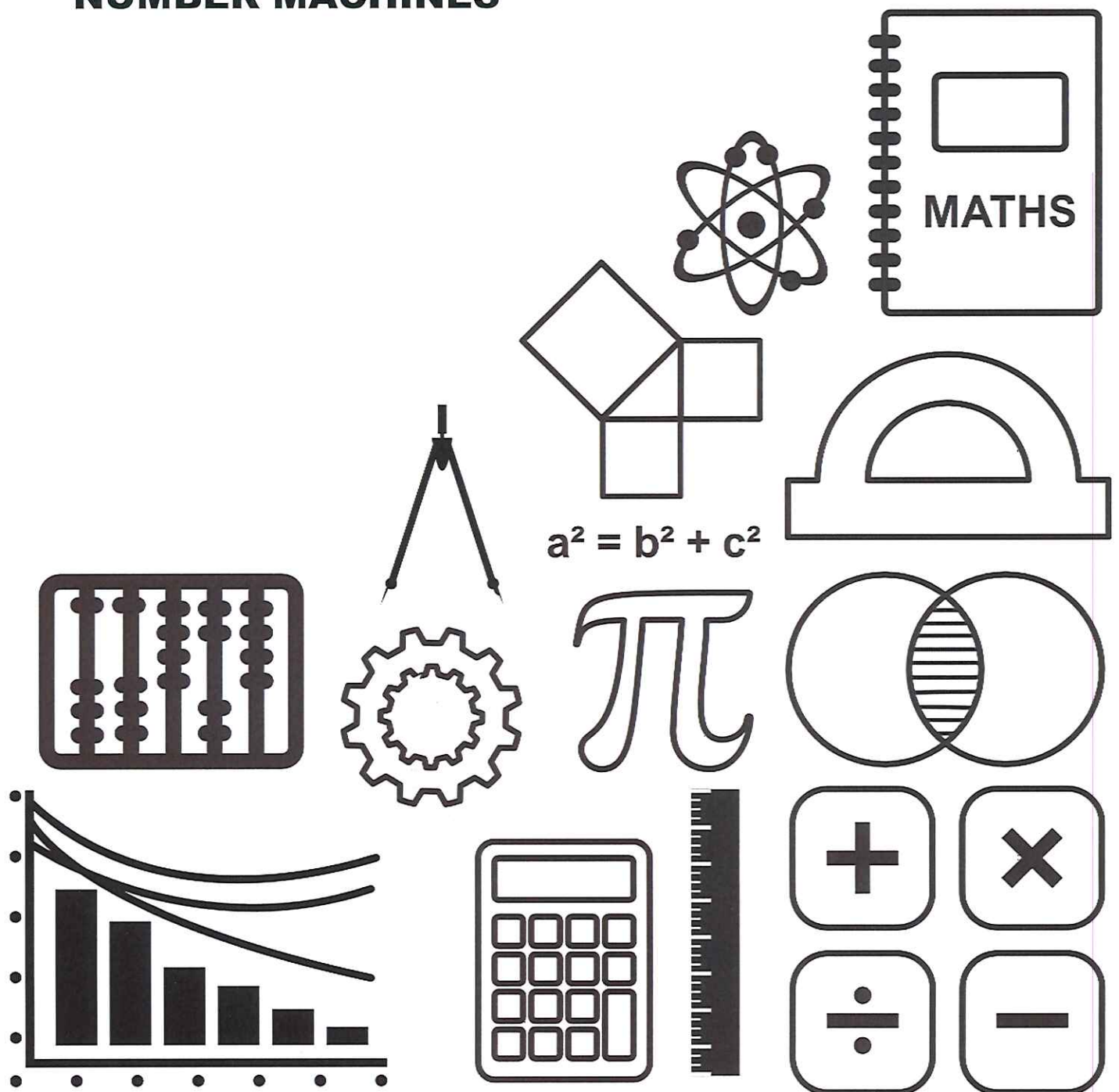
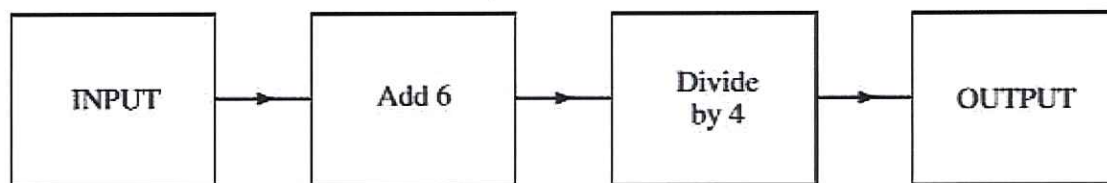


GCSE TOPIC BOOKLET NUMBER MACHINES

SOLUTIONS



1. (a) The diagram below represents a number machine.



- (i) When the INPUT is 14, what is the OUTPUT?

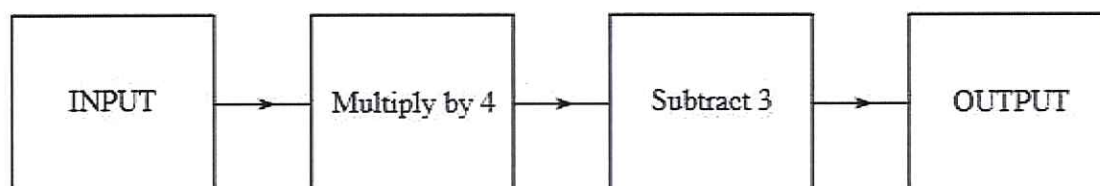
$$14 + 6 = 20 \quad 20 \div 4 = \underline{\underline{5}}$$

- (ii) When the OUTPUT is 7, what is the INPUT?

$$7 \times 4 = 28 \quad 28 - 6 = \underline{\underline{22}}$$

[3]

2. (a) The diagram below represents a number machine.



- (i) When the INPUT is 8, what is the OUTPUT?

$$8 \times 4 = 32 \quad 32 - 3 = \underline{\underline{29}}$$

- (ii) When the OUTPUT is 17, what is the INPUT?

$$17 + 3 = 20 \quad 20 \div 4 = \underline{\underline{5}}$$

[3]

3.

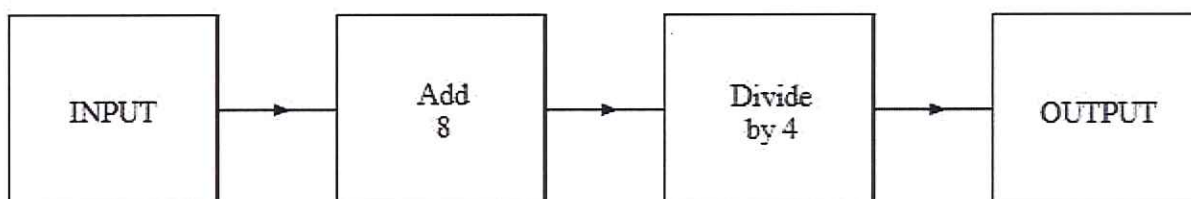


Numbers are INPUT into the above number machine.
What is the INPUT when the OUTPUT is 33?

$$33 + 3 = 36 \quad 36 \div 4 = \underline{9}$$

[2]

4.



(i) Find the value of the OUTPUT when the INPUT is 12.

$$12 + 8 = 20 \quad 20 \div 4 = \underline{5}$$

[1]

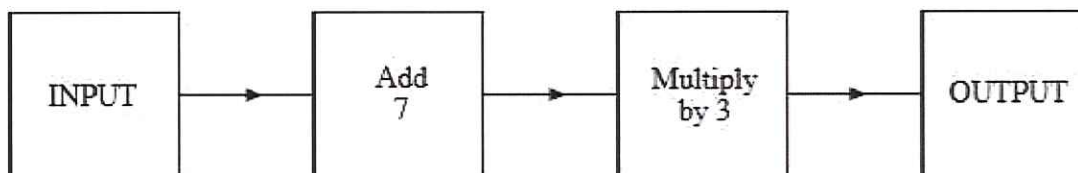
(ii) Find the value of the INPUT when the OUTPUT is 10.

$$10 \times 4 = 40 \quad 40 - 8 = \underline{32}$$

[2]

5.

The diagram below represents a number machine.



Find the OUTPUT when

(i) the INPUT is 5,

$$\text{OUTPUT} = \underline{36}$$

(ii) the INPUT is -9,

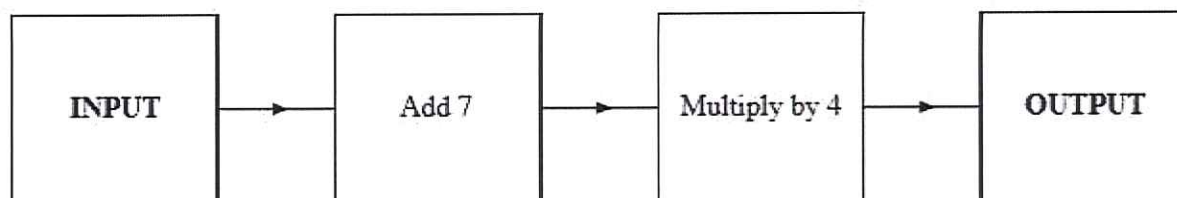
$$\text{OUTPUT} = \underline{-6}$$

(iii) the INPUT is n .

$$\text{OUTPUT} = \underline{(n+7) \times 3}, \quad \underline{3(n+7)}$$

$$\text{or } \underline{3n+21}$$

[4]



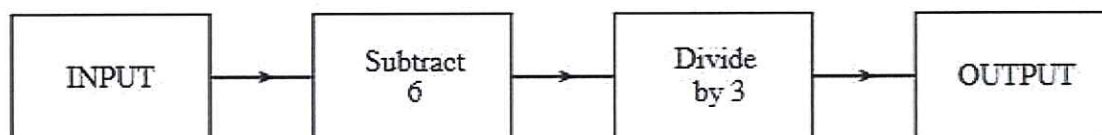
Write down the OUTPUT when n is INPUT into the number machine.

$(n+7) \times 4$ or $4(n+7)$
 or $4n+28$

[2]

7.

The diagram below represents a number machine.



(a) When the INPUT is 18, what is the OUTPUT?

$18 - 6 = 12$ $12 \div 3 = 4$

[1]

(b) If the INPUT is x , write down the OUTPUT in terms of x .

$(x-6) \div 3$, $\frac{x-6}{3}$

[2]

(c) If the OUTPUT is y , write down the INPUT in terms of y .

$y \times 3 + 6$, $3y + 6$

[2]

8. Triangle patterns are made using sticks.

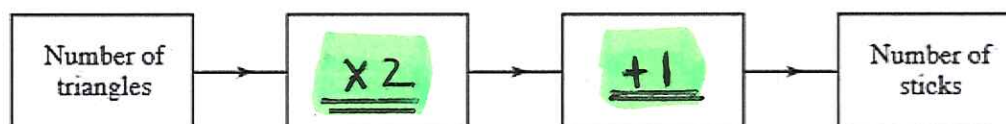


- (a) Complete the following table which shows the relationship between the number of triangles in a pattern and the number of sticks.

Number of triangles	Number of sticks
1	3
2	5
3	7
4	9
5	11
...	...
10	21

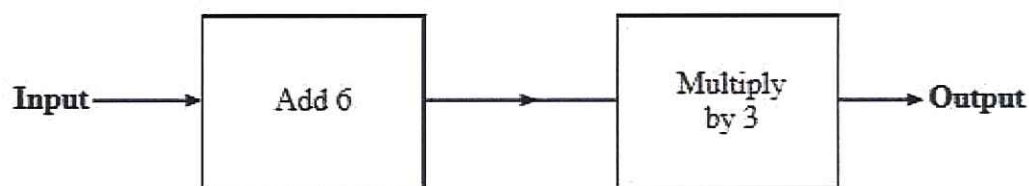
[1]

- (b) Use your table to enter the two missing stages in the number machine which is used to calculate the number of sticks for a given number of triangles.



[2]

9. The diagram shows a number machine.



- (i) Find the **Input** to the number machine when the **Output** is -18 .

$$-18 \div 3 = -6 \quad -6 - 6 = \underline{\underline{-12}}$$

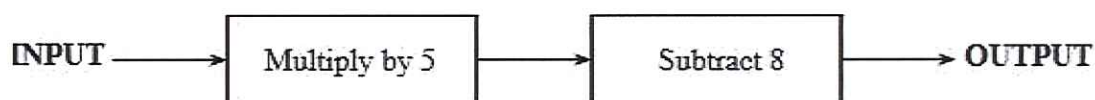
[1]

- (ii) Write down the **Output** from the number machine when the **Input** is n .

$$\underline{\underline{(n+6) \times 3}}, \quad \underline{\underline{3(n+6)}}, \quad \underline{\underline{3n+18}}$$

[2]

10. The diagram shows a number machine.



- (i) Write down the **OUTPUT** when x is **INPUT** into the number machine.

$$\underline{\underline{x \times 5 - 8}}, \quad \underline{\underline{5x - 8}}$$

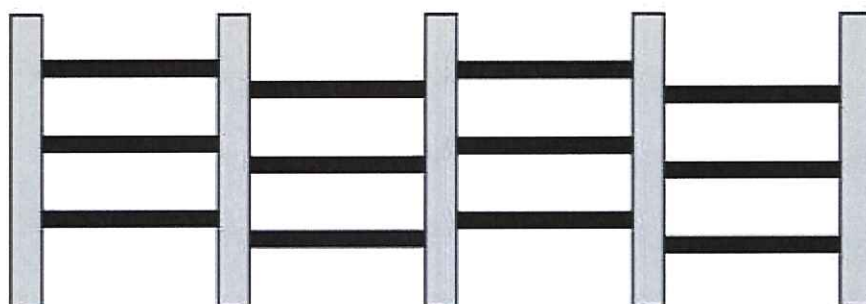
[1]

- (ii) Find the **INPUT** when y is the **OUTPUT** from the number machine.

$$\underline{\underline{(y+8) \div 5}}, \quad \underline{\underline{\frac{y+8}{5}}}$$

[1]

11. Fences are made using vertical posts and 3 horizontal rails between each pair of vertical posts. The fence shown below has 5 vertical posts with 3 horizontal rails between each pair of vertical posts.

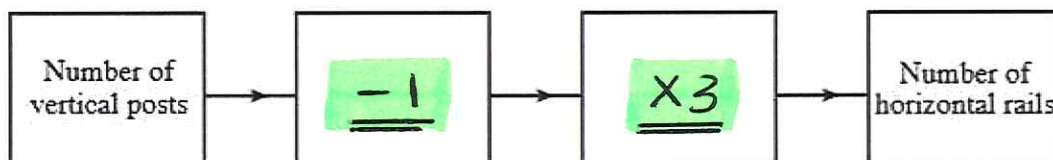


- (a) Complete the following table which shows the relationship between the number of vertical posts and horizontal rails.

Number of vertical posts	Number of horizontal rails
2	3
3	6
4	9
5	12
6	<u>15</u>
10	<u>27</u>

[1]

- (b) Use your table to enter the two missing stages in the number machine.



[2]