MATHEMATICS

Quarter 2 - Module 1:
Illustrating Polynomial Functions

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MATHEMATICS 10
Quarter 2 - Module 1: Illustrating Polynomial Functions
Second Edition, 2021

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MATHEMATICS

Quarter 2 - Module 1: Illustrating Polynomial Functions

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.

Target

This module was designed and written with you in mind. This will help you illustrate polynomial function, understand, describe and interpret the graphs of polynomial functions. You will use the scope of this module in many different learning situations. You will also recognize that the language used are in your vocabulary level .The lessons are arranged to follow the standard sequence of the course. Read and answer this module properly and correctly.

After going through this module, you are expected to be able to demonstrate knowledge and skills related to polynomial functions and apply these in solving problems.

Specifically, you should be able to:

1. Illustrate polynomial functions (**M10AL - IIa – 1)**
2. Understand, describe and interpret the graphs of polynomial functions.

Subtasks:

1. Define a polynomial function and determine its coefficients, term, degree, and standard form of equation.
2. Determine the x-intercepts, y-intercepts, turning point and end behaviors of the graph of a polynomial function.
3. Formulate observations on the graph of polynomial functions.

Pre-Assessment:

The questions below are intended to check your prior knowledge, skills, and understanding of polynomial functions. Choose the letter of your choice from the given options. Take note of the items that you are not able to answer correctly and find the correct answer as you go through this module. Write your answers on a separate sheet of paper.

1. Which of the following is referred to as a polynomial in the first degree?
   A. binomial B. linear polynomial
   C. monomial D. quadratic polynomial

2. Which of the following could be the value of n in the equation $f(x) = x^n$ if f(x) is a polynomial function?
   A. 5 B. $\sqrt{3}$ C. $\frac{1}{2}$ D. -2

3. Which of the following is NOT a polynomial function?
   A. $f(x) = 2x^{-3} – 8$ B. $f(x) = 2x^2 – 6x + 1$
   C. $f(x) = -x^2 – 6x$ D. $f(x) = \frac{1}{2} – x^4 + x^2 - x$

4. Which of the following is a polynomial function?
   A. $P(x) = x^{-4} - 5x$ B. $P(x) = x^2 - 5x - 3$
   C. $P(x) = x^{-2} - \frac{1}{x} - 3$ D. $P(x) = x^{-3} - x - 9$

5. Given that $f(x) = 3x^{-n} + 2x - 1$, what value should be assigned to n to make f(x) a function of degree 5?
   A. -5 B. $-\frac{2}{5}$ C. $\frac{5}{2}$ D. 5

6. What is the leading coefficient of the polynomial function $f(x) = x^2 - 5x^4 + 1$?
   A. -5 B. 1 C. 2 D. 4

7. What is the leading term of $P(x) = 2x^3 - 3x^2 + x - 9$?
   A. $2x^3$ B. $-3x^2$ C. x D. -9

8. What is the leading coefficient of the function $P(x) = 3x + 2x^4 - 1$?
   A. -1 B. 2 C. 3 D. 4

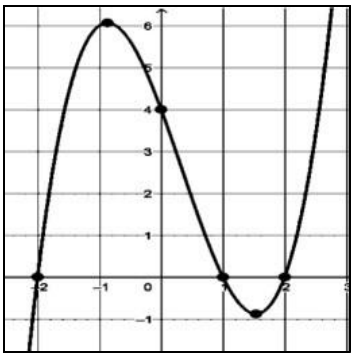
9. Which of the following polynomial function is in standard form?
   A. $P(x) = x^3 + 4x^4 - x + 6$ B. $P(x) = x^3 + 3x^2 - 2x + 1$
   C. $P(x) = x^2 + 7x^4 - 2x^3 + 2$ D. $P(x) = x + 3x^4 - x + 5$

10. How should the polynomial function $f(x) = 2x - 3x^2 + x^4 + x^3 - 5$ be written in standard form?
   A. $f(x) = x^4 - 3x^2 + 2x + x^3 - 5$ B. $f(x) = 2x - 3x^2 + x^3 + x^4 - 5$
   C. $f(x) = 2x - 5 - 3x^2 + x^4 + x^3$ D. $f(x) = x^4 + x^3 - 3x^2 + 2x - 5$

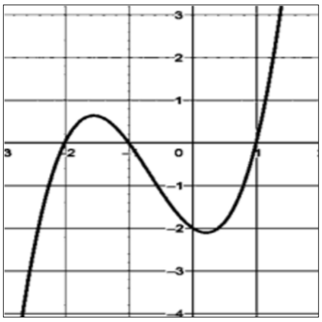
11. If a polynomial function is of degree n, then how will you represent its number of turning points on its graph?
   A. $n - 1$ B. n C. $n+1$ D. $n + 2$

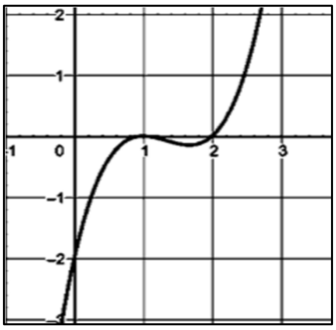
12. If you will draw the graph of $f(x) = (x + 2)(x - 1)$, how will the graph behave along the x – axis?
   A. The graph crosses both (-2, 0) and (1, 0).
   B. The graph crosses both (0, -2) and (-1, 0).
   C. The graph crosses both (-2, 0) and (0, -1).
   D. The graph crosses both (2, 0) and (-1, 0).

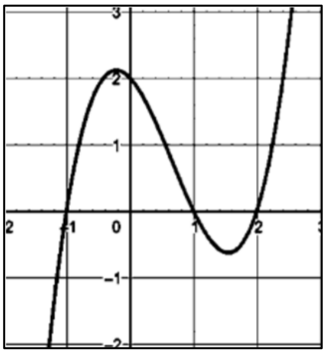
13. Which polynomial function in factored form represents the given graph?
   A. y = (x+2) (x+1) (x-2)
   B. y = (x+2) (x-+) (x+2)
   C. y = (x+2) (x-1) (x-2)
   D. y = (x-2) (x-1) (x-2)

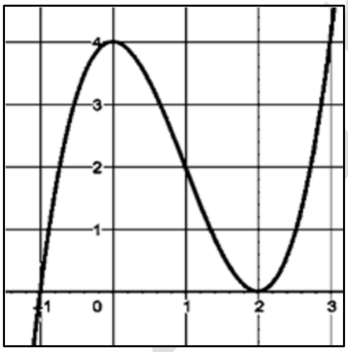


14. Given the polynomial function y = $(x+1)(x-2)(x-1)$, which of the following represents its graph?

A.


B.


C.


D.


15. What are the end behaviors of the graph of $f(x)=(x+1)(x-2)^2(x-4)$?

A. falls to both directions
B. rises to both directions
C. rises to the left and falls to the right
D. falls to the left and rises to the right

Lesson 1	Illustrating Polynomial Functions

Jumpstart

A **polynomial** is a mathematical expression that consists two or more algebraic terms that are added, subtracted, or multiplied. It includes at least one variable and typically contains constants and positive exponents as well.

A polynomial is in standard form when its terms are written in descending order of exponents from left to right.

Activity 1: Identify Me!

Determine whether each is a polynomial in standard form or not. Write **SF** if it is in standard form and **NSF** if it is not in standard form.

1. $-2x - 3$
2. $3x – 5 + 2x^2$
3. $x^2 – x + 4$
4. $x + x^2 - 2$
5. $2 + 8x^3$
6. $x^3 + 6x - 1$
7. $5x + 2x^3$
8. $1 – 6x$
9. $x^3 – x^2 + x - 8$
10. $2x^3 + 6x - 2$

Discover

Let us start this lesson by defining a polynomial function considering its coefficients, leading term, leading coefficient, constant term and its standard form. The mathematical terms and concepts mentioned will help you illustrate what a polynomial function is. Furthermore, the x-intercepts, turning points and end behavior of the graph of polynomial function are important in describing and interpreting its graph.

A **polynomial function** is a function of the form

$$P(x) = a_nx^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + \ldots + a_1x + a_0,$$

where $a_n \neq 0$, where n is a nonnegative integer, $a_0, a_1, \ldots, a_n$, are real numbers called **coefficients**, a_nx^n is the **leading coefficient**, and a_0 is the **constant term**.

In the polynomial function $P(x) = 2x^3 + x^2 - 5x + 6$;

$2x^3$ is the **leading term**
2 is the **leading coefficient**
6 is the **constant term**

Parts of a polynomial

$P(x)= 2x^3 -5x^2 -2x +5$ → Constant term

Leading coefficient | Cubic term | Quadratic term | Linear term

The terms of a polynomial function may be written in any order. They can also be written in factored form and as a product of irreducible factors. However, if they are written in decreasing powers of x, then the polynomial function is in **standard form**.

Examples:

1. $P(x) = 7 + 2x$ when written in standard form is $P(x) = 2x + 7$.
2. $P(c) = 8+14c^2 -5c$ is not in standard form since it is not arranged in decreasing power of x. Hence, the standard form of the function is
   $P(c) = 14c^2 -5c + 8$

The **degree of the polynomial** is equal to the largest degree of any term of the polynomial.

Example: What is the degree of $6p^2 -7p + 3$?
This polynomial function is in the second degree. It is a quadratic polynomial function since the highest exponent is 2.

Polynomials and terms can have more than one variable. Here is another example of a polynomial function, $P(t)= t^4 - 6s^3t^2 -12st + 4s^2 - 5$. The positive integer exponents confirm this example is a polynomial. The polynomial has five terms.

When a term has multiple variables, the **degree of the term is the sum of the exponents** within the term.

In the example, $P(t) = t^4 - 6s^3t^2 -12st + 4s^4 - 5$
t^4 has a degree of 4, so it's a 4th order term
$- 6s^3t^2$ has a degree of 3 + 2 =5, so it's a 5th order term
$-12st$ has a degree of 1 + 1=2. So, it's a 2nd order term
$4s^4$ has a degree of 4, so it's a 4th order term
$- 5$ is a constant, so its degree is 0.

Since the **largest degree** of a term in this polynomial is 5, then this a polynomial **of degree 5** or 5th order polynomial.

Polynomials are classified according to two attributes -- number of terms and degree.

Linear functions, quadratic functions, cubic functions all belong to the class of functions called polynomial functions.

Classification of polynomials					
By number of terms			By Degree		
Number of terms	Name	Example	Degree	Name	Example
1	Monomial	$4x$	0	Constant	5
2	Binomial	$2x - 7$	1	Linear	$4x - 9$
3	Trinomial	$14x^2 + 8x - 5$	2	Quadratic	$7x^2 + 18x + 15$
4+	Polynomial	$5x^3 + 2x^2 -x + 1$	3	Cubic	$8x^3 + 27$
			4	Quartic	$32c^4 + 7c - 4$
			5	Quintic	$25h^5 + 8h^3$

A polynomial function is denoted by f(x) which means it is represented by a set P of ordered pairs (x, y). It can also be written as f(x) or y. Thus, a polynomial function can be written in different ways like the following.

1. $P(x) = a_nx^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + \ldots + a_1x + a_0$
2. $f(x) = a_nx^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + \ldots + a_1x + a_0$
3. $y = a_nx^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + \ldots + a_1x + a$

Explore

Activity 2: Make Me Standard Then Complete Me!

Complete the table below by filling up the standard form of the given polynomial function , its degree, leading term and classification. Number 1 is done for you.

Polynomial Function	Standard Form	Degree	Leading Term	Classification	
				By number of terms	By degree
1. $P(x) = 12x-2+ 3x^2$	$P(x) = 3x^2 +12x -2$	2	$3x^2$	trinomial	quadratic
2. $f(x) = 4x-2x^2 + x^3$					
3. $P(x) = -8-x+ 4x^2$					
4. $y = 7x-2x^3 +6$					
5. $P(x) = x-2+ 6x^4$					
6. $f(x) = 6x-1+ 3x^3$					
7. $y = -7x + 5x^4$					
8. $y = x^2 -4x +3x^3 +2$					
9. $f(x) = 8a +a$					
10. $P(x) =3a^4b2c$					

Deepen

Activity 3: Who am I!

Directions: Write the following polynomial functions in standard form. Then identify the following: a) degree, b) classification by term, and c) classification by degree

1. $P(x) = (x+4)\ (x-5)$
2. $P(x) = (x-1)(x+1)(x-4)$
3. $P(x) = (x+1)^2(x-1)^2$
4. $P(x) = a(x-2)^2$
5. $P(x) = (x+1)^2(y-2)$

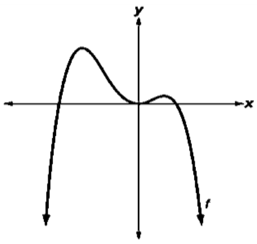
Lesson 2 Graphs of Polynomial Functions

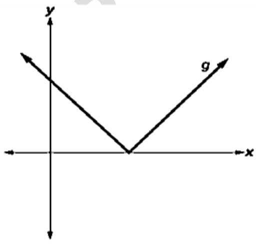
Jumpstart

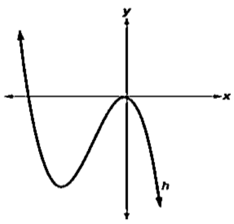
The graphs of polynomial functions are continuous, smooth, and have rounded turns. They do not have sharp corners and have no breaks. Further, the number of turning points in the graph of a polynomial is strictly less than the degree of the polynomial.

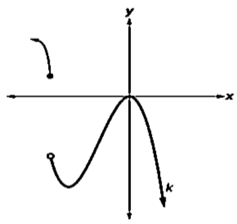
Activity 4. Guess Me!

Directions: Which of the following graphs represents a polynomial function? Write **PF** if the graph illustrates a polynomial function, otherwise write **NOT**. Write your answer on the blank provided for.

1. ________


2. ________


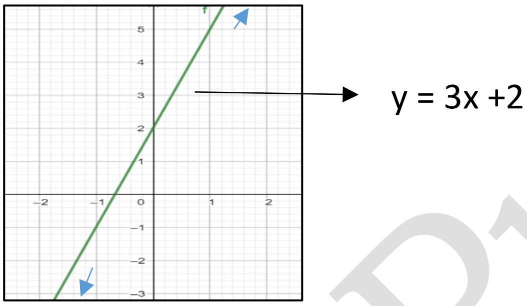
3. _______


4. _______


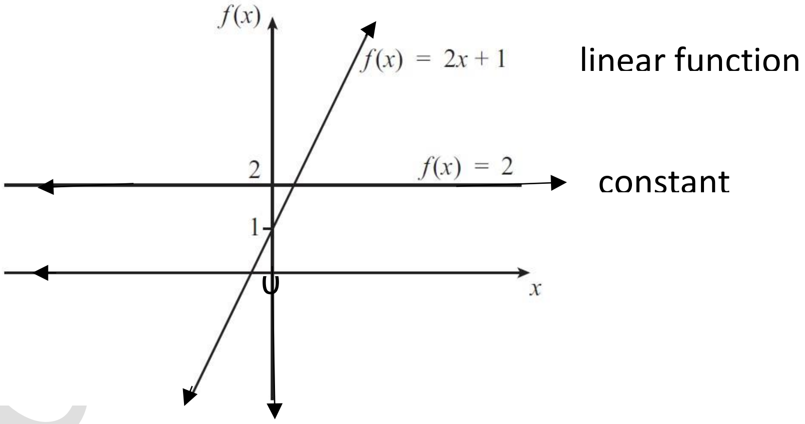
Discover

Graph of a Polynomial Function

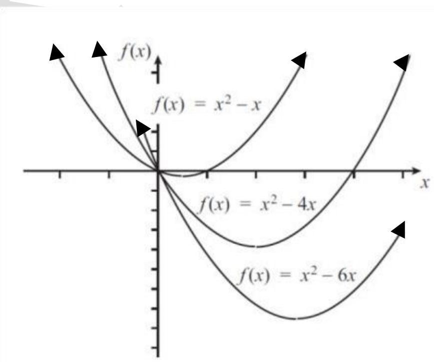
The shape of the graph of a first-degree polynomial is a straight line. The linear function f(x) = mx + b is an example of a first-degree polynomial. Hence, the linear function y = 3x + 2 is a straight line.



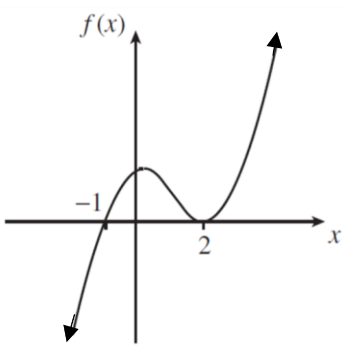
Another example, f(x) = 2 is a constant function and f(x) = 2x + 1 is a linear function. The graph of these functions is shown below. It is important to notice that the graphs of constant functions and linear functions are always straight lines.



The second-degree polynomials are also called quadratic functions and their graphs are parabolas. Cubic functions take on several different shapes and they can be figured out if we know their roots, critical points and inflection points the function has. The figures below are graph of quadratic functions and cubic functions.



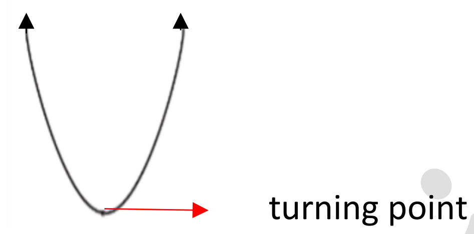
Quadratic Functions



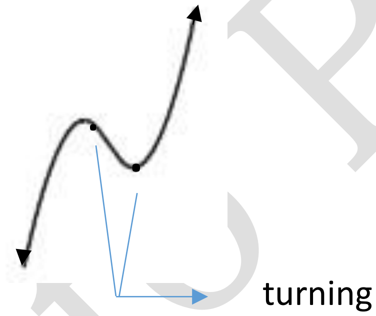
Cubic Function

Turning Points of the Graph of Polynomial Functions

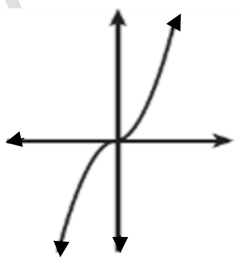
A turning point of a function is a point where the graph of the function changes from sloping downwards to sloping upwards, or vice versa. So, the gradient changes from negative to positive, or from positive to negative. Generally speaking, curves of degree n can have up to (n − 1) turning points. For instance, a quadratic has only one turning point.



A cubic could have up to two turning points, and so would look something like this.



However, some cubic have fewer turning points: for example, $f(x) = x^3$. But no cubic has more than two turning points.

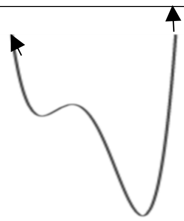
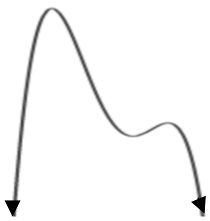


Key Point:
A polynomial of degree n can have up to (n − 1) turning points.

End Behavior of Graphs of Polynomial Functions

Polynomial graphs behave differently depending on whether the degree is even or odd. Even function starts and ends on the same side of the axis and this true for all even degree functions. The odd degree functions start and end in opposite directions.

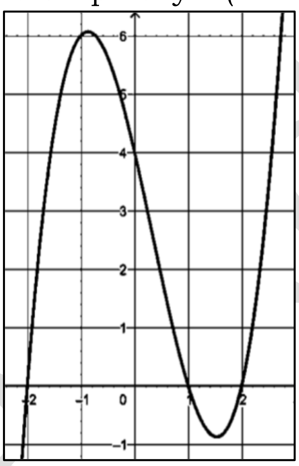
The table below shows the summary of the end behavior of the graph of polynomial functions.

	Even degree	Odd degree
Positive leading coefficient		
Negative leading coefficient		

For more accurate graphs of polynomial functions, you may use graphing calculators and graphing applications such as Geogebra, Graphmatica, Microsoft Math, Desmos and the like. Accurate graph will help you more in understanding, describing and interpreting the graph of polynomial functions.

Example 1:

The Graph of y = (x + 2) (x -1) (x - 2)

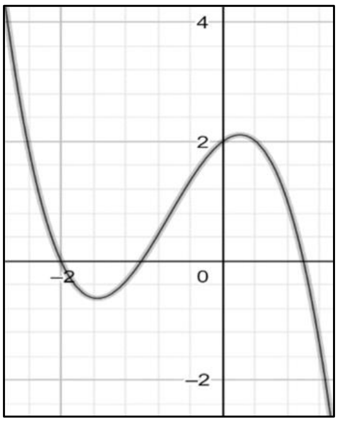


In the graph at the left, you can observe that the polynomial function y = (x + 2) (x - 1) (x - 2) intersects at points (-2,0), (1,0) and (2,0) which means that the x- intercepts are -2,1 and 2 because y = 0. On the other hand, the graph intersects at (0,4), hence the y-intercept is 4 letting x = 0. Further, the function when written in standard form

$y = x^3-x^2-4x+4$ is of degree 3, therefore it has 3-1=2, 2 turning points. Observe the behavior of the graph. It **falls to the left and rises to the right.**

Example 2:

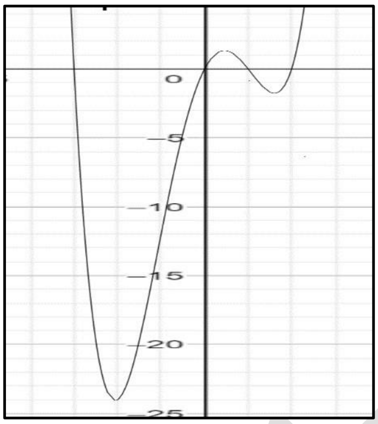
The graph of y = - (x – 1) (x + 1) (x + 2)



The graph of the polynomial function y = - (x - 1) (x + 1) (x + 2) intersects at points (-1,0), (1,0) and (-2,0) which means that the x- intercepts are -1,1 and -2 because y = 0. On the other hand, the graph intersects at (0,2), hence the y-intercept is 2 letting x = 0. Further, the function when written in standard form is $y = x^3+x^2-4x-2$ is of degree 3, and therefore has 2 turning points. Observe that the graph **rises to the left and falls to the right**, that is because the leading coefficient is negative.

Example 3:

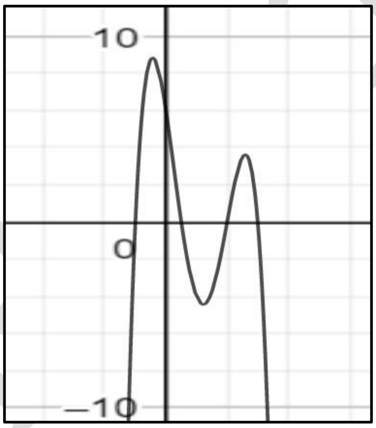
The graph of y= x^4 -7x^2 + 6x



In this example, the polynomial function y = x^4 -7x^2 + 6x can be expressed in factored form as y=x (x +3) (x - 1) (x - 2). The x intercepts are 0,-3,1 and 2. The y -intercept is 0. Its graph is shown at the left. Notice that it has 3 turning points, that is because the degree of the function is 4. Thus 4-1 =3. Observe the behavior of the graph. It **rises on both direction** because the degree of the function is **even** and the **leading coefficient is positive.**

Example 4:

The graph of y= - (x-3) (x+1) (2x-1) (x-2)



In this example since the polynomial is in the factored form. The x and y intercepts can easily be determined. The x intercepts are 3, -1 and 1/2 and 2. The y -intercept is 6. Its graph is shown at the left. Notice that it has 3 turning points, that is because the degree of the function is 4.

Thus 4-1 =3. Observe the behavior of the graph. It **falls on both direction** because the degree of the function is **even** and the leading **coefficient is negative.**

Zeroes of Polynomial Functions

In general, given the function, f(x), its zeros can be found by setting the function to zero. The values of x that represent the set equation are the zeroes of the function. To find the zeros of a function, find the values of x where f(x) = 0.

Example:

Solve for the zeroes of f(x) = (x+3)(x-2).

A. set f(x) to 0; 0 = (x+3)(x-2)

B. equate each factor to 0.

Hence: x+3 =0; x=-3 and x-2 = 0; x = 2.

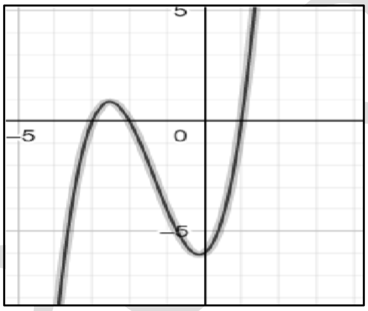
The zeros of f(x) are -3 and 2.

MULTIPLICITY OF A ZERO

The zeroes/roots of a polynomial correspond to the x- intercepts of the graph of that polynomial function. By looking at the zeroes of the polynomial (or at the factored form of the polynomial), we can tell how many times the graph is **going to touch** or **cross the *x*-axis**.

The **multiplicity of each zero** is the number of times that its corresponding factor appears. Any zero whose corresponding factor occurs in pairs or occurs an even number of times (so two times, or four times, or six times, etc.) will only touch or is tangent to the x axis, that is, it "bounce off" the *x*-axis and return the way it came. Any zero whose corresponding factor occurs an odd number of times (so once, or three times, or five times, etc.) will cross the *x*-axis. Polynomial zeroes with even and odd multiplicities will *always* behave in this way.

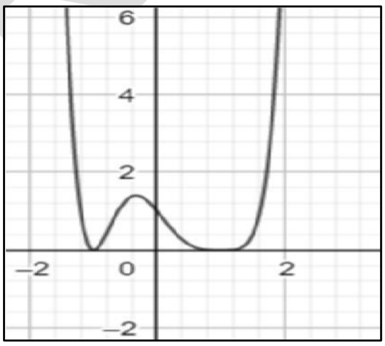
Example 1. y = (x + 3)(x + 2)



The zeroes are -3, 1 and -2. Each zero appeared once. Therefore,

-3 is a zero of multiplicity 1 (odd)
1 is a zero of multiplicity 1 (odd) and
-2 is a zero of multiplicity 1 (odd).
The graph crosses the x-axis at -3, 1 and -2

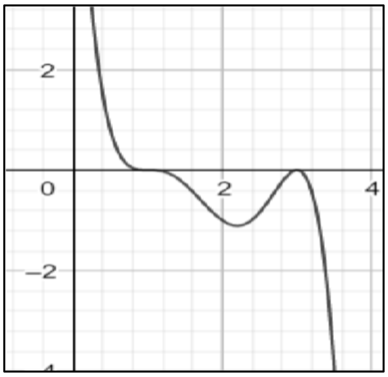
Example 2. y = $(x + 1)^2 (x - 1)^4$



The zeroes are -1 (2 times) and 1 (4 times). Therefore,

-1 is a zero of multiplicity 2 (even)
1 is a zero of multiplicity 4 (even) and
The graph is tangent to the x-axis at -1 and 1
Notice that the graph touches the x-axis at -1 and 1 and bounces back to where the graph came

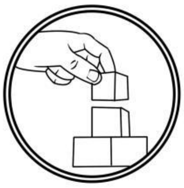
Example 3. $y= -(x-1)^3(x-3)^2$



The zeroes are 1 (3 times) and 3 (2 times).
Therefore,

1 is a zero of multiplicity 3 (odd)
3 is a zero of multiplicity 2 (even) and
The graph is tangent to the x-axis at 3 and it crosses the x-axis at 1.

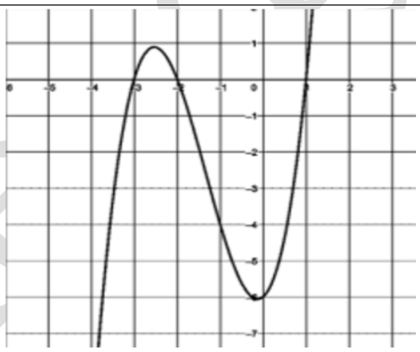
Now that you have learned the different concepts on the graph of polynomial functions, you are ready to answer the other activities.

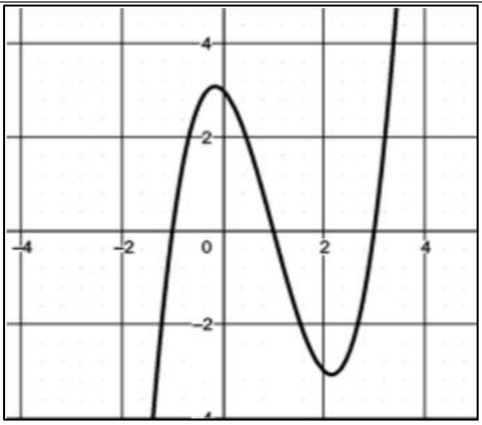
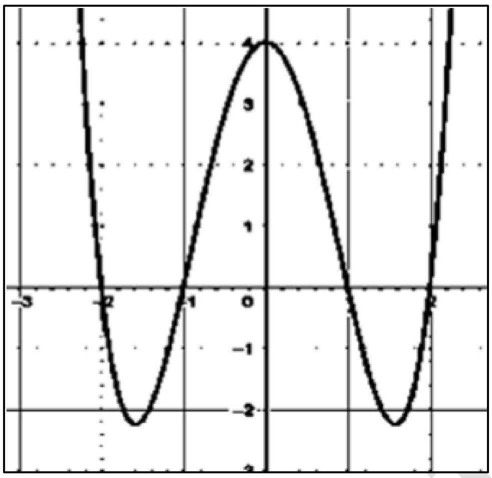
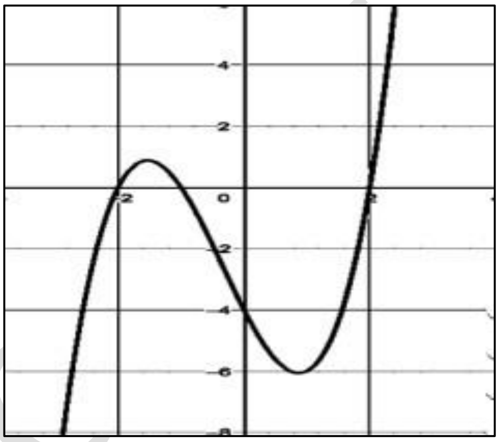


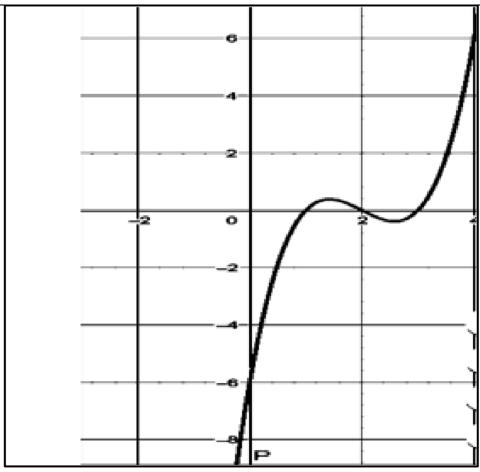
Explore

Activity 5: Trace My Path!

Directions: Identify the x- and y-intercepts of the given graphs of polynomial functions. Write the letter of your answer for each item.

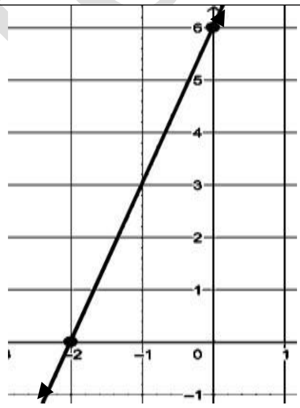
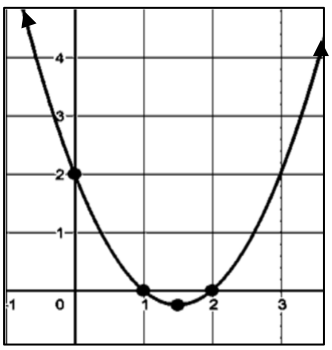
Graph of Polynomial Function	**x & y intercepts**
1. 	a. x = -3, -2, -1 & y = 6 b. x = 3, -2,1 & y = -6 c. x = -3, -2,1 & y = -6 d. x = 3,2, -1 & y = 6

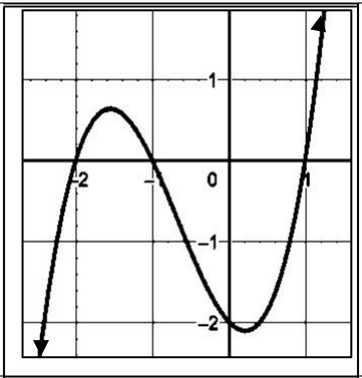
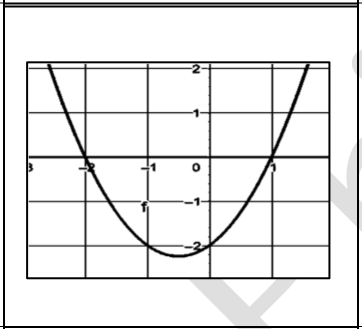
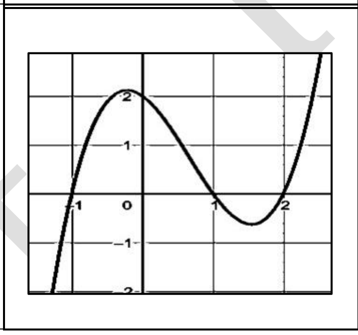
2. 	a. x = -1, -1,3 & y = -3 b. x = -1,1, -3 & y = 3 c. x = -1,1,3 & y = -3 d. x = -1,1,3 & y = 3
3. 	a. x = -2, -1,1,2 & y = 4 b. x = -2,1,1,2 & y = 4 c. x = -2, -1, -1,2 & y = -4 d. x = -2, -1, -1, -2 & y = 4
4. 	a. x = -2, -1,2 & y = -4 b. x = -2,1, -2 & y = -4 c. x = 2,1,2 & y = 4 d. x = -2, -1, -2 & y = 4

5. 	a. x = 1,2,3 & y = 6 b. x = 1,2,3 & y =-6 c. x = 1,2, -3 & y = 6 d. x = 1, -2,3 & y =-6

Activity 6. My Specifications!

Directions: Complete the table below by identifying the degree and x-intercepts of the given polynomial function and its corresponding graph.

Polynomial Function	Degree	Graph	x-intercepts
1. y=3x+6	____		____________
2. $y= x^2 -3x +2$	____		_________

3. $y = x^3+2x^2 - x - 2$	_____		______________
4. $y = (x - 1)(x + 2)$	_____		______________
5. $y = (x - 1)(x + 1)(x - 2)$	_____		______________

Deepen

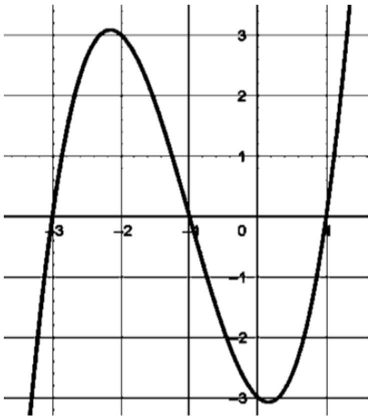
If you have illustrated, described and interpreted the graph of polynomial function then you have already understood the concepts and acquired the skills you are expected to develop in this lesson.

Answer the next activity to deepen your understanding in the concepts of polynomial functions.

Activity 7: Look at Me!

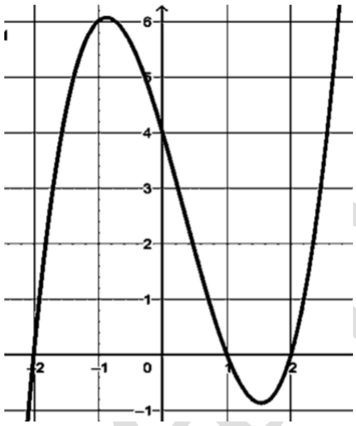
Directions: Analyze the given equations and graphs of each polynomial function, then provide the needed information in each item.

1.



Odd or Even function: ________________
x-intercepts: ________________
y – intercept: ________________
Number of turning points of the graph: ____
Polynomial function: y = (x+3) (x+1) (____)

2.



Odd or Even Function: ________________
x-intercepts: ________________
y – intercept: ________________
Number of turning points of the graph: ____
Polynomial function: y = (____) (x-1) (______)

3. $y = -(x+3)(x+1)^2(2x-5)$

standard form: __________________
leading term: __________________
x-intercepts: ____________________
y-intercepts: ____________________
Number of turning points of the graph: _______
Describe the end behavior of the graph:____
Discuss the multiplicity of the roots:____

4. f(x)= $(x^2-5)(x-1)^2(x-2)^3$

standard form:________________
leading term: _________________
x-intercepts____________________
y-intercept____________________
Number of turning points of the graph: _______
Describe the end behaviour of the graph:____
Discuss the multiplicity of the roots:____

5.y = $-x^3 + 2x^2 - 2x + 4$

standard form:________________
leading term: _________________
x-intercepts____________________
y-intercept____________________
Number of turning points of the graph: _______
Describe the end behavior of the graph:____
Discuss the multiplicity of the roots:____

Gauge

Post- Assessment

Directions: Read and analyze each item carefully then write the letter of the correct answer. Write your answers on a separate sheet of paper.

1. Which of the following is a polynomial in the second degree?
   A. binomial B. linear polynomial
   C. monomial D. quadratic polynomial
2. Which of the following could be the value of n in the equation f(x) $=x^n$ if f(x) is a polynomial function?
   A. 3 B. $\sqrt{2}$ C. $\frac{1}{3}$ D. -5
3. Which of the following is NOT a polynomial function?
   A. f(x) = 6 B. f(x) = $x^2 - 3x + 1$
   C. f(x) = $-x^2 - 2x$ D. f(x) = $\frac{1}{x} - x^{-1} + 2$
4. Which of the following is a polynomial function?
   A. P(x) = $x^{-2} - 5$ B. P(x) = $x^2 - 5$
   C. P(x) = $-x^2 - \frac{1}{x}$ D. P(x) = $x^{-3} - 7x - 5$

5. Given that f(x) = $2x^{-2n} + x - 1$, what value should be assigned to n to make f(x) a function of degree 5?

A. $-\frac{5}{2}$ B. $-\frac{2}{5}$ C. $\frac{2}{5}$ D. $\frac{5}{2}$

6. What is the leading coefficient of the polynomial function $f(x) = x^2 - 3x^4 + 1$?

A. -3 B. 1 C. 2 D. 4

7. What is the leading term of $P(x) = 3x^3 - x^2 + 2x - 6$?

A. $3x^3$ B. $-x^2$ C. $2x$ D. -6

8. What is the leading coefficient of the function $P(x) = x + 5x^3 - 4$?

A. 1 B. 3 C. -4 D. 5

9. Which of the following polynomial function is in standard form?

A. $P(x) = x^3 + 2x^4 - x + 1$ B. $P(x) = x^3 + 2x^2 - x + 1$
C. $P(x) = x^2 + 2x^4 - x^3 + 1$ D. $P(x) = x + 2x^4 - x + 1$

10. How should the polynomial function $f(x) = 2x - 3x^2 + x^4 + x^3 - 5$ be written in standard form?

A. $f(x) = x^4 - 3x^2 + 2x + x^3 - 5$ B. $f(x) = 2x - 3x^2 + x^3 + x^4 - 5$
C. $f(x) = 2x - 5 - 3x^2 + x^4 + x^3$ D. $f(x) = x^4 + x^3 - 3x^2 + 2x - 5$

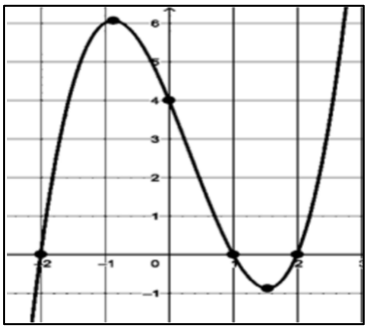
11. If a polynomial function is of degree n, then how will you represent its number of turning points on its graph?

A. n B. $n-1$ C. $n+1$ D. $n+2$

12. If you will draw the graph of $f(x) = (x + 3)(x+1)$, how will the graph behave along the x – axis?

A. The graph crosses both (-3, 0) and (-1, 0)
B. The graph crosses both (0, -3) and (-1, 0)
C. The graph crosses both (-3, 0) and (0, -1)
D. The graph crosses both (3, 0) and (-1, 0)

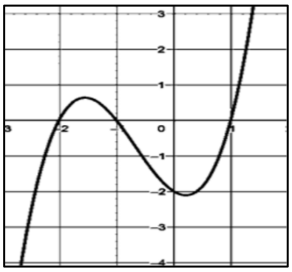
13. Which polynomial function in factored form represents the given graph?



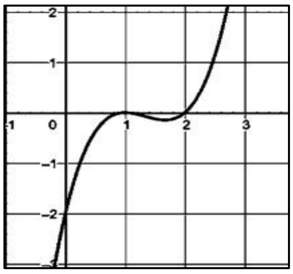
A. $y = (x+2)(x-1)(x-2)$
B. $y = (x+2)(x-1)(x+2)$
C. $y = (x-2)(x-1)(x-2)$
D. $y = (x+2)(x+1)(x-2)$

14. Given the polynomial function y = (x -1) (x+1) (x-2), which of the following represents its graph?

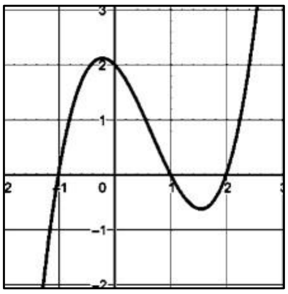
A.



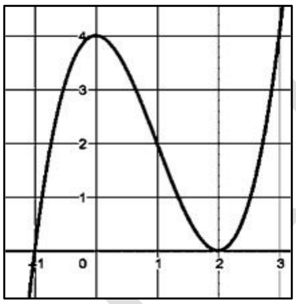
B.



C.



D.



15. Which of the functions below crosses the x axis at (0,0) and tangent at (2,0)?

A. $y=x^2(x-2)$

B. $y=x(x-2)^2$

C. y=x(x-2

D. $y=x^2(x-2)^2$

References

Books:

Callanta,Melvin M et al .Mathematics Grade 10 Learner's Module.Rex Bookstore First Edition 2015, pp.99-123.

Callanta,Melvin M et al .Mathematics Grade 10 Teacher's Guide.Rex Bookstore. First Edition 2015, pp. 82 -112.

Dilao, et. al .Advanced Algebra: Trigonometry and Statistics.JTW Corporation 2003. pp. 96-97.

Links:
https://www.bing.com/search?q=polynomial+function&cvid
byjus.com/maths/polynomial-functions/

https://byjus.com/maths/polynomial-functions

www.mathcentre.ac.uk/resources/uploaded/mc-ty-polynomial-2009-1.pdf

https://www.calculushowto.com/types-of-functions/polynomial-function

https://www.mathplanet.com/education/algebra-2/polynomial-functions/..

https://www.khanacademy.org/math/algebra-home/alg-polynomial

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