

5 PLATONIC SOLIDS

– Drawing to Learn Workbook Series –

INTRODUCTION

FIVE ELEMENTS IN ANCIENT WISDOM



EARTH
Stability
& Growth



WATER
Flow
& Purity



FIRE
Energy
& Passion



AIR
Movement
& Freedom



ETHER
Space
& Unity



3 DIMENSIONAL GEOMETRY WORKBOOK

Learn to Draw ✦ Explore Tilt Angles and Shadows

Discover Shapes. Build Imagination. Create in 3D!

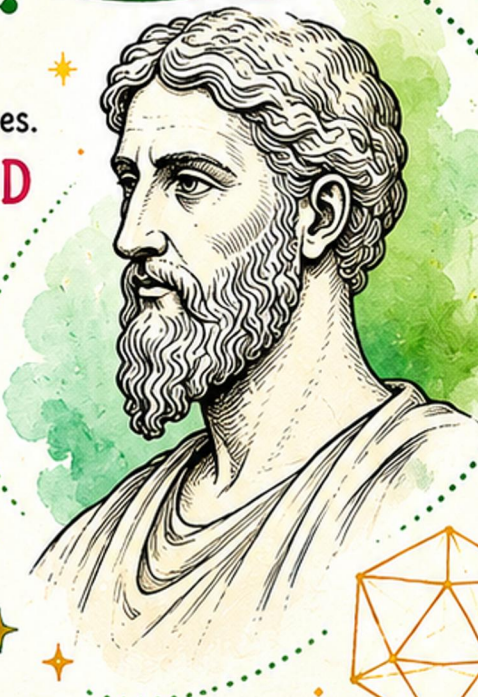
Children's Joy

childrensjoy.io

Good to Know!

About 2,400 years ago, the ancient Greek mathematician Pythagoras and his friends discovered five very special shapes.

These shapes are so **PERFECT** and **BALANCED** that they are called **PLATONIC SOLIDS.**



- They are the **ONLY** 3D shapes where all faces are the same regular shape.
- All **edges** in each solid are the same length.
- They fit together beautifully and make **nature** and **the universe** amazing!
- These shapes appear in **crystals, honeycombs, snowflakes, planets** and many living things.
- They are connected to the **five elements** in ancient wisdom:

Tetrahedron
Fire

Icosahedron
Water

Octahedron
Air

Cube
Earth

Dodecahedron
Spirit

THE 5 PLATONIC SOLIDS

SOLID	TETRAHEDRON	CUBE	OCTAHEDRON	ICOSAHEDRON	DODECAHEDRON
FACES	4	6	8	20	12
EDGES	6	12	12	30	30
VERTICES (CORNERS)	4	8	6	12	20
SHAPE OF FACES	Triangles	Squares	Triangles	Triangles	Pentagons
TOTAL (F+E+V)	14	26	26	62	62

★ Look around you! You will find these magical shapes **everywhere!**













WORKSHEET

NUMBER OF DEGREES OF FREEDOM OF THE 5 PLATONIC SOLIDS

★ Fill in the missing information.

★ Notice which figures matches the number of faces, edges or vertices.

Name of Solid	 FACES (F)	 EDGES (E)	 VERTICES (CORNERS) (V)	 SHAPE OF FACES	 TOTAL (F+E+V)
 TETRAHEDRON (FIRE)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
 CUBE (EARTH)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
 OCTAHEDRON (AIR)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
 ICOSAHEDRON (WATER)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
 DODECAHEDRON (ETHER)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

OBSERVE, CALCULATE & DISCOVER THE BEAUTY OF GEOMETRY!



EXERCISE 1

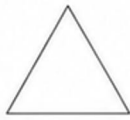
LEARN TO DRAW

TETRAHEDRON



Follow the simple steps to draw a tetrahedron.
Use a pencil and draw lightly at first, then darken your final lines.

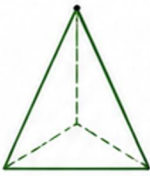
- 1** Draw an equilateral triangle.



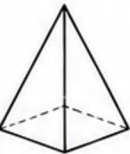
- 2** Mark a point above the center of the triangle. This will be the top vertex.



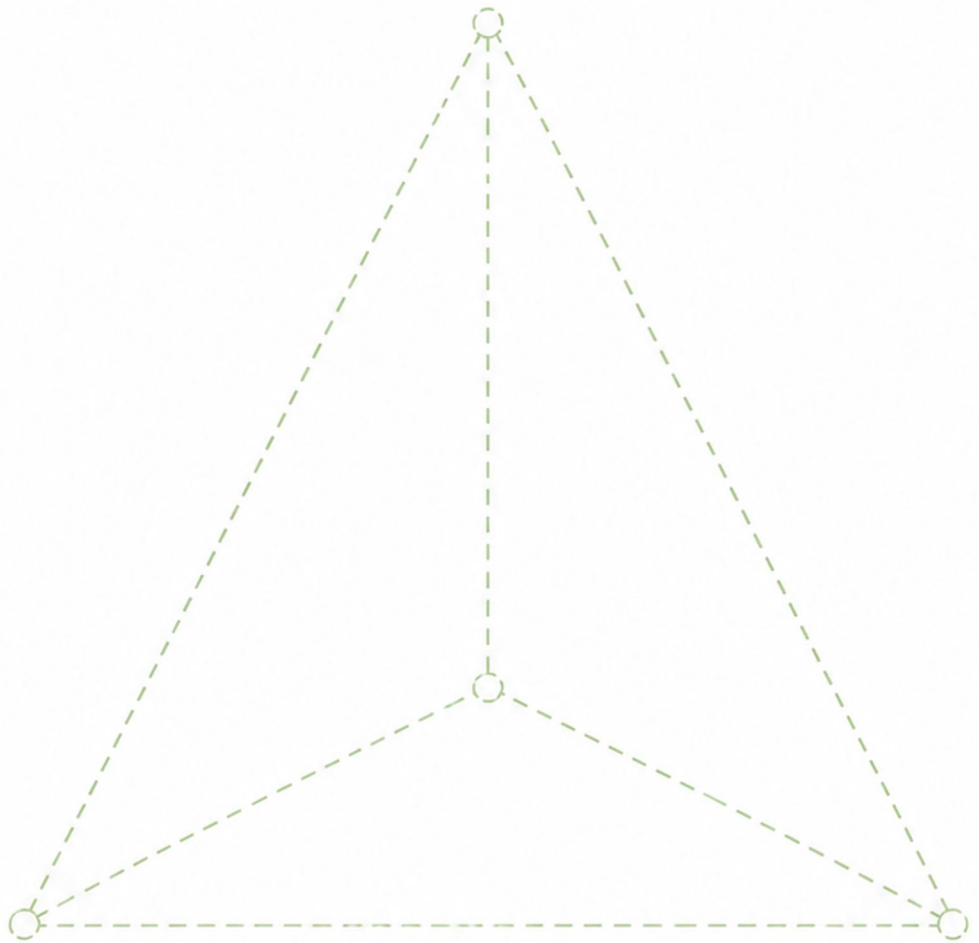
- 3** Draw straight lines from the top point to each of the three corners of the base triangle.



- 4** Erase any extra lines if needed and darken your lines.



- 5** Great! You have drawn a tetrahedron!



You did it!

A tetrahedron has 4 faces,
6 edges and 4 vertices.





EXERCISE 2

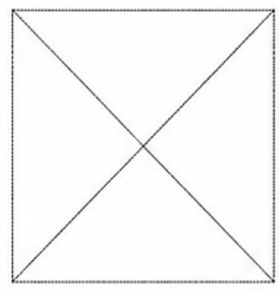
DRAW 3 VARIOUS SHADOWS OR TILT ANGLES

OF THE TETRAHEDRON

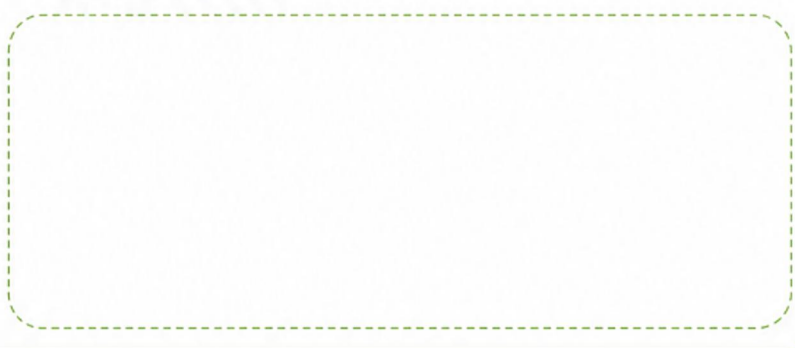
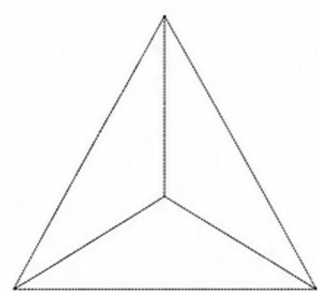


Practice to draw the 3 various shadows or tilt angles of the tetrahedron.

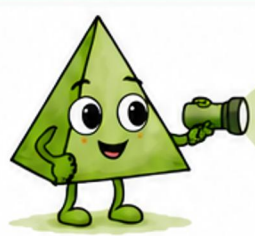
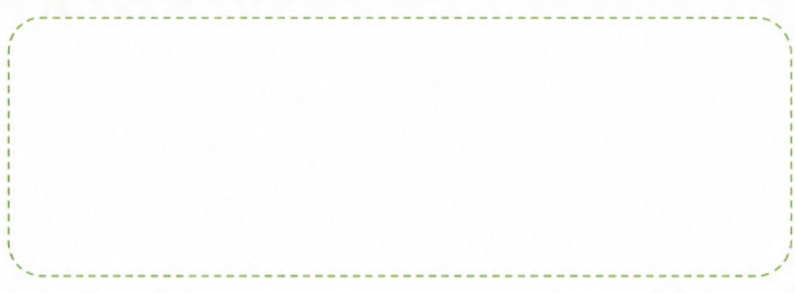
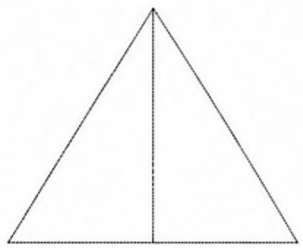
SHADOW 1



SHADOW 2



SHADOW 3



EXPERIMENT:

Build the 3D shape of a tetrahedron (you can find the activity in Book 1).

Use a torch at home and observe how the shadow changes as you tilt the tetrahedron.

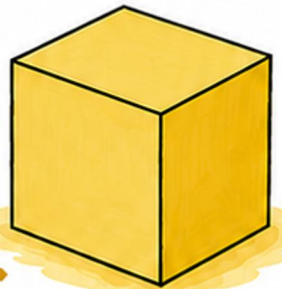




EXERCISE 3

LEARN TO DRAW

CUBE

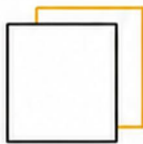


Follow the simple steps to draw a cube.
Use a pencil and draw lightly at first, then darken your final lines.

- 1 Draw a square.



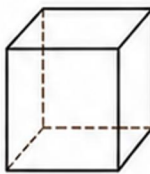
- 2 Draw a second, slightly tilted square behind the first one.



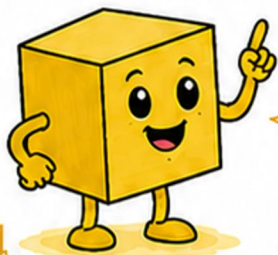
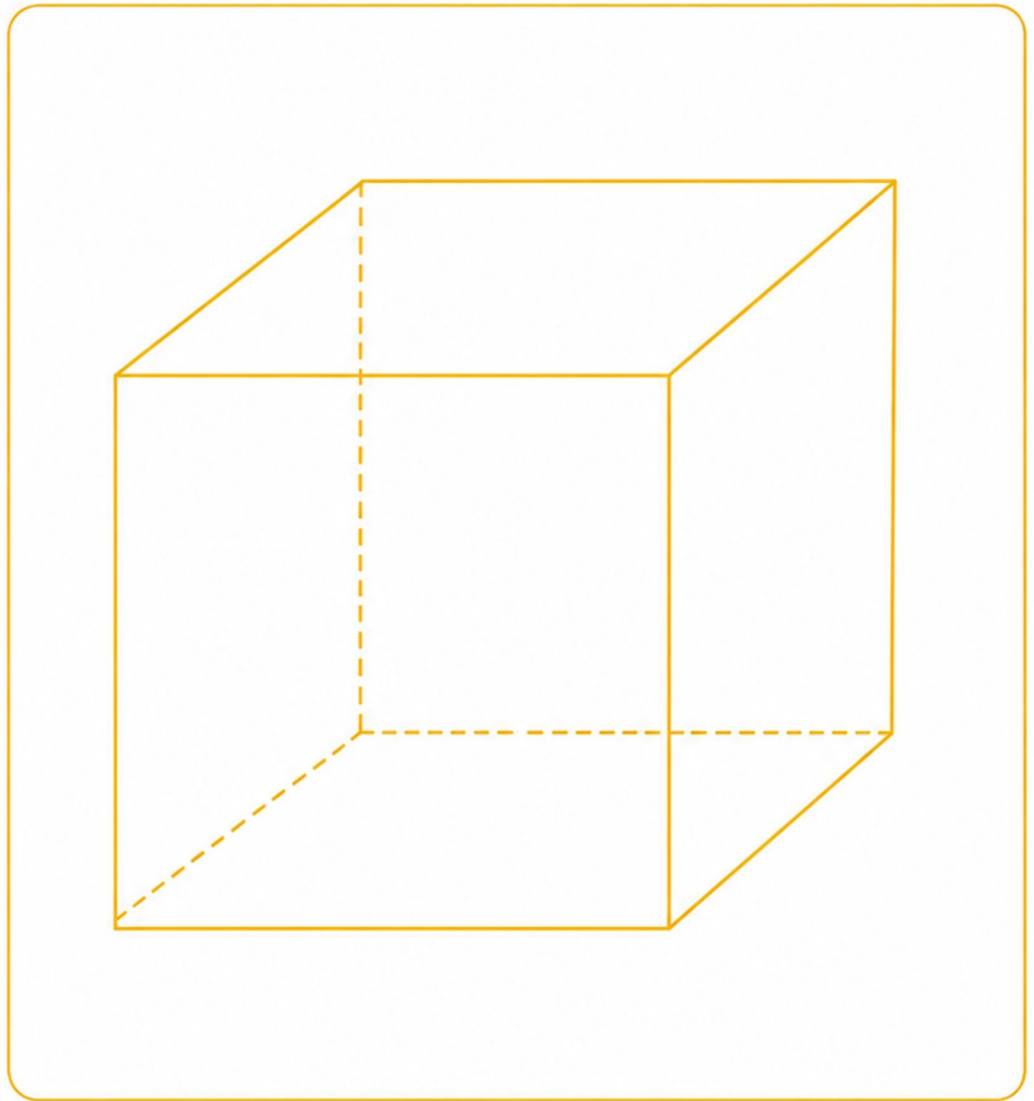
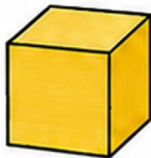
- 3 Connect the corresponding corners with straight lines.



- 4 Erase any extra lines if needed and darken your lines.



- 5 Great! You have drawn a cube!



You did it!

A cube has 6 faces,
12 edges and 8 vertices.





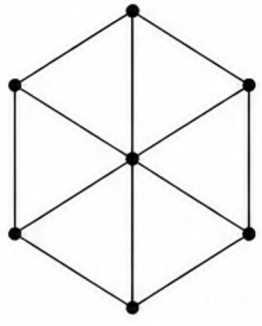
EXERCISE 4

DRAW 3 VARIOUS SHADOWS OR TILT ANGLES

OF THE CUBE

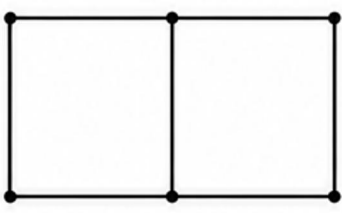
Practice to draw the 3 various shadows or tilt angles of the cube.

ANGLE 1

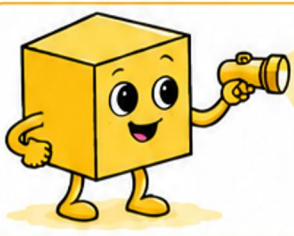
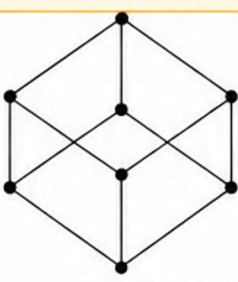


3-cube (projection)

ANGLE 2



ANGLE 3



EXPERIMENT:

Build the 3D shape of a cube (you can find the activity in Book 1).

Use a torch at home and observe how the shadow changes as you tilt the cube.

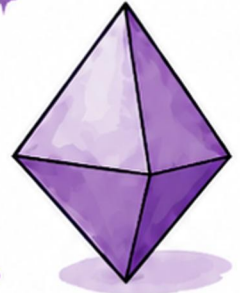




EXERCISE 5

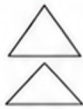
LEARN TO DRAW

OCTAHEDRON



Follow the simple steps to draw an octahedron.
Use a pencil and draw lightly at first, then darken your final lines.

- 1** Draw two equilateral triangles.



- 2** Place one triangle inverted below the other.



- 3** Mark the center point where the triangles meet.



- 4** Draw straight lines from the top vertex to the two bottom vertices.



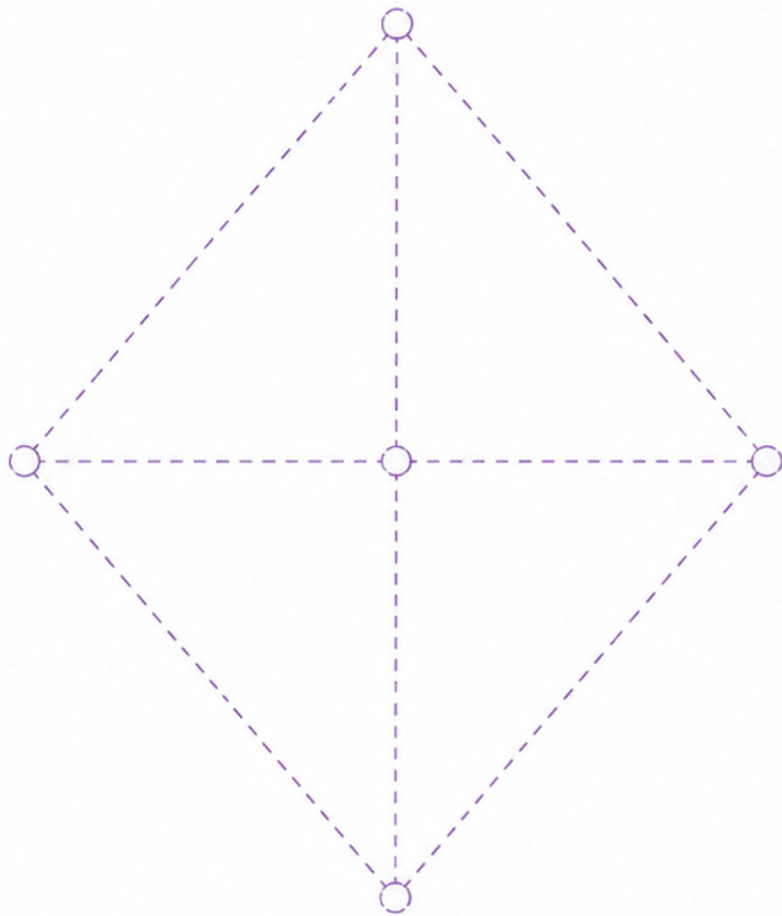
- 5** Draw straight lines from the bottom vertex to the two top vertices.



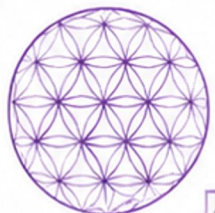
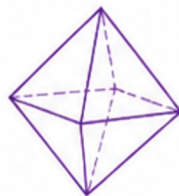
- 6** Erase any extra lines if needed and darken your lines.



- 7** Great! You have drawn an octahedron!



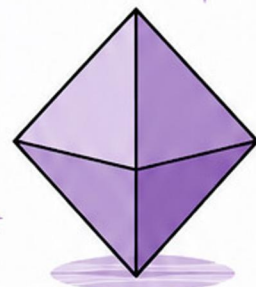
You did it!
An octahedron has
8 faces, 12 edges
and 6 vertices.





EXERCISE 6

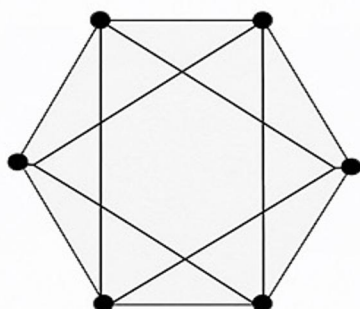
DRAW 3 VARIOUS SHADOWS OR TILT ANGLES



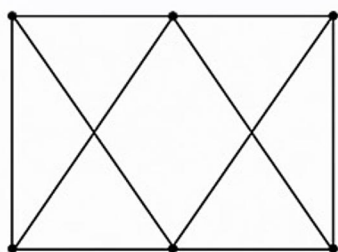
OF THE OCTAHEDRON

Practice to draw the 3 various shadows or tilt angles of the octahedron.

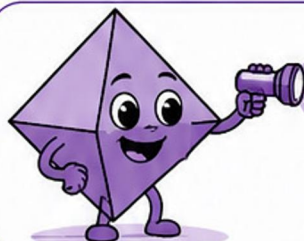
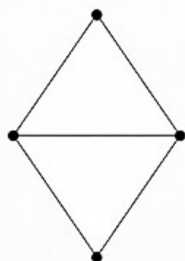
ANGLE 1



ANGLE 2



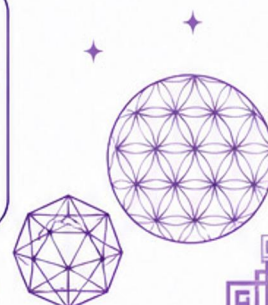
ANGLE 3

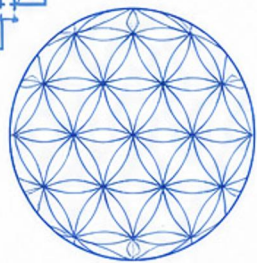


EXPERIMENT:

Build the 3D shape of an octahedron (you can find the activity in Book 1).

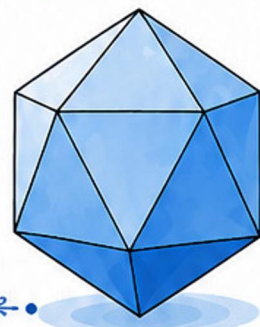
Use a torch at home and observe how the shadow changes as you tilt the octahedron.





EXERCISE 7

LEARN TO DRAW



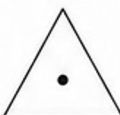
ICOSAHDREDON

Follow the simple steps to draw an icosahedron.
Use a pencil and draw lightly at first, then darken your final lines.

- 1 Draw an equilateral triangle.



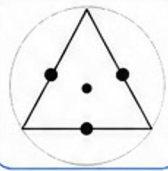
- 2 Mark a point at the center of the triangle.



- 3 Draw a circle passing through the three vertices of the triangle.



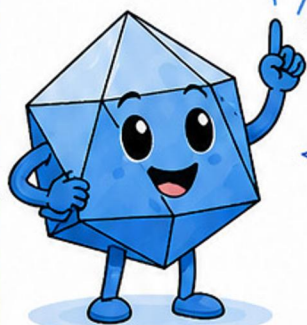
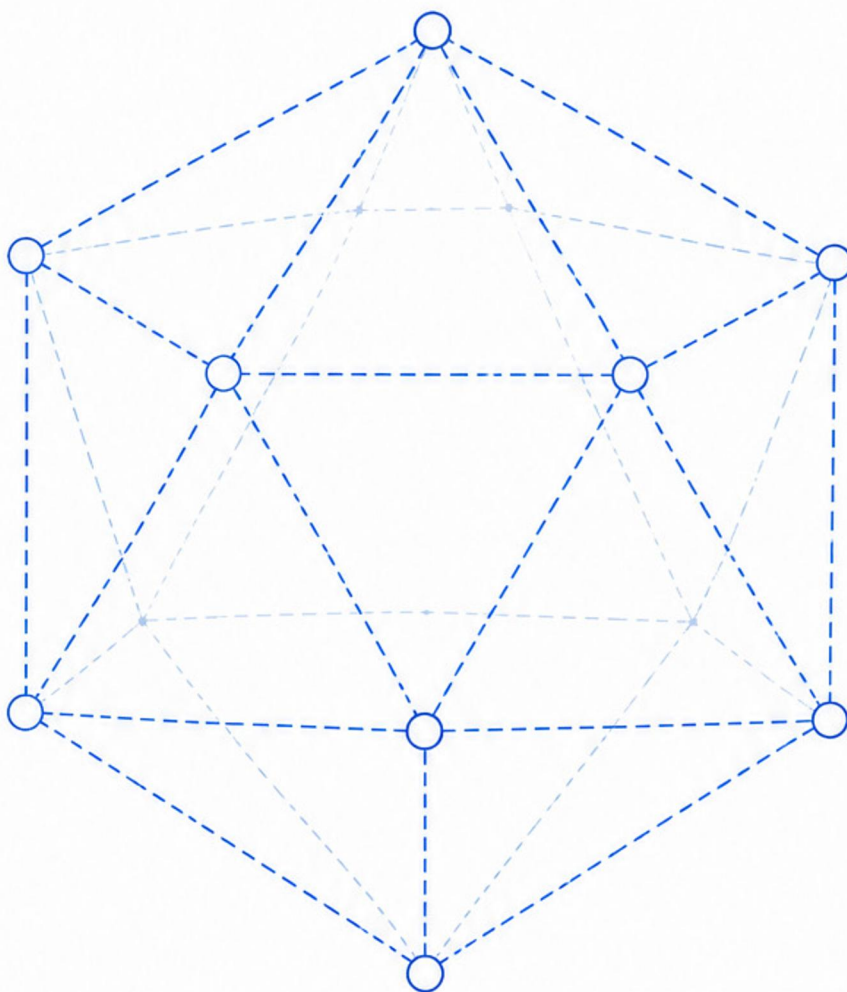
- 4 Mark the midpoints of the three sides of the triangle.



- 5 Connect each vertex of the triangle to the midpoints of the other two sides.



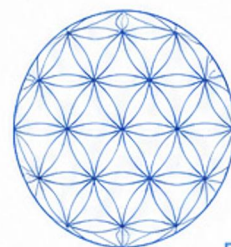
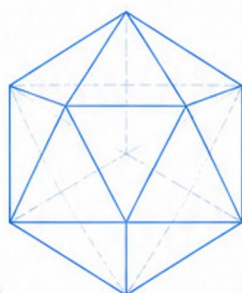
- 6 Use the same pattern on the other side to complete the icosahedron.

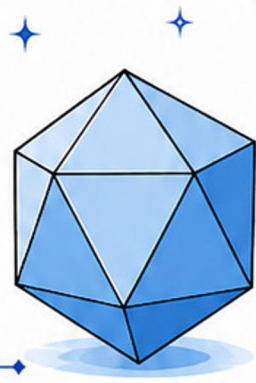
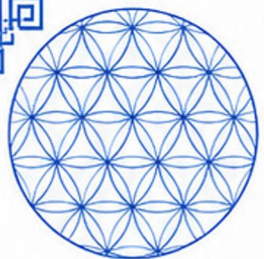


You did it!

An icosahedron has

- ★ 20 faces
- ★ 30 edges
- ★ 12 vertices





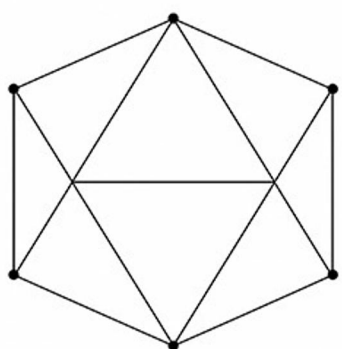
EXERCISE 8

DRAW 3 VARIOUS SHADOWS OR TILT ANGLES

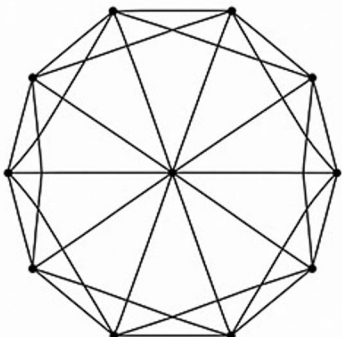
OF THE ICOSAHEDRON

Practice to draw the 3 various shadows or tilt angles of the icosahedron.

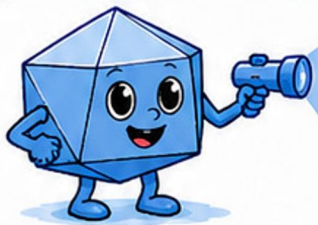
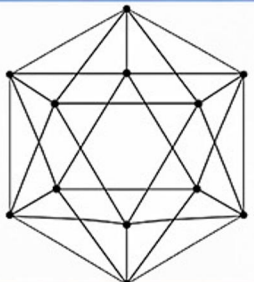
SHADOW 1



SHADOW 2



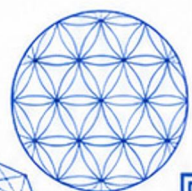
SHADOW 3



EXPERIMENT:

Build the 3D shape of an icosahedron (you can find the activity in Book 1).

Use a torch at home and observe how the shadow changes as you tilt the icosahedron.





EXERCISE 9

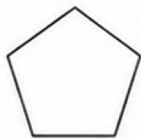
LEARN TO DRAW

DODECAHEDRON

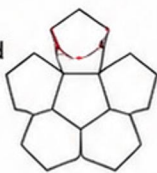


Follow the simple steps to draw a dodecahedron.
Use a pencil and draw lightly at first, then darken your final lines.

- 1** Draw a regular pentagon.



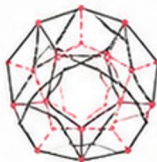
- 2** Draw 5 more pentagons around the first one, sharing each side.



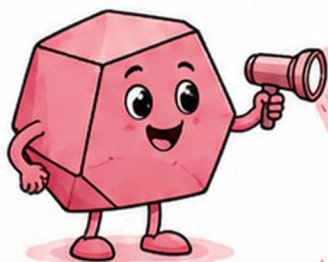
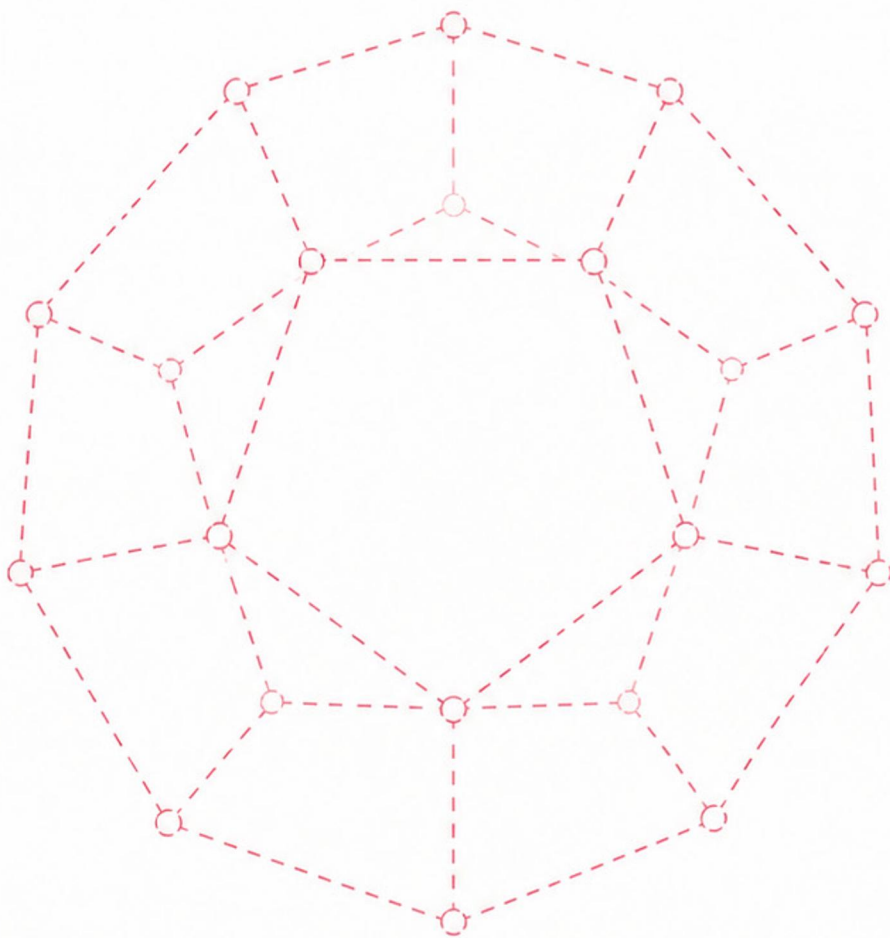
- 3** Draw a pentagon in the center.



- 4** Connect the corresponding vertices with straight lines.



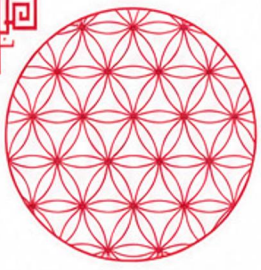
- 5** Great!
You have drawn a dodecahedron!



You did it!

A dodecahedron has
12 faces, 30 edges
and 20 vertices.





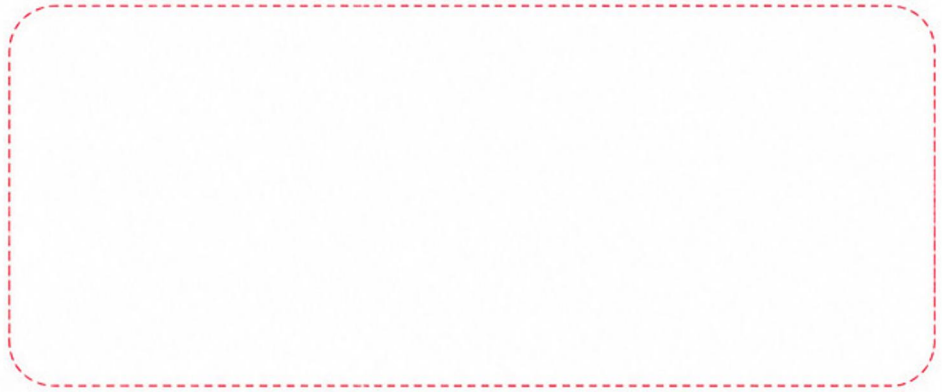
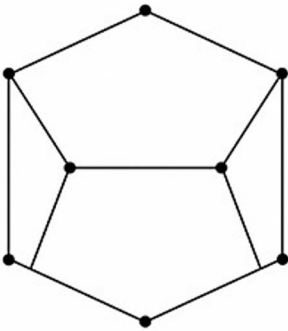
EXERCISE 10

DRAW 3 VARIOUS SHADOWS OR TILT ANGLES

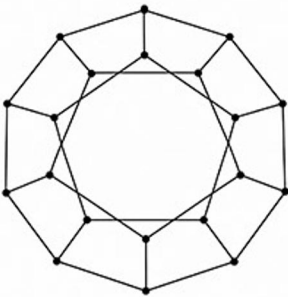
OF THE DODECAHEDRON

Practice to draw the 3 various shadows or tilt angles of the dodecahedron.

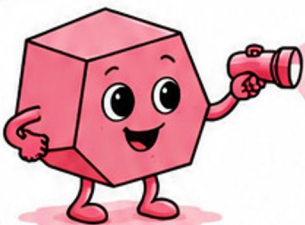
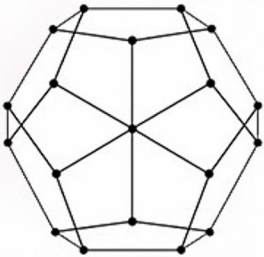
ANGLE 1



ANGLE 2



ANGLE 3



EXPERIMENT:

Build the 3D shape of a dodecahedron (you can find the activity in Book 1).

Use a torch at home and observe how the shadow changes as you tilt the dodecahedron.

