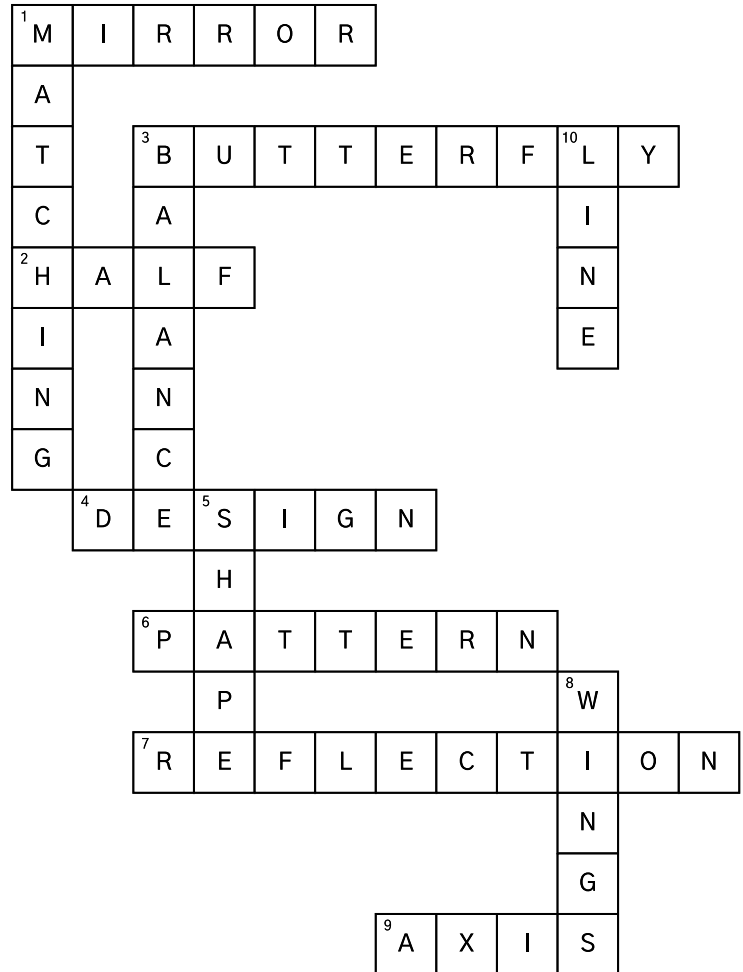
Use the clues to fill in the crossword. Each word is part of the patterns and symmetry we explore in this workbook.

Down:

1. Looking exactly alike in size, shape, or position
3. When both sides of something look even and not heavier on one side
5. The outline of something, like a circle, triangle, or butterfly wing
8. The matching left and right sides of insects and birds that show symmetry
10. A straight path we draw to show where a picture can be split into equal parts

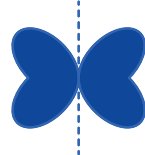
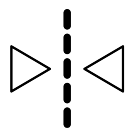
Across:

1. Something that shows a backwards copy of whatever is in front of it
2. One of two equal parts of a whole
3. An animal with two wings that look the same on both sides
4. A planned arrangement of shapes or lines that creates a balanced look
6. A design that repeats in a clear, organized way
7. The flipped image you see in a mirror or in still water
9. The imaginary line that runs down the middle, where two sides mirror each other

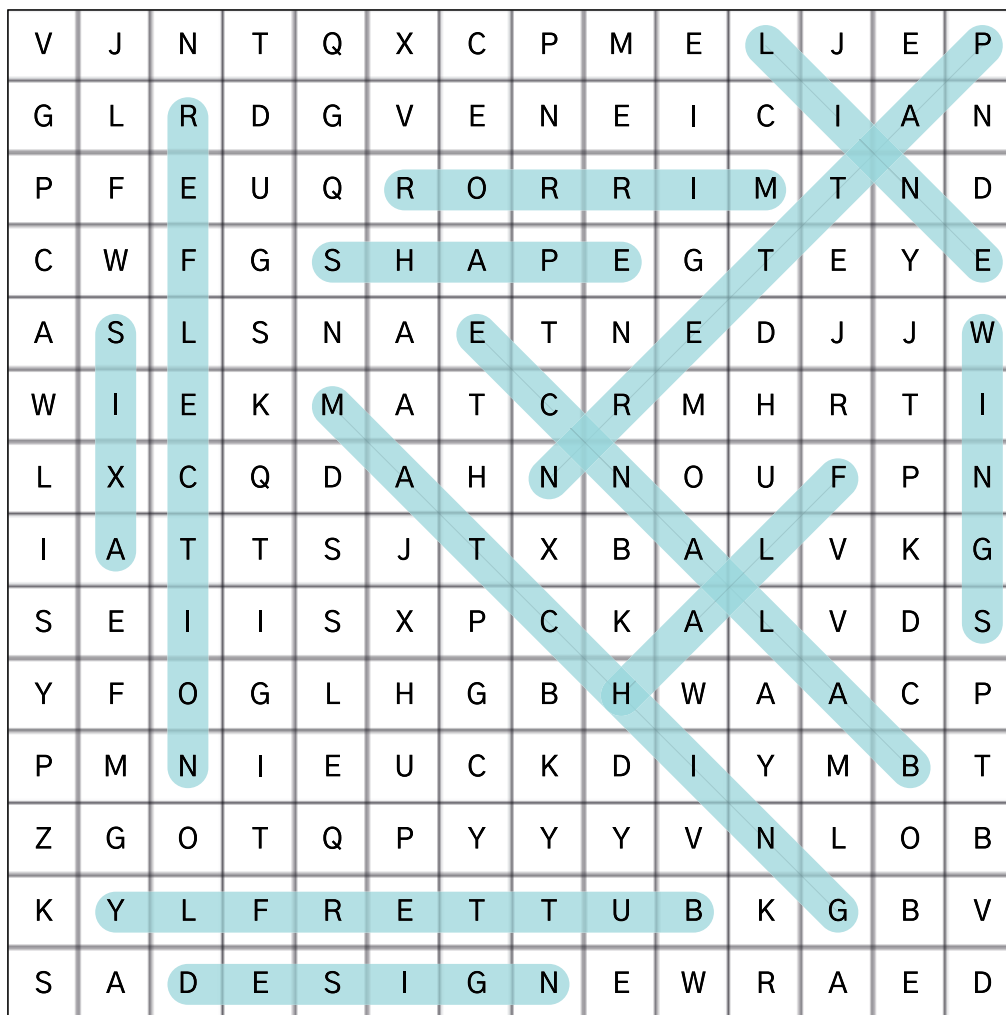


WORD BANK

line	design
mirror	butterfly
balance	axis
reflection	matching
pattern	half
shape	wing



SYMMETRY WORD SEARCH



DESIGN
BUTTERFLY
PATTERN
MIRROR
SHAPE
AXIS

REFLECTION
MATCHING
BALANCE
WINGS
HALF
LINE