



EP.M131 Function Machines and Simple Equations

GL ASSESSMENT GL-11PLUS-MATHS · Calculators not allowed · about 55 minutes

Total Marks

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Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** A function machine does: multiply by 3. What is the output when the input is 4?

- ☐ A) 7
- ☐ B) 11
- ☐ C) 12
- ☐ D) 16
- ☐ E) 1

(Total for Question 1 is 1 mark)

- 2** A function machine does: add 7. If the input is 15, what is the output?

- ☐ A) 8
- ☐ B) 22
- ☐ C) 28
- ☐ D) 105
- ☐ E) 9

(Total for Question 2 is 1 mark)

- 3** A machine takes an input, multiplies it by 4 then subtracts 5 to give the output. If the output is 11, what was the input?

- ☐ A) 2
- ☐ B) 3
- ☐ C) 4
- ☐ D) 5
- ☐ E) 6

(Total for Question 3 is 1 mark)

4 A function machine does: subtract 6 then divide by 2. The output is 7. What was the input?

- ☐ A) 14
- ☐ B) 18
- ☐ C) 20
- ☐ D) 26
- ☐ E) 28

(Total for Question 4 is 1 mark)

5 A function machine turns 6 into 18, and also turns 10 into 30. Which single operation is the rule of the machine?

- ☐ A) add 12
- ☐ B) multiply by 3
- ☐ C) square the input
- ☐ D) multiply by 2 then add 6
- ☐ E) add 6 then multiply by 2

(Total for Question 5 is 1 mark)

6 Solve the equation $x + 7 = 15$. Give the value of x .

(Total for Question 6 is 1 mark)

7 Solve the equation $3x = 21$. Give the value of x .

(Total for Question 7 is 1 mark)

8 Solve $2x + 5 = 17$. Show your method.

(Total for Question 8 is 2 marks)

9 A machine does: times 2 then add 3. If the output is 19, what was the input?

- ☐ A) 6
- ☐ B) 7
- ☐ C) 8
- ☐ D) 9
- ☐ E) 10

(Total for Question 9 is 1 mark)

10 If $f(x) = x - 4$, what is $f(12)$?

- ☐ A) 16
- ☐ B) 8
- ☐ C) 12
- ☐ D) 4
- ☐ E) 28

(Total for Question 10 is 1 mark)

11 Solve $x - 9 = -2$. Give the value of x .

(Total for Question 11 is 1 mark)

12 Solve $5 - 2x = 1$. Show your working.

(Total for Question 12 is 2 marks)

13 A machine does: multiply by 3 then add 4. The output is 25. Find the input. Show your method.

(Total for Question 13 is 2 marks)

- 14** A machine does: add 5 then multiply by 2. The output is 26. What was the input? Show your working.

(Total for Question 14 is 2 marks)

- 15** A function gives $f(2) = 11$ and $f(5) = 26$. Assuming $f(x) = ax + b$, find a and b and give the rule of the machine.

(Total for Question 15 is 2 marks)

- 16** Solve $x/3 + 4 = 10$. Show your working.

(Total for Question 16 is 2 marks)

- 17** If $f(x) = 2x - 3$, find $f(10)$.

- ☐ A) 17
- ☐ B) 20
- ☐ C) 23
- ☐ D) 7
- ☐ E) 30

(Total for Question 17 is 1 mark)

- 18** Solve $3(x - 2) = 12$. Show your method.

(Total for Question 18 is 2 marks)

19 Solve $2x + 3 = 7x - 12$. Show all steps.

(Total for Question 19 is 3 marks)

20 Input 4 goes through machine f then g. f adds 2 and g multiplies by 3. What is the final output?

- ☐ A) 12
- ☐ B) 18
- ☐ C) 14
- ☐ D) 10
- ☐ E) 8

(Total for Question 20 is 1 mark)

21 A machine divides by 2 then adds 7. The final output is 15. What was the original input? Show your working.

(Total for Question 21 is 2 marks)

22 Solve $4x - 3 = 2x + 11$. Show your method.

(Total for Question 22 is 2 marks)

Mark scheme · EP.M131 Function Machines and Simple Equations

Question 1

- **B1** option C (12) cao
- **Answer: C) 12**

Question 2

- **B1** option B (22) cao
- **Answer: B) 22**

Question 3

- **B1** option C (4) cao
- **Answer: C) 4**

Question 4

- **B1** option C (20) cao
- **Answer: C) 20**

Question 5

- **B1** option B (multiply by 3) cao
- **Answer: B) multiply by 3 (the only rule that works for both $6 \rightarrow 18$ and $10 \rightarrow 30$).**

Question 6

- **B1** $x = 8$ cao
- **Answer: $x = 8$**

Question 7

- **B1** $x = 7$ cao
- **Answer: $x = 7$**

Question 8

- **M1** $2x = 12$ or equivalent method seen
- **A1** $x = 6$ cao
- **Answer: $x = 6$**

Question 9

- **B1** option C (8) cao
- **Answer: C) 8**

Question 10

- **B1** option B (8) cao
- **Answer: B) 8**

Question 11

- **B1** $x = 7$ cao
- **Answer: $x = 7$**

Question 12

- **M1** $-2x = -4$ or equivalent method seen
- **A1** $x = 2$ cao
- **Answer: $x = 2$**

Question 13

- **M1** $3x + 4 = 25$ seen and $3x = 21$ or equivalent method
- **A1** $x = 7$ cao
- **Answer: $x = 7$**

Question 14

- **M1** $(x + 5) \times 2 = 26$ seen or $x + 5 = 13$
- **A1** $x = 8$ cao
- **Answer: $x = 8$**

Question 15

- **M1** $a = (26 - 11)/(5 - 2) = 15/3 = 5$ or equivalent seen
- **A1** $a = 5$, $b = 1$ so 'multiply by 5 then add 1' cao
- **Answer: multiply by 5 then add 1**

Question 16

- **M1** $x/3 = 6$ or equivalent method seen
- **A1** $x = 18$ cao
- **Answer: $x = 18$**

Question 17

- **B1** option A (17) cao
- **Answer: A) 17**

Question 18

- **M1** $3(x - 2) = 12$ then $x - 2 = 4$ or equivalent method
- **A1** $x = 6$ cao
- **Answer: $x = 6$**

Question 19

- **M1** Collecting x terms: $2x - 7x = -12 - 3$ or $5x = 15$ seen
- **M1** Division or simplification step to find x seen ($5x = 15$)
- **A1** $x = 3$ cao
- **Answer: $x = 3$**

Question 20

- **B1** option B (18) cao
- **Answer: B) 18 (f: $4 + 2 = 6$; g: $6 \times 3 = 18$)**

Question 21

- **M1** $x/2 + 7 = 15$ or $x/2 = 8$ seen
- **A1** $x = 16$ cao
- **Answer: $x = 16$**

Question 22

- **M1** Collecting x terms: $4x - 2x = 11 + 3$ or $2x = 14$ seen
- **A1** $x = 7$ cao
- **Answer: $x = 7$**