INDIAN SCHOOL AL WADI AL KABIR

Class X, Mathematics

Worksheet-Polynomials

27-04-2023

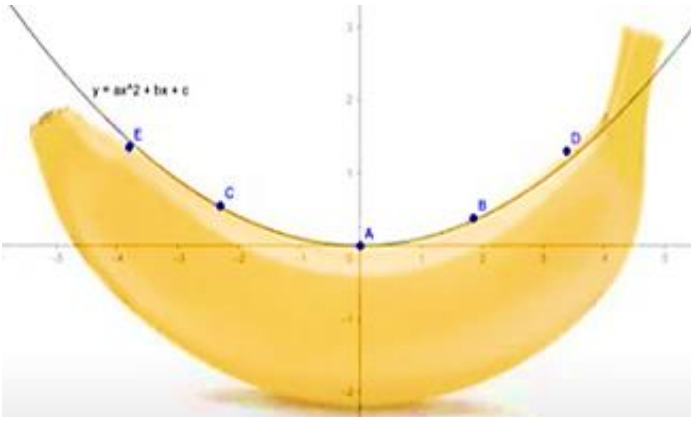
Q. No.	

Case Study Based

I.

The quadratic function can model the natural shape of banana. We know that the shape of banana must have a quadratic function, therefore an equation in standard form of $f(x) = ax^2 + bx + c$. From the picture of banana, we can see that a quadratic function is able to model the banana accurately with a = 0.1, b = 0 and c = 0.

Therefore, the equation is $f(x) = 0.1\ x^2$



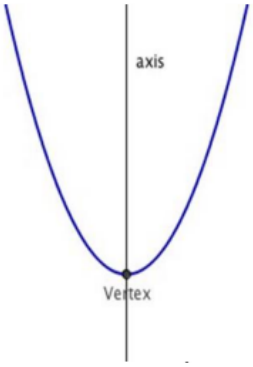
Based on the above information answer the following questions.

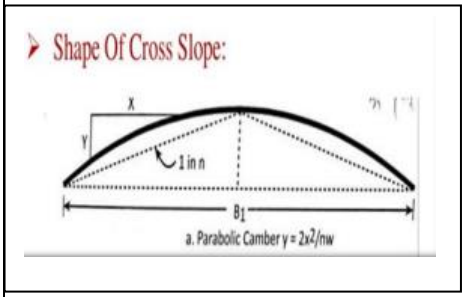
1.	Name the shape of banana curve from the given figure.
2.	Find the number of zeroes of the polynomial for the shape of banana?
3.	If the curve of the banana is represented by the equation $f(x) = x^2 - x - 12$, find its zeroes.
4.	In a representation of banana curve if one zero is 4 and sum of the zeroes is 0, find the quadratic polynomial.
5.	What is the value of the polynomial $f(x) = x^2 - x - 12$ when x = -2.

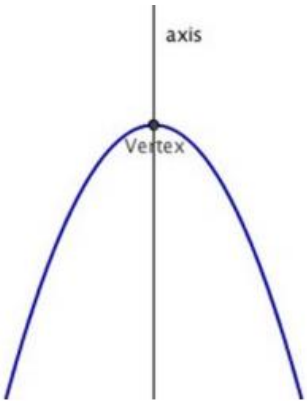
II

Parabola: A parabola is the graph that results from $p(x)=ax^2 + bx + c$.

Parabolas are symmetric about a vertical line known as the Axis of Symmetry. The Axis of Symmetry runs through the maximum or minimum point of the parabola which is called the Vertex.





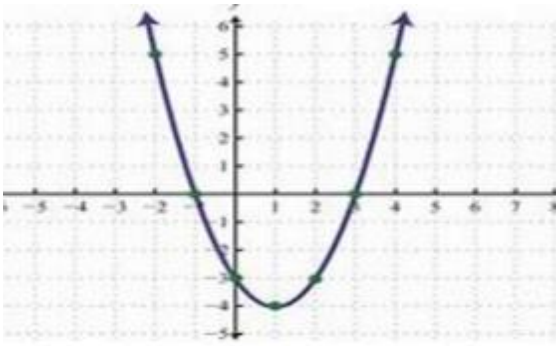


Based on the above information answer the following questions.

6.	If the highway overpass is represented by $x^2 – 2x – 8$. Then its zeroes are:
7.	The representation of Highway Underpass whose one zero is 6 and sum of the zeroes is 8, is:
8.	The number of zeroes that polynomial $f(x) = (x – 2)^2 - 16$ can have is:
9.	Graph of a quadratic polynomial is a:

III

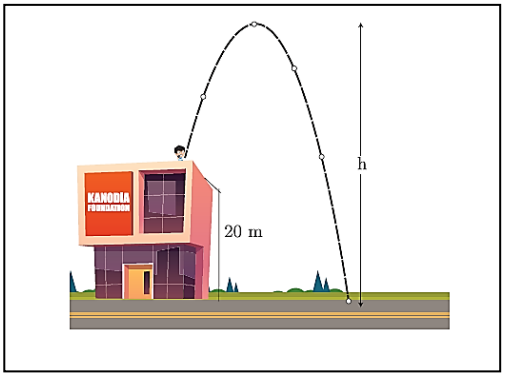
Due to heavy storm an electric wire got bent as shown in the figure. It followed a mathematical shape. Answer the following questions below.



10.	How many zeroes are there for the polynomial (shape of the wire)?
11.	The zeroes of the polynomial are:
12.	What will be the expression of the polynomial?
13.	What is the value of the polynomial if x = -1?

IV

Lavanya throws a ball upwards from a rooftop, which is 20 m above from ground. It will reach a maximum height and then fall back to the ground. The height of the ball from the ground at time t is h, which is given by $h = -4t^2 + 16t + 20$.



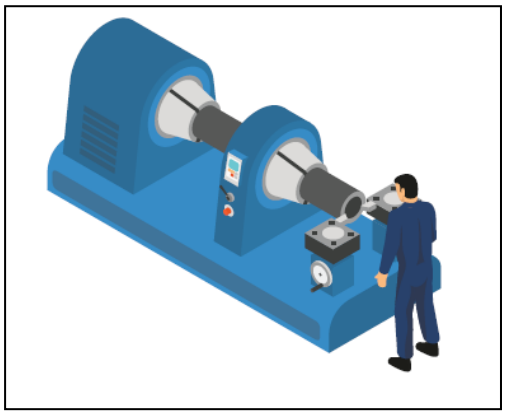
Based on the above information answer the following questions.

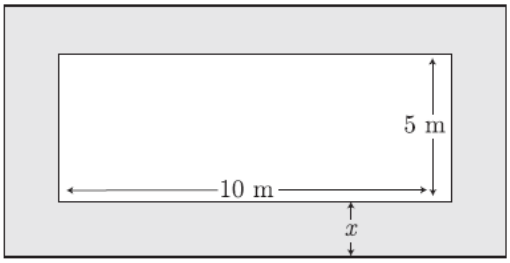
14.	What is the height reached by the ball after 1second?
15.	How long will the ball take to hit the ground?
16.	What are the two possible times to reach the ball at the same height of 32 m?
17.	What is the equation represented by $-4t^2 + 16t + 20$ known as?

V

RK Fabricators has got a order for making a frame for machine of their client, for which they are using a AutoCAD software to create a constructible model that includes the relevant information such as dimensions of the frame and materials needed.

In order to input the right values in the AutoCAD software the engineer needs to calculate some basic values. The frame will have a solid base and will be cut out of a piece of steel. The final area of the frame should be 54 sq m. The diagram of frame is shown below.





18.	What are the dimensions of the outer frame in terms of x?
19.	A metal sheet of minimum area is used to make the frame. What should be the minimum area of metal sheet before cutting ?.
20.	What is the area of required final metal frame?
21.	If the area of the frame is 54 sq m, what is the value of x ?
22.	What is the perimeter of the outer frame?

	Answers							
Answers	**1**	Parabola	**2**	1	**3**	4, -3	**4**	x^2 -16
	5	-6	**6**	4,-2	**7**	$x^2 - 8x + 12$	**8**	2
	9	Parabola	**10**	2	**11**	-1, 3	**12**	$x^2 - 2x - 3$
	13	0	**14**	32m	**15**	5 seconds	**16**	1s, 3 s
	17	Quadratic Equation	**18**	$10 + 2x, 5 + 2x$	**19**	$4x^2 + 30x + 50$	**20**	$4x^2 + 30x$
	21	1.5 m	**22**	42 m				