2.7 Function Machines and Inverse Operations: 1-hour Pack

Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A function machine is shown.
input -> [x 9] -> [+ 7] -> 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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2 A function machine is shown.
input -> [÷ 2] -> [- 2] -> [+ 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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3 A function machine is shown.
input -> [+ 5] -> [- 8] -> output
The output is 0. Work out the input.

(2)

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4 A function machine is shown.
input -> [x 9] -> [+ 8] -> output
The output is 134. Work out the input.

(2)

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5 Solve 5t = -20

(1)

---

6 Solve a/3 - 13 = -18

(2)

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7 Solve 5n - 3 = 17

(2)

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8 The function machine: multiply by 2 then add 1. Find the output when the input is 4.

(2)

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9 A function machine is shown.
input -> [x 9] -> [- 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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10 A function machine is shown.
input -> [÷ 5] -> [x 2] -> 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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11 Solve a/6 - 10 = -8

(2)

---

12 Solve 2m + 14 = 24

(2)

---

13 A function machine is shown.
input -> [+ 2] -> [÷ 4] -> [x 6] -> 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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14 I think of a number, n. I subtract 2 and then divide the result by 4. Write an expression for the result.

.....

.....

(2)

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15 A function machine is shown.
input -> [+ 8] -> [- 6] -> 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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16 Solve m + 15 = 8

(1)

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17 A function machine does: subtract 6. Work out the input if the output is given.

(a) Output 2. What was the input? **(1)**

.....

(b) Output -3. What was the input? **(1)**

.....

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18 Solve b/3 - 11 = -2

(2)

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19 Solve p + 11 = 7

(1)

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20 Solve n/4 - 9 = -3

(2)

---

21 A function machine is shown.
input -> [+ 9] -> [- 7] -> output
The input is 11. Work out the output.

(2)

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22 A machine does: subtract 4, then divide by 3. What input gives output 5?

(2)

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23 Stretch. A two-step machine multiplies the input by k, then adds 5, where k is unknown. When the input is 3, the output is 20. Find the value of k. Then state the inverse of the complete machine as two one-step instructions, in the correct order.

(4)

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24 Write down the inverse operation of: multiply by 8.

(1)

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Mark scheme · 2.7 Function Machines and Inverse Operations: 1-hour Pack

Question 1

inverse operations identified (at least half correct) **M1**
- 7, ÷ 9 cao **A1**
Answer: **- 7, ÷ 9**

Question 2

inverse operations identified (at least half correct) **M1**
- 5, + 2, x 2 cao **A1**
Answer: **- 5, + 2, x 2**

Question 3

uses the inverse operations in reverse order **M1**
3 cao **A1**
Answer: **3**

Question 4

uses the inverse operations in reverse order **M1**
14 cao **A1**
Answer: **14**

Question 5

t = -4 cao **B1**
Answer: **t = -4**

Question 6

correct first step (undoing the + or - or reordering) **M1**
a = -15 cao **A1**
Answer: **a = -15**

Question 7

correct first step (undoing the + or - or reordering) **M1**
n = 4 cao **A1**
Answer: **n = 4**

Question 8

correct method: 4 x 2 = 8 then +1 **M1**
9 cao **A1**
Answer: **9**

Question 9

inverse operations identified (at least half correct) **M1**
+ 9, ÷ 9 cao **A1**
Answer: **+ 9, ÷ 9**

Question 10

inverse operations identified (at least half correct) **M1**
÷ 2, x 5 cao **A1**
Answer: **÷ 2, x 5**

Question 11

correct first step (undoing the + or - or reordering) **M1**
a = 12 cao **A1**
Answer: **a = 12**

Question 12

correct first step (undoing the + or - or reordering) **M1**
m = 5 cao **A1**
Answer: **m = 5**

Question 13

inverse operations identified (at least half correct) **M1**
÷ 6, x 4, - 2 cao **A1**
Answer: **÷ 6, x 4, - 2**

Question 14

one correct operation applied to the letter, eg a product or a sum **M1**
(n - 2) ÷ 4 oe cao **A1**
Answer: **(n - 2) ÷ 4**

Question 15

inverse operations identified (at least half correct) **M1**
+ 6, - 8 cao **A1**
Answer: **+ 6, - 8**

Question 16

m = -7 cao **B1**
Answer: **m = -7**

Question 17

(a) 8 cao **B1**
(a) Answer: **8**
(b) 3 cao **B1**
(b) Answer: **3**

Question 18

correct first step (undoing the + or - or reordering) **M1**
b = 27 cao **A1**
Answer: **b = 27**

Question 19

p = -4 cao **B1**
Answer: **p = -4**

Question 20

correct first step (undoing the + or - or reordering) **M1**
n = 24 cao **A1**
Answer: **n = 24**

Question 21

first operation applied correctly (20) **M1**
13 cao **A1**
Answer: **13**

Question 22

correctly reverses the last step first, e.g. 5 x 3 = 15 **M1**
19 cao **A1**
Answer: **19**

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Question 23

correct equation formed, e.g. 3k + 5 = 20	**M1**
correct rearrangement, e.g. 3k = 15	**M1**
k = 5 cao	**A1**
subtract 5, then divide by 5 cao (correct inverse steps, correct order)	**A1**

Answer: **k = 5; inverse: subtract 5, then divide by 5**

Question 24

divide by 8 cao	**B1**

Answer: **divide by 8**

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