# 2.7 Function Machines and Inverse Operations: Test Pack

Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

**Answer ALL questions. Show all your working.**

**1** A function machine does: add 3. For each input, write the output.

**(a)** Input 2 **(1)**

.....

**(b)** Input 10 **(1)**

.....

**(c)** Input 0 **(1)**

.....

**(d)** Input -4 **(1)**

.....

**2** A machine does: add 2, multiply by 3, then subtract 5. The final output is 16. Work backwards to find the original input and show steps.

**(3)**

**3** The machine does: subtract 2 then divide by 3. What input gives output 4?

**(2)**


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**4** Stretch: A box contains a hidden input n. A function machine does: add n, then multiply by 3. The final output is 27. Find n.

**(4)**

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**5** I think of a number, t. I add 2 and then multiply the result by 7. Write an expression for the result.

**(2)**

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**6** A function machine is shown.
input -> [+ 5] -> [x 2] -> output
The input is 13. Work out the output.

**(2)**

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**7** A function machine is shown.
input -> [- 5] -> [x 9] -> output
Write down the inverse function machine, in the order in which the operations are done to get from the output back to the input.

**(2)**


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**8** A function machine is shown.
input -> [+ 6] -> [÷ 8] -> output
The output is 1. Work out the input.

**(2)**

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**9** Solve b/6 + 15 = 12

**(2)**

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**10** A function machine is shown.
input -> [÷ 3] -> [+ 7] -> output
The input is 12. Work out the output.

**(2)**

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**11** A function machine is shown.
input -> [- 3] -> [x 5] -> output
Write down the inverse function machine, in the order in which the operations are done to get from the output back to the input.

**(2)**

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**12** I think of a number, m. I add 8 and then multiply the result by 6. Write an expression for the result.

**(2)**


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**13** A function machine is shown.
input -> [x 5] -> [- 3] -> output
The input is 14. Work out the output.

**(2)**

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**14** Solve $6p = -6$

**(1)**

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**15** Describe the inverse operation of each. Give the inverse as a one-step instruction.

**(a)** Original: add 9 **(1)**

**(b)** Original: divide by 4 **(1)**

**(c)** Original: multiply by -2 **(1)**

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**16** Find the input when a machine does: multiply by 5, then add 3, and the output is 38.

**(2)**

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**17** A machine does: subtract 5, then multiply by 2. Write down, in the correct order, the two steps of the inverse machine.

**(3)**


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**18** A theatre's ticket-pricing machine works as follows: it takes the number of tickets, multiplies by 9, then subtracts a loyalty-card discount of £4, to give the total cost in pounds.

(a) A customer with a loyalty card pays £41. Form the calculation and work backwards to find how many tickets they bought.

(b) Work out the cost for 3 tickets without the loyalty discount.

**(4)**

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**19** Write down the inverse operation of: subtract 5.

**(1)**


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# Mark scheme · 2.7 Function Machines and Inverse Operations: Test Pack

## Question 1

(a) 5 cao — B1

(a) Answer: **5**

(b) 13 cao — B1

(b) Answer: **13**

(c) 3 cao — B1

(c) Answer: **3**

(d) -1 cao — B1

(d) Answer: **-1**

## Question 2

correct first inverse: 16 + 5 = 21 — M1

correct second inverse: 21 / 3 = 7 — M1

5 cao — A1

Answer: **5**

## Question 3

inverse attempt: 4 x 3 = 12 then +2 — M1

14 cao — A1

Answer: **14**

## Question 4

set up equation: 3(n + n) or interpretation that first step adds n to hidden input — M1

correct equation formed: 3(2n) = 27 or equivalent reasoning — M1

solve to get n = 27 / 6 = 4.5 — M1

4.5 cao — A1

Answer: **4.5**

## Question 5

one correct operation applied to the letter, eg a product or a sum — M1

7(t + 2) oe cao — A1

Answer: **7(t + 2)**

## Question 6

first operation applied correctly (18) — M1

36 cao — A1

Answer: **36**

## Question 7

inverse operations identified (at least half correct) — M1

÷ 9, + 5 cao — A1

Answer: **÷ 9, + 5**

## Question 8

uses the inverse operations in reverse order — M1

2 cao — A1

Answer: **2**

## Question 9

correct first step (undoing the + or - or reordering) — M1

b = -18 cao — A1

Answer: **b = -18**

## Question 10

first operation applied correctly (4) — M1

11 cao — A1

Answer: **11**

## Question 11

inverse operations identified (at least half correct) — M1

÷ 5, + 3 cao — A1

Answer: **÷ 5, + 3**

## Question 12

one correct operation applied to the letter, eg a product or a sum — M1

6(m + 8) oe cao — A1

Answer: **6(m + 8)**

## Question 13

first operation applied correctly (70) — M1

67 cao — A1

Answer: **67**

## Question 14

p = -1 cao — B1

Answer: **p = -1**

## Question 15

(a) subtract 9 oe — B1

(a) Answer: **subtract 9**

(b) multiply by 4 oe — B1

(b) Answer: **multiply by 4**

(c) divide by -2 oe — B1

(c) Answer: **divide by -2**

## Question 16

correctly reverses the last step first, e.g. 38 - 3 = 35 — M1

7 cao — A1

Answer: **7**

## Question 17

recognises the order of the two steps must be reversed — M1

correctly finds the inverse of each operation (divide by 2; add 5) — M1

divide by 2, then add 5 cao — A1

Answer: **divide by 2, then add 5**

## Question 18

reverses the discount correctly, e.g. 41 + 4 = 45 — M1

reverses the multiplication correctly, e.g. 45 / 9 = 5 — M1

5 tickets cao — A1

£27 cao (3 x 9, no discount) — A1

Answer: **5 tickets; 3 tickets without the discount costs £27**

## Question 19

add 5 cao — B1

Answer: **add 5**


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