Grade 12

Mathematics Project

Applied Technology High School

ثانويــة التكنولوجيــا التطبيقيــة
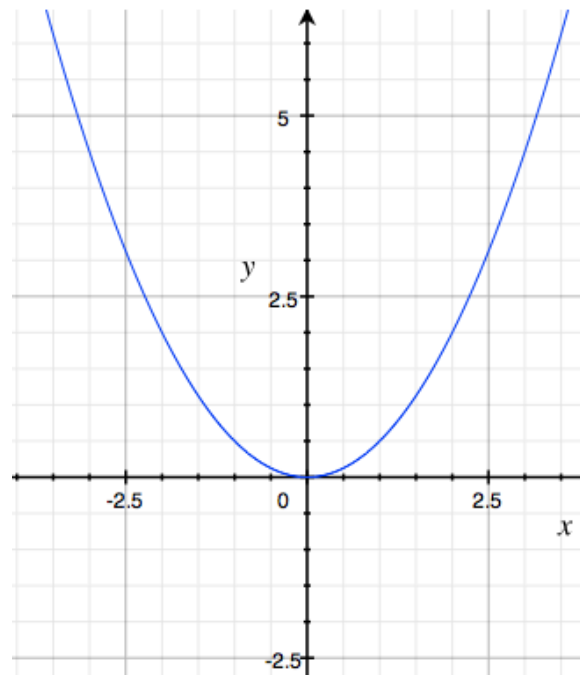
Term 2

Student's Name:

ID #:

Section:

2011 - 2012

Part I:

The figure below shows the graph of a parabola.

1. Plot the point A (3, 4.5), and draw the straight line (Δ) with equation $y = -\frac{1}{2}$ on the same graph above.

2. Calculate the distance between the points A and S (0, 0.5).

3. Find the distance between the point A and the straight line (Δ).

4. Compare the distances found in **2** and **3**.

5. What is the name of the:

   i.   Point S: _____

   ii.   Straight line (Δ): _____

2

Generalization:

Let $P(x, y)$ is a point of the drawn parabola, and $F(0, p)$ the focus point of the parabola ($p > 0$) as illustrated in the figure below.
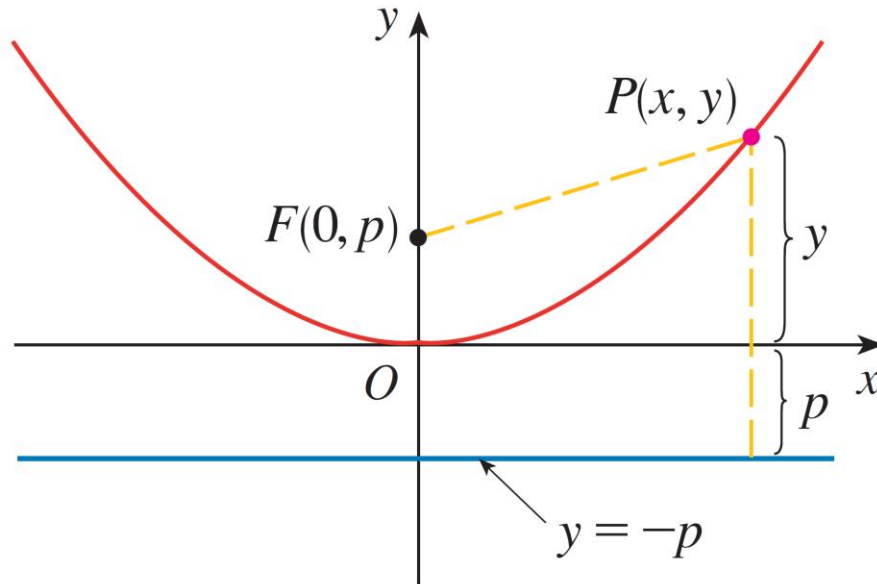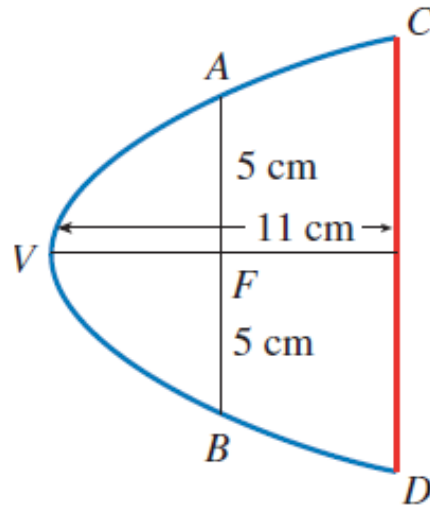

6. Find the distance d_1 between P and F, and the distance d_2 between P and the straight line with equation $y = -p$

7. Find the relation between x and y when $d_1 = d_2$.

3

8. A cross-section of a parabolic reflector is shown in the figure.
   The bulb is located at the focus and the opening at the focus is 10 cm

i. Find an equation of the parabola.

ii. Find the diameter of the opening |CD|, 11 cm from the vertex.

Part II

In the **LORAN** (**LO**ng **RA**nge **N**avigation) radio navigation system, two radio stations located at A and B transmit simultaneous signals to a ship located at P. The onboard computer converts the time difference in receiving these signals into a distance difference $|PA| - |PB|$, and this, according to the definition of a hyperbola, locates the ship on one branch of a hyperbola (see the figure).
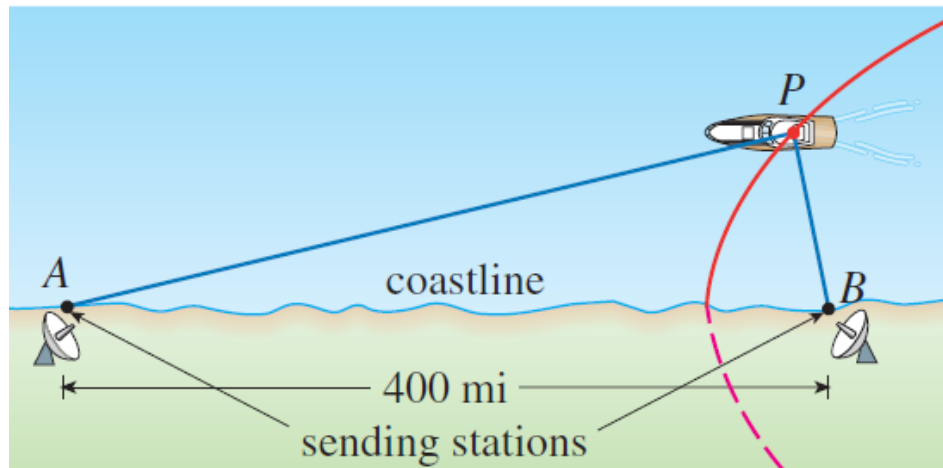
Suppose that station B is located 400 mi due east of station A on a coastline. A ship received the signal from B 1200 microseconds (μs) before it received the signal from A.

    (a) Assuming that radio signals travel at a speed of 980 ft/μs, find an equation of the hyperbola on which the ship lies.

    (b) If the ship is due north of B, how far of the coastline is the ship?

Rubrics

	Criteria				Points
	4	**3**	**2**	**1**	
Completeness of Tasks **20%**	Tasks are totally completed and correct. (100%)	Tasks are partially completed, **OR** Partially wrong.(75%)	Tasks are partially completed, **AND** Partially wrong (50%).	Tasks are Attempted (25% or less)	____
Presentation and Integration of Technology **70%**	Students used one mean of technology. The tool used helped the student and was useful to support his project. Moreover, the student was able to explain the work he/she submitted confidently and fluently; he/she was **able to answer all** of colleagues and instructor's questions	Student used a mean of technology but it was not that supportive to the topic. In addition, student was able to explain the work he/she submitted confidently and fluently and he/she reflected an understanding of his/her works. The student was **able to answer most** of colleagues and instructor's questions.	Student was able to explain the work he/she submitted. Student reflected a shallow understanding of his/her work; she was **able to answer some** of colleagues and instructor's questions,	Student use of technology was primitive and way below the level of other IAT students. Student was unable to explain the work he/she submitted. Student reflected no understanding of his/her work; he/she was **unable to answer any** of colleagues and instructor's questions.	____
Creativity& enrichment **10%**	Student had an outstanding addition in **all aspects** of his/her project.	Student had an outstanding addition in **some aspects** of his/her project.	Student had an outstanding addition in **very few aspects** of his/her project.	Student had an outstanding addition in **no aspects** of his/her project.	____
This rubric is out of 100, percentage orientation. **To make the mark out of 30 (Student's Mark/10*3)**				**Total ---->**	____