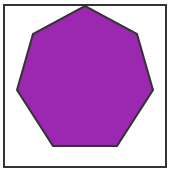
Shape Master Challenge

Name: _____ Date: _____

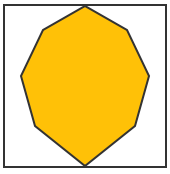
Advanced Shape Explorer

Let's discover some extraordinary shapes that have special properties!

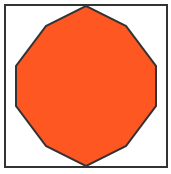
These shapes are more complex and have unique characteristics.



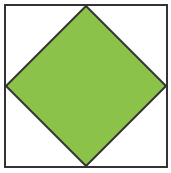
Heptagon
7 sides



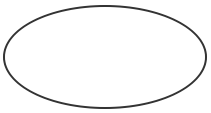
Nonagon
9 sides



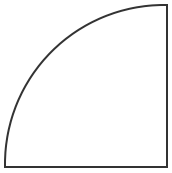
Decagon
10 sides



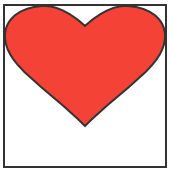
Kite
4 sides



Ellipse
0 sides



Quarter-circle
2 sides



Heart
1 curved side

Advanced Shape Challenge: Match each shape with its special properties!

Shape	Number of Sides	Number of Vertices (Corners)	Has Curved Sides?
Heptagon			
Kite			
Decagon			
Heart			

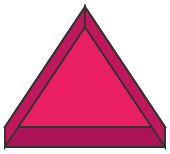
Advanced shapes are hiding in plain sight! Let's look at some examples:

- The face of a stop sign is an octagon
- A baseball diamond is actually a square viewed from an angle
- Many traffic signs are shaped like regular polygons

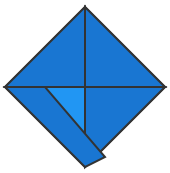
Shape Detective: Find and draw three objects in your home or classroom that have advanced shapes:

Complex 3D Shape Explorer

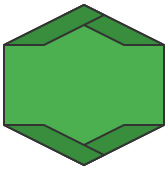
> **3D shapes can get even more complex and fascinating!**
>
> Let's explore some advanced 3D shapes and their properties.



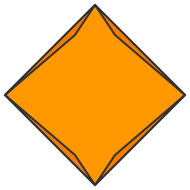
Triangular Prism
5 faces



Octahedron
8 faces



Dodecahedron
12 faces



Icosahedron
20 faces

Platonic Solids: These special 3D shapes have faces that are all the same regular polygon.

3D Shape	Number of Faces	Shape of Each Face	Number of Vertices	Number of Edges
Tetrahedron	4	Triangle		
Cube			8	12
Octahedron	8	Triangle		
Dodecahedron	12	Pentagon		
Icosahedron			12	30

Platonic solids are used in many games and toys!

- A standard die is a cube
- Some role-playing games use dice shaped like all five Platonic solids
- Many sports balls like soccer balls are based on these special shapes

If you were to design a new game, which Platonic solid would you use for the game piece? Why?

Shape Transformations

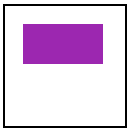
> **Shapes can be changed through transformations like rotation, reflection, and translation!**

> Let's explore how shapes can be moved and changed while keeping their essential properties.

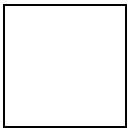
Rotations: When a shape is rotated, it turns around a point.

Reflections: When a shape is reflected, it flips across a line like a mirror.

Challenge: Draw how this shape would look after being rotated 90° clockwise:



Original Shape



After 90° Rotation

Perspective Transformation: How shapes look changes based on your viewpoint!

Top View

Side View

Front View

Draw how a triangular prism would look from these three views:

Tessellations

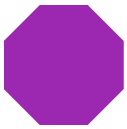
> **A tessellation is when shapes fit together perfectly with no gaps or overlaps!**
>
> Only certain shapes can tessellate (tile) a surface completely.

Tessellation Challenge: Which shapes can tessellate a plane? Circle your answers:

Rhombus ○

Circle ○

Triangle ○



Octagon ○

Venn Diagrams and Shape Properties

> **Shapes can be organized by their properties using Venn diagrams!**
>
> Let's explore how shapes can be classified based on their attributes.

4 Sides
All Sides Equal

?

Venn Diagram Challenge: Which shapes belong in each region of the Venn diagram?

Square

Rectangle

Equilateral Triangle

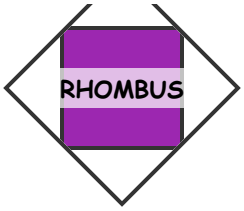
Rhombus

Draw arrows to place each shape in the correct region of the Venn diagram:

Master Challenge: Shape Properties Expert

> **Let's test your expert knowledge about shapes and their properties!**
>
> Complete these challenges to earn your Shape Master badge.

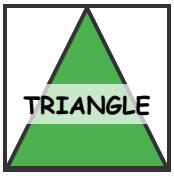
How many lines of symmetry does a square have?



What shape do you get if you connect the midpoints of a square?

Is every rectangle a square?

Choose



What's the sum of angles in a triangle?

Master Puzzle: Match each 3D shape with its 2D net (flattened version):

A

Net 1

Write the matching letter next to each net: _____

Congratulations on completing the Shape Master Challenge!

You've mastered the properties of 2D and 3D shapes, transformations, and classifications!

Teacher's Signature: _____

Teacher Note: *Press Ctrl+Alt+A to toggle the answer key visibility.*

Shape Master Challenge - Answer Key

Advanced Shape Explorer Answers

Shape	Number of Sides	Number of Vertices (Corners)	Has Curved Sides?
Heptagon	7	7	No
Kite	4	4	No
Decagon	10	10	No
Heart	1	1	Yes

3D Shapes Answers

3D Shape	Number of Faces	Shape of Each Face	Number of Vertices	Number of Edges
Tetrahedron	4	Triangle	4	6
Cube	6	Square	8	12
Octahedron	8	Triangle	6	12
Dodecahedron	12	Pentagon	20	30
Icosahedron	20	Triangle	12	30

Tessellation Challenge Answers

Shapes that can tessellate a plane: Rhombus, Triangle

Shapes that cannot tessellate a plane by themselves: Circle, Octagon

Venn Diagram Answers

Left circle only (4 sides but not all equal): Rectangle

Intersection (4 sides AND all sides equal): Square, Rhombus

Right circle only (all sides equal but not 4 sides): Equilateral Triangle

Master Challenge Answers

- How many lines of symmetry does a square have? **4**
- What shape do you get if you connect the midpoints of a square? **Square**
- Is every rectangle a square? **No**
- What's the sum of angles in a triangle? **180°**
- 3D shape nets: Triangular Prism (A) matches with Net 1