

Euclidean Geometry

April 6 – April 9

Time Allotment: 40 minutes per day

Student Name: _____

Teacher Name: _____

Packet Overview

Date	Objective(s)	Page Number
Monday, April 6	1. Identify the parts of prisms	2
Tuesday, April 7	1. Calculate the lateral area, total area, and volume of a prism	4
Wednesday, April 8	1. Calculate the lateral area, total area, and volume of a prism practice	8
Thursday, April 9	1. Minor assessment on prisms	10

Additional Notes: Hello students!,

The day you have been waiting for is finally here! We are going to begin learning about 3-D Figures!!!

Make sure you are reading with a pencil in your hand (NO PENS). You should always be underlining, circling, taking margin notes etc.

Mr. Bernstein will have office hours at the following times

- 1st Period 10:00-10:50am Mondays & Wednesdays
- 5th Period 11:00- 11:50 am Tuesdays & Thursdays

Miss McCafferty will hold office hours at the following times:

- 1st Period 10:00-10:50 am Mondays & Wednesdays
- 3rd Period 1:00- 1:50 pm Mondays & Wednesdays
- 4th Period 10:00-10:50 am Tuesdays & Thursdays
- 6th Period 1:00- 1:50 pm Tuesdays & Thursdays

Love,

Miss McCafferty and Mr. Bernstein

The answer key to each lesson will be at the end of each lesson. The answer keys should only be used when checking work.

Academic Honesty

I certify that I completed this assignment independently in accordance with the GHNO Academy Honor Code.

Student signature:

I certify that my student completed this assignment independently in accordance with the GHNO Academy Honor Code.

Parent signature:

Monday, April 6

Geometry Unit: 3-D Figures
Lesson 1: Prisms

Objective: Be able to do this by the end of this lesson.

1. Identify the parts of prisms

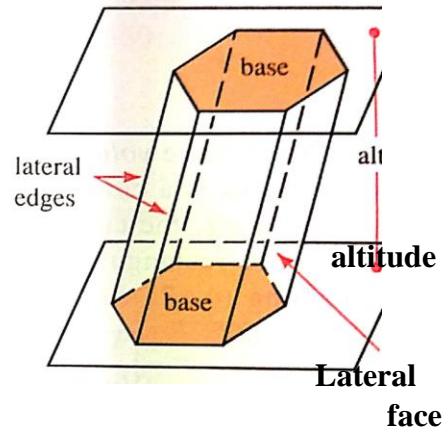
Lesson 1

12-1 Prisms

In this chapter you will be calculating surface areas and volumes of special solids. It is possible to begin with some postulates and then prove as theorems the formulas for areas and volumes of solids, as we did for plane figures. Instead, the formulas for solids will be stated as theorems, and informal arguments will be given to show you that the formulas are reasonable.

The first solid we will study is the **prism**. The two shaded faces of the prism shown are its **bases**. Notice that the bases are congruent polygons lying in parallel planes. An **altitude** of a prism is a segment joining the two base planes and perpendicular to both. The length of an altitude is the *height, h* , of the prism.

The faces of a prism that are not its bases are called **lateral faces**. Adjacent lateral faces intersect in parallel segments called **lateral edges**.



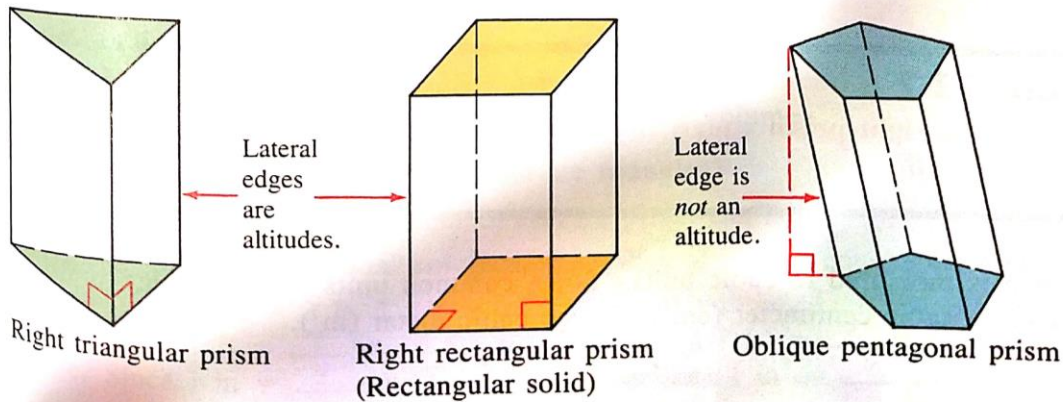
Write your answer on a separate sheet of paper titled: “April 6, Lesson 1, pg. 2”

1. What does the text ask you to notice about the bases of the prism? (Answer in a complete sentence.)
2. What is an altitude? (Answer in a complete sentence.)
3. What is the difference between a lateral face and a lateral edge? (Answer in a complete sentence.)

Key Terms:

Congruent means that two figures are equal in *every* way. The figures have equal areas, sides, angles, etc.

The lateral faces of a prism are parallelograms. If they are rectangles, the prism is a **right prism**. Otherwise the prism is an **oblique prism**. The diagrams below show that a prism is also classified by the shape of its bases. Note that in a right prism, the lateral edges are also altitudes.



Areas and Volumes of Solids / 4

Write your answer on a separate sheet of paper titled: “April 6, Lesson ,1 pg. 3”

4. What kind of figure is the lateral face of a prism? (Answer in a complete sentence.)
5. What kind of parallelogram do right prisms have as their lateral face? (Answer in a complete sentence.)
6. What is the difference between a right prism and an oblique prism? (Answer in a complete sentence.)

Notice that all prisms have **TWO** adjectives that tell us what kind of prism we are dealing with.

1st. The prism is either RIGHT or OBLIQUE

2nd. The prism is described by its base TRIANGULAR, RECTANGULAR, PENTAGONAL, and so on. Any Rectilinear figure can be the base of a prism.

BASES ARE ALWAYS CONGRUENT.

Tuesday, April 7

Geometry Unit: 3-D Figures

Lesson 2: Prisms

Objective: Be able to do this by the end of this lesson.

1. Calculate the lateral area, total area, and volume of a prism

The surface area of a solid is measured in square units. The **lateral area** (L.A.) of a prism is the sum of the areas of its lateral faces. The **total area** (T.A.) is the sum of the areas of all its faces. Using B to denote the area of a base, we have the following formula.

$$\text{T.A.} = \text{L.A.} + 2B$$

If a prism is a right prism, the next theorem gives us an easy way to find the lateral area.

Theorem 12-1

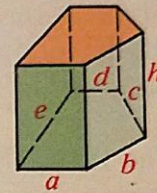
The lateral area of a right prism equals the perimeter of a base times the height of the prism. (L.A. = ph)

Write your answer on a separate sheet of paper titled: “April 7, Lesson 2, pg. 4”

1. What is lateral area? (Answer in a complete sentence.)
2. What is the abbreviation for lateral are?
3. What is total area? (Answer in a complete sentence.)
4. What is the abbreviation for lateral area?
5. What does B stand for?
6. What is the formula for Total Area?
7. What is the formula for Lateral Area?
 - a. What doe p stand for?
 - b. What does h stand for?

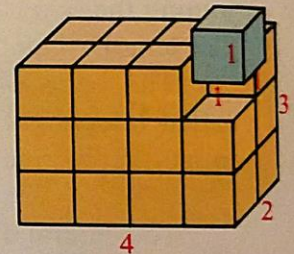
The formula for lateral area applies to any right prism. The right pentagonal prism can be used to illustrate the development of the formula:

$$\begin{aligned} \text{L.A.} &= ah + bh + ch + dh + eh \\ &= (a + b + c + d + e)h \\ &= \text{perimeter} \cdot h \\ &= ph \end{aligned}$$



Prisms have *volume* as well as area. A rectangular solid with square faces is a **cube**. Since each edge of the blue cube shown is 1 unit long, the cube is said to have a volume of 1 cubic unit. The larger rectangular solid has 3 layers of cubes, each layer containing $(4 \cdot 2)$ cubes. Hence its volume is $(4 \cdot 2) \cdot 3$, or 24 cubic units.

$$\begin{aligned} \text{Volume} &= \text{Base area} \times \text{height} \\ &= (4 \cdot 2) \cdot 3 \\ &= 24 \text{ cubic units} \end{aligned}$$



The same sort of reasoning is used to find the volume of any right prism.

Theorem 12-2

The volume of a right prism equals the area of a base times the height of the prism. ($V = Bh$)

Volume is measured in cubic units. Some common units for measuring volume are the cubic centimeter (cm^3) and the cubic meter (m^3).

Another name for a cube is a **RIGHT SQUARE PRISM**.

Write your answer on a separate sheet of paper titled: "April 7, Lesson 2, pg. 5"

8. What is the formula for a **RIGHT** prism?

Here are two example problems. Read through them and write down any questions you might have.

Example 1 A right trapezoidal prism is shown. Find the (a) lateral area, (b) total area, and (c) volume.

Solution

a. First find the perimeter of a base.

$$p = 5 + 6 + 5 + 12 = 28 \text{ (cm)}$$

Now use the formula for lateral area.

$$\text{L.A.} = ph = 28 \cdot 10 = 280 \text{ (cm}^2\text{)}$$

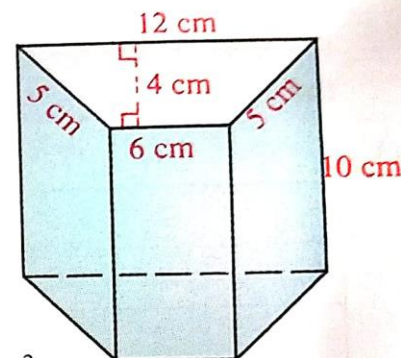
b. First find the area of a base.

$$B = \frac{1}{2} \cdot 4 \cdot (12 + 6) = 36 \text{ (cm}^2\text{)}$$

Now use the formula for total area.

$$\text{T.A.} = \text{L.A.} + 2B = 280 + 2 \cdot 36 = 352 \text{ (cm}^2\text{)}$$

c. $V = Bh = 36 \cdot 10 = 360 \text{ (cm}^3\text{)}$



Example 2 A right triangular prism is shown. The volume is 315. Find the total area.

Solution

First find the height of the prism.

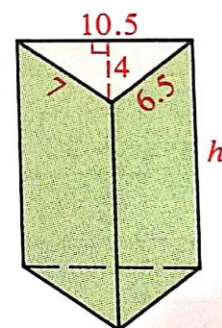
$$\begin{aligned} V &= Bh \\ 315 &= \left(\frac{1}{2} \cdot 10.5 \cdot 4\right)h \\ 315 &= 21h \\ 15 &= h \end{aligned}$$

Next find the lateral area.

$$\text{L.A.} = ph = (10.5 + 6.5 + 7) \cdot 15 = 24 \cdot 15 = 360$$

Now use the formula for total area.

$$\text{T.A.} = \text{L.A.} + 2B = 360 + 2 \cdot 21 = 402$$

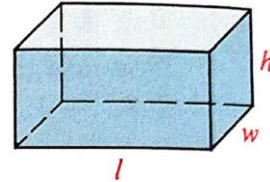


Written Exercises

Exercises 1–6 refer to rectangular solids with dimensions l , w , and h . Complete the table.

A

	1.	2.	3.	4.	5.	6.
l	6	50	6	?	9	$5x$
w	4	30	3	8	?	$4x$
h	2	15	?	5	2	$3x$
L.A.	?	?	?	?	60	?
T.A.	?	?	?	?	?	?
V	?	?	54	360	?	?



Fill out the table for the ODD numbered columns. Do your work on a separate sheet of paper titled: “April 7, Lesson 2, pg. 7”

Answer key

Pg. 7

- 1. 40; 88; 48
- 3. 3; 54; 90
- 5. 6; 168; 108

Wednesday, April 8

Geometry Unit: 3-D Figures

Lesson 3: Prism practice

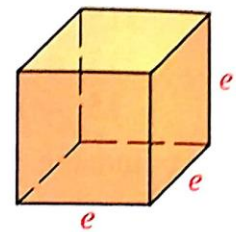
Objective: Be able to do this by the end of this lesson.

1. Practice calculating lateral area, total area, and volume of prisms

Do the odd numbered problems. Do your work on a separate sheet of paper titled: “April 8, Lesson 3, pg. 8”

Exercises 7–12 refer to cubes with edges of length e . Complete the table.

	7.	8.	9.	10.	11.	12.
e	3	e	?	?	?	$2x$
T.A.	?	?	?	?	150	?
V	?	?	1000	64	?	?



13. Find the lateral area of a right pentagonal prism with height 13 and base edges 3.2, 5.8, 6.9, 4.7, and 9.4.
14. A right triangular prism has lateral area 120 cm^2 . If the base edges are 4 cm, 5 cm, and 6 cm long, find the height of the prism.
15. If the edge of a cube is doubled, the total area is multiplied by $\underline{\quad?}$ and the volume is multiplied by $\underline{\quad?}$.
16. If the length, width, and height of a rectangular solid are all tripled, the lateral area is multiplied by $\underline{\quad?}$, the total area is multiplied by $\underline{\quad?}$, and the volume is multiplied by $\underline{\quad?}$.

Facts about the base of a right prism and the height of the prism are given. Sketch each prism and find its lateral area, total area, and volume.

17. Equilateral triangle with side 8; $h = 10$
18. Triangle with sides 9, 12, 15; $h = 10$
- B** 19. Isosceles triangle with sides 13, 13, 10; $h = 7$
20. Isosceles trapezoid with bases 10 and 4 and legs 5; $h = 20$
21. Rhombus with diagonals 6 and 8; $h = 9$
22. Regular hexagon with side 8; $h = 12$

Answer Key

Pg. 8

7. 54:27

9. 10; 600

11. 5; 125

13. 390

15. 4; 8

17. 240; $24 + 32\sqrt{3}$; $160\sqrt{3}$

19. 252; 372; 420

21. 180; 228; 216

Thursday, April 9

Geometry Unit: 3-D Figures

Lesson 3: Minor assessment on Prisms

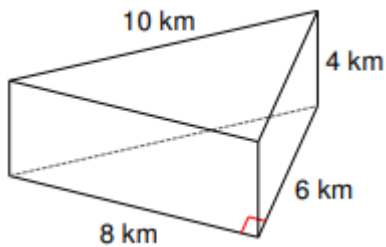
Objective: Be able to do this by the end of this lesson.

1. Take minor assessment

Do your work on a separate sheet of paper titled: “April 9, Minor Assessment, pg. 10”

Find the lateral area and surface area of each figure. Round your answers to the nearest thousandth, if necessary.

1.



Name the figures

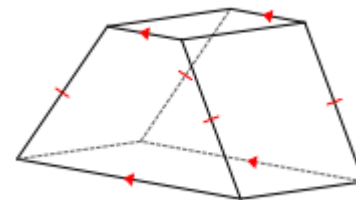
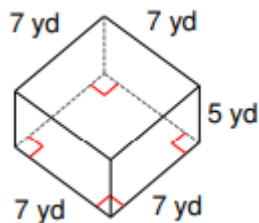
4.



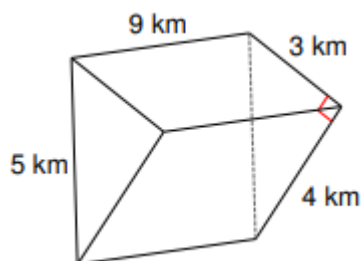
The Lateral Faces are rectangles

5. The Lateral Faces are not rectangles

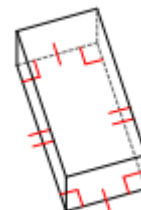
2.



3.



6. The Lateral Faces are rectangles



Answer Key

Minor Assessment

1. $LA = 96 \text{ km}^2$; $SA = 144 \text{ km}^2$
2. $LA = 140 \text{ yd}^2$; $SA = 238 \text{ yd}^2$
3. $LA = 108 \text{ km}^2$; $SA = 120 \text{ km}^2$
4. Right pentagonal prism
5. Oblique trapezoidal prism
6. Right rectangular prism