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| **Strand:** | Geometry and Measurement | **Sub-Strand:** | Measurement |



**BASIC 9**

**WEEKLY LESSON PLAN – WEEK 11**

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| **Content Standard:** | B.9.3.2.1 Derive the formulas for determining the surface area of prisms (i.e. cuboid and triangular prism) and use to solve problems | | | | |
| **Indicator (s)** | B9.3.2.1.1 Identify cuboids and triangular prisms; draw their nets to construct the 3-D shapes and use it to determine the surface area<br><br>B9.3.2.1.2 Use the net of a cuboid to determine its surface area. | **Performance Indicator:** Learners can draw the nets for triangular prisms and cuboids. | | | |
| **Week Ending** | 22-11-2024 | | | | |
| **Class** | B.S.9 | **Class Size:** | | **Duration:** | |
| **Subject** | Mathematics | | | | |
| **Reference** | Mathematics Curriculum, Teachers Resource Pack, Learners Resource Pack, Textbook. | | | | |
| **Teaching / Learning Resources** | Poster, Cardboard, Pictures, video | **Core Competencies:** | • Communication<br>• Critical thinking<br>• Creativity and Innovation | | |

| **DAY/DATE** | **PHASE 1 : STARTER** | **PHASE 2: MAIN** | **PHASE 3: REFLECTION** |
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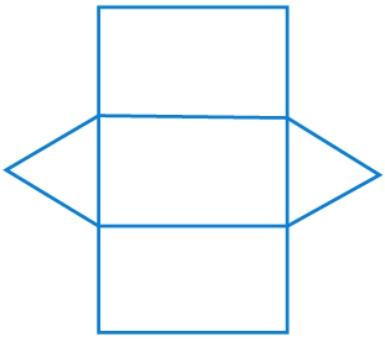
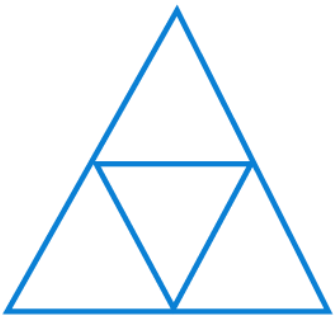
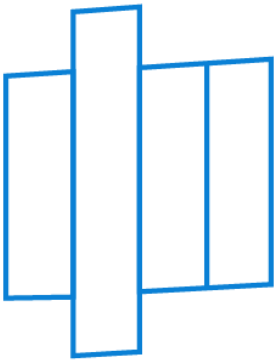
| **MONDAY** | Assist Learners to identify and draw triangular prism and cuboid shapes. | 1. Learners brainstorm to draw the nets of triangular prism and cuboid to construct the 3-D shapes.<br>2. Demonstrate on how to draw the nets of triangular prism and cuboids.<br>3. Assist Learners to use net drawn to determine the surface area.<br><br>**Draw the nets of the following:**<br>**(i) Triangular prism**<br>**(ii) Tetrahedron**<br>**(iii) Cuboid**<br><br>**Solution:**<br><br>(i) Net of a triangular prism | Through questions and answers, conclude the lesson.<br><br>**Exercise;**<br><br>Draw the nets of the following:<br>i) Triangular prism<br>ii) Tetrahedron<br>iii) Cuboid |



(ii) Net of a tetrahedron



(iii) Net of a cuboid



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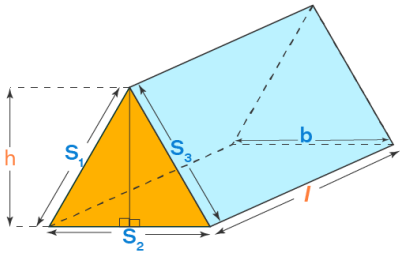
| **WEDNESDAY** | Learners brainstorm to find the surface area of cuboids. | 1. Discuss with the Learners about the formula for calculating the surface area of triangular prisms.<br>2. Draw triangular prisms on the chalkboard and ask Learners to calculate their surface area.<br>3. Assist Learners to find the surface area of right triangular prisms.<br><br>**Surface Area of Triangular Prism**<br><br>The **surface area of triangular prism** is the total area of all its faces. A triangular prism is a prism that has two congruent triangular faces and three rectangular faces that join the triangular faces. It has 6 vertices, 9 edges, and 5 faces. Let us learn more about the total surface area of a triangular prism, the formula for surface area of triangular prism, the lateral surface area of a triangular prism along with examples.<br><br>**What is the Total Surface Area of a Triangular Prism?**<br><br>The **surface area of a triangular prism** is also referred to as its total surface area. The total surface area of a triangular prism is the sum of the areas of all the faces of the prism. A triangular prism has three rectangular faces and two triangular faces. The rectangular faces are said to be the lateral faces, while the triangular faces are called bases. If the bases of a triangular prism are placed horizontally, they are referred to as the top and the bottom (faces) of the prism, respectively. The **surface area of triangular prism** is expressed in square units, like, $m^2$, $cm^2$, $in^2$ or $ft^2$, etc.<br><br>**Formula for Surface Area of Triangular Prism**<br><br>The triangular prism formula for surface area is formed by adding up the area of all the rectangular and triangular faces of a prism. Observe the following figure of a triangular prism to know the dimensions that are considered to frame the formula. | Reflect on the difference between the formula for calculating the surface area of cuboids and triangular prisms. |

Surface Area of a Triangular Prism




**Total Surface Area** = ( Perimeter x Length ) + (2 x Base Area)

= ( $S_1 + S_2 + S_3$ )$l$ + bh

**The formula for the surface area of triangular prism is:**

**Surface area = (Perimeter of the base × Length of the prism) + (2 × Base Area) = ($S_1$ +$S_2$ + $S_3$)L + bh**

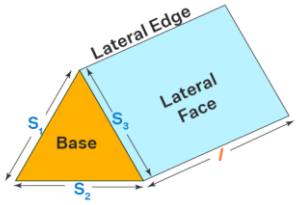
where,

- b is the bottom edge of the base triangle,
- h is the height of the base triangle,
- L is the length of the prism and
- $S_1$, $S_2$, and $S_3$ are the three edges (sides) of the base triangle
- (bh) is the combined area of the two triangular faces [2 × (1/2 × bh)] = bh

**Lateral Surface Area of Triangular Prism**

The **lateral surface area** of any solid is the area without the bases. In other words, the **lateral surface area of a triangular prism** is calculated without considering the base area. When a triangular prism has its bases facing up and down, the lateral area is the area of the vertical faces. The lateral surface area of a triangular prism can be calculated by multiplying the perimeter of the base by the length of the prism. The perimeter of the base is the total length of the edges of the base triangle, while the length of the prism is its height. Observe the following figure to understand the lateral surface and the base of a triangular prism.

Lateral Surface Area of a Triangular Prism




Lateral Surface Area of a Triangular Prism

$= (S_1 + S_2 + S_3)\, l$

$=$ Perimeter of the base x Length

Thus, the lateral surface area of triangular prism is:

Lateral Surface Area = $(S_1 + S_2 + S_3) \times l$ = (Perimeter × Length) or LSA = $p \times l$

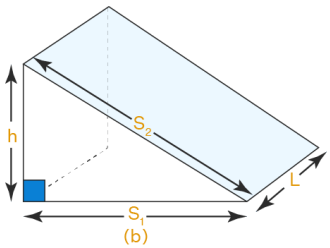
where,

- l is the height (length) of a prism
- p is the perimeter of the base

**How to Find the Surface Area of a Right Triangular Prism?**

A right triangular prism has two parallel and congruent triangular faces and three rectangular faces that are perpendicular to the triangular faces. The surface area of a right triangular prism can be calculated by representing the 3-d figure into a 2-d net, which makes it easier to understand. After expanding this 3-d shape into the 2-d shape we get two right triangles and three rectangles. Observe the following figure which shows a right triangular prism. The following steps are used to calculate the surface area of a right triangular prism:

Surface Area of a Right Triangular Prism




Total Surface Area = $(S_1 + S_2 + h)L + bh$

- **Step 1:** Find the area of the top and the base triangles using the formula, Area of the two base triangles = 2 × (1/2 × base of the triangle × height of the triangle) which simplifies to 'base × height' (bh).
- **Step 2:** Find the product of the length of the prism and the perimeter of the base triangle which will give the

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| | | lateral surface area = $(S_1 + S_2 + h) \times l$.<br>• **Step 3:** Add all the areas together to get the total surface area of a right triangular prism in square units. This means, total surface area of a right triangular prism = $(S_1 + S_2 + h) \times l + bh$<br><br>**Example:** Find the total surface area of a right triangular prism which has a base area of 60 square units, the base perimeter of 40 units, and the length of the prism is 7 units.<br><br>**Solution:** Given, base area = 60 square units, base perimeter = 40 units and length of prism = 7 units<br><br>Thus, the surface area of the right triangular prism, Surface Area = (Perimeter of the base × Length of the prism ) + (2 × Base Area)<br><br>⇒ SA = (40 × 7) + (2 × 60)<br><br>⇒ SA = (280 + 120)<br><br>⇒ SA = 400 square units<br><br>Thus, the surface area of the right triangular prism is 400 square units. | |
| **FRIDAY** | Distribute the nets of cuboids and assist Learners identify the following:<br>• Number of rectangular faces<br>• Dimensions of each face (length, width, and height) | 1. Using the formula 2(lw + wh + lh), where l is the length, w is the width, and h is the height, demonstrate on how to calculate the total surface area (TSA) of cuboid.<br>2. Assist Learners to calculate the total surface area of cuboids using the formula.<br>3. Provide additional nets for Learners to practice calculating the surface area. Encourage them to apply this skill to real-world problems, such as finding the surface area of a bookshelf or a storage container.<br><br>**Calculating the surface area of a cuboid**<br>A cuboid is a three-dimensional rectangular solid with six rectangular faces. To calculate its surface area, you need to **add the areas of all six faces**.<br><br>**Formula:** The surface area of a cuboid (TSA) is given by:<br><br>TSA = 2(lw + lh + wh)<br><br>where:<br><br>• l is the length (horizontal longer side)<br>• w is the width (horizontal shorter side) | Reflect on the importance of using the net to visualize and calculate the surface area of a cuboid.<br><br>**Exercise;**<br><br>1. Given below is a cuboid having its dimension given as length = 8 cm, width = 6 cm and height = 5 cm, find the TSA of a cuboid.<br>2. The dimensions of a cuboid are given as follows:<br>Length = 4.8 cm |

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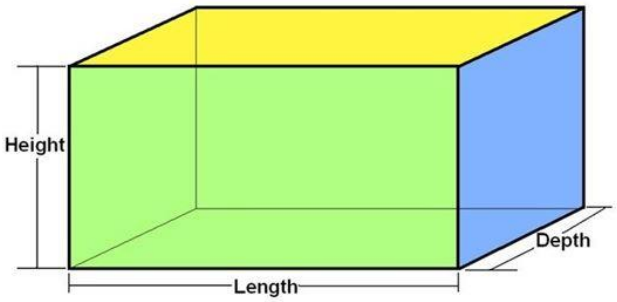
| | | • h is the height (vertical side)<br><br>**Breakdown:**<br><br>• **2(lw)** represents the area of the two rectangular faces with length (l) and width (w)<br>• **2(lh)** represents the area of the two rectangular faces with length (l) and height (h)<br>• **2(wh)** represents the area of the two rectangular faces with width (w) and height (h)<br><br>**Example:** Suppose you have a cuboid with length (l) = 5 cm, width (w) = 3 cm, and height (h) = 2 cm. To calculate its surface area:<br><br>TSA = 2(5 × 3 + 5 × 2 + 3 × 2) = 2(15 + 10 + 6) = 2 × 31 = 62 square centimeters<br><br>**Note:** This formula calculates the total surface area (TSA) of the cuboid, which includes all six rectangular faces. If you want to find the lateral surface area (LSA), which excludes the base and top faces, you can use the formula LSA = 2(lh + wh).<br><br>  <br> | Width = 3.4 cm<br>Height = 7.2 cm.<br>Find the Total Surface area and the Lateral Surface area. |

**Name of Teacher:** **School:** **District:**