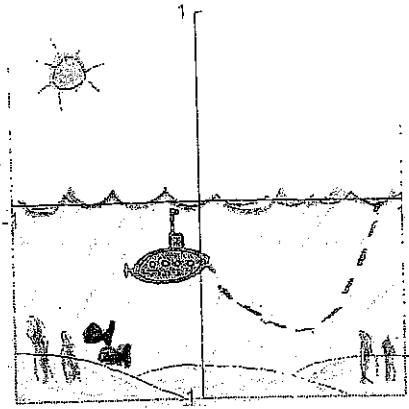


Submarine Problem

A graph is superimposed on a diagram showing the motion of a submarine through water.

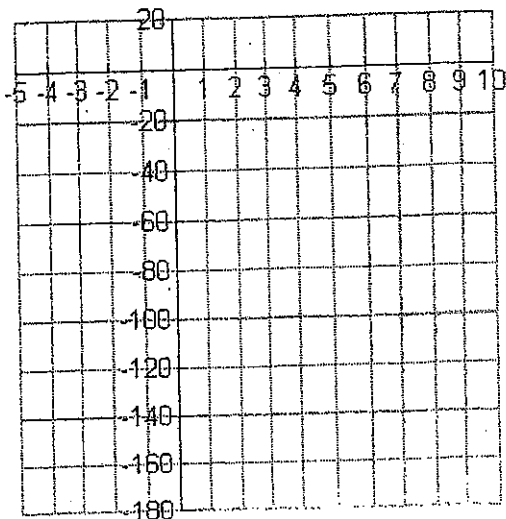


Let x = the number of minutes since the submarine began moving
 Let y = the position (or height) of the submarine
 NOTE: All of our "heights" will be negative since the submarine will always be below the water line!!

The equation that describes the motion of the sub is $y = 5x^2 - 40x - 60$

- Find the initial height of the submarine
- The submarine was running a practice drill and sunk to a specific height before climbing back to the surface. When did the submarine reach this lowest point?
- Find the lowest point the submarine sank to.
- Find the time when the submarine reached the surface of the water.

e. Using what you found in $a - d$, plot the motion of the submarine including x -intercept, y -intercept, and vertex.



Write, in interval notation, a reasonable domain for this problem.

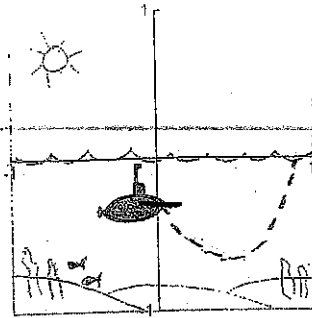
Submarine Problem

A grid is superimposed on a diagram showing the motion of a submarine through water.

Let x = the number of minutes since the submarine began moving

Let y = the position (or height) of the submarine

NOTE: All of our "heights" will be negative since the submarine will always be below the water line!!



The equation that describes the motion of the sub is $y = 5x^2 - 40x - 60$

$$y = 5(x^2 - 8x + 16) - 60$$

$$y = 5(x - 4)^2 - 80$$

a. Find the initial height of the submarine

-60

b. The submarine was running a practice drill and sunk to a specific height before climbing back to the surface. When did the submarine reach this lowest point?

x-Coord of vertex 4

$$y = 5(x - 4)^2 - 140$$

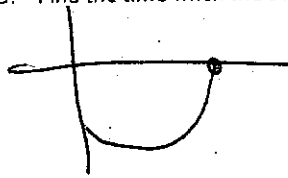
c. Find the lowest point the submarine sank to.

-140

$$x = \frac{-b}{2a} = \frac{40}{2 \cdot 10} = 4$$

$$y = 5(4)^2 - 40(4) - 60$$

d. Find the time when the submarine reached the surface of the water.



$$0 = 5x^2 - 40x - 60$$

$$0 = 5(x - 4)^2 - 140$$

$$140 = 5(x - 4)^2$$

$$28 = (x - 4)^2$$

$$9.29 = x - 4$$

$$x = 13.29$$

e. Using what you found in a - d, plot the motion of the submarine including x-intercept, y-intercept, and vertex.

Write, in interval notation, a reasonable domain for this sm.

$[0, 9.29]$

