



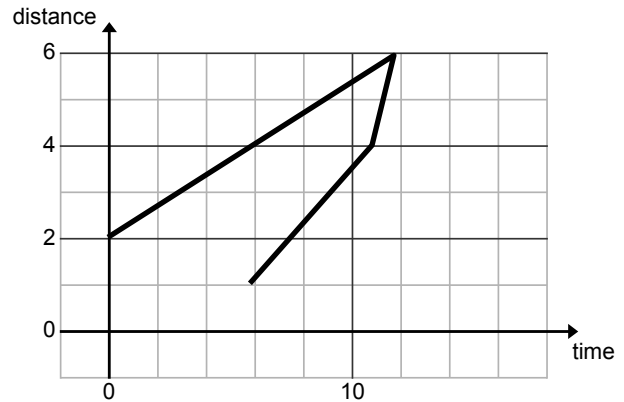
**Definition**

A *function* is a relation in which each input is paired with exactly **one** output. For every value that goes into a function, the function outputs one unique result.

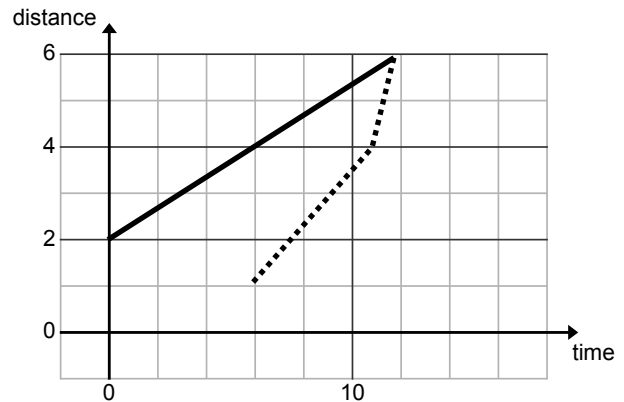
**Problem 1 – Graphical**

At time  $t = 0$ , Marty is at position  $d = 2$ .

1. Can the graph to the right describe Marty's position as a function of time? Explain.
2. What would have to happen for this graph to occur?



3. Redraw the dashed lines to make the graph a function.



**Problem 2 – Set of ordered pairs**

The first element of each ordered pair is the input value.

4. Which sets below describe a function? Explain why.
 

A. $\{(0, 1), (1, 4), (2, 7), (3, 6)\}$	B. $\{(-2, 2), (-1, 1), (0, 0), (1, 3), (2, 4)\}$
C. $\{(3, 2), (3, 4), (5, 6), (7, 8)\}$	D. $\{(2, 3), (3, 2), (1, 4), (4, 1)\}$



Marty flies to Mars, where the acceleration of gravity is 0.375 of what it is on Earth. So with  $a = 12\text{ft/s}^2$ , use the distance formula  $d = \frac{1}{2}at^2$  to compute the output when given the input.

5. Use the formula to compute  $d$ . Give the set or ordered pairs  $(t, d)$  when the input  $t$  is the set  $\{0, 1, 2, 6\}$ .

6. Use the formula to compute  $t$ . Give the set of ordered pairs  $(d, t)$  if the input is  $d$ . The input set for  $d$  is  $\left\{0, \frac{2}{3}, 6\right\}$ .

7. Which of the two solutions sets from Questions 5 and 6 is a function? Why?

8. From solutions sets above, which is true?

- A.  $d$  is a function of  $t$
- B.  $t$  is a function of  $d$
- C. both
- D. neither

**Problem 3 – Function notation**

If  $f$  is a function of  $x$  this can be written as  $f(x)$ .

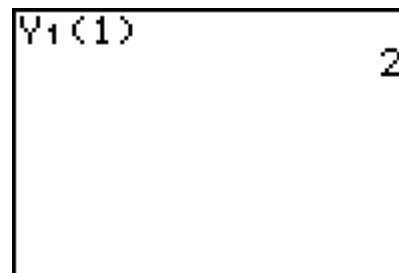
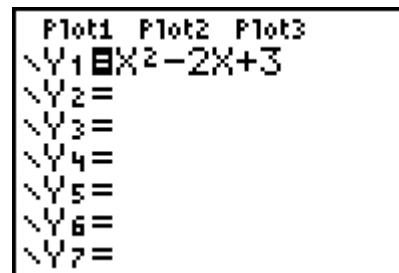
For example,  $f(x) = x^2$ . So  $f(3) = 9$ .

To use the function ability of your graphing calculator, press  $\boxed{Y=}$  and enter  $x^2 - 2x + 3$ .

Return to the Home screen.

To enter different values for  $x$  and observe what  $f(x)$  equals, press  $\boxed{\text{VARs}}$ , arrow right to the **Y-VARS** menu, select **Function** and then choose **Y1**. Then enter **(#)**, replacing # with the  $x$ -value.

Press  $\boxed{2\text{nd}} \boxed{\text{ENTRY}}$  to recall the last entry.





9. For  $f(x) = x^2 - 2x + 3$ , find  $f(4)$  using the graphing calculator, then by substitution showing your work below.

10. For  $f(x) = 3x^2 + 5x + 3$ , find  $f(2)$  using the graphing calculator, then by substitution showing your work below.

**Problem 4 – Function Machine**

Run the program **MACHINE** and select option 1. The program will return an output for the input entered.

11. What is the input for the function  $f(x)$  that gives an output of 8.5?

12. What is the unknown function?

```
OUTPUT GOAL: 8.5
INPUT?
```

Now select option 2.

13. What is the input for the function  $f(x)$  that gives an output of 6?

14. What is the unknown function?

```
OUTPUT GOAL: 6
INPUT?
```

Now select option 3.

15. What is the input for the function  $f(x)$  that gives an output of 83?

16. What is the unknown function?

```
OUTPUT GOAL: 83
INPUT?
```