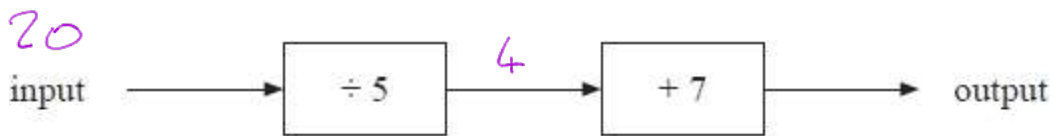


## FULL MODEL ANSWERS

### Q1. NON-CALCULATOR

Here is a two-stage number machine.



(a) Work out the output when the input is 20

$$\dots\dots\dots 11$$

(1)

Here is a different two-stage number machine.



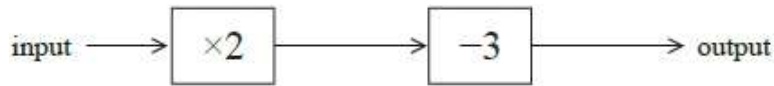
When the input is 10, the output is 12

(b) Complete the number machine.

(1)  
(Total for question = 2 marks)

### Q2. NON-CALCULATOR

Here is a number machine.



(a) What is the output when the input is 4?

$$4 \longrightarrow \times 2 \xrightarrow{8} - 3 \longrightarrow \dots\dots\dots 5$$

(1)

(b) What is the input when the output is 11?

$$\leftarrow \div 2 \leftarrow + 3 \leftarrow 11$$

$$\dots\dots\dots 7$$

(2)

(c) Show that there is an input for the machine for which the output is the same as the input.

$$3 \longrightarrow \times 2 \xrightarrow{6} - 3 \longrightarrow 3$$

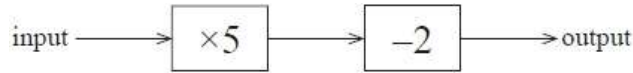
$$3 \times 2 = 6 \qquad \qquad \qquad \text{Input} = 3 = \text{Output}$$

$$6 - 3 = 3$$

(2)  
(Total for question = 5 marks)

**Q3. CALCULATOR ALLOWED**

Here is a number machine.



(a) Work out the output when the input is 8

$$8 \longrightarrow \times 5 \xrightarrow{40} - 2 \longrightarrow \dots\dots\dots 38$$

(1)

(b) Work out the input when the output is 28

$$6 \longleftarrow \div 5 \xleftarrow{30} + 2 \longleftarrow 28$$

\dots\dots\dots 6

(2)

(Total for question = 3 marks)

**Q4. CALCULATOR ALLOWED**

Here is a number machine.



(a) Find the output when the input is 6

$$6 \longrightarrow \times 6 \xrightarrow{36} + 7 \longrightarrow \dots\dots\dots 43$$

(1)

(b) Find the output when the input is -4

$$-4 \longrightarrow \times 6 \xrightarrow{-24} + 7 \longrightarrow \dots\dots\dots -17$$

(1)

(c) Find the input when the output is 79

$$12 \longleftarrow \div 6 \xleftarrow{72} - 7 \longleftarrow 79$$

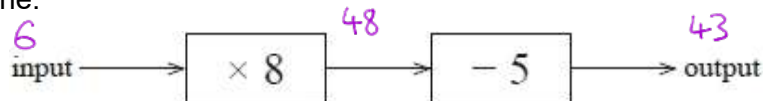
\dots\dots\dots 12

(2)

(Total for question = 4 marks)

**Q5. CALCULATOR ALLOWED**

Here is a number machine.

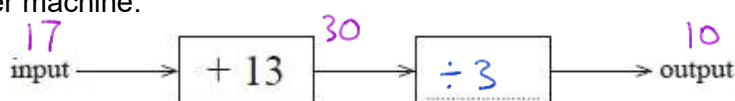


(a) Work out the output when the input is 6

$$\dots\dots\dots 43$$

(1)

Here is a different number machine.



When the input is 17, the output is 10

(b) Complete the number machine.

(1)  
(Total for question = 2 marks)

**Q6. CALCULATOR ALLOWED**

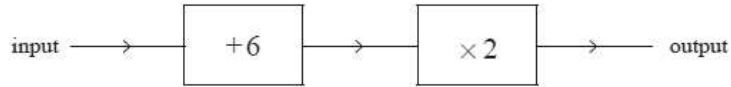
Daisy thinks of a whole number.  
She multiplies the number by 3. Daisy's answer is 34

(a) Explain how you know Daisy's answer is wrong.

No whole number can be multiplied by 3 to give 34. The inverse is  $34 \div 3 \neq$  whole number.

(1)

Here is a number machine.



Abbie says that when the output is 36 the input is 60

Here is her working.

$$36 - 6 = 30 \quad \begin{matrix} 12 \\ \leftarrow \end{matrix} \quad -6 \quad \begin{matrix} 18 \\ \leftarrow \end{matrix} \quad \div 2 \quad \begin{matrix} 36 \\ \leftarrow \end{matrix}$$

$$30 \times 2 = 60$$

Abbie is wrong.

(b) Explain what she has done wrong.

Abbie has subtracted 6 rather than dividing by 2. She then multiplied by 2 rather than subtracting 6.

(2)

(Total for question = 3 marks)

**Q7. CALCULATOR ALLOWED**

Here is a number machine.



(a) Work out the output when the input is 4

$$4 \rightarrow \times 3 \xrightarrow{12} -4 \rightarrow \dots 8$$

(1)

(b) Work out the input when the output is 11

$$\leftarrow \div 3 \quad \begin{matrix} 15 \\ \leftarrow \end{matrix} + 4 \quad \begin{matrix} 11 \\ \leftarrow \end{matrix} \quad \dots 5$$

(2)

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

$$2 \rightarrow \times 3 \xrightarrow{6} -4 \rightarrow 2$$

$$2 \times 3 = 6 \quad \text{Input} = \text{Output} = 2$$

$$6 - 4 = 2$$

(2)

(Total for question = 5 marks)