

Name:

Date:

Mathematics Exam I

Grade 9 - The Concept of Function & Function Types

Instructions:

- Remember to write your names on each page (It is enough to write the date on the first page only).
- 45 minutes are required for this examination. Answer all questions in blanked sections for each question.
- The points of each question are written in brackets.
- No calculator is allowed.

Q1- Function is one of the important ways of identifying our world mathematically. The key to define a case mathematically is obtaining relations between the variables of the case. For example:

- ✓ The boiling point of water depends on the height above sea level.
- ✓ The interest payable on money deposited in a bank depends on how long the money stays at the bank.
- ✓ The area of a circle depends on the length of its radius.

Hence, similarly write down your own example by giving a short and clear justification. [4]

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Q2- According to the table:

a. State the domain and range of the function. [4]

Activity	Calories Burned
Jogging	210
Swimming	270
Tennis	210
Walking	120
Bicycling	330

b. Give each correspondence as a set of ordered pairs. [2]

Q3- According that the sets $A = \{a, b, c\}$ and $B = \{1, 2, 3\}$; which of the following relations is/are a function from A to B? [4]

$$f_1 = \{(a,1), (b,1), (c,1)\}$$

$$f_3 = \{(a,1), (b,2)\}$$

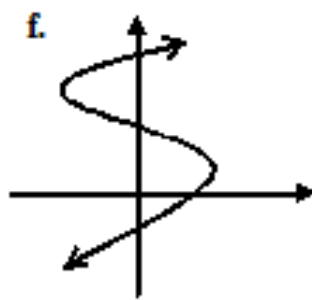
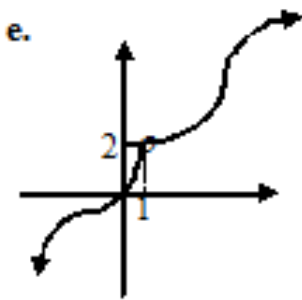
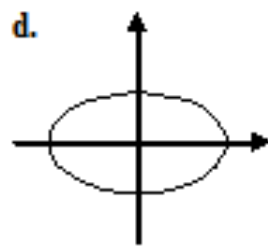
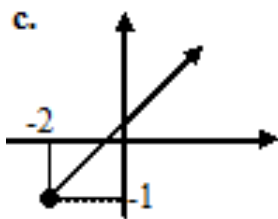
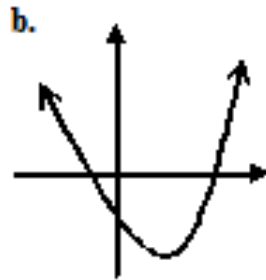
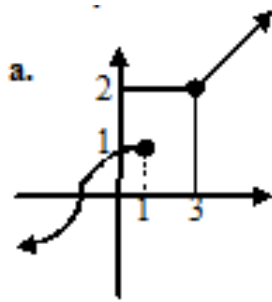
$$f_2 = \{(a,1), (a,2), (a,3)\}$$

$$f_4 = \{(1,a), (2,b), (3,c)\}$$

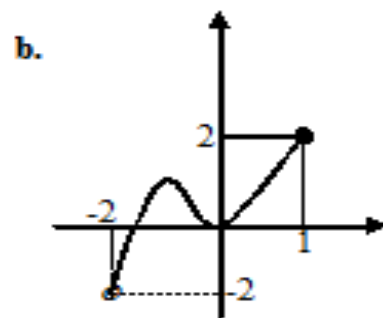
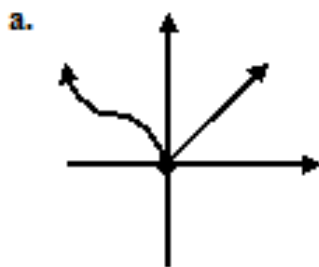
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Q4- Which of the following relations is/are a function from R to R ? [6]



Q5- Find and write down the sets of domain and image for the following graphics. [4]



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Q6- For which of the following intervals does the given relation graph indicate a function? For each bullet point, justify your answer shortly. [12]

a. $[-1,1] \rightarrow \mathcal{R}$

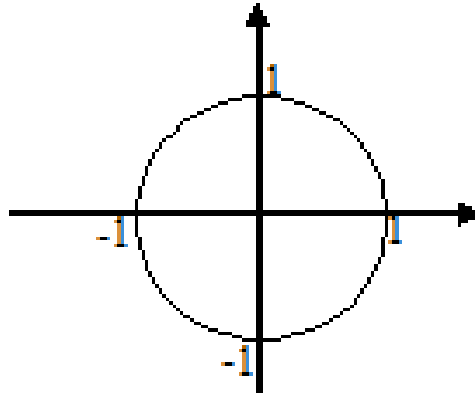
b. $[-1,1] \rightarrow [0,1]$

c. $[0,1] \rightarrow [-1,1]$

d. $[0,1] \rightarrow [0,1]$

e. $[-1,0] \rightarrow [-1,0]$

f. $[-1,0] \rightarrow [-1,1]$



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Q7- According to the given functions:

a. $f: \mathbb{R} \rightarrow \mathbb{R}$; $f(x) = 2x + 3$. What is the value of $f(1) + f(3)$? **[5]**

b. $f(x-3) = \begin{cases} 2x-1 & x \leq -1 \\ 1-6x & x > -1 \end{cases}$

$f(-5) + f(-3) - f(-4) = ?$ **[7]**

Q8- $f: [-4, 1) \rightarrow \mathbb{R}$ and $f(x) = 3 - x$ is given.

Hence, find out the image for this function and explicitly specify. **[10]**

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Q9- According to the sets $A = \{a, b, c, d\}$ and $B = \{1, 2, 3, 4\}$; give an example for one to one function (injective), onto function (surjective), into function from A to B. [6]

Q10- $f(x)$ is a linear function. Since $f(1) = 3$ and $f(2) = 5$ then,

- a. $f(5) = ?$ [14]
- b. Sketch the graph of the function. [4]

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Q11- $f(x)$ is an identity function.

Since $f(x) = (a+2)x^2 + (b-3)x + c + 1$ then, $a+b+c = ?$ [9]

Q12- $f(x) = (a-3)x + a + 2$ is a constant function . Hence, what is the value of $f(a) + f(4)$? [9]