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DEPARTMENT OF EDUCATION

Math

Quarter 3 – Module 5

Illustrating Polygons

SLM
SELF-LEARNING MODULE

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Math

Quarter 3 – Module 5

Illustrating Polygons

Introductory Message

For the facilitator:

Welcome to the Math 7 Self-Learning Module on Illustrating Polygons.

This module was collaboratively designed, developed and reviewed by educators both from public and private institutions to assist you, the teacher or facilitator in helping the learners meet the standards set by the K to 12 Curriculum while overcoming their personal, social, and economic constraints in schooling.

This learning resource hopes to engage the learners into guided and independent learning activities at their own pace and time. Furthermore, this also aims to help learners acquire the needed 21st century skills while taking into consideration their needs and circumstances.

In addition to the material in the main text, you will also see this box in the body of the module:

Notes to the Teacher

This contains helpful tips or strategies that will help you in guiding the learners.

As a facilitator, you are expected to orient the learners on how to use this module. You also need to keep track of the learners' progress while allowing them to manage their own learning. Furthermore, you are expected to encourage and assist the learners as they do the tasks included in the module.

For the learner:

Welcome to the Math 7 Self-Learning Module on Illustrating Polygons.

This module was designed to provide you with fun and meaningful opportunities for guided and independent learning at your own pace and time. You will be enabled to process the contents of the learning resource while being an active learner.

Basic Concepts And Terms In Geometry

CONTENT STANDARD

Demonstrates understanding of key concepts of geometry of shapes and sizes, and geometric relationships

PERFORMANCE STANDARD

Is able to create models of plane figures and formulate and solve accurately authentic problems involving sides and angles of a polygon

LEARNING COMPETENCY

Illustrates polygons: (a) convexity; (b) angles; and (c) sides. *M7GE-IIIe-2*

LEARNING OBJECTIVES:

- Define polygons
- Describe polygons in terms of its convexity, angles and sides
- Identify and classify polygons
- Draw examples of polygons

INTRODUCTION

In this Module, the students will learn how to illustrate polygons base on its convexity, angles and sides using concrete and visual presentations.The learners will be able to define and describe polygons in terms of its convexity, angles and sides; identify and classify polygons and draw some examples.

PRE-TEST

Name: _____Grade & Section: _____Score: _____

Direction. Read the questions carefully. Write the letter that corresponds to the correct answer on the space provided before each number.

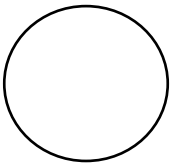
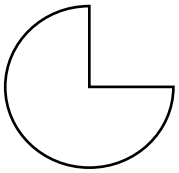
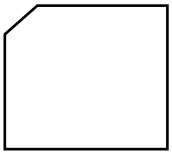
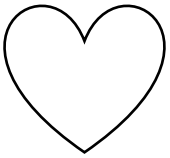
____ 1.What is a polygon?

A. It is a closed plane figure bounded straight lines.
B. It is an open shape.
C. It is a 3D (three-dimensional) shape.
D. It can be formed by curved lines.

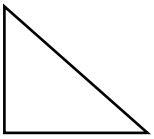
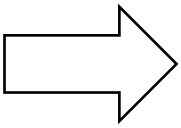
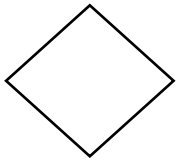
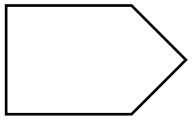
____ 2. Which of the following describes a polygon?

A. It is a closed shape.
B. It is a two-dimensional shape.
C. It is formed by connecting straight lines.
D. All of the above

____ 3.Which of the following is an example of a polygon?

A.  B.  C.  D. 

____ 4.The following shapes are convex polygons ***EXCEPT***

A.  B.  C.  D. 

____ 5. A convex polygon is different from nonconvex polygon in terms of the measure of each of the interior angles because

A. Its measure is less than 180°.
B. Its measure is more than 180°.
C. Its measure is 180°.
D. Its measure is 100°.

_____ 6. The point where the sides of a polygon meet is called _____.

A. Vertex B. angles C. side D. interior angle

____ 7. What do you call the straight line segments that forms a polygon?

A. Vertex B. angle C. side D. interior angle

____ 8.Which of the following statements refer to the convexity of a polygon?

A. That each angle inside the polygon should measure at least 180°.
B. That each angle inside the polygon should measure less than 180°.
C. That each angle outside the polygon should measure at least than 180°.
D. That each angle outside the polygon should measure less than 180°.

____ 9. In a polygon, what is formed when endpoints of two lines meet at a point?

A. Vertex B. angle C. side D. interior angle

____ 10 Is the shape in *Figure 1* a polygon?

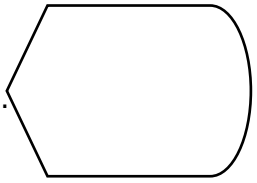
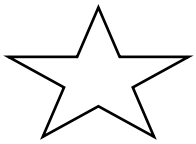
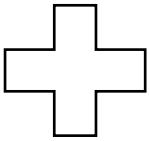


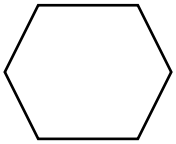
Figure 1

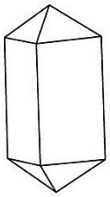
A. Yes, because it is a 2D (two dimensional) or flat shape.
B. Yes, because it is a closed shape.
C. No, because it is an open shape.
D. No, because not all sides are straight line.

____ 11 The given pictures shows a polygon, ***EXCEPT***

A. 

B. 

C. 

D. 

____ 12. Is the shape in *Figure 2* a polygon?

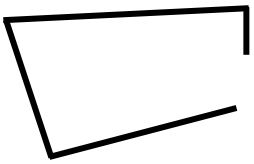


Figure 2

A. Yes, because it is formed with straight line segment.
B. Yes, because it is a flat shape.
C. No, because it is open.
D. No, because it is not flat.

____13. A polygon which has all its sides equal?

A. Equiangular
B. Equilateral
C. Non-regular
D. None of the above

____ 14. Which of the following refers to a regular polygon?

A. A polygon which has all of its sides and interior angles equal
B. A polygon which has only its sides equal.
C. A polygon which has only its angles equal.
D. A polygon whose angles and sides are not equal.

____ 15. How many sides and interior angles does the polygon shown in *Figure 3* have?

A. It has 5 sides and 6 interior angles.
B. It has 5 sides and 5 interior angles.
C. It has 4 sides and 5 interior angles.
D. It has 4 sides and 3 interior angles.

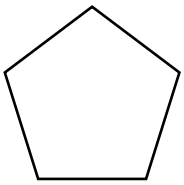


Figure 3

PRESENTATION OF THE MODULE

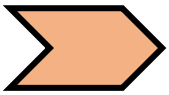
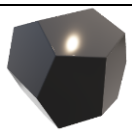
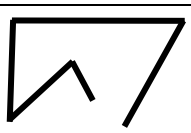
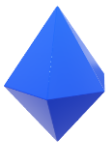
This module is about illustrating polygons in relation to its convexity, angles and sides. In this module the students will be able to identify and describe polygons as they are applied in the real-life situations. Students will develop an in-depht understanding of the concept of polygons and will give examples therefor.

ACTIVITY

DESCRIBE ME IN COLORS!

In the given table, a number of shapes or figures are drawn. For each shape, identify whether it shows the indicated characteristics/description. Use a RED crayon to color the corresponding box indicating that such description does describe the shape. If otherwise, use a YELLOW crayon. **The first one is done for your reference.*

Table 1.

Shape/Figure	DESCRIPTION			
	Is it a **closed** shape?	Is it two-dimensional (**2D**) or **flat**?	Are its sides or edges **straight lines**?	Are the sides/edges **touching** or **connected**?
				
				
				
				
				
				

ANALYSIS

1. What is the difference between a 2D shape from a 3D shape?

2. Is a ball a two-dimensional (2D) figure? Why or why not?

3. Are there flat or 2D shapes you can see in your house? How about outside? Draw three (3) examples of these flat or 2D shapes.

ABSTRACTION

https://www.sciencefriday.com/wp-content/uploads/2017/08/Beehive-micro_large-min.jpg

Honeybees are interesting creatures. They are excellent builders. They construct their honeycombs with hexagonal cells. Such design involving hexagons, according to some research, is for efficiency of storage of honey and minimization of material usage of beeswax.

A honeycomb is among the prime examples of illustrating polygons. Polygons can also be seen around our house-your doors, windows, cabinets, television, table among other things. However, polygons are not exactly the obejcts itself that were mentioned. Rather, it was the shapes that constitutes these objects that are considered to be polygons.

Definition of Polygons

A shape is a polygon when the following requisites are met:

1. It is a closed shape;
2. It is a flat or two-dimensional (2D) shape; and
3. It is bounded by connecting straigth line segments;

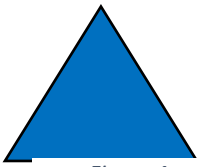


Figure 4

Take for instance, a triangle (Figure 4). Is it a polygon? Does it satisfy all the requisites for it to be considered as one?

Is it a closed shape? Yes!

Is it a flat or two-dimensional (2D) shape? Yes, because a 2D shape only consist of length and width. [Note: When it already consist of height or thickness, it is no longer a flat shape.]

Is it bounded by connecting straight line segments? Yes. The lines are connected at their endpoints.

Since all the requisites are met, a triange is a polygon.

How about the one in Figure 5? Is it a polygon?

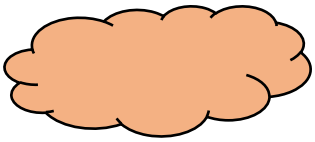


Figure 5

Parts of a Polygon

A polygon consists of sides, angles, vertices and diagonals.

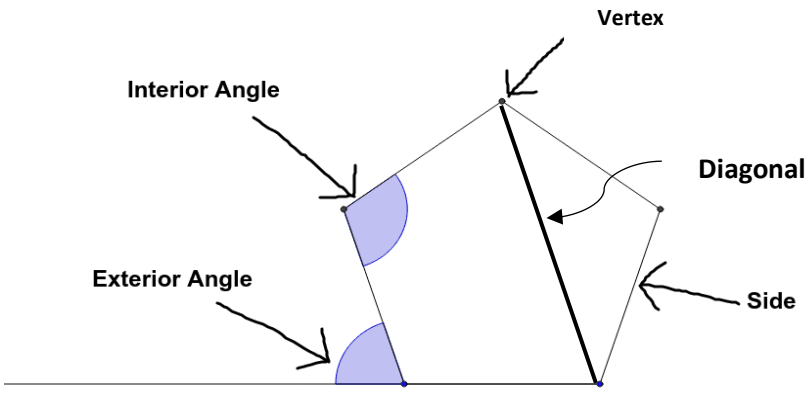
The **sides** are the straight line segments that bounds the polygon.

The **angles** are formed when the sides meet at their endpoints. The interior angles are those found inside the polygon while its supplement and adjacent angle is called exterior angle .

The **vertices** are the points where the endpoints of the sides meet and which are found on the same plane.

A **diagonal** of a polygon is drawn from two non-consecutive vertices.

As a summary, look at the illustration below.



https://www.geogebra.org/resource/NNYMHs9k/jo6HnWDiMMbEWU4B/material-NNYMHs9k.png

Figure 6 . Parts of a Polygon

Classification of Polygons

A polygon can be classified into (1) **convex or non-convex** or (2) r**egular** (equilateral and equiangular) or **irregular.**

A polygon is **convex** when all its interior angles measures less than 180° or if the lines containing the sides of the polygon do not cross the interior of the polygon. While a polygon is **concave** when it has one or some of its interior angles measure more than 180° or the lines containing the sides of the polygon cross the interior of the polygon.

See examples below.

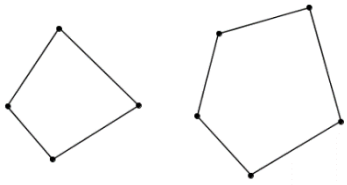


Figure 7. Convex Polygons

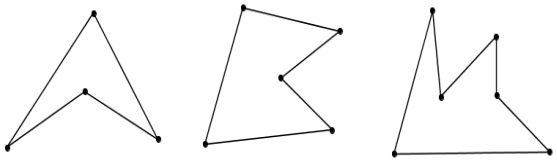


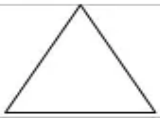
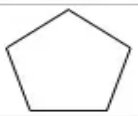
Figure 8. Non-convex Polygons

Moreover, the different types of polygon according to congruency of parts are **regular** (equilateral and equiangular) or i**rregular**.

A polygon is considered to be equilateral if all of its sides are equal. It is an equiangular polygon when all the interior angles are equal. It is **regula**r when it is both equilateral and equiangular.

Meanwhile, an irregular polygon is a polygon whose sides and angles are of different or unequal measures. See examples below (Table 1).

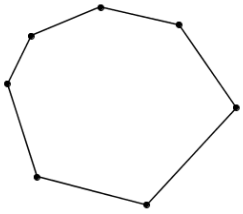
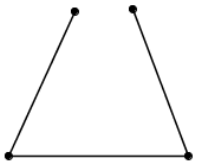
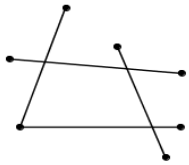
Table 1. Regular and Irregular Polygons

Name	Regular	Irregular	Number of Sides
Triangle			3
Quadrilateral			4
Pentagon			5
Hexagon			6
Octagon			8

https://qph.fs.quoracdn.net/main-qimg-577d508af403aac439c52fb8f2e11ad2.webp

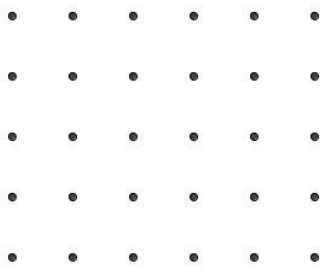
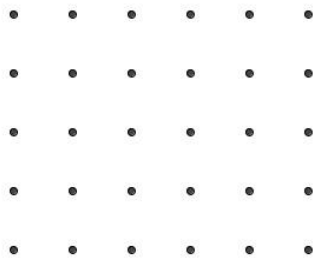
PRACTICE TEST

Identify whether or not the following illustration is a polygon. Give reasons for your answer.

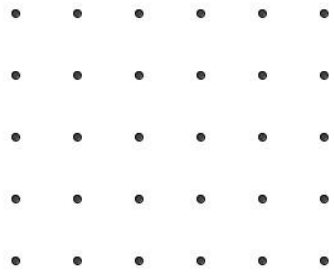
Illustration	Polygon or Not	Reasons
1. 		
2. 		
3. 		

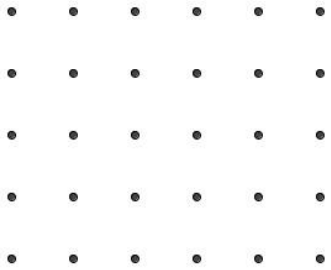
APPLICATION

Draw three (3) examples each of convex and non-convex polygons by connecting the points given. Darken the vertices of your polygons for emphasis.

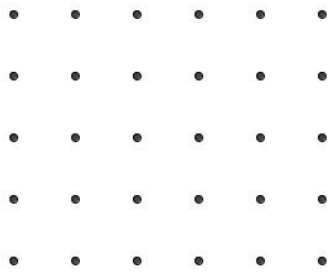
	CONVEX	NON-CONVEX
1.		

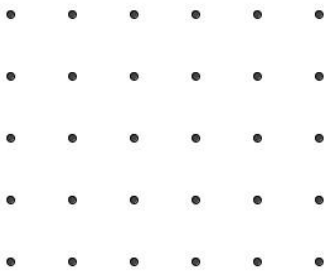
2.





3.





ENRICHMENT

Answer the following questions briefly and concisely.

1. Can two segments form a polygon? If yes, draw the figure. If no, explain why.

2. Lebron argued that the figure in the right is a convex polygon. Do you agree with Lebron? Why or why not?

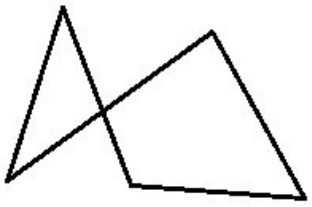


Figure 9

POST TEST

Name: _____ Grade & Section:_____Score:_____

Direction. Read the questions carefully. Write the letter that corresponds to the correct answer on the space provided before each number.

1. Which of the following refers to a regular polygon?
   A. A polygon which has all of its sides and interior angles equal
   B. A polygon which has only its sides equal.
   C. A polygon which has only its angles equal.
   D. A polygon whose angles and sides are not equal.

2. Is the shape in *Figure 10* a polygon?
   A. No, because it is open.
   B. No, because it is not flat.
   C. Yes, because it is formed with straight line segment.
   D. Yes, because it is a flat shape.

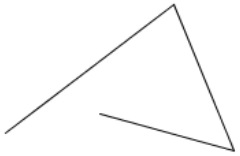
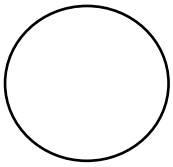
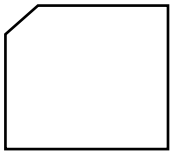
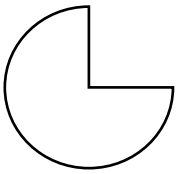


Figure 10

3. Which of the following statements refer to the convexity of a polygon?
   A. That each angle inside the polygon should measure at least 180°.
   B. That each angle inside the polygon should measure less than 180°.
   C. That each angle outside the polygon should measure at least than 180°.
   D. That each angle outside the polygon should measure less than 180°.

4. Which of the following is an example of a polygon?

A.  B.  C.  D. 

5. Is the shape in *Figure 11* a polygon?
   A. Yes, because it is a 2D (two dimensional) or flat shape.
   B. Yes, because it is a closed shape.
   C. No, because it is an open shape.
   D. No, because not all sides are straight line.

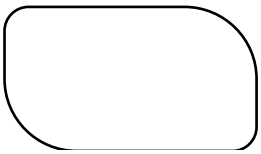
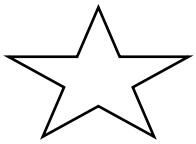
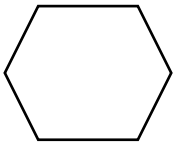
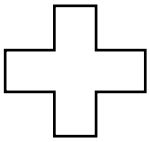


Figure 11

6. A convex polygon is different from nonconvex polygon in terms of the measure of each of the interior angles because
   A. Its measure is less than 180°.
   B. Its measure is more than 180°.
   C. Its measure is 180°.
   D. Its measure is 100°.

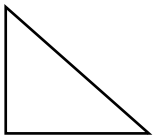
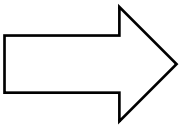
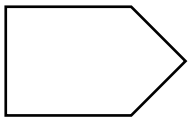
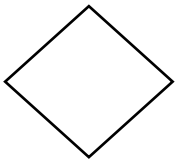
7. A polygon which has all its angles equal?
   A. Equiangular
   B. Equilateral
   C. Irregular
   D. None of the above

8. The given figures shows a polygon, ***EXCEPT***

   A.  B.  C.  D. 

9. In a polygon, what is formed when endpoints of two lines meet at a point?
   A. Angle B. Vertex C. side D. interior angle

10. The following shapes are convex polygons ***EXCEPT***

   A.  B.  C.  D. 

11. What do you call the straight line segments that forms a polygon?
   A. Vertex B. angle C. side D. interior angle

12. How many sides and interior angles does the polygon shown in *Figure 12* have?
   A. It has 6 sides and 6 interior angles.
   B. It has 5 sides and 5 interior angles.
   C. It has 4 sides and 5 interior angles.
   D. It has 4 sides and 3 interior angles.

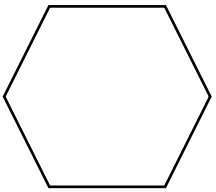
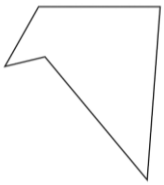


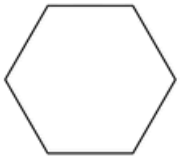
Figure 12

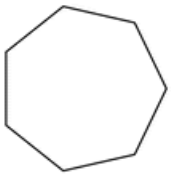
13. What is a polygon?
   A. It is a closed plane figure bounded straight lines.
   B. It is an open shape.
   C. It is a 3D (three-dimensional) shape.
   D. It can be formed by curved lines.

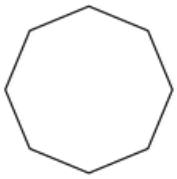
14. Which of the following describes a polygon?
   A. It is a closed shape.
   B. It is a two-dimensional shape.
   C. It is formed by connecting straight lines.
   D. All of the above

15. Whch is an irregular polygon?

A. 

B. 

C. 

D. 

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