FOUNDATION

2.8 Function Machines: 1-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Here is a function machine.
input --> [- 4] --> output
Work out the output when the input is each of 20, 2, 15.

(Total for Question 1 is 3 marks)

2 Here is a function machine.
input --> [+ 5] --> [x 2] --> output
The input is n. (a) Write an expression for the output. (b) Work out the output when n = 8.

(Total for Question 2 is 3 marks)

3 Here is a function machine.
input --> [+ 2] --> [+ 6] --> output
Work out the output when the input is 8, and when the input is 2.

(Total for Question 3 is 3 marks)

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4 Here is a function machine.

input --> [+ 3] --> output

Work out the output when the input is each of 8, 13, 18.

(Total for Question 4 is 3 marks)

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5 Here is a function machine.

input --> [+ 4] --> [x 4] --> output

The input is n. (a) Write an expression for the output. (b) Work out the output when n = 9.

(Total for Question 5 is 3 marks)

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6 Here is a function machine.

input --> [x 4] --> [- 9] --> output

The output is 71. Work out the input.

(Total for Question 6 is 3 marks)

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7 Here is a function machine.

input --> [x 3] --> output

Work out the output when the input is each of 2, 5, 8.

(Total for Question 7 is 3 marks)

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8 Here is a function machine.

input --> [+ 8] --> [- 8] --> output

Work out the output when the input is 15, and when the input is 1.

(Total for Question 8 is 3 marks)

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9 Here is a function machine.

input --> [x 6] --> [- 6] --> output

The output is 84. Work out the input.

(Total for Question 9 is 3 marks)

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10 Here is a function machine.

input --> [- 10] --> output

Work out the output when the input is each of 12, 15, 19.

(Total for Question 10 is 3 marks)

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11 Here is a function machine.

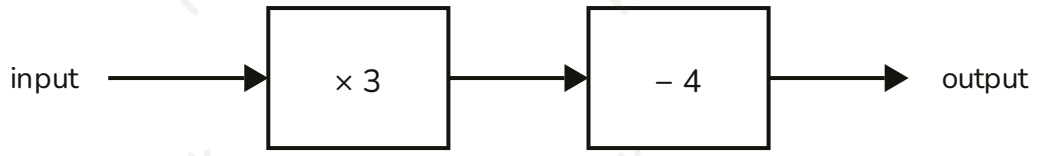
input --> [- 6] --> [- 7] --> output

Work out the output when the input is 6, and when the input is 13.

(Total for Question 11 is 3 marks)

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12 The function machine below has two steps.
input --> [x 3] --> [-4] --> output
Complete the table of outputs.



(a) input = 0 **(1)**

.....

(b) input = 2 **(1)**

.....

(c) input = 5 **(1)**

.....

(d) input = -1 **(1)**

.....

(Total for Question 12 is 4 marks)

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13 Two function machines are described below. Find the missing operation in each.

(a) A function machine has the rule: input --> [?] --> output. When the input is 3 the output is 15, and when the input is 6 the output is 30. Find the missing operation. **(1)**

.....

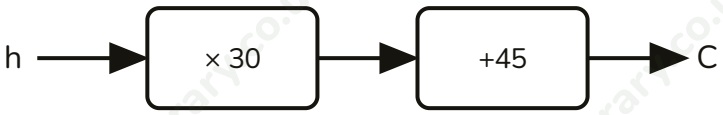
(b) A function machine has two steps: input --> [x 2] --> [?] --> output. When the input is 4 the output is 5, and when the input is 10 the output is 17. Find the missing second operation. **(2)**

.....

(Total for Question 13 is 3 marks)

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14 A plumber uses the function machine below to work out the total charge, C (in pounds), for a job lasting h hours:
h --> [x 30] --> [+45] --> C



(a) Work out the total charge for a job that takes 3 hours. **(2)**

.....

(b) A job cost a total of £165. Work out how many hours the job took. **(3)**

.....

(Total for Question 14 is 5 marks)

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Mark scheme · 2.8 Function Machines: 1-hour Pack

A correct answer earns full marks unless the question asks for working, a method, proof or explanation.

Question 1

one output correct	**B1**
two outputs correct	**B1**
all outputs correct	**B1**

Answer: 16, -2, 11

Question 2

attempts to build the expression	**M1**
2(n + 5)	**A1**
26 cao	**B1**

Answer: (a) 2(n + 5), (b) 26

Question 3

applies the operations in the correct order	**M1**
16 cao	**A1**
10 cao	**B1**

Answer: 16 and 10

Question 4

one output correct	**B1**
two outputs correct	**B1**
all outputs correct	**B1**

Answer: 11, 16, 21

Question 5

attempts to build the expression	**M1**
4(n + 4)	**A1**
52 cao	**B1**

Answer: (a) 4(n + 4), (b) 52

Question 6

uses inverse operations or works backwards	**M1**
all inverse operations in the correct order	**M1**
20 cao	**A1**

Answer: 20

Question 7

one output correct	**B1**
two outputs correct	**B1**
all outputs correct	**B1**

Answer: 6, 15, 24

Question 8

applies the operations in the correct order	**M1**
15 cao	**A1**
1 cao	**B1**

Answer: 15 and 1

Question 9

uses inverse operations or works backwards	**M1**
all inverse operations in the correct order	**M1**
15 cao	**A1**

Answer: 15

Question 10

one output correct	**B1**
two outputs correct	**B1**
all outputs correct	**B1**

Answer: 2, 5, 9

Question 11

applies the operations in the correct order	**M1**
-7 cao	**A1**
0 cao	**B1**

Answer: -7 and 0

Question 12

(a) -4 cao	**B1**

(a) Answer: -4

(b) 2 cao	**B1**

(b) Answer: 2

(c) 11 cao	**B1**

(c) Answer: 11

(d) -7 cao	**B1**

(d) Answer: -7

Question 13

(a) multiply by 5 oe (x5)	**B1**

(a) Answer: x5 (multiply by 5)

(b) 8 or 20 seen (correct value after the x2 step for either pair)	**M1**
(b) subtract 3 oe (-3), ft	**A1**

(b) Answer: -3 (subtract 3)

Question 14

(a) 90 seen (3 x 30)	**M1**
(a) 135 cao (accept £135)	**A1**

(a) Answer: £135

(b) 120 seen (165-45)	**M1**
(b) complete method: 120 / 30	**M1**
(b) 4 cao	**A1**

(b) Answer: 4 hours

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