

GCSE MATHS • GRADE 2

MATHS



MODEL ANSWERS

FUNCTION MACHINES

SCORE

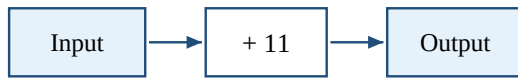
/185

PERCENTAGE

%

STEM UP

- 1 Here is a number machine.
The input is 25. Work out the output.

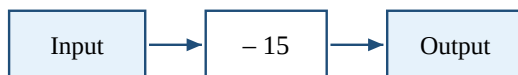


$$25 + 11 = 36$$

36

/ 1

- 2 Here is a number machine.
The input is 3. Work out the output.

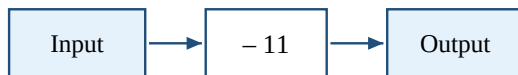


$$3 - 15 = -12$$

-12

/ 1

- 3 Here is a number machine.
The input is 21. Work out the output.

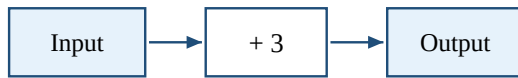


$$21 - 11 = 10$$

10

/ 1

- 4 Here is a number machine.
The input is 22. Work out the output.



$$22 + 3 = 25$$

25

/ 1

- 5 Here is a number machine.
The input is 6. Work out the output.



$$6 \times 5 = 30, 30 - 11 = 19$$

19

/ 1

- 6 Here is a number machine.
The input is 24. Work out the output.

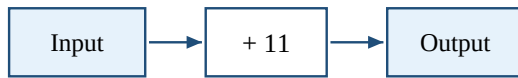


$$24 - 18 = 6, 6 + 23 = 29$$

29

/ 1

- 7 Here is a number machine.
The output is 41. Work out the input.



Work backwards using inverse operations: $41 - 11 = 30$

30

/ 1

- 8 Here is a number machine.
The input is 26. Work out the output.



$26 + 7 = 33$, $33 \times 8 = 264$

264

/ 1

- 9 Here is a number machine.
The input is 23. Work out the output.

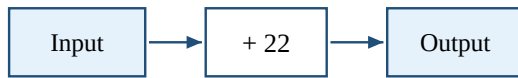


$23 \times 9 = 207$, $207 - 9 = 198$

198

/ 1

- 10 Here is a number machine.
The output is 38. Work out the input.



Work backwards using inverse operations: $38 - 22 = 16$

16

/ 1

- 11 Here is a number machine.
The input is 25. Work out the output.



$25 \times 5 = 125$, $125 - 7 = 118$

118

/ 1

- 12 Here is a number machine.
The input is 6. Work out the output.

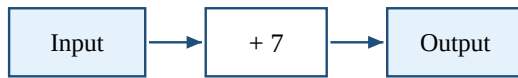


$6 + 24 = 30$, $30 \times 4 = 120$

120

/ 1

- 13 Here is a number machine.
The output is 17. Work out the input.



*Work backwards using inverse operations: $17 - 7$
 $= 10$*

10

1 / 1

- 14 Here is a number machine.
The input is 26. Work out the output.



$26 - 16 = 10$, $10 + 17 = 27$

27

1 / 1

- 15 Here is a number machine.
The input is 12. Work out the output.

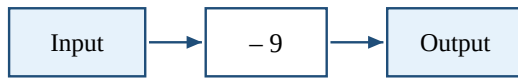


$12 \times 9 = 108$, $108 - 6 = 102$

102

1 / 1

- 16 Here is a number machine.
The output is 8. Work out the input.



*Work backwards using inverse operations: $8 + 9$
 $= 17$*

17

/ 1

- 17 Here is a number machine.
When the input is 11 the output is 66.
Work out the missing operation.



*Work out what happens at the missing step: 55
becomes 66*

+ 11

/ 1

- 18 Here is a number machine.
The input is 29. Work out the output.

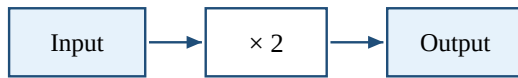


$29 \times 4 = 116, 116 - 13 = 103$

103

/ 1

- 19 Here is a number machine.
The output is 12. Work out the input.



Work backwards using inverse operations: $12 \div 2 = 6$

6

/ 1

- 20 Here is a number machine.
When the input is 28 the output is 25.
Work out the missing operation.



Work out what happens at the missing step: 9 becomes 25

+ 16

/ 1

- 21 Here is a number machine.
The input is 18. Work out the output.

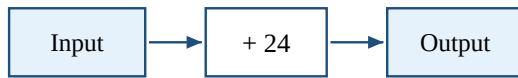


$18 - 8 = 10$, $10 \times 2 = 20$

20

/ 1

- 22 Here is a number machine.
The output is 51. Work out the input.



Work backwards using inverse operations: $51 - 24 = 27$

27

/ 1

- 23 Here is a number machine.
When the input is 7 the output is 16.
Work out the missing operation.



Work out what happens at the missing step: 25 becomes 16

- 9

/ 1

- 24 Here is a number machine.
The input is 18. Work out the output.

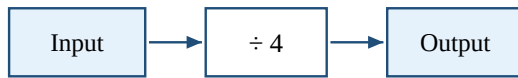


$18 - 16 = 2$, $2 \times 3 = 6$

6

/ 1

- 25 Here is a number machine.
The output is 5. Work out the input.



*Work backwards using inverse operations: 5×4
= 20*

20

/ 1

- 26 Here is a number machine.
When the input is 17 the output is 23.
Work out the missing operation.



*Work out what happens at the missing step: 2
becomes 23*

+ 21

/ 1

- 27 Here is a number machine.
The input is 30. Work out the output.

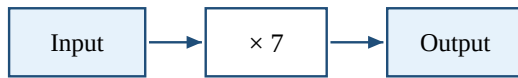


$30 \times 4 = 120$, $120 + 6 = 126$

126

/ 1

- 28 Here is a number machine.
The output is 175. Work out the input.



Work backwards using inverse operations: $175 \div 7 = 25$

25

/ 1

- 29 Here is a number machine.
When the input is 18 the output is 9.
Work out the missing operation.



Work out what happens at the missing step: 20 becomes 9

- 11

/ 1

- 30 Here is a number machine.
The input is 26. Work out the output.



$26 - 20 = 6$, $6 \times 4 = 24$

24

/ 1

- 31 Here is a number machine.
The output is 77. Work out the input.



Work backwards using inverse operations: $77 + 23 = 100$, $100 \div 4 = 25$

25

/ 1

- 32 Here is a number machine.
When the input is 23 the output is 78.
Work out the missing operation.

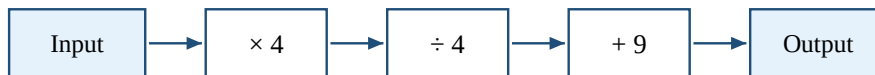


Work out what happens at the missing step: 92 becomes 78

- 14

/ 1

- 33 Here is a number machine.
The input is 2. Work out the output.



$2 \times 4 = 8$, $8 \div 4 = 2$, $2 + 9 = 11$

11

/ 1

- 34 Here is a number machine.
The output is 36. Work out the input.



Work backwards using inverse operations: $36 + 16 = 52$, $52 \div 4 = 13$

13

1 / 1

- 35 Here is a number machine.
When the input is 8 the output is 34.
Work out the missing operation.

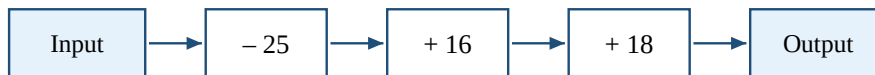


Work out what happens at the missing step: 17 becomes 34

+ 17 or $\times 2$

1 / 1

- 36 Here is a number machine.
The input is 28. Work out the output.



$28 - 25 = 3$, $3 + 16 = 19$, $19 + 18 = 37$

37

1 / 1

- 37 Here is a number machine.
The output is 152. Work out the input.



Work backwards using inverse operations: $152 \div 4 = 38$, $38 - 17 = 21$

21

1 / 1

- 38 Here is a number machine.
When the input is 3 the output is 16.
Work out the missing operation.



Work out what happens at the missing step: 25 becomes 16

- 9

1 / 1

- 39 Here is a number machine.
(a) What is the output when the input is 29?
(b) What is the input when the output is 113?



(a) Follow the machine forwards. (b) Work backwards: $113 - 13 = 100$, $100 \div 4 = 25$

(a) 129 (b) 25

1 / 1

- 40 Here is a number machine.
The output is 43. Work out the input.



Work backwards using inverse operations: $43 - 22 = 21$, $21 + 4 = 25$

25

1 / 1

- 41 Here is a number machine.
When the input is 11 the output is 41.
Work out the missing operation.



Work out what happens at the missing step: 55 becomes 41

- 14

2 / 2

- 42 Here is a number machine.
(a) What is the output when the input is 23?
(b) What is the input when the output is 43?



(a) Follow the machine forwards. (b) Work backwards: $43 - 3 = 40$, $40 \div 8 = 5$

(a) 187 (b) 5

2 / 2

- 43 Here is a number machine.
The output is 168. Work out the input.



Work backwards using inverse operations: $168 \div 8 = 21$, $21 - 18 = 3$

3

2 / 2

- 44 Here is a number machine.
When the input is 19 the output is 78.
Work out the missing operation.



Work out what happens at the missing step: 39 becomes 78

+ 39 or x 2

2 / 2

- 45 Here is a number machine.
(a) What is the output when the input is 5?
(b) What is the input when the output is 109?



(a) Follow the machine forwards. (b) Work backwards: $109 - 5 = 104$, $104 \div 4 = 26$

(a) 25 (b) 26

2 / 2

- 46 Here is a number machine.
The output is 63. Work out the input.



Work backwards using inverse operations: $63 \div 9 = 7$, $7 + 18 = 25$

25

2 / 2

- 47 Here is a number machine.
When the input is 30 the output is 133.
Work out the missing operation.



Work out what happens at the missing step: 19 becomes 133

x 7

2 / 2

- 48 Here is a number machine.
(a) What is the output when the input is 3?
(b) What is the input when the output is 72?



(a) Follow the machine forwards. (b) Work backwards: $72 \div 8 = 9$, $9 - 3 = 6$

(a) 48 (b) 6

2 / 2

- 49 Here is a number machine.
The output is 211. Work out the input.



Work backwards using inverse operations: $211 + 5 = 216$, $216 \div 8 = 27$

27

2 / 2

- 50 Here is a number machine.
When the input is 10 the output is 97.
Work out the missing operation.



Work out what happens at the missing step: 10 becomes 90

$\times 9$

2 / 2

- 51 Here is a number machine.
(a) What is the output when the input is 2?
(b) What is the input when the output is 15?



(a) Follow the machine forwards. (b) Work backwards: $15 + 13 = 28$, $28 - 12 = 16$

(a) 1 (b) 16

2 / 2

- 52 Here is a number machine.
The output is 252. Work out the input.

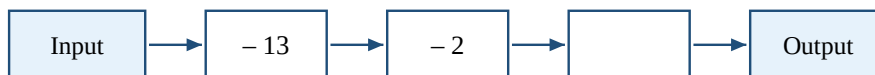


Work backwards using inverse operations: $252 \div 7 = 36$, $36 - 22 = 14$

14

2 / 2

- 53 Here is a number machine.
When the input is 22 the output is 19.
Work out the missing operation.



Work out what happens at the missing step: 7 becomes 19

+ 12

2 / 2

- 54 Here is a number machine.
(a) What is the output when the input is 7?
(b) What is the input when the output is 32?

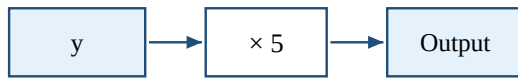


(a) Follow the machine forwards. (b) Work backwards: $32 \div 2 = 16$, $16 - 11 = 5$

(a) 36 (b) 5

2 / 2

- 55 Here is a number machine.
The input is y . Write an expression, in terms of y , for the output.

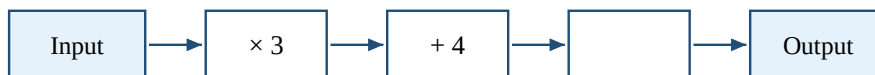


Apply each step to y in turn

$5y$

2 / 2

- 56 Here is a number machine.
When the input is 20 the output is 128.
Work out the missing operation.



Work out what happens at the missing step: 64 becomes 128

$\times 2$

2 / 2

- 57 Here is a number machine.
(a) What is the output when the input is 8?
(b) What is the input when the output is 19?

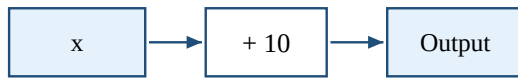


(a) Follow the machine forwards. (b) Work backwards: $19 + 9 = 28$, $28 - 2 = 26$

$(a) \ 1 \ (b) \ 26$

2 / 2

- 58 Here is a number machine.
The input is x . Write an expression, in terms of x , for the output.

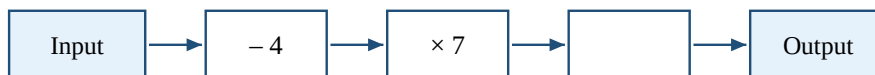


Apply each step to x in turn

$$x + 10$$

2 / 2

- 59 Here is a number machine.
When the input is 13 the output is 43.
Work out the missing operation.

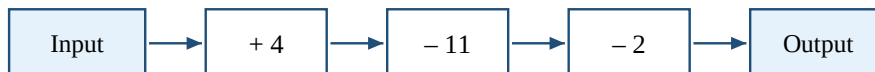


Work out what happens at the missing step: 63 becomes 43

$$- 20$$

2 / 2

- 60 Here is a number machine.
The output is 14. Work out the input.

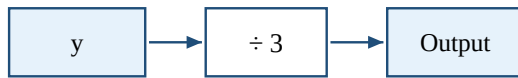


Work backwards using inverse operations: $14 + 2 = 16$, $16 + 11 = 27$, $27 - 4 = 23$

$$23$$

2 / 2

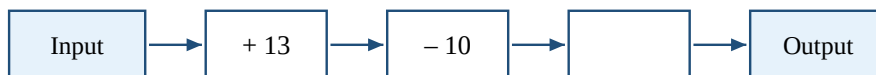
- 61 Here is a number machine.
The input is y . Write an expression, in terms of y , for the output.



Apply each step to y in turn

$$\frac{y}{3} \div 2$$

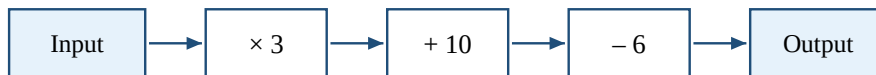
- 62 Here is a number machine.
When the input is 23 the output is 52.
Work out the missing operation.



Work out what happens at the missing step: 26 becomes 52

$$+ 26 \text{ or } \times 2$$

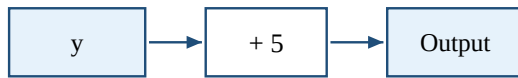
- 63 Here is a number machine.
The output is 16. Work out the input.



Work backwards using inverse operations: $16 + 6 = 22$, $22 - 10 = 12$, $12 \div 3 = 4$

$$4$$

- 64 Here is a number machine.
The input is y . Write an expression, in terms of y , for the output.

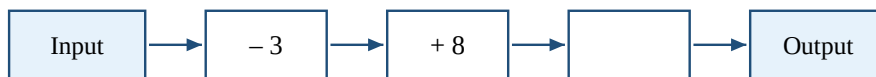


Apply each step to y in turn

$$y + 5$$

2 / 2

- 65 Here is a number machine.
When the input is 28 the output is 165.
Work out the missing operation.

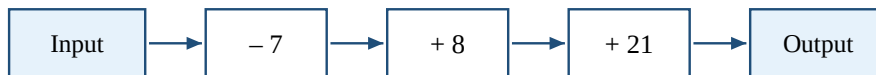


Work out what happens at the missing step: 33 becomes 165

$$\times 5$$

2 / 2

- 66 Here is a number machine.
The output is 51. Work out the input.



Work backwards using inverse operations: $51 - 21 = 30$, $30 - 8 = 22$, $22 + 7 = 29$

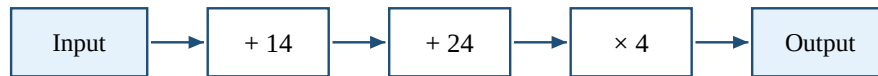
$$29$$

2 / 2

67 Here is a number machine.

(a) What is the output when the input is 27?

(b) What is the input when the output is 184?



(a) Follow the machine forwards. (b) Work backwards: $184 \div 4 = 46$, $46 - 24 = 22$, $22 - 14 = 8$

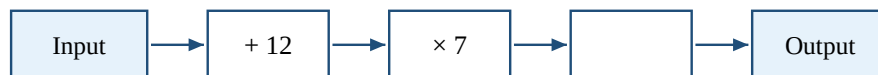
(a) 260 (b) 8

2 / 2

68 Here is a number machine.

When the input is 25 the output is 275.

Work out the missing operation.



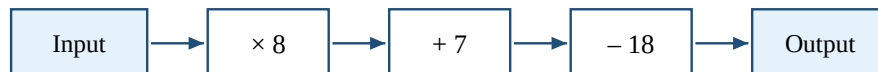
Work out what happens at the missing step:
259 becomes 275

+ 16

2 / 2

69 Here is a number machine.

The output is 101. Work out the input.



Work backwards using inverse operations: $101 + 18 = 119$, $119 - 7 = 112$, $112 \div 8 = 14$

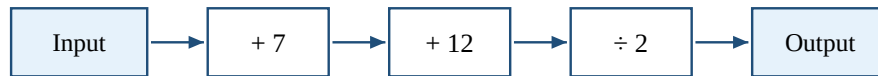
14

2 / 2

70 Here is a number machine.

(a) What is the output when the input is 15?

(b) What is the input when the output is 23?



(a) Follow the machine forwards. (b) Work backwards: $23 \times 2 = 46$, $46 - 12 = 34$, $34 - 7 = 27$

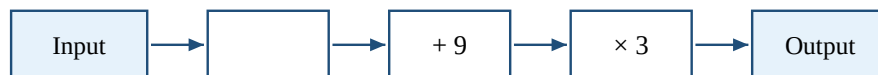
(a) 17 (b) 27

2 / 2

71 Here is a number machine.

When the input is 17 the output is 138.

Work out the missing operation.



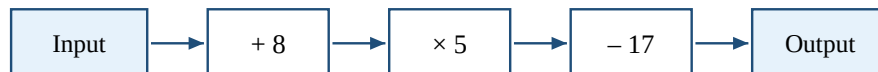
Work out what happens at the missing step: 17 becomes 37

+ 20

2 / 2

72 Here is a number machine.

The output is 128. Work out the input.



Work backwards using inverse operations: $128 + 17 = 145$, $145 \div 5 = 29$, $29 - 8 = 21$

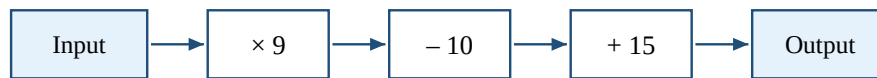
21

2 / 2

73 Here is a number machine.

(a) What is the output when the input is 26?

(b) What is the input when the output is 77?



(a) Follow the machine forwards. (b) Work backwards: $77 - 15 = 62$, $62 + 10 = 72$, $72 \div 9 = 8$

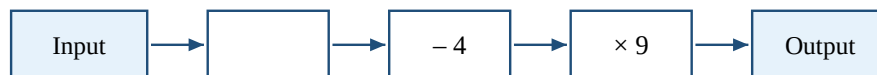
(a) 239 (b) 8

2 / 2

74 Here is a number machine.

When the input is 16 the output is 207.

Work out the missing operation.



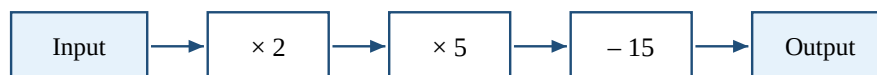
Work out what happens at the missing step: 16 becomes 27

+ 11

2 / 2

75 Here is a number machine.

The output is 275. Work out the input.



Work backwards using inverse operations: $275 + 15 = 290$, $290 \div 5 = 58$, $58 \div 2 = 29$

29

2 / 2

- 76 Here is a number machine.
The input is y . Write an expression, in terms of y , for the output.



Apply each step to y in turn

$$\frac{7y}{8}$$

3 / 3

- 77 Here is a number machine.
When the input is 23 the output is 13.
Work out the missing operation.

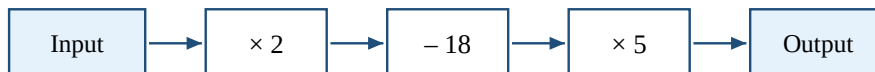


Work out what happens at the missing step: 10 becomes 1

$$- 9 \text{ or } \div 10$$

3 / 3

- 78 Here is a number machine.
The output is 60. Work out the input.



Work backwards using inverse operations: $60 \div 5 = 12$, $12 + 18 = 30$, $30 \div 2 = 15$

$$15$$

3 / 3

- 79 Here is a number machine.
The input is y . Write an expression, in terms of y , for the output.



Apply each step to y in turn

..... y
3 / 3

- 80 Here are two number machines.
The same input, n , gives the same output in both machines.
Work out the value of n .



$2n + 14 = 3n + 4$, so $n = 10$

..... 10
3 / 3

- 81 Here is a number machine.
The input is x . Write an expression, in terms of x , for the output.



Apply each step to x in turn

..... $8x + 24$
3 / 3

- 82 Here is a number machine.
The input is x . Write an expression, in terms of x , for the output.



Apply each step to x in turn

$$5x - 85$$

3 / 3

- 83 Here are two number machines.
The same input, n , gives the same output in both machines.
Work out the value of n .



$$4n + 3 = 3n + 12, \text{ so } n = 9$$

$$9$$

3 / 3

- 84 Here is a number machine.
The input is y . Write an expression, in terms of y , for the output.



Apply each step to y in turn

$$\frac{y}{2} + 6$$

3 / 3

- 85 Here is a number machine.
The input is p . Write an expression, in terms of p , for the output.



Apply each step to p in turn

$$p + 11$$

3 / 3

- 86 Here are two number machines.
The same input, n , gives the same output in both machines.
Work out the value of n .



$$3n + 7 = 4n + 6, \text{ so } n = 1$$

$$1$$

3 / 3

- 87 Here is a number machine.
The input is p . Write an expression, in terms of p , for the output.



Apply each step to p in turn

$$\frac{p}{3} + 9$$

3 / 3

- 88 Here is a number machine.
The input is x . Write an expression, in terms of x , for the output.



Apply each step to x in turn

$$6x - 36$$

3 / 3

- 89 Here are two number machines.
The same input, n , gives the same output in both machines.
Work out the value of n .



$$2n + 16 = 6n + 8, \text{ so } n = 2$$

$$2$$

3 / 3

- 90 Here is a number machine.
The input is x . Write an expression, in terms of x , for the output.



Apply each step to x in turn

$$5x - 70$$

3 / 3

- 91 Here is a number machine.
The input is a . Write an expression, in terms of a , for the output.



Apply each step to a in turn

$$\frac{9a}{7}$$

3 / 3

- 92 Here are two number machines.
The same input, n , gives the same output in both machines.
Work out the value of n .



$$3n + 19 = 4n + 10, \text{ so } n = 9$$

$$9$$

3 / 3

- 93 Here is a number machine.
The input is n . Write an expression, in terms of n , for the output.



Apply each step to n in turn

$$\frac{n}{6} - \frac{23}{6}$$

3 / 3

- 94 Here are two number machines.
The same input, n , gives the same output in both machines.
Work out the value of n .



$$4n + 14 = 6n + 12, \text{ so } n = 1$$

1

3 / 3

- 95 Here are two number machines.
The same input, n , gives the same output in both machines.
Work out the value of n .

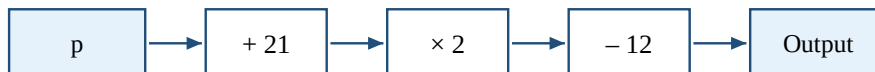


$$6n + 11 = 5n + 14, \text{ so } n = 3$$

3

3 / 3

- 96 Here is a number machine.
The input is p . Write an expression, in terms of p , for the output.



Apply each step to p in turn

$$2p + 30$$

3 / 3

- 97 Here are two number machines.
The same input, n , gives the same output in both machines.
Work out the value of n .

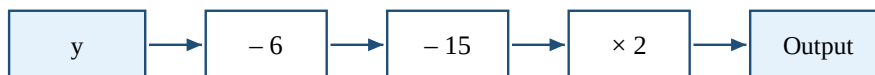


$$3n + 16 = 7n + 8, \text{ so } n = 2$$

2

3 / 3

- 98 Here is a number machine.
The input is y . Write an expression, in terms of y , for the output.

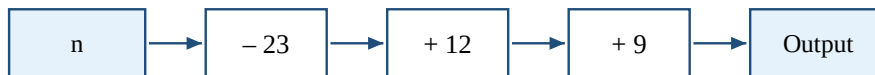


Apply each step to y in turn

$$2y - 42$$

3 / 3

- 99 Here is a number machine.
The input is n . Write an expression, in terms of n , for the output.



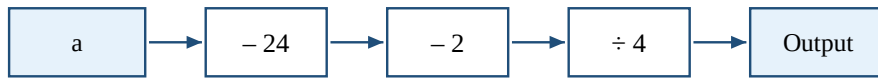
Apply each step to n in turn

$$n - 2$$

3 / 3

100 Here is a number machine.

The input is a . Write an expression, in terms of a , for the output.



Apply each step to a in turn

$$\frac{a}{4} - \frac{13}{2}$$

$$\boxed{3} / 3$$