MTAP SATURDAY PROGRAM IN MATHEMATICS GRADE 9 SESSION 2
QUADRATIC FUNCTION/DIRECT AND INVERSE VARIATION

A. Write the following quadratic function in standard form.

1. $y = (x+3)^2 - 1$
2. $y = 3(x-1)^2 + 5$
3. $y = -(x-4)^2 - 3$
4. $y = -2(x-1)^2 - 1$
5. $y = \frac{1}{4}(x-4)^2 - 8$
6. $y = -2(x+1)(x+3)$
7. $y = -3(x-0.5)^2$
8. $y = -2(x+1)(x+3)$
9. $y = -\frac{2}{3}(x-1)^2 + 1$

B. Determine if the given quadratic functions below contain the given points.

1. $y = -x^2 - 6x - 1;\ (-6,-1)$
2. $y = 2x^2 - 8x + 3;\ (0,3)$
3. $y = \frac{3}{4}x^2;\ (0,0)$
4. $y = x^2 - 2;\ (-2,0)$
6. $y = x^2 - x - 2; (2,0)$
7. $y = x^2 - 2x + 1; (1, \frac{1}{2})$
8. $y = (x-4)^2; (4,0)$
9. $y = (x-3)^2 - 2$; (-2,23)

C. Transform the following quadratic functions to vertex form, then identify the values of a,h and k.

Quadratic Functions	Vertex Form	a	h	k
1. $y = 2x^2 - 3x + 1$				
2. $y = x^2 + 6x+5$				
3. $y = \frac{1}{4}x^2 + 2x + 1$				
4. $y = x^2 - 8x + 11$				
5. $y = x^2 - 2x + 5$				
6. $y = x^2 + 4x + 8$				

D. Given the quadratic functions below, determine the parabola's domain, range, axis of symmetry, vertex, and opening.

Quadratic Functions	Domain	Range	Axis of Symmetry	Vertex	Opening
1. $x^2 - 3 = 0$					
2. $x^2 + 5x + 6 = 0$					
3. $x^2 + x - 2 = 0$					
4. $2x^2 + 7x + 3 = 0$					
5. $3x^2 - 1 = 0$					

E. Determine the equation of the quadratic function given the following table of values. Write the answer in standard form

1.

x	-2	-1	0	1	2
y	8	2	0	2	8

2.

x	-2	-1	0	1	2
`y	15	8	5	6	11

3.

x	-2	-1	0	1	2
y	6	3	2	3	6

4.

x	-2	-1	0	1	2
y	3	0	-1	0	3

F. Write whether the following situations imply direct variation or inverse variation.

1. The cost of a pencil and the number of pencils you buy.
2. The number of days needed in repairing a house and the number of men working.

3. The time a teacher spends checking papers and the number of students.
4. The fare of a passenger and the distance of his destination.
5. The cost of electricity and the number of kilowatt-hour consumption.
6. The speed of the car and the time it reaches its destination.

G. Write a variation equation that relates the two variables. Solve for k and the unknown variable.
1. If y varies directly as x and y= 16 when x = 8. Find y when x=4.
2. If j varies inversely as m and j= -4 when m= 3. Find j when m=6.
3. If n varies directly as the square of h and n =8, h= 2. Find n when h= -4.
4. If s varies directly as the cube of r and s=2 when r=2. Find s when r=4
5. If a varies inversely as as b and a=5 when b=8. Find a when b=8.

H. Solve the following problems.
1. A flare is launched from a boat. The height h, in meters, of the flare above the water is approximately modeled by the function $h(t) = -15t^2 + 150t$, where t is the number of seconds after the flare is launched. How many seconds will it take for the flare to return to the water?
2. Gen popped a baseball straight up with an initial upwards velocity of 48 ft/s. The height, h, in feet, of the ball above the ground is modelled by the function $h(t) = -16t^2 + 48t + 3$. How long was the ball in the air if the catcher catches the ball three feet above the ground?
3. The area of a rectangular pool is 1260 ft^2. Find the dimensions of the rectangle, if one side of the pool is 48 ft more than three times the other side.
4. The time to complete a project varies inversely with the number of employees. If 3 people can complete the project in 7 days, how long will it take 5 people?
5. The amount of money spent at the gas station varies directly with the number of gallons purchased. When 11.5 gallons of gas were purchased, the cost was 598. How much would 8 gallons of gas cost?
6. The time needed to travel a certain distance varies inversely with the rate of speed. If it takes 8 hours to travel a certain distance at 36 miles per hour, how long will it take to travel the same distance at 60 miles per hour?
7. The volume V of gas kept at a constant temperature varies inversely with the pressure P. If the pressure is 24 pounds per square inch, the volume is 15 cubic feet. What will the volume be when the pressure is 30 pounds per square inch?
8. The time it takes to cover the distance between two cities by car varies inversely with the speed of the car. The trip takes 3 hours for a car moving at 68 mph . What is the speed of a car that makes the trip in 4 hours?

Challenge
1. The axis of symmetry of the parabola having the equation $y = ax^2 - 5x + c$ is the line $x = 5$ and its y-intercept is 2. Find the values of a and c.
2. Find the percentage increase of the area of a square if the length of each side is increased by 20%.
3. If r and s are roots of the equation $x^2 + kx + 3 = 0$ and you doubled the roots what is the new quadratic equation?
4. Solve for the solution of the equation $\frac{1}{x^2-9} + \frac{1}{x^2-6x+9} = \frac{2}{x^2+6x+9}$

Prepared by: Suzette B. Asuncion, Lingunan National High School
Teacher III-SDO-Valenzuela City