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Flip, Slide or Turn - Year 5

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TRANSFORMATION TOOLKIT

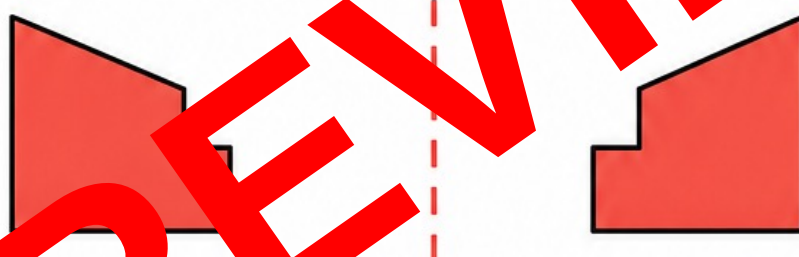
TRANSLATION

Slide a shape. Its size, shape and orientation stay the same.



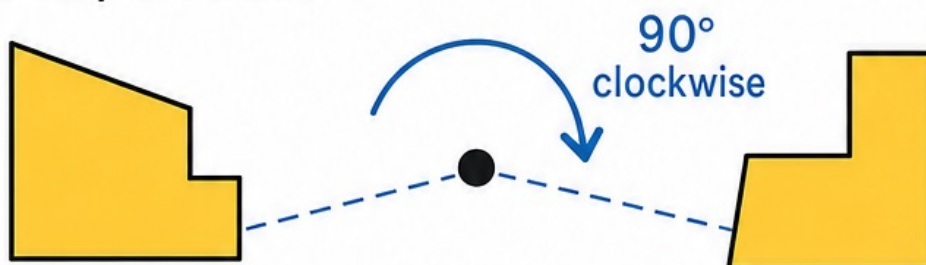
REFLECTION

Flip a shape across a mirror line. Its size and shape stay the same; its orientation reverses.



ROTATION

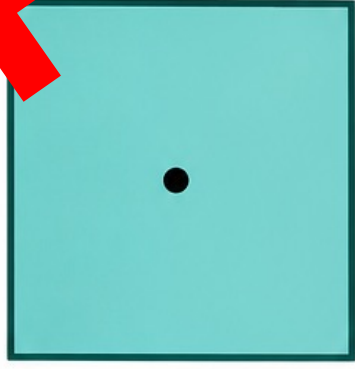
Turn a shape around a fixed centre. Its size and shape stay the same.



WHAT ALWAYS STAYS THE SAME?

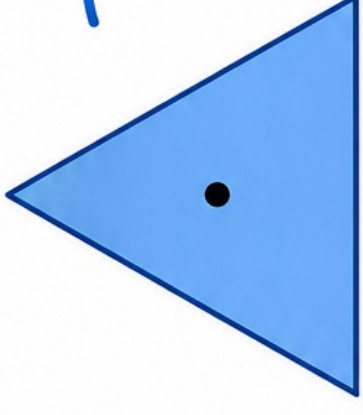
Side lengths • Angle sizes • Shape • Area

ROTATIONAL SYMMETRY



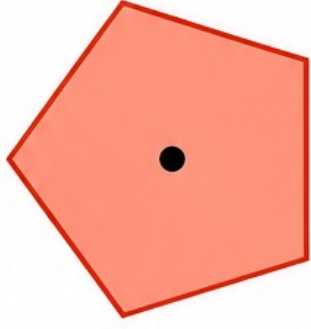
SQUARE

Order 4 • Smallest turn 90°



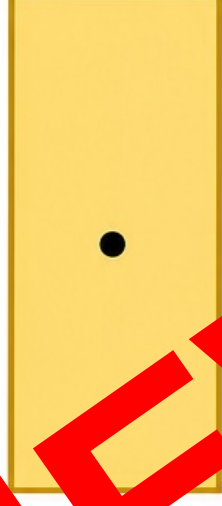
EQUILATERAL TRIANGLE

Order 3 • Smallest turn 120°



REGULAR PENTAGON

Order 5 • Smallest turn 72°



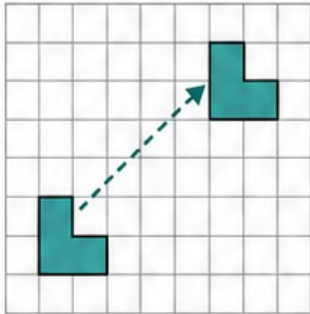
RECTANGLE

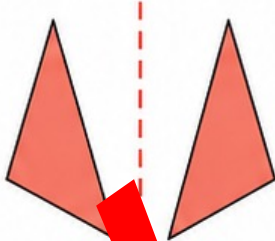
Order 2 • Smallest turn 180°

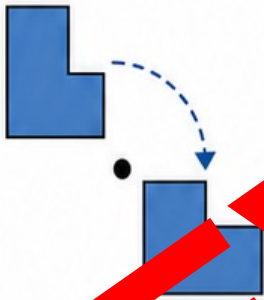
The order tells how many times a shape matches itself in one full turn.

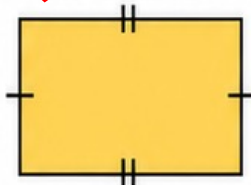
TRANSFORMATION DOMINOES

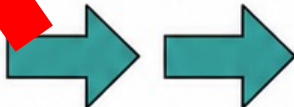
Cards 1–8 • Cut on the dashed lines

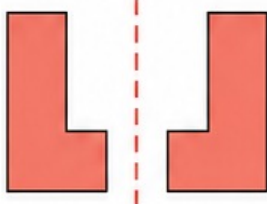
TRANSLATION	Slide 4 right, 2 up 
--------------------	--

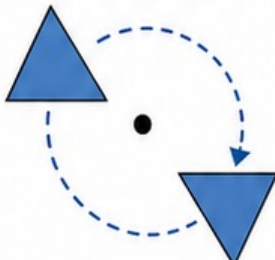
REFLECTION	Flip across a vertical line 
-------------------	--

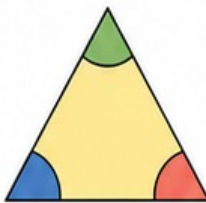
ROTATION	Turn 90° clockwise 
-----------------	--

INVARIANT	Side lengths stay equal 
------------------	---

TRANSLATION	Same orientation 
--------------------	---

REFLECTION	Orientation reverses 
-------------------	---

ROTATION	Turn around a fixed centre 
-----------------	---

INVARIANT	Angle sizes stay equal 
------------------	---

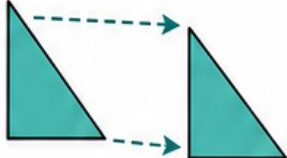
TRANSFORMATION DOMINOES

Cards 9–16 • Cut on the dashed lines

9.

TRANSLATION

Every point moves equally



10.

REFLECTION

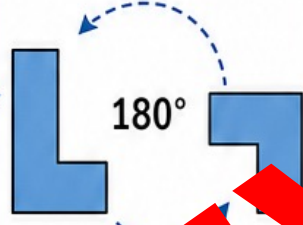
Mirror line



11.

ROTATION

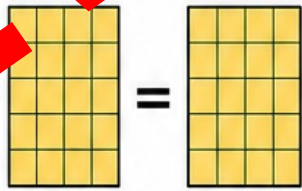
Turn 180°



12.

INVARIANT

Area stays equal



13.

TRANSLATION

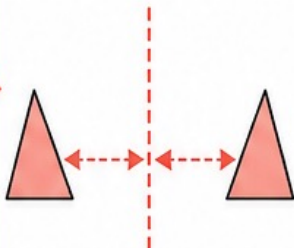
Sliding or flipping



14.

REFLECTION

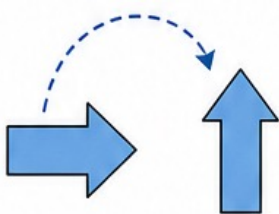
Equal distance from the line



15.

ROTATION

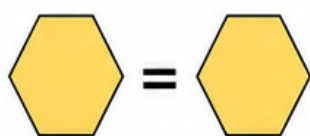
Quarter turn anticlockwise



16.

INVARIANT

Shape and size stay the same





TRANSLATE

TURNING SHAPE TRAIL



REFLECT



ROTATE



EXPLAIN

HOW TO PLAY

1. Roll a die and move.
2. Take a challenge card that matches your space.
3. Explain or show your answer.
4. A correct answer keeps your place. First to **FINISH** wins.



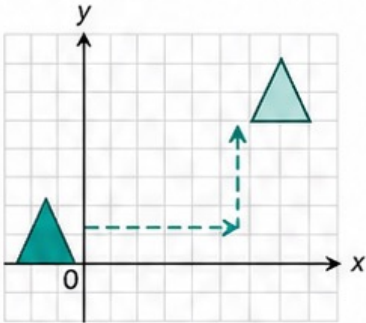
T Translate • **F** Reflect • **R** Rotate • ★ Explain

TURNING SHAPE TRAIL

Challenge Cards • Cut on the dashed lines

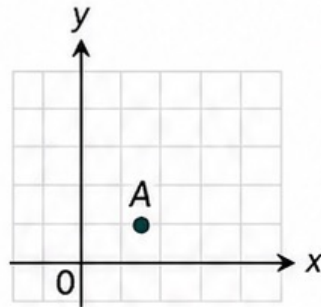
TRANSLATE

Move a triangle 3 right and 2 up. Describe the vector.



TRANSLATE

Point A is at (2, 1). Move it 4 right and 3 up. Where is A'?



TRANSLATE

What stays the same after a translation?



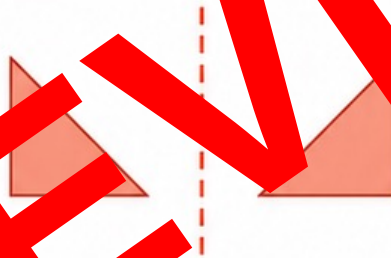
REFLECT

Reflect an arrow across a vertical mirror line.



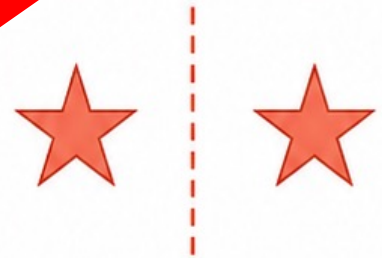
REFLECT

How does orientation change after reflection?



REFLECT

What must be equal on both sides of a mirror line?



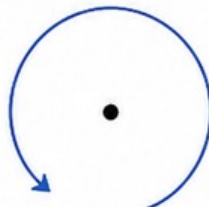
ROTATE

Turn an L-shape 90 degrees clockwise about a centre point.



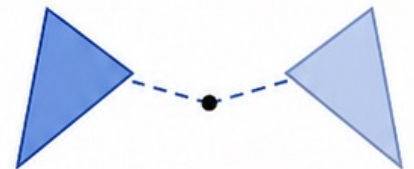
ROTATE

Describe a half-turn using degrees.



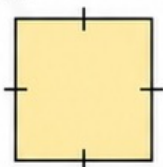
ROTATE

What stays fixed during a rotation?



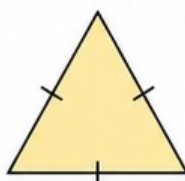
EXPLAIN

What is the rotational symmetry order of a square?



EXPLAIN

What is the smallest turn for an equilateral triangle?



EXPLAIN

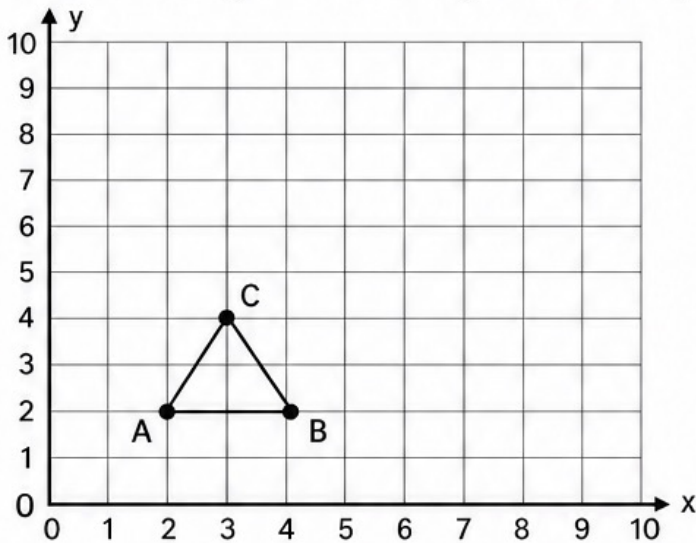
Name three properties preserved by every rigid transformation.

TRANSLATION VECTOR DETECTIVE

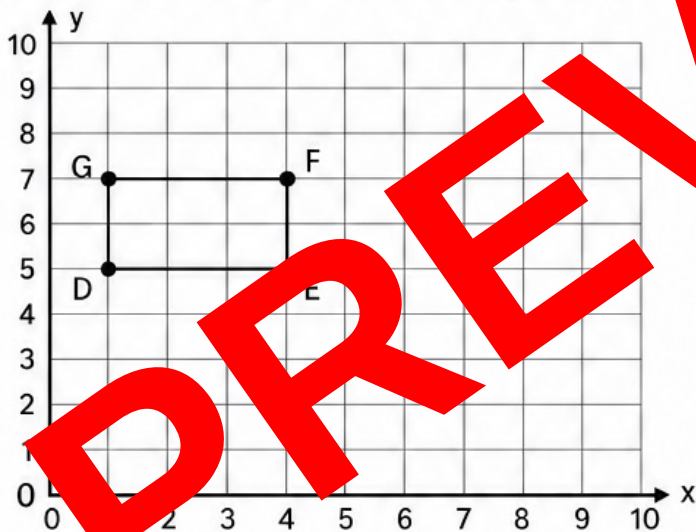
Page 1 • Follow the vector

Translate each object. Label every image point with a prime symbol.

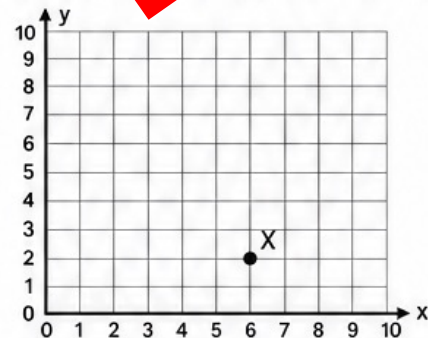
1. Translate triangle ABC 4 units right and 3 units up. Draw $A'B'C'$.



2. Translate rectangle DEFG 3 units right and 4 units down. Draw $D'E'F'G'$.



3. Move point X 2 units left and 5 units up. Record $X' = (\underline{\hspace{1cm}}, \underline{\hspace{1cm}})$.



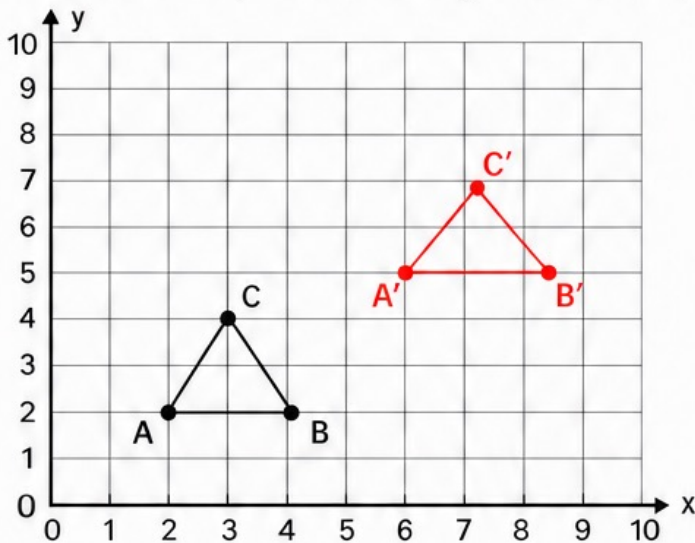
4. What changes and what stays the same during a translation?

TRANSLATION VECTOR DETECTIVE

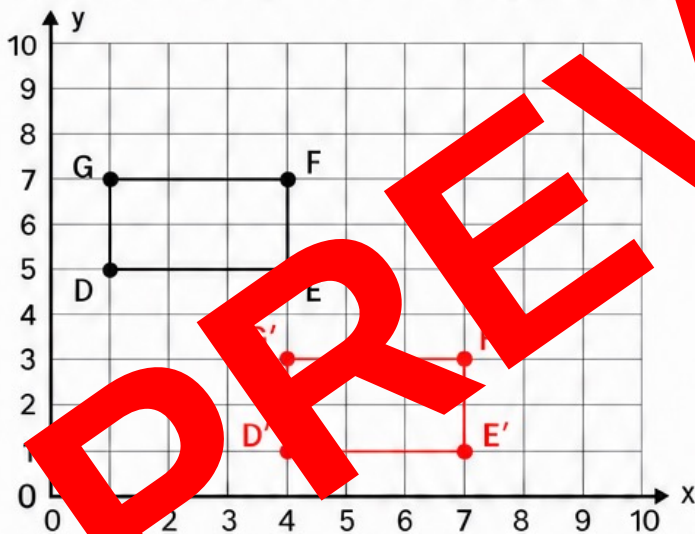
Page 1 • Follow the vector

Translate each object. Label every image point with a prime symbol.

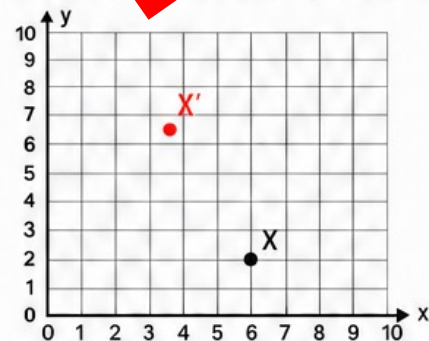
1. Translate triangle ABC 4 units right and 3 units up. Draw $A'B'C'$.



2. Translate rectangle DEFG 3 units right and 4 units down. Draw $D'E'F'G'$.



3. Move point X 4 units left and 5 units up. Record $X' = (\underline{4}, \underline{7})$.



4. What changes and what stays the same during a translation?

Position changes. Size, shape, orientation, side lengths and angle sizes stay the same.

Name: _____

Date: _____

TRANSLATION VECTOR DETECTIVE

Page 2 • Reason and explain

1. Follow each two-step route. Record the final point.

	Start	First move	Second move	Final point
a	P(2, 2)	5 right, 2 up	2 left, 3 up	$P' = (\underline{\quad}, \underline{\quad})$
b	Q(8, 4)	3 left, 4 up	1 right, 2 down	$Q' = (\underline{\quad}, \underline{\quad})$
c	R(1, 7)	6 right, 3 down	2 right, 1 up	$R' = (\underline{\quad}, \underline{\quad})$

2. Find the single translation.

$$A(2, 7) \rightarrow A'(7, 3)$$

$$B(4, 1) \rightarrow B'(9, 4)$$

_____ units right and _____ units down

3. Mia says, 'A translation 2 units right and 2 units up changes a shape's orientation.' Is Mia correct? Explain.

4. Create a translation with a net movement of 3 units right and 5 units up. Write two different two-step routes.

Route A: _____

Route B: _____

5. List three properties that stay the same after any translation.

1. _____
2. _____
3. _____

Name: **ANSWERS**

Date: _____

TRANSLATION VECTOR DETECTIVE

Page 2 • Reason and explain

1. Follow each two-step route. Record the final point.

	Start	First move	Second move	Final point
a	$P(2, 2)$	5 right, 2 up	2 left, 3 up	$P' = (5, 7)$
b	$Q(8, 4)$	3 left, 4 up	1 right, 2 down	$Q' = (6, 6)$
c	$R(1, 7)$	6 right, 3 down	2 right, 1 up	$R' = (9, 6)$

2. Find the single translation.

$$A(2, 7) \rightarrow A'(7, 3)$$

$$B(4, 1) \rightarrow B'(9, 4)$$

5 units right and 4 units down

3. Mia says, 'A translation 2 units right and 2 units up changes a shape's orientation.'
Is Mia correct? Explain.

No. A translation changes position but keeps the same orientation.

4. Create a translation with a net movement of 3 units right and 5 units up.
Write two different two-step routes.

Route A: **5 right, 2 up; then 2 left, 3 up.**

Route B: **1 left, 6 up; then 4 right, 1 down.**

5. List three properties that stay the same after any translation.

- size
- shape
- orientation

Name: _____

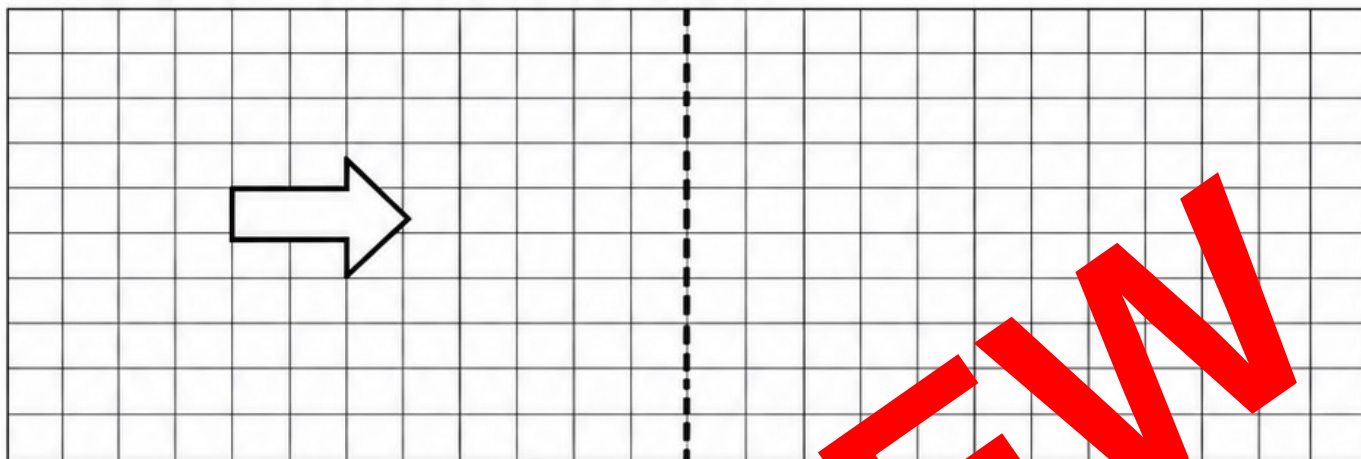
Date: _____

REFLECT ACROSS THE LINE

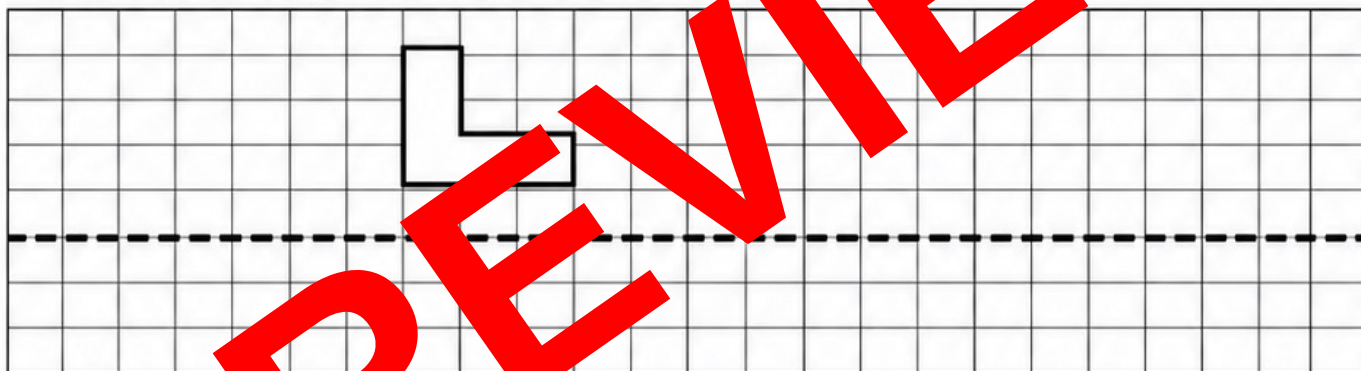
Page 1 • Mirror images

Draw each reflected image. Matching points must be the same perpendicular distance from the mirror line.

1. Reflect the arrow across the vertical mirror line.



2. Reflect the L-shape across the horizontal mirror line.



3. Reflect and read the following.

a. Point P is 4 cm perpendicular from a diagonal mirror line. How far is P' from the line? _____ cm

b. Segment AB is 6 cm long. After reflection, $A'B' =$ _____ cm

c. A right-facing arrow is reflected in a vertical line. Its image faces _____

4. What changes after a reflection?

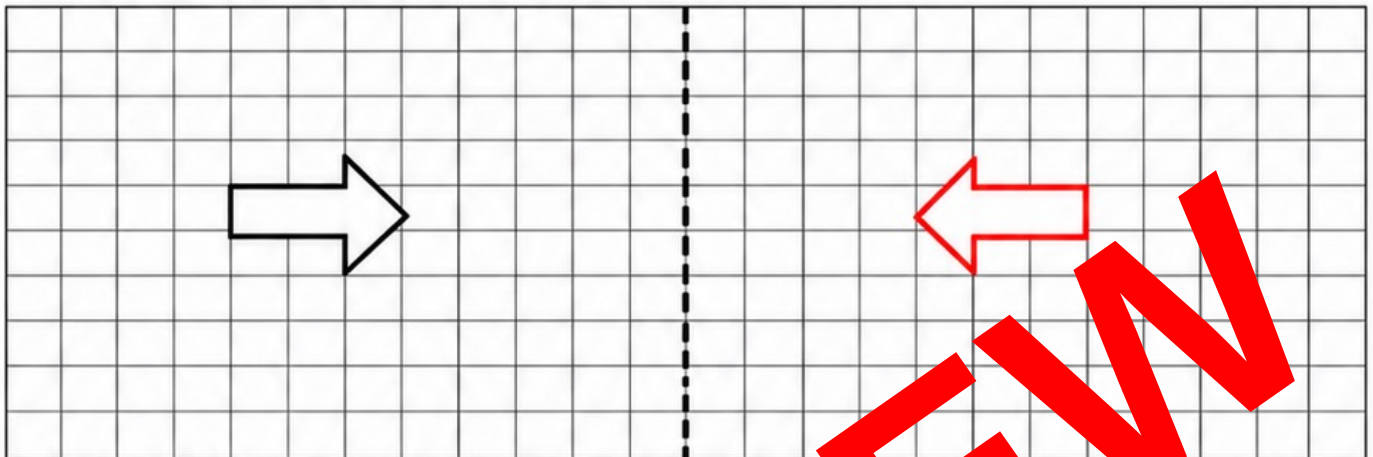
5. What stays the same after a reflection?

REFLECT ACROSS THE LINE

Page 1 • Mirror images

Draw each reflected image. Matching points must be the same perpendicular distance from the mirror line.

1. Reflect the arrow across the vertical mirror line.



2. Reflect the L-shape across the horizontal mirror line.



3. Reflection reasoning.

a. Point P is 3 cm perpendicular from a diagonal mirror line. How far is P' from the line? **3** cm

b. Segment AB is 6 cm long. After reflection, $A'B' =$ **6** cm

c. A right-facing arrow is reflected in a vertical line. Its image faces **left**

4. What changes after a reflection?

Position and orientation change; orientation reverses. _____

5. What stays the same after a reflection?

Size, shape, side lengths, angle sizes and area stay the same. _____

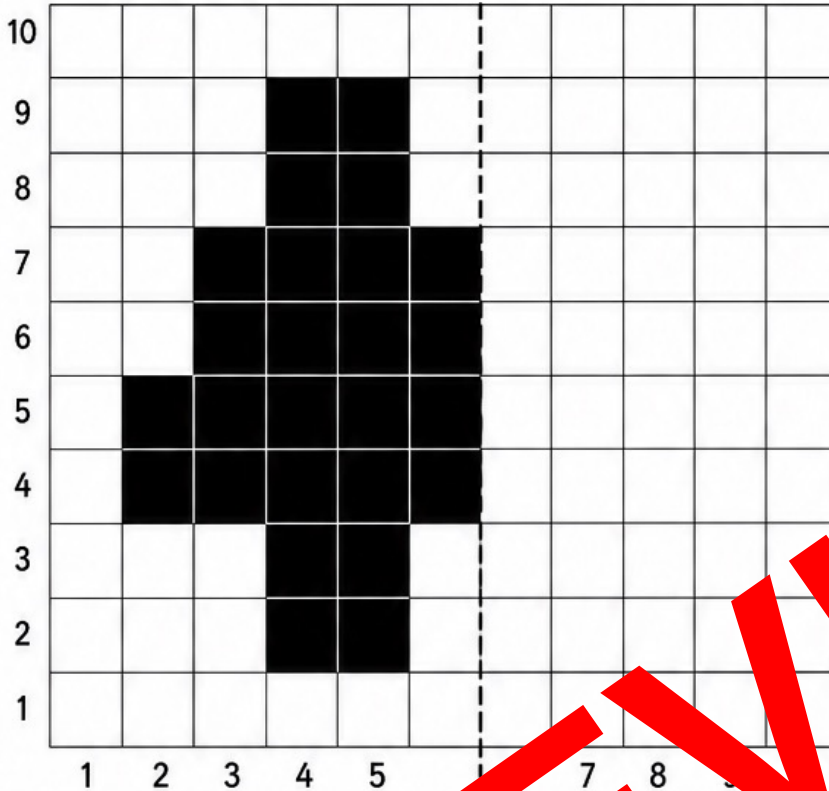
Name: _____

Date: _____

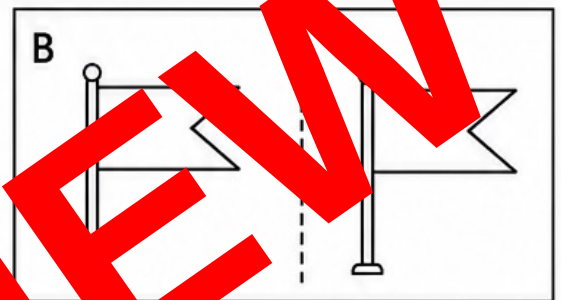
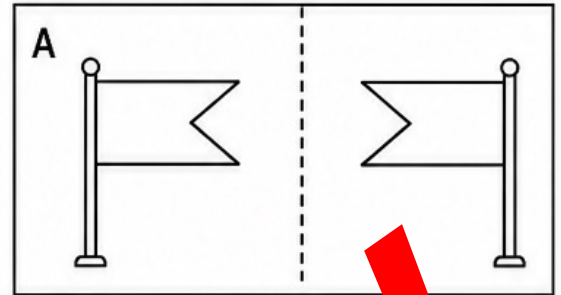
REFLECT ACROSS THE LINE

Page 2 • Analyse and create

1. Complete the pattern so the dashed vertical line is its line of symmetry.



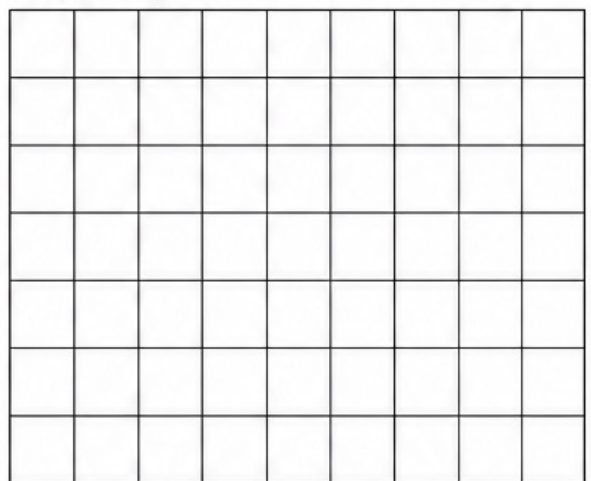
2. Which diagram shows a correct reflection? Circle A or B, then explain.



3. Draw a shape with exactly one line of symmetry.



4. Draw an asymmetric shape with no line of symmetry.

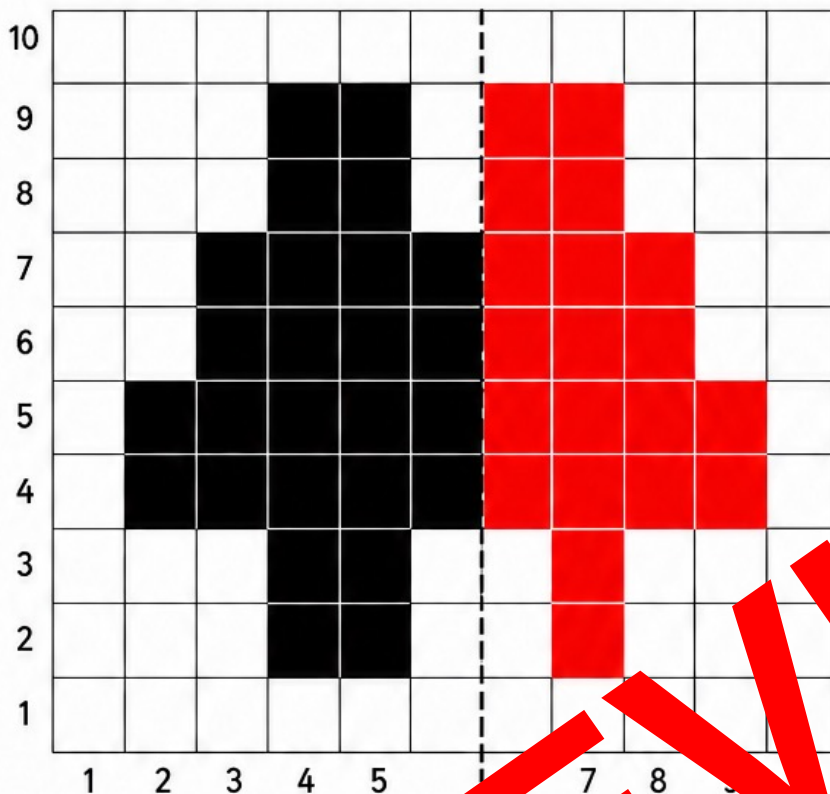


5. Can a shape have reflection symmetry and rotational symmetry? Give an example and explain.

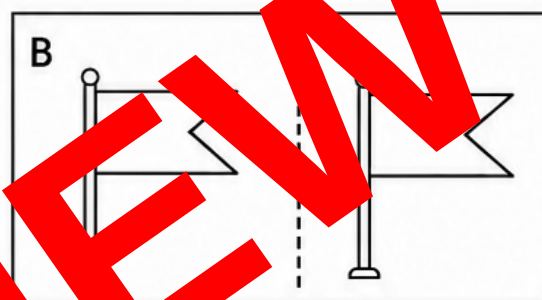
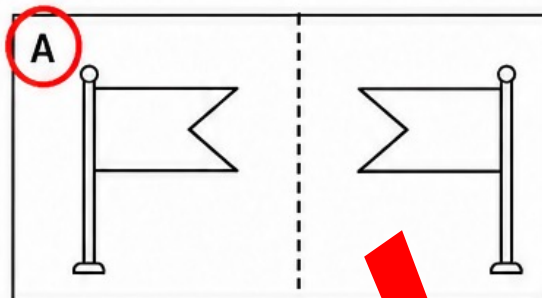
REFLECT ACROSS THE LINE

Page 2 • Analyse and create

1. Complete the pattern so the dashed vertical line is its line of symmetry.

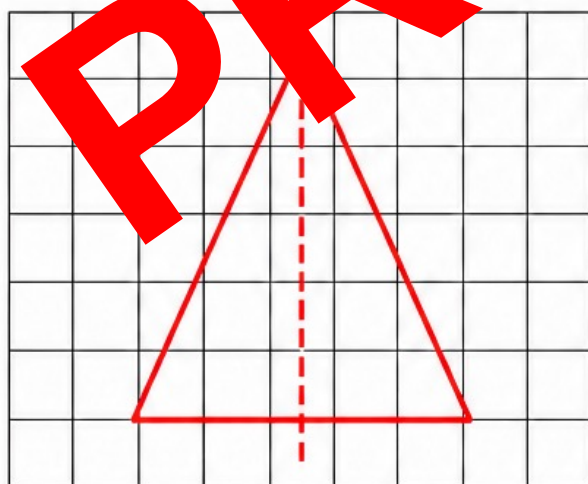


2. Which diagram shows a correct reflection? Circle A or B, then explain.

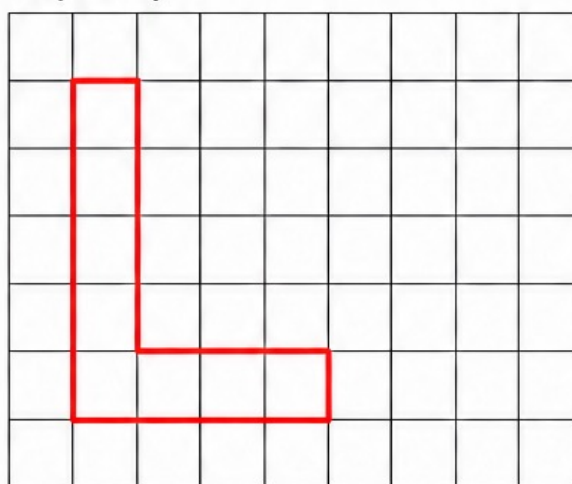


reverses orientation and
matching points are equal
distances from the mirror line.

3. Draw a shape with exactly one line of symmetry.



4. Draw an asymmetric shape with no line of symmetry.



5. Can a shape have reflection symmetry and rotational symmetry? Give an example and explain.

Yes. A square has reflection symmetry and rotational symmetry of order 4.

ROTATION RULES

Page 1 • Common turns

1. Complete the turn table.

Turn	Degrees	Direction
Quarter turn clockwise	_____°	clockwise
Half-turn	_____°	either direction
Three-quarter turn clockwise	_____°	clockwise
Quarter turn anticlockwise	_____°	anticlockwise

2. Draw each rotated image about the black centre point.

A. Rotate 90° clockwise.

B. Rotate 180°.

C. Rotate 90° anticlockwise.

3. What stays fixed during a rotation?

4. List three properties that stay the same after a rotation.

1. _____

2. _____

3. _____

ROTATION RULES

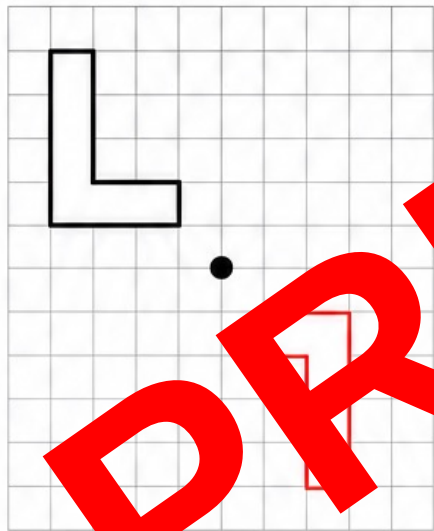
Page 1 • Common turns

1. Complete the turn table.

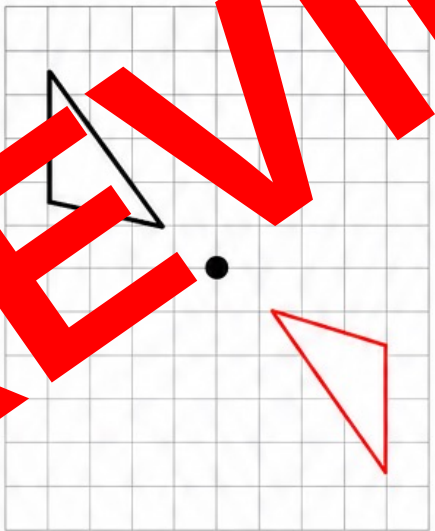
Turn	Degrees	Direction
Quarter turn clockwise	<u>90°</u>	clockwise
Half-turn	<u>180°</u>	either direction
Three-quarter turn clockwise	<u>270°</u>	clockwise
Quarter turn anticlockwise	<u>90°</u>	anticlockwise

2. Draw each rotated image about the black centre point.

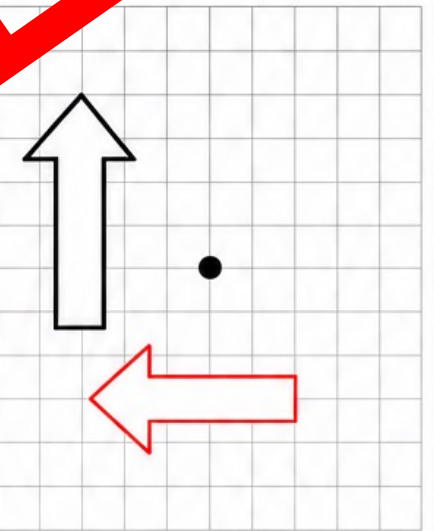
A. Rotate 90° clockwise.



B. Rotate 180°.



C. Rotate 90° anticlockwise.



3. What stays fixed during a rotation?

The centre of rotation stays fixed.

4. List three properties that stay the same after a rotation.

1. size
2. shape
3. side lengths and angle sizes

ROTATION RULES

Page 2 • Reason and sequence

1. Track each rotation. Circle the final direction.

A.		Start: up. Rotate 90° clockwise.	up	right	down	left
B.		Start: left. Rotate 180°.	up	right	down	left
C.		Start: down. Rotate 90° anticlockwise.	up	right	down	left

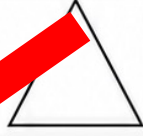
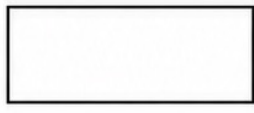
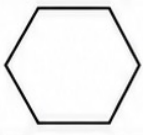
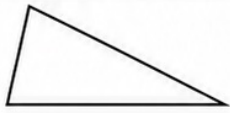
2. Combine the turns.

A right-pointing arrow turns 90° clockwise, then 180°. Final direction: _____

An up-pointing arrow turns 90° anticlockwise, then 90° clockwise. Final direction: _____

A down-pointing arrow makes three quarter-turns clockwise. Final direction: _____

3. Complete the rotational symmetry table

SQUARE		Order: _____
EQUILATERAL TRIANGLE		Order: _____
NON-SQUARE RECTANGLE		Order: _____
REGULAR HEXAGON		Order: _____
SCALENE TRIANGLE		Order: _____

4. Noah says, 'Every shape has rotational symmetry of order at least 2.'
Is Noah correct? Use an example to explain.

5. A shape has rotational symmetry of order 4. What is its smallest angle of rotation? _____°

ROTATION RULES

Page 2 • Reason and sequence

1. Track each rotation. Circle the final direction.

A.		Start: up. Rotate 90° clockwise.	up right down left
B.		Start: left. Rotate 180°.	up right down left
C.		Start: down. Rotate 90° anticlockwise.	up right down left

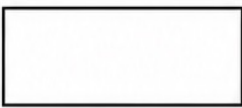
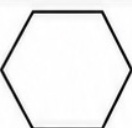
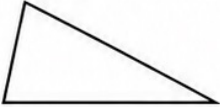
2. Combine the turns.

A right-pointing arrow turns 90° clockwise, then 180°. Final direction: up

An up-pointing arrow turns 90° anticlockwise, then 90° clockwise. Final direction: up

A down-pointing arrow makes three quarter-turns clockwise. Final direction: right

3. Complete the rotational symmetry table.

SQUARE		Order: <u>4</u>
EQUILATERAL TRIANGLE		Order: <u>3</u>
NON-SQUARE RECTANGLE		Order: <u>2</u>
REGULAR HEXAGON		Order: <u>6</u>
SCALENE TRIANGLE		Order: <u>1</u>

4. Noah says, 'Every shape has rotational symmetry of order at least 2.'

Is Noah correct? Use an example to explain.

No. A scalene triangle only matches after a full turn, so its order is 1.

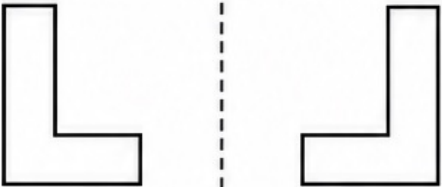
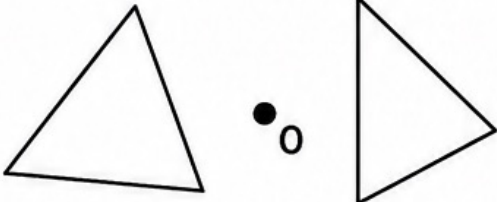
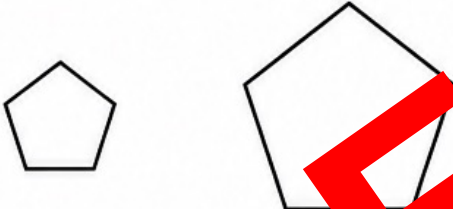
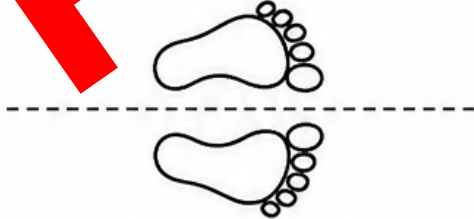
5. A shape has rotational symmetry of order 4. What is its smallest angle of rotation? 90°

Name: _____

Date: _____

TRANSFORMATION SORT AND EXPLAIN

Study each pair. Tick the best category, then give one piece of evidence.

A		<table><tr><td>translation</td><td>reflection</td><td>rotation</td><td>not rigid</td></tr><tr><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr><tr><td colspan="4">Evidence: _____</td></tr></table>	translation	reflection	rotation	not rigid	☐	☐	☐	☐	Evidence: _____			
translation	reflection	rotation	not rigid											
☐	☐	☐	☐											
Evidence: _____														
B		<table><tr><td>translation</td><td>reflection</td><td>rotation</td><td>not rigid</td></tr><tr><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr><tr><td colspan="4">Evidence: _____</td></tr></table>	translation	reflection	rotation	not rigid	☐	☐	☐	☐	Evidence: _____			
translation	reflection	rotation	not rigid											
☐	☐	☐	☐											
Evidence: _____														
C		<table><tr><td>translation</td><td>reflection</td><td>rotation</td><td>not rigid</td></tr><tr><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr><tr><td colspan="4">Evidence: _____</td></tr></table>	translation	reflection	rotation	not rigid	☐	☐	☐	☐	Evidence: _____			
translation	reflection	rotation	not rigid											
☐	☐	☐	☐											
Evidence: _____														
D		<table><tr><td>translation</td><td>reflection</td><td>rotation</td><td>not rigid</td></tr><tr><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr><tr><td colspan="4">Evidence: _____</td></tr></table>	translation	reflection	rotation	not rigid	☐	☐	☐	☐	Evidence: _____			
translation	reflection	rotation	not rigid											
☐	☐	☐	☐											
Evidence: _____														
E		<table><tr><td>translation</td><td>reflection</td><td>rotation</td><td>not rigid</td></tr><tr><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr><tr><td colspan="4">Evidence: _____</td></tr></table>	translation	reflection	rotation	not rigid	☐	☐	☐	☐	Evidence: _____			
translation	reflection	rotation	not rigid											
☐	☐	☐	☐											
Evidence: _____														
F		<table><tr><td>translation</td><td>reflection</td><td>rotation</td><td>not rigid</td></tr><tr><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr><tr><td colspan="4">Evidence: _____</td></tr></table>	translation	reflection	rotation	not rigid	☐	☐	☐	☐	Evidence: _____			
translation	reflection	rotation	not rigid											
☐	☐	☐	☐											
Evidence: _____														

7. How can you prove that a transformation is rigid?

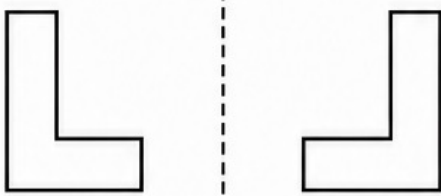
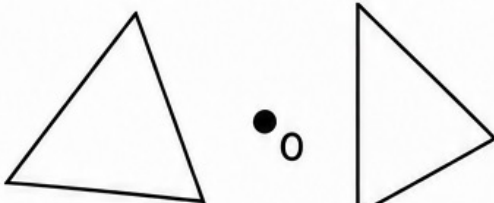
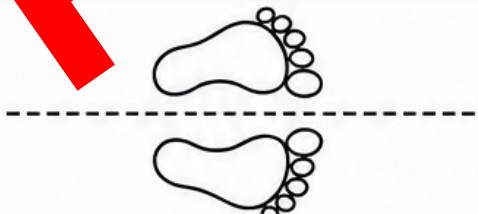
8. Which rigid transformation reverses orientation? _____

Name: **ANSWERS**

Date: _____

TRANSFORMATION SORT AND EXPLAIN

Study each pair. Tick the best category, then give one piece of evidence.

A		translation ☒	reflection ☐	rotation ☐	not rigid ☐	Evidence: <u>same size and orientation; every point shifts equally</u>
B		translation ☐	reflection ☒	rotation ☐	not rigid ☐	Evidence: <u>orientation reverses across the mirror line</u>
C		translation ☐	reflection ☐	rotation ☒	not rigid ☐	Evidence: <u>the shape turns and centre O</u>
D		translation ☐	reflection ☐	rotation ☐	not rigid ☒	Evidence: <u>the size changes</u>
E		translation ☒	reflection ☐	rotation ☐	not rigid ☐	Evidence: <u>same flag shifts up and right</u>
F		translation ☐	reflection ☒	rotation ☐	not rigid ☐	Evidence: <u>equal distances across a horizontal mirror line</u>

7. How can you prove that a transformation is rigid?

Compare corresponding side lengths and angle sizes; a rigid transformation preserves size, shape and area.

8. Which rigid transformation reverses orientation? reflection

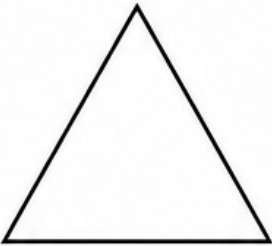
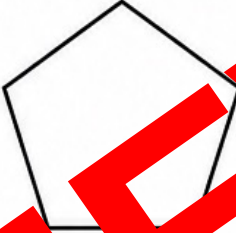
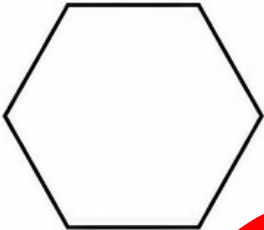
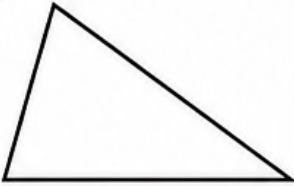
Name: _____

Date: _____

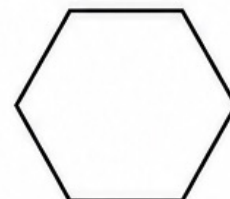
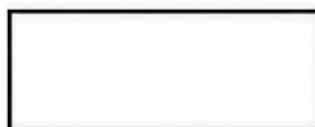
SYMMETRY AND SEQUENCES

Page 1 • Rotational symmetry

For each shape, record the order of rotational symmetry and the smallest angle of rotation.

1.		SQUARE Order: ____ Smallest angle: ____°	2.		NON-SQUARE RECTANGLE Order: ____ Smallest angle: ____°
3.		EQUILATERAL TRIANGLE Order: ____ Smallest angle: ____°	4.		REGULAR PENTAGON Order: ____ Smallest angle: ____°
5.		REGULAR HEXAGON Order: ____ Smallest angle: ____°	6.		PARALLELOGRAM Order: ____ Smallest angle: ____°
7.		RHOMBUS Order: ____ Smallest angle: ____°	8.		SCALED TRIANGLE Order: ____ Smallest angle: ____°

9. Mark the centre of rotation on the square, rectangle and regular hexagon.

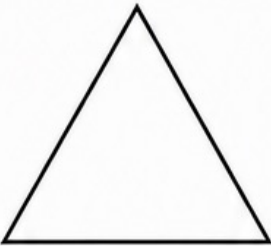
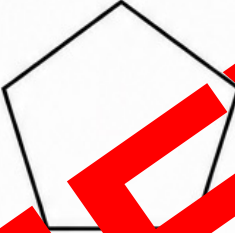
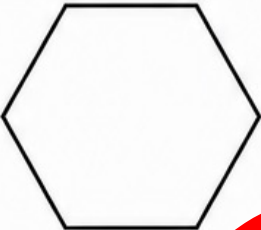
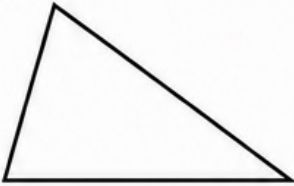


10. Explain why a scalene triangle has rotational symmetry of order 1.

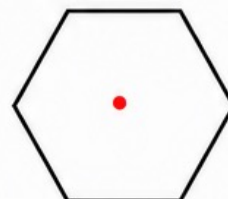
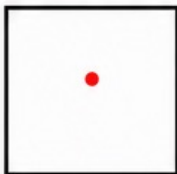
SYMMETRY AND SEQUENCES

Page 1 • Rotational symmetry

For each shape, record the order of rotational symmetry and the smallest angle of rotation.

1.  SQUARE Order: <u>4</u> Smallest angle: <u>90°</u>	2.  NON-SQUARE RECTANGLE Order: <u>2</u> Smallest angle: <u>180°</u>
3.  EQUILATERAL TRIANGLE Order: <u>3</u> Smallest angle: <u>120°</u>	4.  REGULAR PENTAGON Order: <u>5</u> Smallest angle: <u>72°</u>
5.  REGULAR HEXAGON Order: <u>6</u> Smallest angle: <u>60°</u>	6.  PARALLELOGRAM Order: <u>2</u> Smallest angle: <u>180°</u>
7.  CUBOID Order: <u>2</u> Smallest angle: <u>180°</u>	8.  SCALED TRIANGLE Order: <u>1</u> Smallest angle: <u>360°</u>

9. Mark the centre of rotation on the square, rectangle and regular hexagon.



10. Explain why a scalene triangle has rotational symmetry of order 1.

It only matches itself after a full 360° turn, so its order is 1.

Name: _____

Date: _____

SYMMETRY AND SEQUENCES

Page 2 • Transformation sequences

1. Follow each sequence.

	Start	First transformation	Second transformation	Final result
A	Point A(2, 3)	4 right, 1 up	1 left, 5 up	$A' = (\underline{\quad}, \underline{\quad})$
B	Arrow points up	Rotate 90° clockwise	Rotate 180°	Points _____
C	Arrow points right	Reflect in a vertical line	Rotate 90° anticlockwise	Points _____
D	Point B(8, 2)	5 left, 6 up	2 right, 1 down	$B' = (\underline{\quad}, \underline{\quad})$

2. Do the routes give the same result? Show the net movement.

Route A: 4 right, 2 up, then 1 left, 3 up.

Route B: 2 up, 3 right, then 3 up.

Route A net: _____ Route B net: _____

Do they give the same result? Yes / No

3. Two quarter turns clockwise from the same starting point give the same result as which single rotation? Explain.

4. Write two different three-step transformation sequences that finish in the same position and orientation.

Sequence A: _____

Sequence B: _____

5. What information must be included when describing a rotation?

SYMMETRY AND SEQUENCES

Page 2 • Transformation sequences

1. Follow each sequence.

	Start	First transformation	Second transformation	Final result
A	Point A(2, 3)	4 right, 1 up	1 left, 5 up	A' = (5, 9)
B	Arrow points up	Rotate 90° clockwise	Rotate 180°	Points left
C	Arrow points right	Reflect in a vertical line	Rotate 90° anticlockwise	Points down
D	Point B(8, 2)	5 left, 6 up	2 right, 1 down	B' = (3, 8)

2. Do the routes give the same result? Show the net movement.

Route A: 4 right, 2 up, then 1 left, 3 up.

Route B: 2 up, 3 right, then 3 up.

Route A net: **3 right, 5 up** Route B net: **3 right, 5 up**

Do the routes give the same result? ☒ Yes / No

3. Two quarter turns clockwise have the same result as which single rotation? Explain.

A half turn or 180°, because two quarter-turns total 180°.

4. Write two different three-step transformation sequences that finish in the same position and orientation.

Sequence A: **Translate 1 right; rotate 90° clockwise; rotate 90° anticlockwise.**

Sequence B: **Rotate 180°; rotate 180°; translate 1 right.**

5. What information must be included when describing a rotation?

the centre of rotation, the angle and the direction

GEO-BOT TRANSFORMATION MISSION

Assessment • Page 1 of 2

A. Transformation language • 4 marks

1. Which transformation slides every point the same distance and direction?

- ☐ A translation ☐ B reflection
☐ C rotation ☐ D enlargement

2. Which transformation reverses orientation?

- ☐ A translation ☐ B reflection
☐ C rotation ☐ D no

3. What stays fixed during a rotation?

- ☐ A side length ☐ B center of rotation
☐ C every vertex ☐ D orientation

4. Which statement describes every rigid transformation?

- ☐ A area changes ☐ B angles change
☐ C size and shape stay the same ☐ D all points stay fixed

B. Apply the rules • 6 marks

5. Triangle ABC has A(2,3), B(4,3), C(3,5). Translate it 3 units right and 2 units up. Record A' and C'.

A' = (____, ____) B' = (____, ____) C' = (____, ____) [3 marks]

6. After a reflection, what changes and what stays the same?

 _____ [2 marks]

7. An arrow points up. It rotates 90° clockwise. Which direction does it point now? _____ [1 mark]

Continue to Page 2.

GEO-BOT TRANSFORMATION MISSION

Assessment • Page 1 of 2

A. Transformation language • 4 marks

1. Which transformation slides every point the same distance and direction?

☒

A translation

☐

B reflection

☐

C rotation

☐

D enlargement

2. Which transformation reverses orientation?

☐

A translation

☒

B reflection

☐

C rotation

☐

D no

3. What stays fixed during a rotation?

☐

A side length

☒

B centre of rotation

☐

C every vertex

☐

D orientation

4. Which statement describes every rigid transformation?

☐

A area change

☐

B angles change

☒

C size and shape stay the same

☐

D all points stay fixed

B. Apply the rules • 6 marks

5. Triangle ABC has A(2,3), B(4,3), C(3,5). Translate it 3 units right and 2 units up. Record A' and C'.

A' = (5, 5)

B' = (7, 5)

C' = (6, 7)

[3 marks]

6. After a reflection, what changes and what stays the same?

Orientation and position change. Size, shape, side lengths, angle sizes and area stay the same.

[2 marks]

7. An arrow points up. It rotates 90° clockwise. Which direction does it point now? right

[1 mark]

Continue to Page 2.

GEO-BOT TRANSFORMATION MISSION

Assessment • Page 2 of 2

8. Follow the sequence. [2 marks]

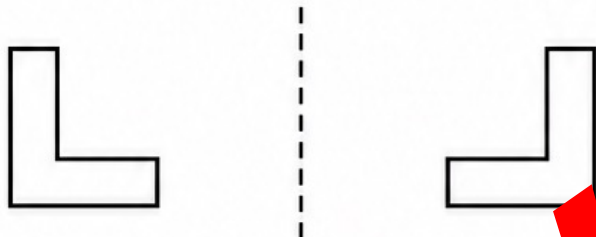
Point P starts at (1,2). Translate it 5 units right and 3 units up, then 2 units left and 1 unit down.

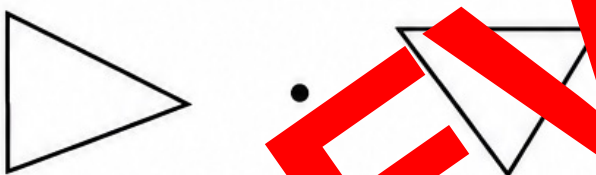
$P' = (\quad , \quad)$

Net movement: _____ right and _____ up

9. Classify each transformation. [3 marks]

a.  a. _____

b.  b. _____

c.  c. _____

10. Rotational symmetry. [1 mark]

An equilateral triangle has rotational symmetry of order _____ and a smallest angle of _____°.

11. Geo-Bot route. [2 marks]


START: (2,1),
pointing up

Translate Geo-Bot 4 units right and 5 units up,
then rotate it 90° anticlockwise.

Final position: (_____ , _____)

Final direction: _____

12. Rigid transformation check. [1 mark]

List three properties that stay the same after a translation, reflection or rotation.

1. _____
2. _____
3. _____

TOTAL: _____ / 20

GEO-BOT TRANSFORMATION MISSION

Assessment • Page 2 of 2

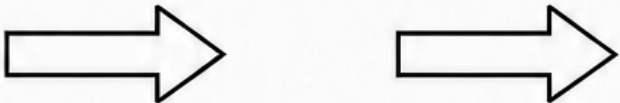
8. Follow the sequence. [2 marks]

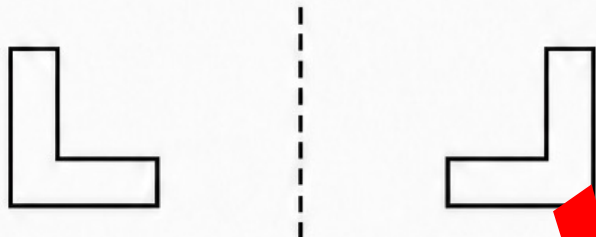
Point P starts at (1,2), Translate it 5 units right and 3 units up, then 2 units left and 1 unit down.

$$P' = (\underline{\mathbf{4}} , \underline{\mathbf{4}})$$

Net movement: **3** right and **2** up

9. Classify each transformation. [3 marks]

a.  a. **translation**

b.  b. **reflection**

c.  c. **rotation**

10. Rotational symmetry. [1 mark]

An equilateral triangle has rotational symmetry of order **3** and a smallest angle of **120**°.

11. Geo-Bot route. [2 marks]


START: (2,1),
pointing up

Translate Geo-Bot 4 units right and 5 units up,
then rotate it 90° anticlockwise.

Final position: (**6** , **6**)

Final direction: **left**

12. Rigid transformation check. [1 mark]

List three properties that stay the same after a translation, reflection or rotation.

1. **side lengths**
2. **angle sizes**
3. **area**

TOTAL: **20** / 20

Student: _____

Date: _____

Total: _____ / 25

FLIP SLIDE OR TURN RUBRIC

CRITERION	BEGINNING • 1	DEVELOPING • 2	ACHIEVING • 3	CONFIDENT • 4	EXCEEDING • 5
Performing transformations	Needs step-by-step support.	Performs one-step tasks.	Accurately performs one-step transformations.	Accurately performs multi-step transformations.	Selects and checks efficient sequences.
Describing transformations	Uses limited transformation language.	Names transformations with some detail.	States distance, line, centre, angle or direction.	Gives complete, precise descriptions.	Compares equivalent transformation routes.
Explaining invariants	Identifies one preserved property.	Identifies some preserved properties.	Explains preserved size, shape, lengths or angles.	Justifies invariants with evidence.	Generalises properties of rigid transformations.
Rotational symmetry	Needs support to identify symmetry.	Finds some orders or angles.	Finds order or angle accurately.	Finds order, centre and angle accurately.	Connects order to $360^\circ \div \text{order}$.
Reasoning and communication	Records incomplete working.	Shows some working using basic terms.	Shows logical working with correct vocabulary.	Justifies and checks conclusions.	Communicates efficient general reasoning.

Teacher feedback: _____

Next learning step: _____

Flip, Slide
or Turn



Learning Intention

- Identify translations, reflection and rotations.
- Describe how a shape's position and orientation change.
- Determine the order of rotational symmetry.



Transformation Language

A translation slides a shape.

A reflection flips a shape across a mirror line.

A rotation turns a shape about a centre.



What Stays the Same?

Translations, reflections and rotations preserve side lengths and angles.

The image stays congruent to the original shape: same size and same shape.



Translation

A translation moves every point the same distance in the same

direction.

The shape does not turn or flip, so its orientation stays the same.



Describe a Translation

Use horizontal and vertical movement.

Example: 4 units right and 2 units down.

Check that every vertex follows the same movement rule.



Reflection

A reflection creates a mirror image across a line of reflection.
The image is the same size, but its orientation is reversed.



Check a Reflection

Match each point with its reflected point.

The pair must be the same perpendicular distance from the mirror line.

The mirror line bisects the joining segment.



Rotation

A rotation turns a shape about a fixed centre of rotation.
The shape keeps its size and shape, but its orientation usually changes.



Describe a Rotation

Name three details: center, angle, and direction.

Example: a quarter-turn clockwise about point P.



Common Turns

Quarter-turn = 90°

Half-turn = 180°

Three-quarter-turn = 270°

Full turn = 360°



Compare the Three

Translation: position changes; orientation stays the same.

Reflection: position changes; orientation reverses.

Rotation: position and orientation may change around a centre.



Rotational Symmetry

A shape has rotational symmetry when it matches itself before a full turn is complete.
Only exact matches count.



Find the Order

The order is the number of exact matches during one full 360° turn.

A square has order 4. A non-square rectangle has order 2.



Two-Step Sequences

Apply transformations in the stated order.

Record the image after step 1, then transform that image in step 2.

Order can change the final result.



Different Routes, Same Result

Combine movements when possible.

A slide 5 units right followed by 2 units left is equivalent to 3 units

right.

Explain how you know.



Guided Check

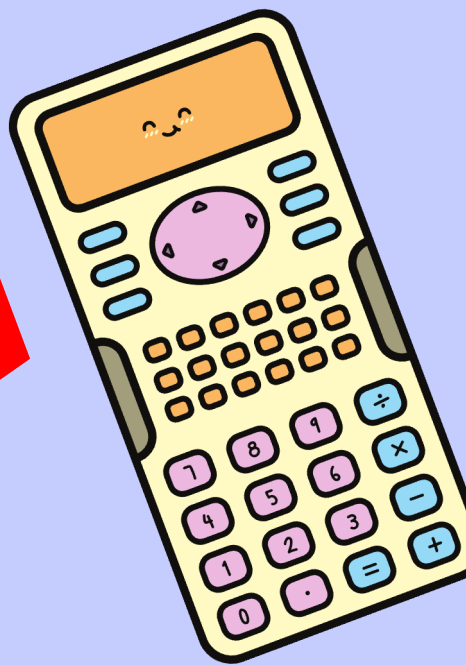
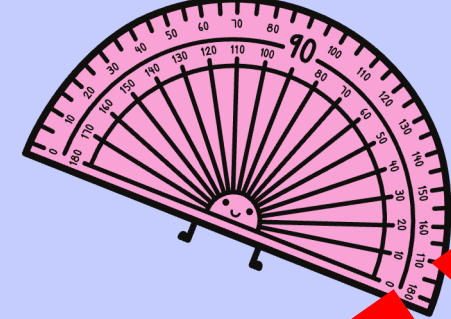
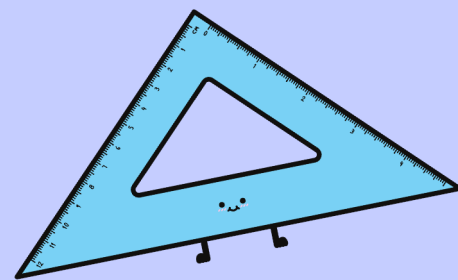
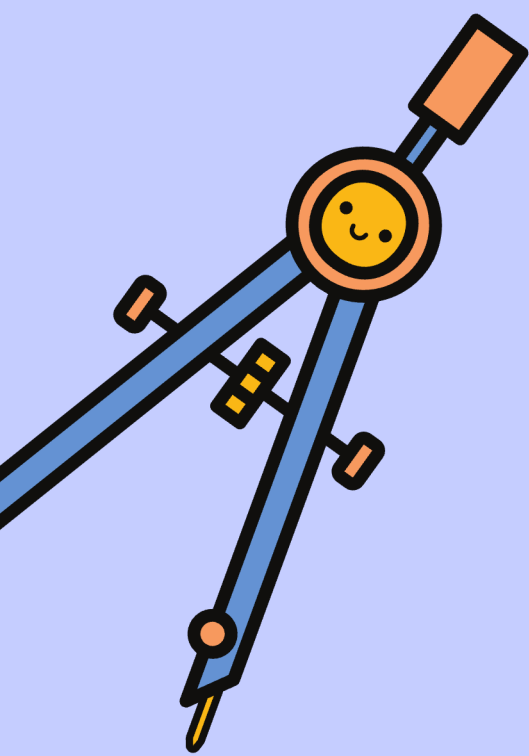
Name the transformation.

Describe the rule precisely.

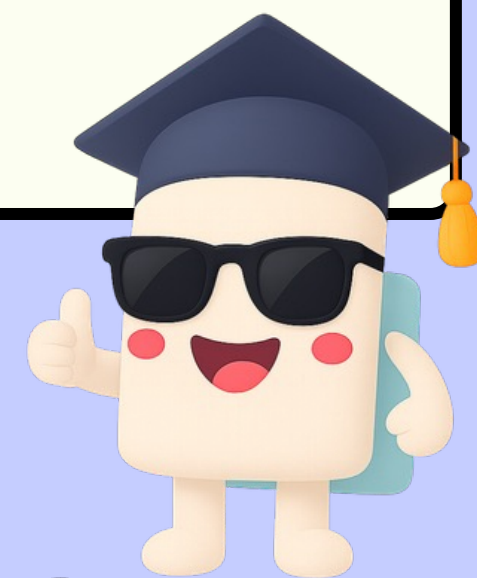
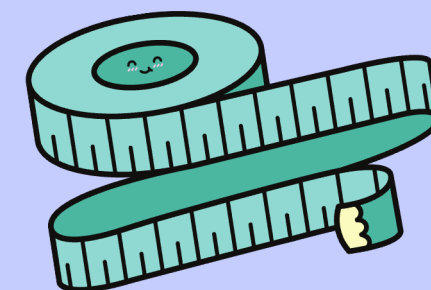
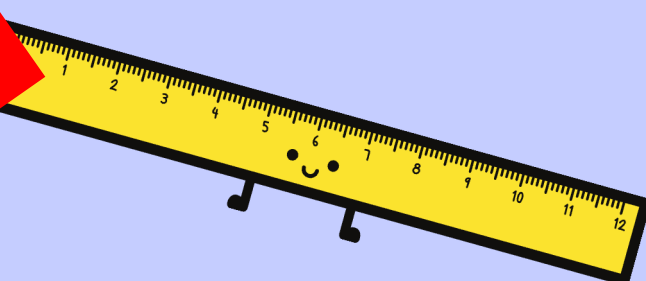
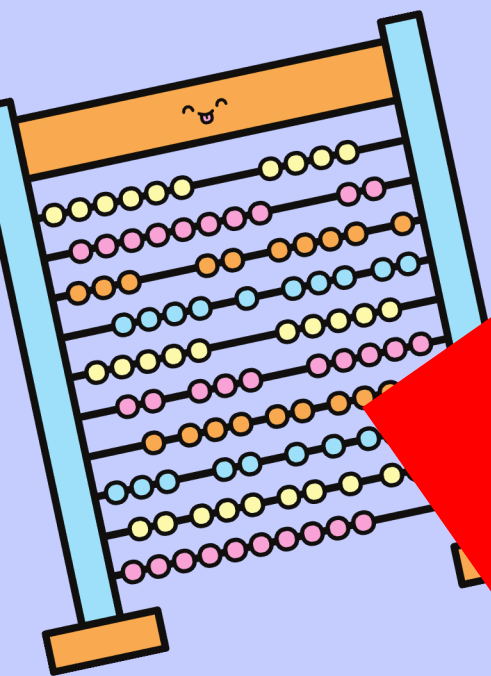
Check size, shape, position and orientation.

Justify your decision with geometric evidence.





Well Done!



Flip, Slide
or Turn
Prequiz



Question 1

True or false: A translation can change a shape's orientation.



Answer 1

False. A translation slides every point the same distance in the same direction, so content on stays the same.



Question 2

Which description is a translation?

A. Flip across a vertical line

B. Turn 90° clockwise

C. Move 3 units right and 2 units up

D. Enlarge by scale factor 2



Answer 2

C. Move 3 units right and 1 unit up.



Question 3

Short answer: Who is a deflector?



Answer ?

A reflection flips a shape across a mirror line to create a congruent mirror image with reversed orientation.



Question 11

True or false: A point and its reflected image are the same perpendicular distance from the mirror line.



Answer 11

True. The mirror line lies halfway between each point and its reflected image.



Question 5

An arrow points up. After a quarter-turn clockwise, which way does it point?

- A. Left
- B. Right
- C. Down
- D. Up



Answer 5

B. Right.



Question 6

Short answer: Name the three details needed to describe a rotation
premise



Answer 6

Centre of rotation, angle of turn and direction of turn.



Question 3

True or false: A half-turn is 180°.



Answer 7

True. Two quarter-turns make one half-turn which is 180° .



Question 8

What is the order of rotational symmetry of a square?

A. 1

B. 2

C. 3

D. 4



Answer 8

D. 4. A square matches itself 4 times during one full turn.



Question 1

Short answer: A shape slides 3 units right, then 2 units left. What single translation has the same result?



Answer d

A translation of unright



Question 10

Which transformation reverses orientation?

A. Translation

B. Reflection

C. Rotation

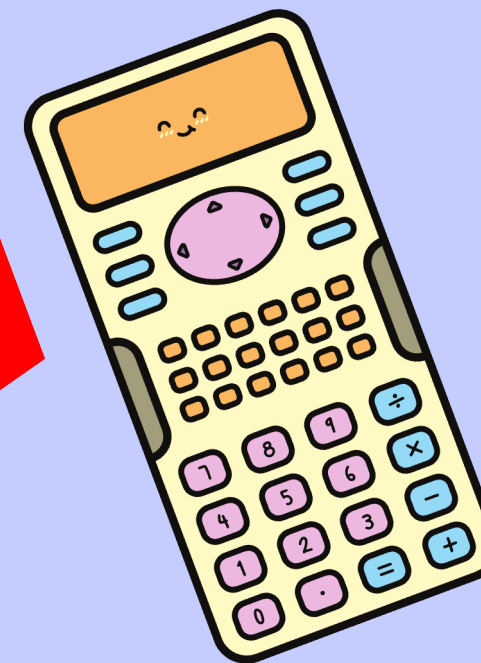
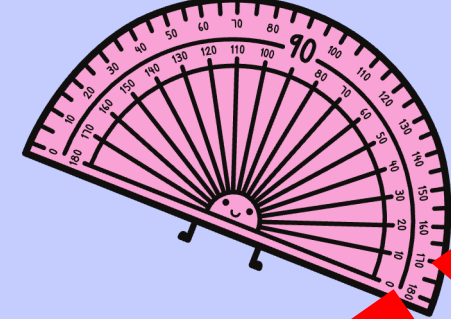
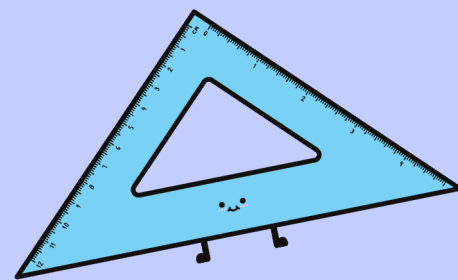
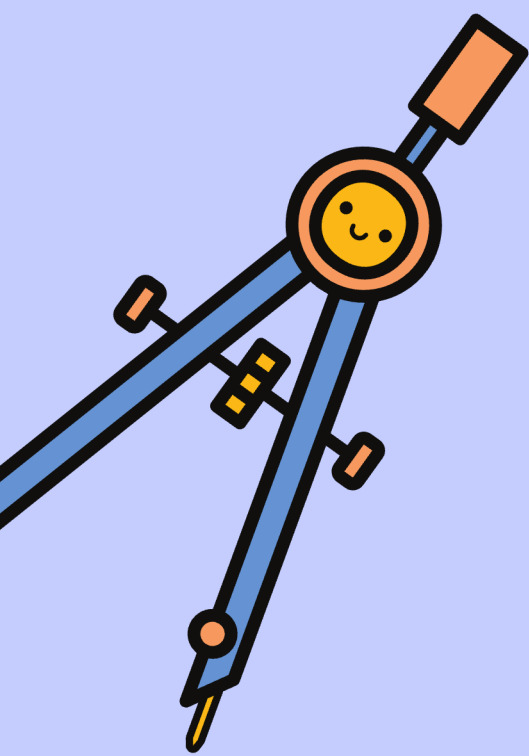
D. Full turn



Answer 10

B. Reflection.





Well Done!

