Melissa is exploring differences between pyramids and prisms. She discovers that ...

- **A pyramid has one base.**
  (There is one exception — in a triangular pyramid, any face is a base.)

- **A prism has two bases.**
  (There is one exception — in a rectangular prism any pair of opposite faces are bases.)

**IMPORTANT NOTE:**
The base(s) are not always on the “bottom” or “top” of the shape.

---

**TEACHER:**
The activity that goes with this worksheet will help your students identify the base of a 3-D figure.

1. Shade a base and circle the point of the following pyramids. The first one is done for you.

   **NOTE:** The base will not necessarily be on the “bottom” of the shape (but it is always at the end opposite the point).

   a) ![Pyramid a)](image)
   b) ![Pyramid b)](image)
   c) ![Pyramid c)](image)
   d) ![Pyramid d)](image)
   e) ![Pyramid e)](image)
   f) ![Pyramid f)](image)
   g) ![Pyramid g)](image)
   h) ![Pyramid h)](image)

2. Shade a pair of bases for each prism.

   **REMEMBER:** Unless all its faces are rectangles, a prism has two bases.

   a) ![Prism a)](image)
   b) ![Prism b)](image)
   c) ![Prism c)](image)
   d) ![Prism d)](image)
   e) ![Prism e)](image)
   f) ![Prism f)](image)
   g) ![Prism g)](image)
   h) ![Prism h)](image)
4. a) Complete the chart. Use actual 3-D shapes to help you. Colour the number of sides in each base to help you name the shape.

<table>
<thead>
<tr>
<th>Shape</th>
<th>Picture of Base</th>
<th>Number of ...</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>edges vertices faces</td>
<td></td>
</tr>
</tbody>
</table>

b) Circle the prisms.

c) Compare the number of vertices in each prism to the number of sides in the base. What do you notice?

5. Write a paragraph outlining how the shapes are the same and how they are different.

a)

b)
To make a skeleton for a prism, start by making a base (as you did for a pyramid). However, your prism will also need a top, so you should make a copy of the base.

Now join each vertex in the base to a vertex in the top.

<table>
<thead>
<tr>
<th>Draw Shape of Base</th>
<th>Number of Sides of Base</th>
<th>Number of Edges of Prism</th>
<th>Number of Vertices of Prism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triangular Prism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectangular Prism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pentagonal Prism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hexagonal Prism</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Describe the pattern in each column of your chart.

3. Use the pattern to fill in the row for the hexagonal prism.

4. What relationship do you see between the number of sides in the base of a prism and the number of edges in the prism?
G4-30: Building Pyramids

To make a skeleton for a pyramid, start by making a base. Your base might be a triangle or a square.

Now add an edge to each vertex on your base and join the edges at a point.

Make a triangular pyramid, a square pyramid, and a pentagonal pyramid.

1. Fill in the first three rows of the chart. Using the skeletons you made.

<table>
<thead>
<tr>
<th>Draw Shape of Base</th>
<th>Number of Sides of Base</th>
<th>Number of Edges of Pyramid</th>
<th>Number of Vertices of Pyramid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triangular Pyramid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Square Pyramid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pentagonal Pyramid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hexagonal Pyramid</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Describe the pattern in each column of your chart.

3. Use the pattern to fill in the row for the hexagonal pyramid.

4. What relationship do you see between the number of sides in the base of a pyramid and the number of edges in the pyramid?
3. Vertices are the points where the edges of a shape meet. Put a dot on each vertex (the first one is started for you). Count the vertices.

a)  ____ vertices
b)  ____ vertices
c)  ____ vertices
d)  ____ vertices
4. Shade the ...

**front face:**
- a)
- b)
- c)
- d)

**back face:**
- e)
- f)
- g)
- h)

**side faces:**
- i)
- j)
- k)
- l)

**top and bottom faces:**
- m)
- n)
- o)
- p)

**back face:**
- q)
- r)
- s)
- t)

**bottom face:**
- u)
- v)
- w)
- x)

5. Shade the edges that would be hidden if the skeleton was covered in paper and placed on a table.

- a)
- b)
- c)
- d)

**BONUS**

6. Shade the edges that would be hidden if the skeleton was covered with paper and was hung above you in the position shown.
TEACHER:
Give your students copies of the nets for the 3-D shapes below (from the Teacher’s Guide).

1. Make the following figures from their nets.
Then fill out the chart like the one below in your notebook.

<table>
<thead>
<tr>
<th>Name of Figure</th>
<th>Number of Faces</th>
<th>Number of Edges</th>
<th>Number of Vertices</th>
</tr>
</thead>
<tbody>
<tr>
<td>triangular pyramid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>square pyramid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pentagonal pyramid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>triangular prism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cube</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pentagonal prism</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Draw the missing face for each net.
   (i) 
   (ii) 
   (iii) 
   a) What is the shape of each missing face? _________________
   b) Are the nets pyramids or prisms? How do you know?

3. Draw the missing face for each net.
   (i) 
   (ii) 
   (iii) 
   a) What is the shape of each missing face? _________________
   b) Are the nets pyramids or prisms? How do you know?

4. Copy the following nets onto centimetre grid paper (use 4 grid squares for each face)
   Predict which nets will make cubes. Cut out each net and fold it to check your predictions.
   a) 
   b) 
   c) 
   d) 
   e) 
   f)
6. Sketch all the faces that make up the following 3-D shapes. The first one has been done for you.

<table>
<thead>
<tr>
<th>3-D Shape</th>
<th>2-D Faces</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>![Triangular prism faces]</td>
</tr>
<tr>
<td>b)</td>
<td>![Pyramid faces]</td>
</tr>
</tbody>
</table>

Show your work for parts c), d), and e) in your notebook.

c) ![Triangular prism net]
d) ![Pyramid net]
e) ![Cone net]

7. Match the description of the figure with its name.

- ____ cone
- ____ triangular prism
- ____ cube
- ____ cylinder
- ____ triangular pyramid

A. I have 6 congruent faces.
B. I have 5 faces: 2 triangles and 3 rectangles.
C. I have 4 faces. Each face is a triangle.
D. I have 2 circular bases and a curved face.
E. I have 1 circular base and a curved face.

8. "I have a square base." Name two 3-D solids that this sentence could describe.

9. Name the object you could make if you assembled the shapes.

a) ![Assembled shapes a)]
b) ![Assembled shapes b)]
c) ![Assembled shapes c)]

10. Sketch two faces that you can’t see.

11. a) Which face of the net has the most vertices?
    b) Which face shares a side with every other face?

12. Sketch a net for ...
    a) a triangular pyramid.
    b) a rectangular pyramid.
    c) a triangular prism.
G4-37: Sorting 3-D Shapes

Eve sorts the following figures using a Venn diagram. She first decides on two properties that a figure might have. She then makes a chart.

<table>
<thead>
<tr>
<th>Property</th>
<th>Figures with this property</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. One or more rectangular faces</td>
<td></td>
</tr>
<tr>
<td>2. Fewer than 7 vertices</td>
<td></td>
</tr>
</tbody>
</table>

1. a) Which figure(s) share both properties? _________
   b) Using the information in the chart above, complete the following Venn diagram.

![Venn Diagram](image)

2. Complete both the chart and the Venn diagram below using the shapes A to E.
   a) Property | Figures with this property |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Triangular base</td>
<td></td>
</tr>
<tr>
<td>2. Prism</td>
<td></td>
</tr>
</tbody>
</table>
   b) Which figures share both properties? _________
   c) Using the information in the chart above, complete the following Venn diagram.

![Venn Diagram](image)
4. a) Complete the chart. Use actual 3-D shapes to help you.
   Colour the number of sides in each base to help you name the shape.

<table>
<thead>
<tr>
<th>Shape</th>
<th>Picture of Base</th>
<th>Number of ...</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>edges</td>
<td>vertices</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) Circle the prisms.

c) Compare the number of vertices in each prism to the number of sides in the base.
   What do you notice?

5. Write a paragraph outlining how the shapes are the same and how they are different.

a) ![Shape A](image1.png) ![Shape B](image2.png)
G4-2: Introduction to Angles

An angle is formed when two lines intersect.

RIGHT ANGLES

Right angles are found in many places, including the corners of squares, rectangles and some triangles.

You can always check for right angles using the corner of a piece of paper.

1. Mark each angle as: (i) less than a right angle, or (ii) greater than a right angle. Check your answers with the corner of a piece of paper.

   a) [diagram]
   b) [diagram]
   c) [diagram]
   d) [diagram]
   e) [diagram]
   f) [diagram]
   g) [diagram]
   h) [diagram]

   less than

   [diagram]

2. Mark the angles that are right angles with a small square. Cross out the angles that are not right angles.

   a) [diagram]
   b) [diagram]
   c) [diagram]
   d) [diagram]
3. Draw two right angles, facing different directions and mark them properly with a small square.

<table>
<thead>
<tr>
<th>Right Angle #1</th>
<th>Right Angle #2</th>
</tr>
</thead>
</table>

4. Circle the figure that has no right angle.

<table>
<thead>
<tr>
<th>Figure 1</th>
<th>Figure 2</th>
</tr>
</thead>
</table>

5. Mark (with a small square) all the right angles in the following figures. Then circle the figures that have two right angles.

a) ![Figure a]  
b) ![Figure b]  
c) ![Figure c]  
d) ![Figure d]  
e) ![Figure e]  
f) ![Figure f]  

6. a) Draw at least 3 letters of the alphabet that have at least one right angle. Mark all the right angles.
   
   ![T]

   b) Which letter of the alphabet do you think has the most right angles?

7. Angles that are less than a right angle are called **acute** angles.

   a) Draw at least 3 letters that have acute angles. Mark all the acute angles with dots.
   
   ![N]

   b) Can you find a letter that has both a right angle and an acute angle?

8. Angles that are greater than a right angle and less than two right angles are called **obtuse** angles.

   The letter A has 2 obtuse angles.

   Draw an A and mark the obtuse angles.
1. Fold a piece of paper to create a half right angle.

Circle the angles that are half right angles. (Use your half right angle to check.)

a)  

b)  

c)  

d)  

2. In this house, mark 2 half right angles with: \( \triangle \)

and 5 right angles with: \( \square \)

3. Using a ruler, divide each right angle into two half right angles.

4. Mark any half right angles with: \( \triangle \) and any right angles with: \( \square \)
To measure an angle, you use a protractor. A protractor has 180 subdivisions around its circumference. The subdivisions are called degrees. 45° is a short form for “forty-five degrees.”

There are 180 subdivisions (180°) around the outside of a protractor.

There are 90° in a right angle (or a square corner).

An angle can be less than 90° ...

... or greater than 90°.

1. Without using a protractor, identify each angle as “less than 90°” or “greater than 90°.
   a) 
   b) 
   c) 
   d) 
   e) 
   f) 
   g) 
   h) 
   i)
A protractor has two scales. The exercise below will help you decide which scale to use.

2. Identify the angle as "less than 90°" or "greater than 90°."
   Circle the two numbers that the arm of the angle passes through.
   Then pick the correct measure (i.e. if you said the angle is "less than 90°," pick the number that is less than 90).

   a) The angle is: less than 90°
   The angle is: 60°

   b) The angle is: ____________
   The angle is: ____________

   c) The angle is: ____________
   The angle is: ____________

   d) The angle is: ____________
   The angle is: ____________

3. Again, identify the angle as "less than 90°" or "greater than 90°." Then write the measure of the angle.
   TEACHER: The letters beside each protractor are for a game in the Teacher's Guide.

   a) E
   b) N
4. Measure the angles using a protractor, and write your answers in the boxes.
HINT: Use a ruler to extend the arms in d), e) and f)

5. Draw 5 angles and use a protractor to measure them.
A polygon with four sides is called a **quadrilateral**.

*Example:*

3 sides  
**NOT a quadrilateral**

4 sides  
**quadrilateral**

4 sides  
**quadrilateral**

4 sides  
**quadrilateral**

1. Based on the properties of the following figures, complete the chart below.

<table>
<thead>
<tr>
<th>Property</th>
<th>Shape with Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quadrilateral</td>
<td></td>
</tr>
<tr>
<td>Non-Quadrilateral</td>
<td></td>
</tr>
</tbody>
</table>

2. 

a) Which shapes are polygons?  **REMEMBER: A polygon has straight sides.**

b) Which shapes have sides that are all the same length?  **(Check with a ruler.)**

c) Which shapes have at least one curved side?

d) What do shapes B, C and G have in common?

e) What do shapes D, E and F have in common?

f) Which shape doesn’t belong in this group: A, E, F and G?  **Explain.**

g) Pick your own group of shapes and say what they have in common.
Some quadrilaterals don’t have any pairs of parallel lines. Some have one pair of parallel lines. Parallelograms have two pairs of parallel lines.

NO parallel lines

ONE pair of parallel lines

TWO pairs of parallel lines

1. For each shape, mark the parallel lines with arrows. Mark all of the opposite sides that are not parallel with an ‘X’. Under each quadrilateral, write how many pairs of sides are parallel.

A
B
C
D
E
F
G
H

2. Sort the above shapes into the chart by writing the letter in the correct column.

<table>
<thead>
<tr>
<th>No pairs of parallel sides</th>
<th>One pair of parallel sides</th>
<th>Two pairs of parallel sides</th>
</tr>
</thead>
</table>

3. Using the figures below, complete the two charts. Start by marking the right angles and parallel lines in each figure.

a) Property | Shapes with Property
---|---
No right angles | 
1 right angle | 
2 right angles | 
4 right angles | 

b) Property | Shapes with Property
---|---
No parallel lines | 
1 pair | 
2 pairs |
NOTE: A shape with all sides the same length is called **equilateral**. ("Equi" comes from a Latin word meaning "equal" and "lateral" means "sides").

4. Use a ruler to measure the sides of the shapes below. Circle the shapes that are equilateral.

   a) [Diagram of a triangle with cm measurements]
   b) [Diagram of a pentagon with cm measurements]
   c) [Diagram of a rectangle with cm measurements]
   d) [Diagram of a parallelogram with cm measurements]

5. Complete the charts below, using shapes A to J for each chart.
   HINT: Start by marking the right angles and parallel lines in each figure. If you are not sure if a figure is equilateral, measure its sides with a ruler.

   a) | Property          | Shapes with Property |
      | Equilateral       |                      |
      | Not equilateral   |                      |

   b) | Property          | Shapes with Property |
      | No right angles   |                      |
      | 1 right angle     |                      |
      | 2 right angles    |                      |
      | 4 right angles    |                      |

   c) | Property                   | Shapes with Property |
      | No parallel sides         |                      |
      | 1 pair of parallel sides  |                      |
      | 2 pairs of parallel sides |                      |
      | 3 pairs of parallel sides |                      |

   d) | Shape Names | Shapes |
      | Triangles   |        |
      | Quadrilaterals |      |
      | Pentagons   |        |
      | Hexagons    |        |
G4-8: Special Quadrilaterals

A quadrilateral (shape with 4 sides) with two pairs of parallel sides is called a **parallelogram**.

- **Parallelogram**
  - A quadrilateral with two pairs of parallel sides.

Some other quadrilaterals have special names.

- **Rhombus**
  - A parallelogram with 4 equal sides

- **Rectangle**
  - A parallelogram with 4 right-angles

- **Square**
  - A parallelogram with 4 right-angles and 4 equal sides

- **Trapezoid**
  - A quadrilateral with only one pair of parallel sides

---

1. Mark all right angles in the quadrilaterals and measure the length of each side. Then choose the best (or most specific) name for each quadrilateral.

   a) 
   - __ cm
   - __ cm
   - __ cm
   - __ cm
   
   Name: ____________________

   b) 
   - __ cm
   - __ cm
   - __ cm
   - __ cm
   
   Name: ____________________

2. Name the shapes. Use the words rhombus, square, parallelogram and rectangle.

   a) 
   - [Shape]

   b) 
   - [Shape]

   c) 
   - [Shape]

   d) 
   - [Shape]

3. Mark all the right angles in each quadrilateral. Then identify each quadrilateral.

   a) 
   - [Shape]

   b) 
   - [Shape]

   c) 
   - [Shape]

4. Match the name of the quadrilateral to the best description.

   - **Square**
   - **Rectangle**
   - **Rhombus**

   - A parallelogram with 4 right angles.
   - A parallelogram with 4 equal sides.
   - A parallelogram with 4 right angles and 4 equal sides.
Triangles can be classified by the lengths of their sides.

i) All three sides of an **equilateral triangle** are of equal length.

ii) Two sides of an **isosceles triangle** are of equal length.

iii) No two sides of a **scalene triangle** are of equal length.

1. a) Measure the sides of each triangle. Write your measurements on the sides.

   ![Triangle A](image)
   ![Triangle B](image)
   ![Triangle C](image)
   ![Triangle D](image)
   ![Triangle E](image)
   ![Triangle F](image)

   b) Classify the triangles by their sides.

<table>
<thead>
<tr>
<th>Property</th>
<th>Triangles with Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equilateral</td>
<td></td>
</tr>
<tr>
<td>Isosceles</td>
<td></td>
</tr>
<tr>
<td>Scalene</td>
<td></td>
</tr>
</tbody>
</table>

2. Measure the following lines and then mark the midpoint of each.
   a) _____________ cm
   b) _____________ cm

3. Each of the triangles below is isosceles.
   Draw the line of symmetry for each.
   **HINT:** First find the midpoint of the base as in triangle A.
1. a) Compare the two shapes by completing the following chart.

<table>
<thead>
<tr>
<th>Property</th>
<th>Figure 1</th>
<th>Figure 2</th>
<th>Same?</th>
<th>Different?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of vertices</td>
<td>3</td>
<td>3</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Number of edges</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of pairs of parallel sides</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of right angles</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any lines of symmetry?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of lines of symmetry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the figure equilateral?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) By simply looking at the following figures, can you say how they are the same and different?

2. Draw two figures and compare them using a chart (similar to that in Question 1).

3. Looking at the following figures, can you comment on their similarities and differences?
   Be sure to mention the following properties:
   ✓ The number of vertices
   ✓ The number of edges
   ✓ The number of pairs of parallel sides
   ✓ The number of right angles
   ✓ Number of lines of symmetry
   ✓ Are the figures equilateral?