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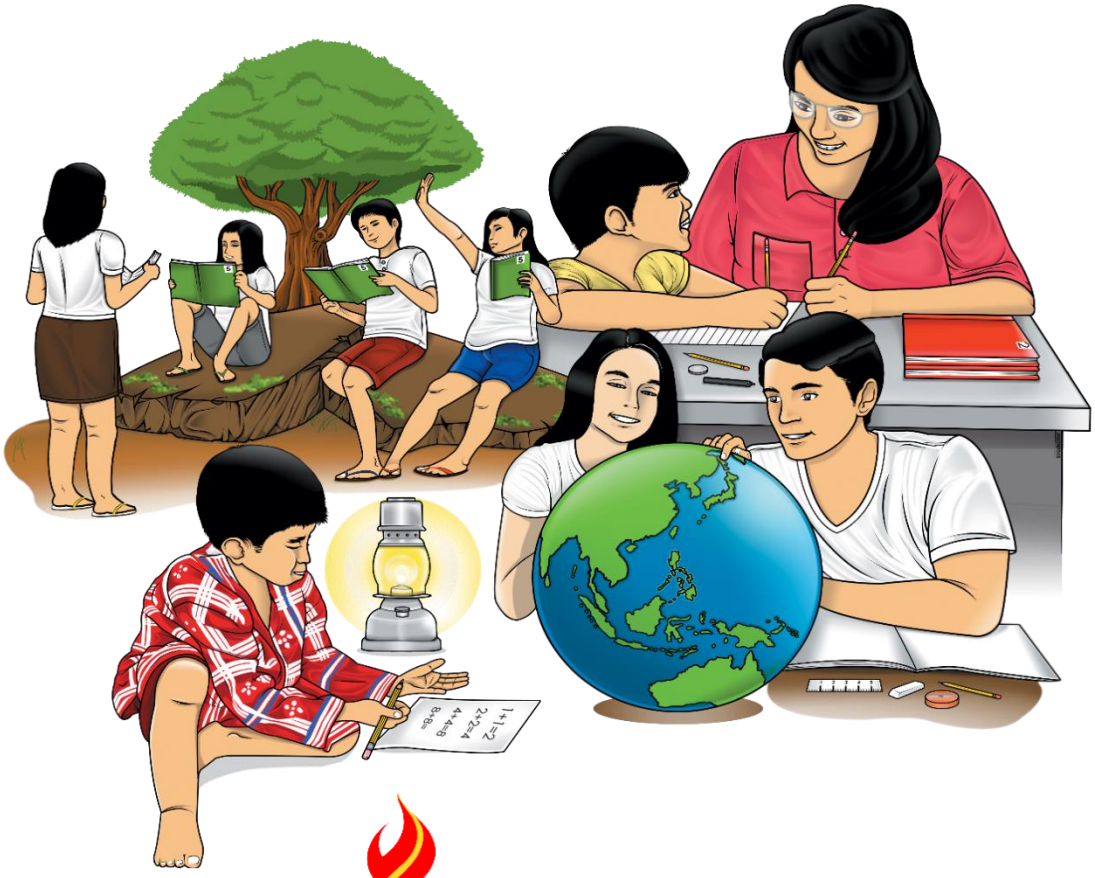
Mathematics

Quarter 3 – Module 9:
Solving Word Problems Involving Measurement of Surface Area



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Mathematics

Quarter 3 – Module 9:
Solving Word Problems Involving Measurement of Surface Area

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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

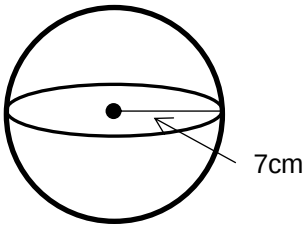
What I Need to Know

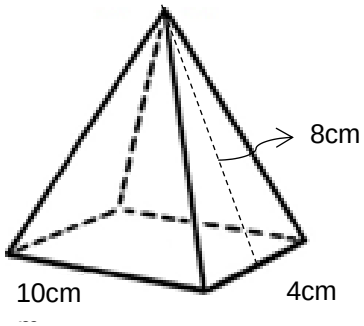
This module was designed and written with you in mind. It is here to help you master the skills in solving word problems involving surface area. this module allows you to use it in various learning situations. The language used recognizes your vocabulary level. The lessons are arranged to follow the standard sequence of your course. But the order in which you read them can be changed to match with the textbook you are now using.

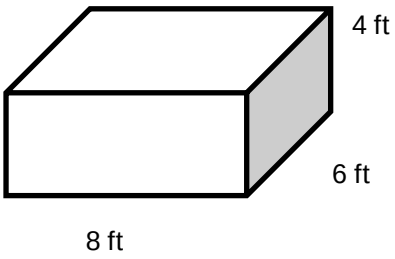
After going through this module, you are expected to be able to solve word problems involving measurement of surface area of different solid objects.

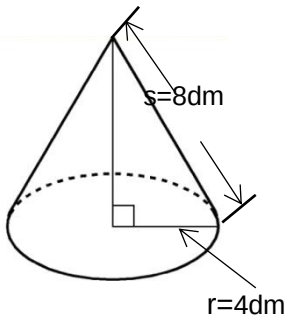
What I Know

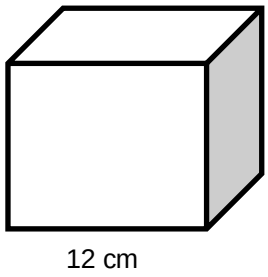
A. On a separate sheet of paper, find the surface area of the following figures:

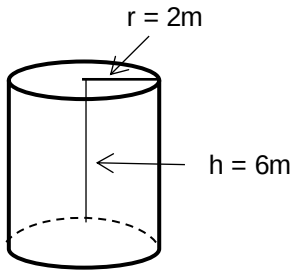
1. 

2. 

3. 

4. 

5. 

6. 

B. Solve the following problems. Write your answer in your answer sheet. Use $\pi = 3.14$

1. A boy is playing with a ball with radius 20 cm. Find the surface area of the ball.

2. A milk can has a radius of 5 cm and a height of 12 cm. How much tin was used to make it?

Lesson 1

Solving Word Problems Involving Measurement of Surface Area

In the previous lessons, you have learned different characteristics of solid figures and how to solve their surface area. This time, we will focus on how to solve word problems involving surface area of solid objects.

What's In

A. On a separate sheet of paper, write **T** if the statement is true and **F** if the statement is false.

_____1. The faces of rectangular pyramid are rectangle.

_____2. A cone has two circular bases.

_____3. The faces of the cube are triangles.

_____4. Surface area refers to the sum of the faces of solid figures.

_____5. A cylinder is a three-dimensional figure with two congruent circular bases that are parallel.

B. Match the solid figure in column A to its surface area formula on column B. Write your answer on a separate sheet of paper.

Column A	**Column B**
1. Cylinder	A. S.A = 2 (lw + lh + wh)
2. Pyramid	B. S.A = $\pi rs + \pi r^2$
3. Cube	C. S.A = $6s^2$
4. Cone	D. S.A = $2\pi rh + 2\pi r^2$
5. Rectangular Prism	E. S.A = $4\pi r^2$
6. Sphere	F. S.A. = l x w x h
	G. S.A = L.A + B

What's New

Read and study the problem below.

Mary wants to wrap her rectangular gift with a dimension of 15 cm by 6 cm by 2 cm. What is the least amount of wrapper can she use to wrap the gift?

Can you help Mary to find the least amount of wrapper to wrap her gift?

What is It

To solve the problem above, we will follow the following steps:

1. Understand:
   a. What is asked?
      Answer: The least amount of wrapper she can use to wrap the gift?
   b. What are the given?
      Answer: dimension: 15 cm by 6 cm by 2 cm
2. Plan: What strategy can we use to solve the problem?

Answer: The problem asked for the wrapper to be used around the gift.

We can solve the problem by finding the surface area of a rectangular prism.

3. Solution: Use the formula to find the surface area of a rectangular prism.

S.A. = 2 (lw + lh + wh)
= 2 (15 cm x 6 cm + 15 cm x 2 cm + 6 cm x 2 cm)
= 2 ($90cm^2$ + 30 cm^2 + 12 cm^2)
= 2 (132 cm^2)
S.A. = 264 cm^2

4. Check:

To check our answer, we will find the area using another formula:

S.A. = 2lw + 2lh + 2wh
= 2 (15 cm x 6 cm) + 2 (15 cm x 2 cm) + 2 (6 cm x 2 cm)
= 2 ($90cm^2$) + 2 ($30cm^2$) + 2 ($12\ cm^2$)
= $180\ cm^2 + 60\ cm^2 + 24\ cm^2$
S.A. = $264\ cm^2$

We have observed that the answer is the same even if we are using different process. So, 264 cm^2 is the amount of wrapper needed to wrap the gift.

Problem 2:

Find the surface area of a can of milk whose diameter is 12 inches and 20 inches high.

Let's analyze the problem:

1. Understand:

   a. What is asked?
   Answer: The surface area of a can of milk.
   b. What are the given?
   Answer: diameter is 12 inches, 20 inches high

2. Plan: What strategy can we use to solve the problem?

   Answer: Find the surface area of a cylinder because a can of milk

   cylinder.

3. Solution: Use the formula in finding the surface area of a cylinder.
   S. A. = $2\pi rh + 2\pi r^2$
   = 2 (3.14) x 6 in x 20 in + 2 (3.14) $(6in)^2$
   = 6.28 x 120 in^2 + 6.28 x 36 in^2
   = 753.6 in^2 + 226.08 in^2
   S.A. = 979.68 in^2

4. Check

To check our answer, we will find the area using another formula:

Step 1: Solve the lateral area.

L.A. = $2\pi rh$

= 2(3.14) x (6 in) x (20 in)

= 6.28 x 120 in^2

= 753.6 in^2

Step 2: Find the surface area.

S.A = L. A. + 2B (Substitute the formula in finding the area of circle)

= L.A. + $2\pi r^2$ (Substitute the value to the formula)

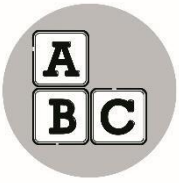
= 753.6 in^2 + 2 (3.14) $(6\ in)^2$ (Multiply: 2 x 3.14 and 3 to itself)

= 753.6 in^2 + 6.28 (36 in^2)

= 753.6 in^2 + 226.08 in^2

S.A.= 979.68 in^2

We have observed that the answer is the same even if we are using a different process. So, 979.68 in^2 is the surface area of the can of milk.



What's More

. Read and solve the following problem using the steps illustrated in the previous section. **Use** π = 3.14

1. Find the surface area of the basketball with a radius of 4.25 cm. Round your answer to the nearest tenths.

2. An ice cream cone has a circular base of radius 2 cm and a slant height of 5 cm. What is the surface area of the cone?

What I Have Learned

The following are the steps to solve a problem:

1. Understand:
   a. What is asked?
   b. What are given?
2. Plan: What formula are you going to use?
3. Solution: Show your computation.
4. Check:

- Surface area (S.A) is the total areas of the surface of solid object.
- Surface Area of Prism

The surface area of a rectangular prism is the sum of all the faces.

$S.A = 2(lw) + 2(lh) + 2(wh)$ or $SA = 2\ (lw + lh + wh)$

The surface area of a cube is the sum of the area of all the faces.

$S.A = 6s^2$

- Surface Area of a Cylinder

The lateral area of a cylinder is the product of the circumference of the base and the height.

The surface of a cylinder is the sum of the lateral area and the areas of the two bases. $S.A = L.A + 2B$ or $S.A = 2\pi rh + 2\pi r^2$

- Surface Area of a Pyramid

The surface area of a pyramid is the sum of the lateral area and the area of the base. $S.A = L.A + B$

- Surface Area of a Cone

The surface area of a cone is the sum of the lateral area and the area of its base.

$S.A = L.A + B$ or $S.A = \pi rs + \pi r^2$

❖ Surface Area of a Sphere

The surface area of a sphere with radius (r) is **$S.A = 4\pi r^2$**

What I Can Do

Read and solve the problems using the steps solving problem. Write your answer on a separate sheet of paper. Use $\pi = 3.14$

1. A wooden cabinet needs repainting. How much surface area needs to be painted if the box has a length of 8m, width of 5 m and height of 6 m?
2. What is the surface area of a sphere whose radius is 4dm?

Assessment

On a separate sheet of paper, solve following the steps on how to solve word problems. Use $\pi = 3.14$

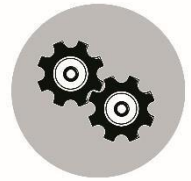
1. Peter and Eric pitched a tent in a shape of a pyramid. The base of the tent is 3 meters wide by 4 meters long. The tent had a slanted height of 5 meters. What was the surface area of the tent?

2. Jason is wrapping a present. The box he is using is a rectangular prism with a length of 8 dm, a width of 5 dm and a height of 4 dm. Find how much paper he needs to wrap the entire box.

3. A cylinder-shaped water pitcher has a radius of 5 inches and a height of 15 inches. Find the surface area of the pitcher.

4. Find the amount of tin needed to make a milk can that has a diameter of 4 cm and a height of 5 cm.

5. A music box has the shape of a cube. Each edge of the music box is 12 centimeters long. What is the surface area of the box?



Additional Activities

Read and solve the following problems. Use $\pi = 3.14$

1. The side of the cube measures 7 cm. Find its surface area.

2. The regular pyramid has a square base whose edge of the base measures 4 m and the slanted height measures 10m. Find the surface area of the pyramid?

3. A box of shoes has dimensions of 20 cm by 12 cm by 9 cm. What is the surface area of the box?

4. A cosmetics company that makes small cylindrical bars of soap. Find the surface area of a bar of soap if the diameter is 4 cm and the height is 9 cm.

5. Gerald own an antique shop. He is applying a coating to a rectangular jewelry box whose dimension is 5 m by 3m by 4m. The can of varnish is enough to cover 80 m^2. Is there enough varnish left in the can to coat the jewelry box? Explain your answer.

Answer Key

What I Know

1. 615.44 cm^2
2. 152 cm^2
3. 208 ft^2
4. 150.72 dm^2
5. 864 cm^2
6. 100.48 m^2
7. 5,024 cm^2
8. 533.8 cm^2

What's In'

A.

1. F
2. F
3. F
4. F
5. T

B.

1. D
2. G
3. C
4. B
5. A
6. E

What's More

1. 226.9 cm^2
2. 31 cm^2

What I Can Do

1. 236 m^2
2. 200.96 dm^2

Assessment

1. 47 m^2
2. 184 dm^2
3. 628 m^2
4. 87.92 cm^2
5. 864 cm^2

Additional Activities

1. 294 cm^2
2. 96 m^2
3. 1,056 cm^2
4. 138.16 cm^2
5. The varnish is not enough because the surface area of the jewelry box is 94 m2 and the varnish left could cover only an area of 80 m^2.

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Most Essential Learning Competencies (MELC) in Mathematics 6

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