Check every answer by running it forwards through the original machine.

1 Each machine does one thing. What went in?

(a) Adds 9; 21 came out (1)

(b) Subtracts 6; 14 came out (1)

(c) Multiplies by 5; 45 came out (1)

(d) Divides by 4; 7 came out (1)

(4 marks)

2 Write down the inverse of each one-step machine.

(a) Adds 12 (1)

(b) Multiplies by 8 (1)

(c) Subtracts 7 (1)

(d) Divides by 3 (1)

(4 marks)

3 Each machine does two things. Write down the inverse, **in the right order**.

(a) Multiply by 3, then add 4 (2)

(b) Add 5, then multiply by 2 (2)

(c) Multiply by 6, then subtract 1 (2)

(6 marks)

4 Use the inverse to find the input.

(a) Multiply by 4 then add 3; 31 came out (1)

(b) Multiply by 2 then subtract 7; 15 came out (1)

(c) Add 8 then multiply by 3; 36 came out (1)

(d) Subtract 2 then multiply by 5; 40 came out (1)

(4 marks)

5 A machine multiplies by 3 then adds 8. A pupil finds the input for an output of 29 by dividing by 3 first and then subtracting 8.

(a) Work out the answer the pupil gets (2)

(b) Check the pupil's answer by putting it into the original machine (2)

(c) Find the correct input (1)

(5 marks)