Name: _____

GCSE (1 – 9)

Function Machines

Instructions

- Use **black** ink or ball-point pen.
- Answer all Questions.
- Answer the Questions in the spaces provided
  – *there may be more space than you need.*
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

Information

- The marks for each Question are shown in brackets
  – *use this as a guide as to how much time to spend on each Question.*

Advice

- Read each Question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every Question.
- Check your answers if you have time at the end

1 Here is a number machine.

Input $\longrightarrow$ $\boxed{\times 5}$ $\longrightarrow$ $\boxed{-3}$ $\longrightarrow$ Output

(a) What is the **output** when the **input** is 7?

$7 \times 5 = 35$

$35 - 3 = 32$

.....32..........
(1)

Here is a different number machine.

Input $\longrightarrow$ $\boxed{+ 11}$ $\longrightarrow$ $\boxed{\div 10 \\ \cdots\cdots}$ $\longrightarrow$ Output

When the input is 9 the output is 2. $9 + 11 = 20$
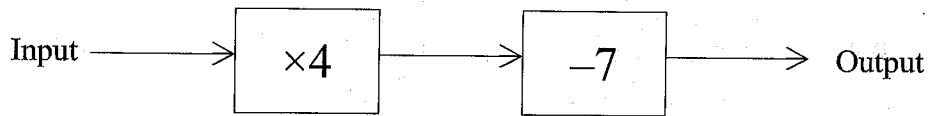
(b) Complete the number machine. $\boxed{\div 10}$ OR $\boxed{\times 0.1}$ OR $\boxed{-18}$ (1)

(Total for question 1 is 2 marks)

2 Here is a number machine.

Input $\longrightarrow$ $\boxed{\times 4}$ $\longrightarrow$ $\boxed{-7}$ $\longrightarrow$ Output

(a) What is the **output** when the **input** is 6?

$6 \times 4 = 24$

$24 - 7 = 17$

................17................
(1)

(b) What is the **input** when the **output** is 25?

Go backwards

$25 + 7 = 32$

$32 \div 4 = 8$

................8................
(2)

(Total for question 2 is 3 marks)

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3 Here is a number machine.

input $\longrightarrow$ $\boxed{\div 4}$ $\longrightarrow$ $\boxed{+ 5}$ $\longrightarrow$ output
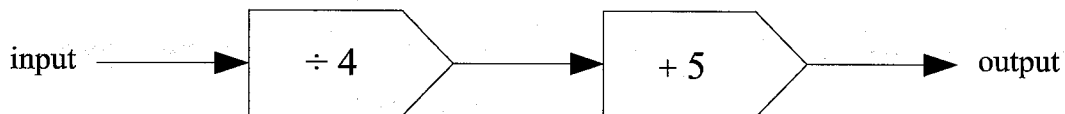
(a) Find the **output** when the **input** is 12

$12 \div 4 = 3$

$3 + 5 = 8$

................8................
(1)

(b) Find the **input** when the **output** is 13

$13 - 5 = 8$

$8 \times 4 = 32$

................32................
(2)

(Total for question 3 is 3 marks)

4 Here is a number machine.

Input $\longrightarrow$ $\boxed{\times 6}$ $\longrightarrow$ $\boxed{+2}$ $\longrightarrow$ Output
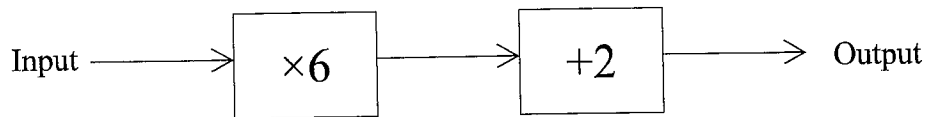
(a) What is the **output** when the **input** is 3?

$$3 \times 6 = 18$$
$$18 + 2 = 20$$

............20............
(1)

(b) What is the **input** when the **output** is 44?

$$44 - 2 = 42$$
$$42 \div 6 = 7$$

............7............
(2)

(Total for question 4 is 3 marks)

5 Here is a number machine.

input $\longrightarrow$ $\boxed{\div 9}$ $\longrightarrow$ $\boxed{-5}$ $\longrightarrow$ output
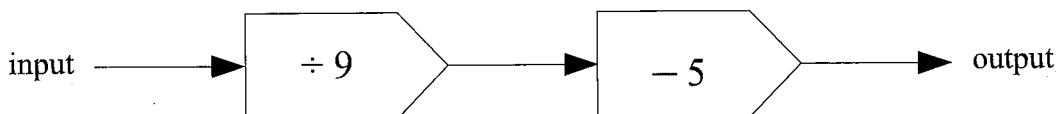
(a) Find the **output** when the **input** is 81

$$81 \div 9 = 9$$
$$9 - 5 = 4$$

............4............
(1)

(b) Find the **input** when the **output** is 0

$$0 + 5 = 5$$
$$5 \times 9 = 45$$

............45............
(2)

(Total for question 5 is 3 marks)

6 Here is a number machine.

input → [× 4] → [+ 7] → output
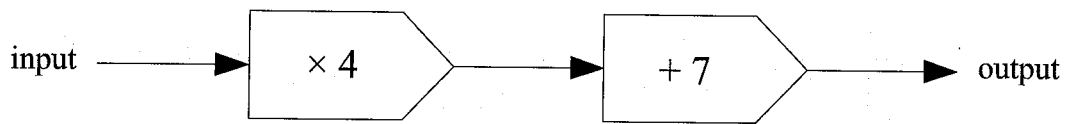
(a) Find the output when the input is 5

$$5 \times 4 = 20$$
$$20 + 7 = 27$$

...........27...........
(1)

(b) Find the output when the input is –3

$$-3 \times 4 = -12$$
$$-12 + 7 = -5$$

...........–5...........
(1)

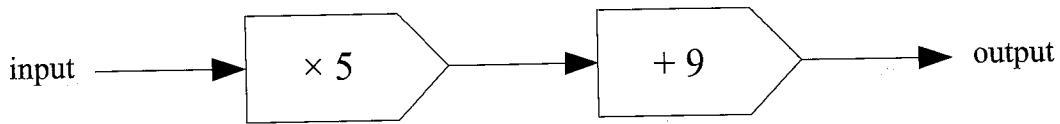(c) Find the input when the output is 71

$$71 - 7 = 64$$
$$64 \div 4 = 16$$

...........16...........
(2)

(Total for question 6 is 4 marks)

7 Here is a number machine.

input $\longrightarrow$ $\times 5$ $\longrightarrow$ $+ 9$ $\longrightarrow$ output

(a) Find the output when the input is 5

$5 \times 5 = 25$
$25 + 9 = 34$

..............**34**..............
(1)

(b) Find the output when the input is –2

$-2 \times 5 = -10$
$-10 + 9 = -1$

..............**– 1**..............
(1)

(c) Find the input when the output is 64

$64 - 9 = 55$
$55 \div 5 = 11$

..............**11**..............
(2)

(Total for question 7 is 4 marks)

8 Here is a number machine.

Input $\longrightarrow$ ×3 $\longrightarrow$ −6 $\longrightarrow$ Output
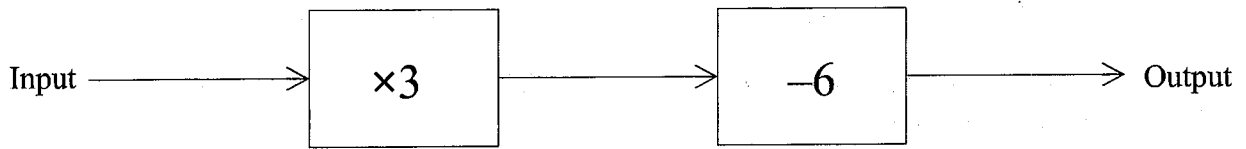
(a) What is the **output** when the **input** is 4?

$4 \times 3 = 12$

$12 - 6 = 6$

.........6.........
(1)

(b) What is the **input** when the **output** is 15?

$15 + 6 = 21$

$21 \div 3 = 7$

.........7.........
(1)

(b) Show that there is a value of the input for which the input and the output have the same value.

Input   Output

2   0

3   3

③ × 3 = 9

9 − 6 = ③

3 $\longrightarrow$ × 3 $\longrightarrow$ − 6 $\longrightarrow$ 3

(2)

(Total for question 8 is 4 marks)

9 A rule to change from temperate measured in degrees Celsius (°C) to degrees Fahrenheit (°F) is

Multiply the temperature in degrees Celsius by 1.8 then add 32

input ⟶ × 1.8 ⟶ + 32 ⟶ output

The temperature in London is 12°C.

(a) Work out the temperature, in London, in Fahrenheit (°F)

$12 \times 1.8 = 21.6$

$21.6 + 32 = 53.6$

53.6

(2)

The temperature in New York is 54°F

(b) Work out the temperature, in New York, in Celsius (°C)

$54 - 32 = 22$

$22 \div 1.8 = 12.\dot{2}$

12.2

(2)

(Total for question 9 is 4 marks)

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10 A rule to calculate a taxi fare is

£2.50 plus £2.20 per mile

Input ⟶ × 2.20 ⟶ + 2.50 ⟶ output

(a) Work how much a 10 mile taxi journey would cost.

$10 \times 2.2 = 22$

$22 + 2.50 = 24.50$

£24.50

(1)

A taxi journey costs £20.10

(b) Work out distance of the journey.

$20.10 - 2.50 = 17.60$

$17.60 \div 2.20 = 8$

8

(2)

(Total for question 10 is 3 marks)