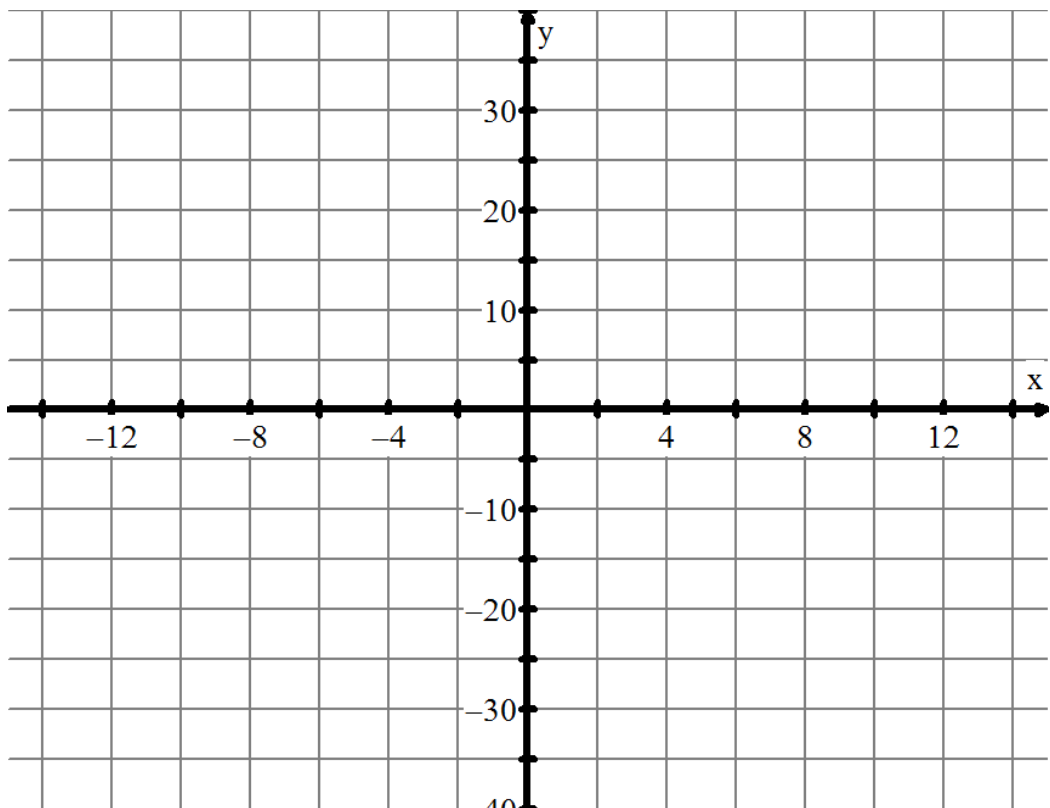


PART A – CALCULATOR INACTIVE – Answer the following questions without the use of your graphing calculator

1. You will work with the parabola $y = x^2 - 6x - 27$ for this series of questions that follow:
 - a. Does the parabola open upwards or downwards? _____ (1)
 - b. How do you know? _____ (1)
 - c. Does the parabola have a maximum or a minimum? _____ (1)
 - d. Where is the axis of symmetry of the parabola? _____ (1)
 - e. What special point does the axis of symmetry go through in a parabola? _____ (1)
 - f. Determine the co-ordinates of this special point. _____ (1)
 - g. Factor the quadratic expression $x^2 - 6x - 27$. _____ (1)
 - h. Where are the x-intercepts of the parabola $y = x^2 - 6x - 27$. _____ (1)
 - i. Complete the table of values showing 5 key points on your parabola: (3)

x					
y					

- j. Graph the quadratic function, given the information you have just determined in these questions. (3)



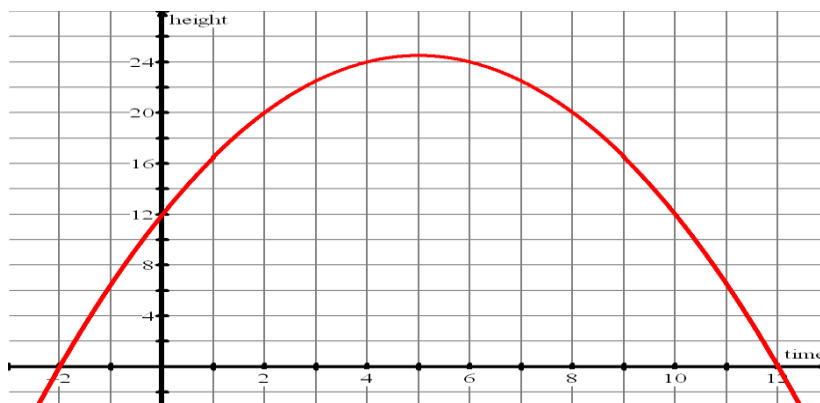
PART B – The following questions are calculator active.

2. Complete the following short answer questions:

- a. Write $(2y^2)^3$ in the form of an expanded product. _____ (1)
- b. Write $\frac{(2x^2)^3}{2x^4}$ in its simplest form. _____ (2)
- c. Determine the GCF of the terms $12x^2y$ and $60x^3y^2$. _____ (1)
- d. Factor $x^2 + 10x + 25$. _____ (1)
- e. Solve for x in the equation $(x - 8)(x + 3) = 0$. _____ (2)
- f. Expand $(2x + 3)^2$ _____ (1)
- g. The axis of symmetry of $y = x^2 + 4x - 2$ is located at _____ (1)
- h. The vertex of $y = x^2 + 4x - 2$ is located at _____ (1)

3. Mr S. launches a rocket from the top of the school and the height of the rocket, in meters, is modelled by the quadratic function graphed below. The x-axis represents time, in seconds. The following questions involve the graph of a parabola included below.

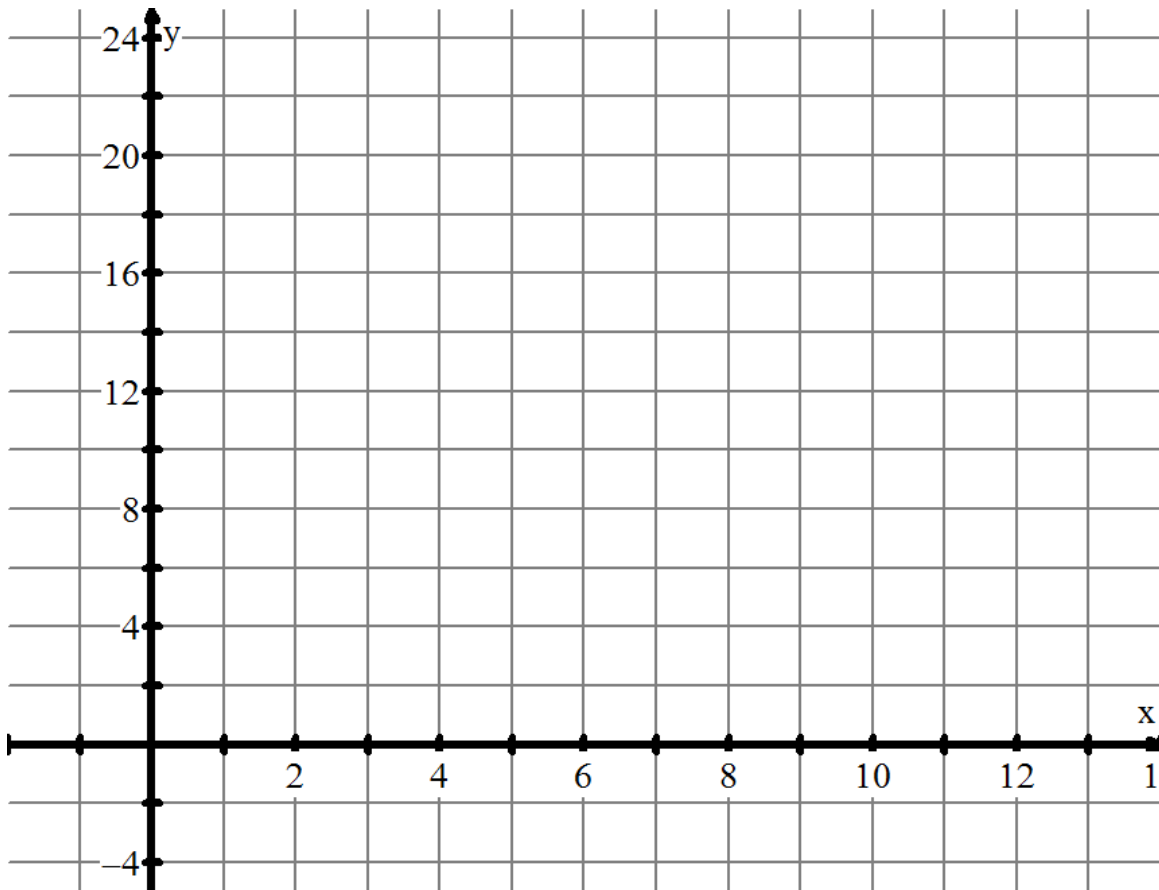
- a. Where is the axis of symmetry of the parabola? _____ (1)
- b. What is the maximum height of the rocket? _____ (1)
- c. From what height was the rocket launched? _____ (1)
- d. Determine the x-intercepts of the parabola. _____ (1)
- e. What must be the factors of the quadratic equation for this parabola? _____ (1)
- f. One of the x-intercepts does not make sense in the context of Mr S. launching a rocket? Which x-intercept and why does it not make sense? _____ (2)



4. My brother has a carpentry business in Canada. His revenues from the business are modelled by the quadratic function $P(x) = -\frac{1}{2}x^2 + 6x + 2$. The x-axis represents months starting with January (i.e. $x = 1$ is January; $x = 3$ is March, etc) and the y-axis represents his monthly revenue (income) in thousands of dollars.

- a. What is his profit in September? _____ (1)
- b. In what month(s) will his profit be \$7,500? _____ (1)
- c. In what month did his business have its maximum profit? _____ (1)
- d. What was his maximum profit? _____ (1)
- e. Approximately, where are the x-intercepts of the parabola? _____ (1)
- f. What do the x-intercepts represent in the case of my brother's business? _____ (1)

g. Graph the parabola, clearly showing 5 points on the parabola. (4)



5. The equation $h(d) = -0.1d^2 + 2d + 2$ models the path of a discus thrown by my son, Andrew. The x axis (I am using d in this example) represents the horizontal distance, in meters, travelled by the discus. The y axis represents the height above the ground, also measured in meters.

a. What is the height of the discus after it has travelled 5 meters forward? _____ (1)

b. When the discus at a height of 11.1 meters, how far forward has the discus travelled?
_____ (1)

c. What is the maximum height of the discus? _____ (1)

d. How far forward does the discus travel before hitting the ground? Explain how you determined your answer? _____ (2)

e. Mr Santowski throws his discus and its path us modelled by the equation $h(d) = -0.15d^2 + 2.5d + 2.5$. Whose discus throw is better, mine or Andrew's. Explain your answer by referring to key features on the graphs of the 2 throws. _____ (2)

6. Factor the following expressions. _____ (10)

a. $x^2 - 2x - 35$

c. $3x^2 - 75$

b. $4x^2 + 32x$

d. $2x^3 - 8x^2 - 10x$

7. Solve the following quadratic equations using algebra and factoring skills. You may use the graphing calculator to VERIFY your solutions, but full marks are only awarded for complete algebra solutions. (9)

a. $x^2 + 5x + 6 = 0$

c. $x^2 - 49 = 0$

b. $2x^2 - 6x + 4 = 0$

8. Expand $(2x - 1)(3x^2 - 5x + 9)$

(3)