Name:

Exam Style Questions

Number Machines
Function Machines

Corbettmaths

Equipment needed: Calculator, pen

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

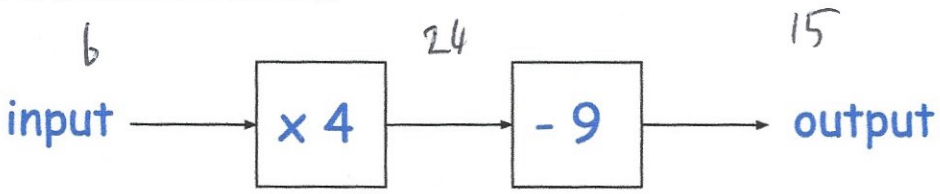
Video Tutorial

www.corbettmaths.com/contents

Video 386

Answers and Video Solutions

1. Below is a number machine.



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

$6 \times 4 = 24$

$24 - 9 = 15$

15

.....

(1)

(b) Work out the input when the output is 35

$35 + 9 = 44$

$44 \div 4 = 11$

11

.....

(2)

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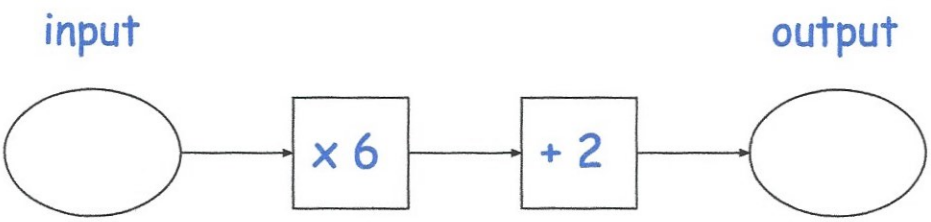
2. Here is a number machine.



(a) Work out the output when the input is 13

$13 \times 6 = 78$

$78 + 2$

80

.....

(1)

(b) Work out the input when the output is 5

$5 - 2 = 3$

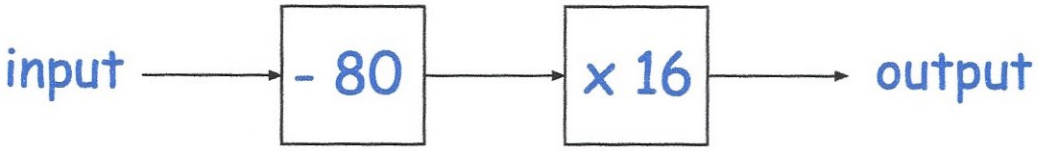
$3 \div 6 = 0.5$

0·5

.....

(2)

3. Below is a number machine.



Work out the input when the output is 400

$400 \div 16 = 25$

$25 + 80 = 105$

105

.....

(2)

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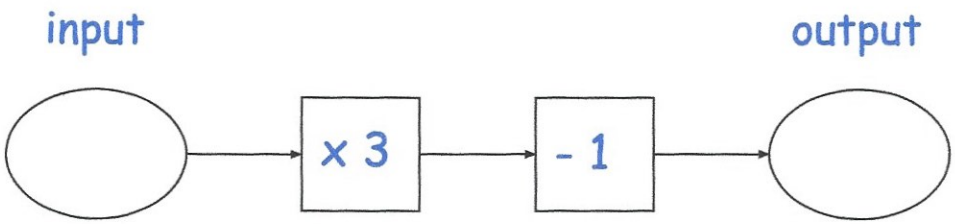
4. Here is a number machine.



(a) Work out the output when the input is –2

$-2 \times 3 = -6$

$-6 - 1 = -7$

-7

.....

(1)

(b) Work out the input when the output is –25

$-25 + 1 = -24$

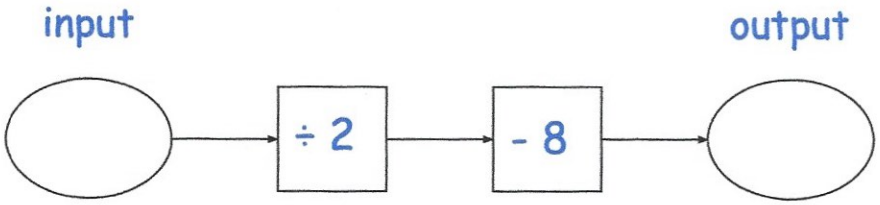
$-24 \div 3 = -8$

-8

.....

(1)

5. Here is a number machine.



(a) Work out the output when the input is 36

$36 \div 2 = 18$

$18 - 8 = 10$

10

(1)

(b) Work out the input when the output is 0

$0 + 8 = 8$

$8 \times 2 = 16$

16

(1)

(c) Work out the output when the input is 23

$23 \div 2 = 11.5$

$11.5 - 8 = 3.5$

3.5

(1)

(d) Work out the input when the output is –1.5

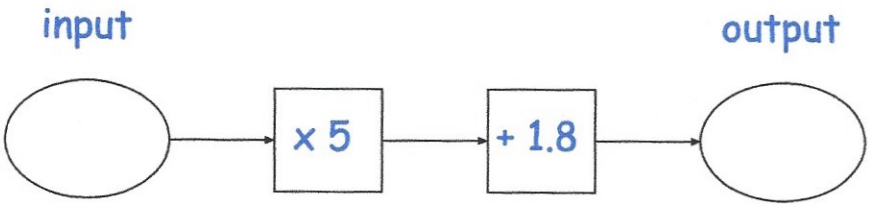
$-1.5 + 8 = 6.5$

$6.5 \times 2 = 13$

13

(1)

6. Here is a number machine.



(a) Work out the output when the input is 0.5

$0.5 \times 5 = 2.5$

$2.5 + 1.8 = 4.3$

4.3

(2)

(b) Work out the output when the input is 1.7

$1.7 \times 5 = 8.5$

$8.5 + 1.8 = 10.3$

10.3

(2)

(c) Work out the input when the output is 7

$7 - 1.8 = 5.2$

$5 \overline{)5.2^{2}0}$ $= 1.04$

1.04

(2)

(d) Work out the input when the output is 0

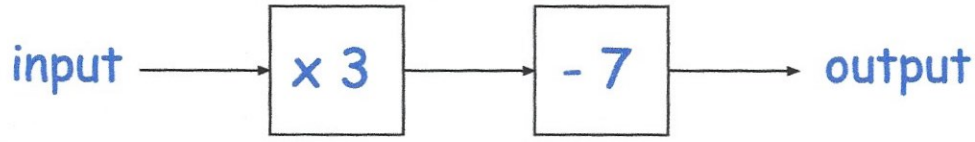
$0 - 1.8 = -1.8$

$5 \overline{)1.^{1}8^{3}0}$ $= 0.36$

-0.36

(2)

7. Below is a number machine.



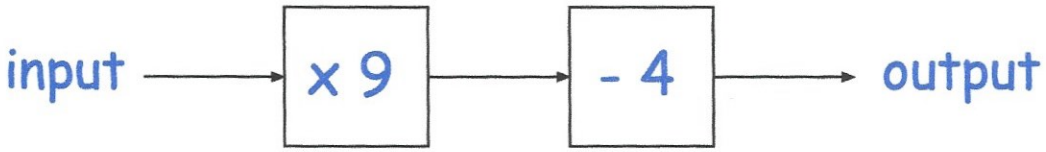
Anna says that if she knows the output, she can work out the input by dividing by 3 and then adding 7.

Explain why Anna is wrong.

Anna would need to add 7 and then divide by 3

(2)

8. Here is a number machine.



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

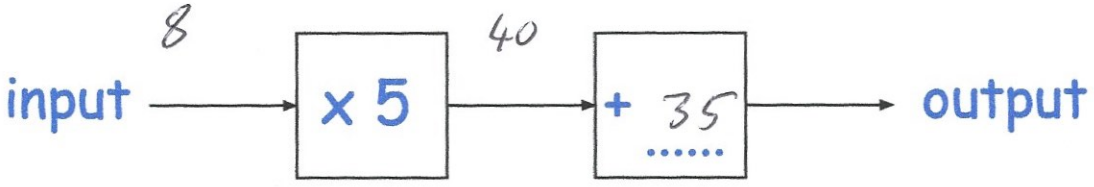
$8 \times 9 = 72$

$72 - 4 = 68$

68

(1)

Here is a different number machine



When the input is 8, the output is 75

(b) Complete the number machine.

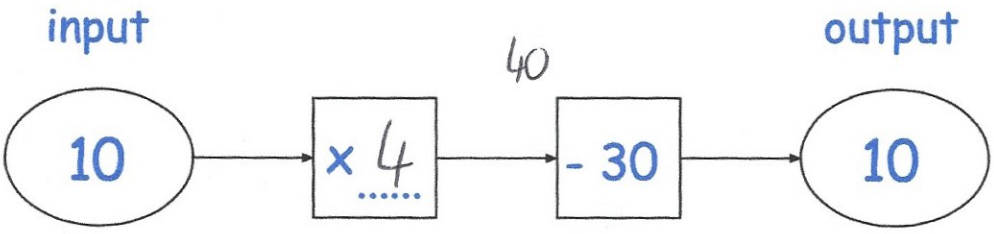
$8 \times 5 = 40$

$75 - 40 = 35$

(1)

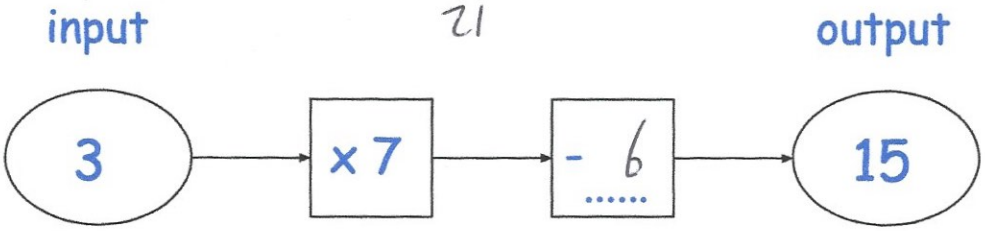
9. Complete the following number machines.

(a)



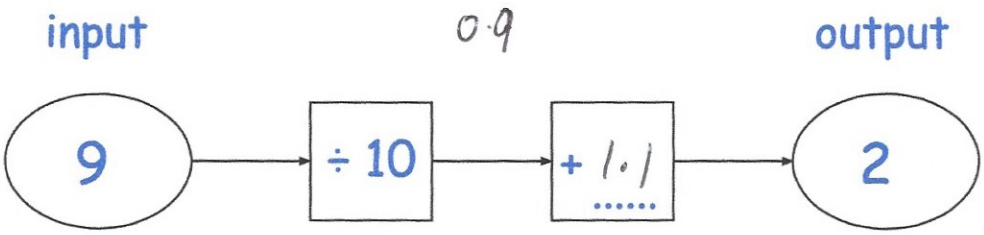
(1)

(b)



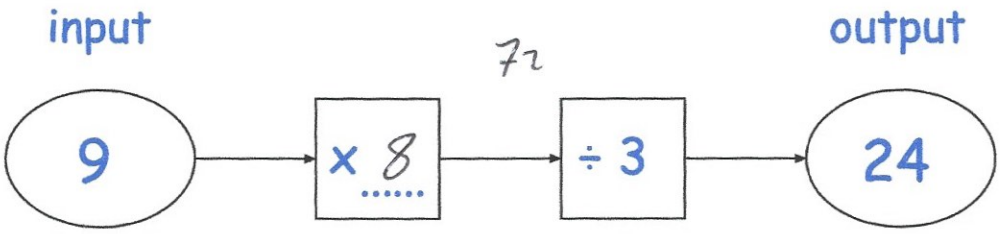
(1)

(c)



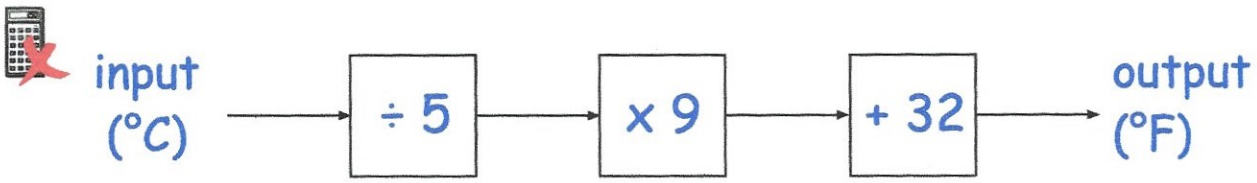
(1)

(d)



(1)

10. Meredith uses the rule below to convert degrees Fahrenheit to degrees Celsius.



(a) Use the rule to convert 30°C into degrees Fahrenheit

$30 \div 5 = 6$

$6 \times 9 = 54$

$54 + 32 = 86$

86 .....°F

(2)

(b) Use the rule to convert 59°F into degrees Celsius

$59 - 32 = 27$

$27 \div 9 = 3$

$3 \times 5 = 15$

15 .....°C

(2)

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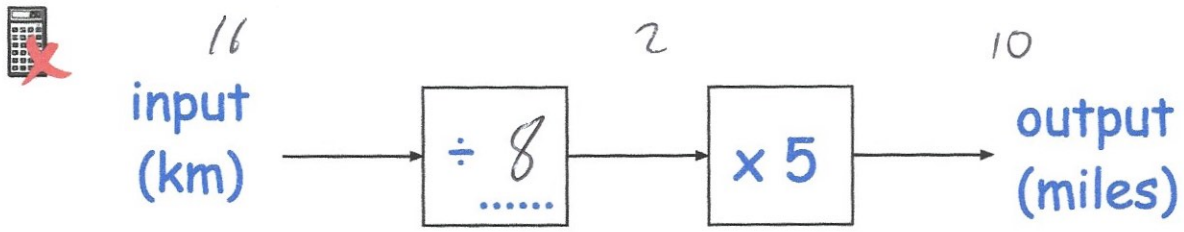
11. Pablo uses this number machine to convert kilometres into miles.

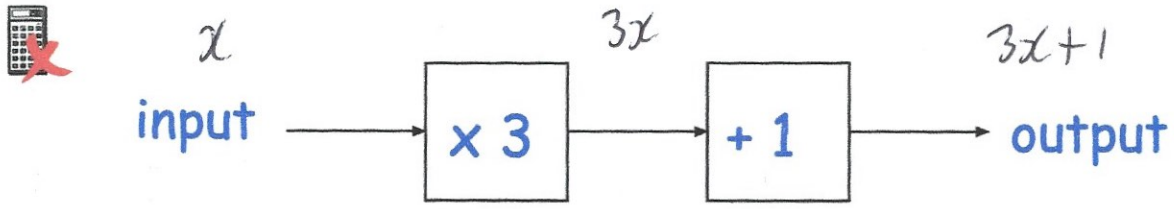


He knows that 16 kilometre is approximately 10 miles.

Complete the number machine.

(2)

12. Here is a number machine.



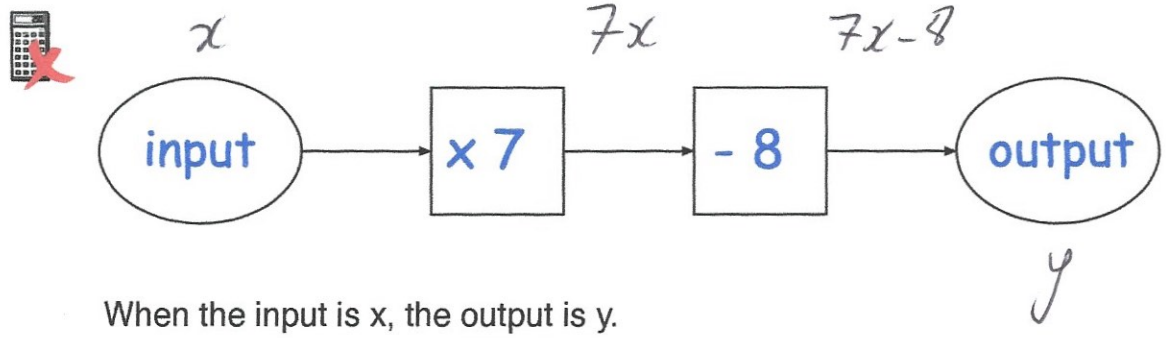
The input is x.

Write an expression for the output, in terms of x.

3x+1

(1)

13. Here is a function machine.



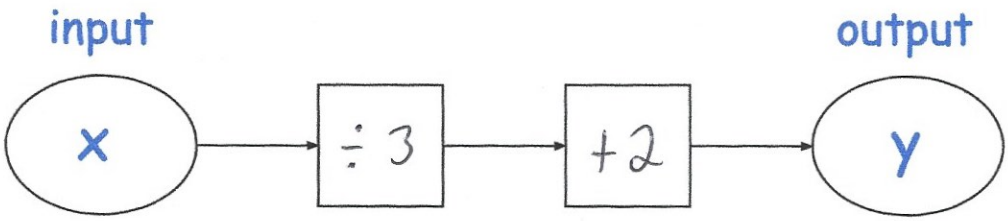
When the input is x, the output is y.

Write the output y in terms of x.

y = 7x - 8

(1)

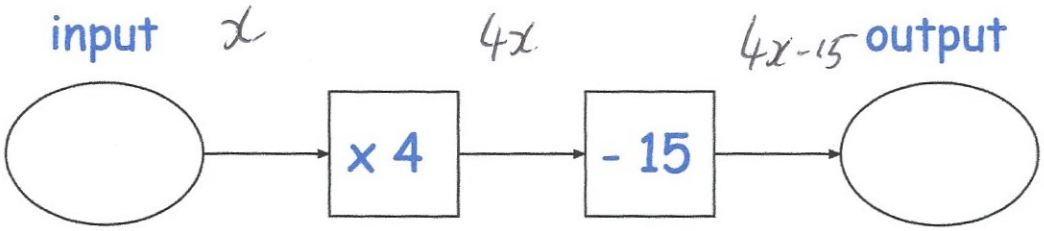
14. Here is a function machine with input, x, and output, y.



Complete the function machine so that $y = \frac{x}{3} + 2$

(2)

15. Here is a number machine.



The input is the same as the output.

Work out the input.

$4x - 15 = x$

$-x \quad -x$

$3x - 15 = 0$

$+15 \quad +15$

$3x = 15$

$\div 3 \quad \div 3$

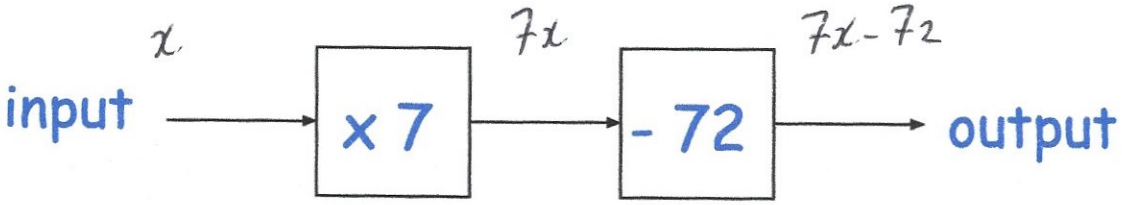
$x = 5$

5

.....

(3)

16. Here is a number machine.



When the input is x, the output is x.

Work out the value of x.

$7x - 72 = x$

$-x \quad -x$

$6x - 72 = 0$

$+72 \quad +72$

$6x = 72$

$\div 6 \quad \div 6$

$x = 12$

.....

(3)

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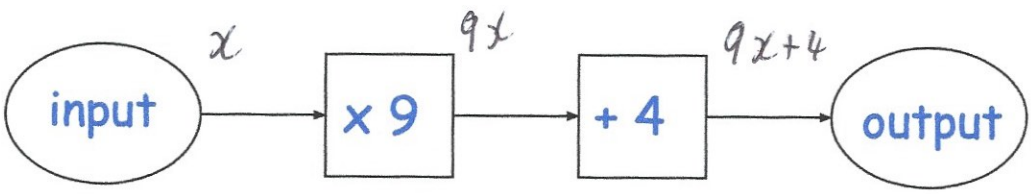
17. Below is a number machine.



The input is the same as the output.

Work out the input

$9x + 4 = x$

$-x \quad -x$

$8x + 4 = 0$

$-4 \quad -4$

$8x = -4$

$\div 8 \quad \div 8$

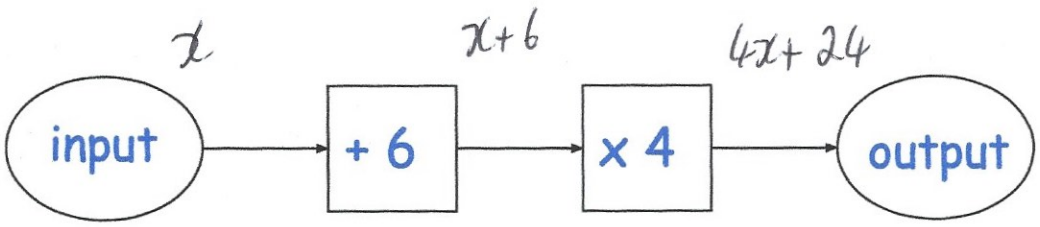
$x = -0.5$

-0.5

.....

(3)

18. Below is a number machine.



The output is twice the input.

2 x input = output

Work out the input

$2x = 4x + 24$

$-2x \quad -2x$

$0 = 2x + 24$

$-24 \quad -24$

$-24 = 2x$

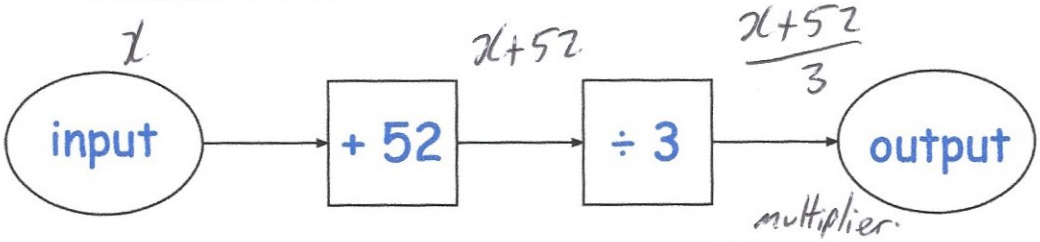
$\div 2 \quad \div 2$

$-12 = x$

-12

(3)

19. Here is a function machine.



The output is 120% of the input. 20% more (x1.2)

Work out the output

output = 1.2 x input

$\frac{x+52}{3} = 1.2x$

$\times 3 \quad \times 3$

$x + 52 = 3.6x$

$-x \quad -x$

$52 = 2.6x$

$\div 2.6 \quad \div 2.6$

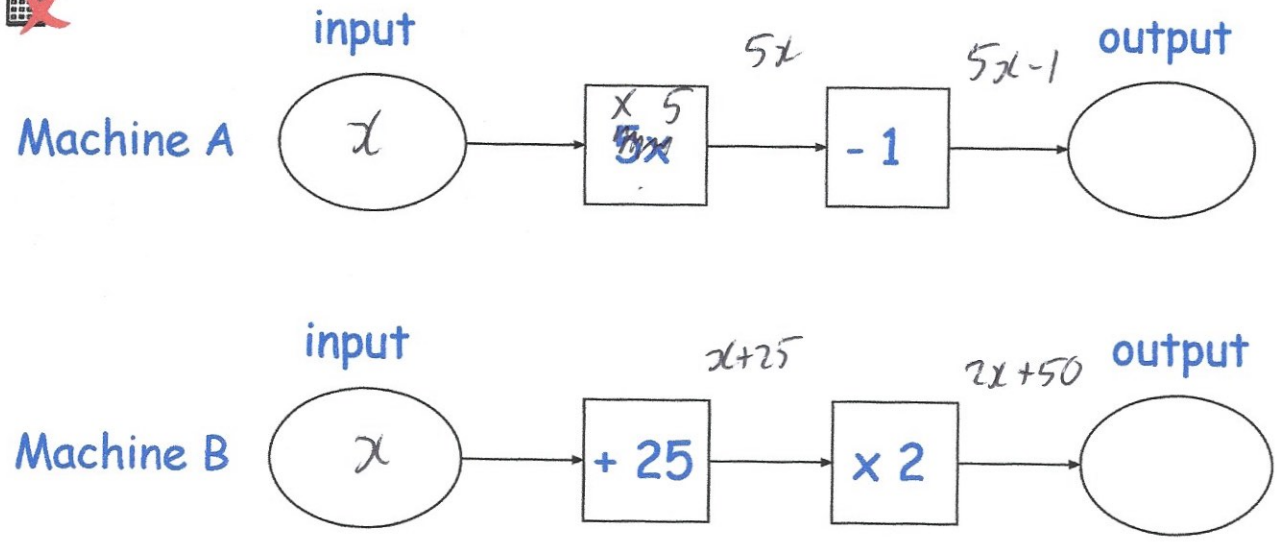
$x = 20$

$20 \times 1.2 = 24$

24

(4)

20. Here are two number machines.



Haseeb inputs the same number, x, into both number machines, A and B.
Both outputs are the same.

Find the value of the input, x.

$5x - 1 = 2x + 50$

$+1 \quad +1$

$5x = 2x + 51$

$-2x \quad -2x$

$3x = 51$

$\div 3 \quad \div 3$

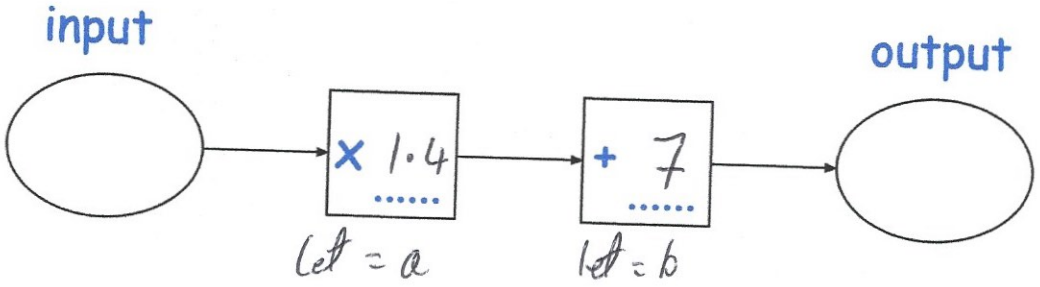
$x = 17$

17

.....

(4)

21. Here is a number machine.



Conor knows that if the input is 5, the output is 14
He also knows that if the input is 10, the output is 21

Complete the number machine.

$5a + b = 14$
$10a + b = 21$

$10a + b = 21$
$5a + b = 14$

$5a = 7$
$a = 1.4$

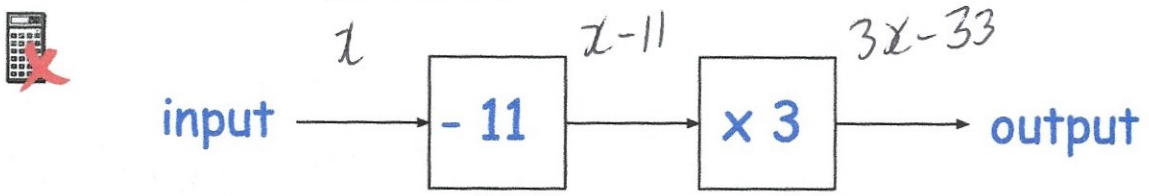
$5 \times 1.4 = 7$

$7 + b = 14$
$b = 7$

.....

(4)

22. Below is a number machine.



(a) The input is x.

Write an expression for the output, in terms of x.

$3x - 33$

.....

(1)

(b) Work out the range of input values for which the input is greater than the output.

$x > 3x - 33$

$+33 \quad +33$

$x + 33 > 3x$

$-x \quad -x$

$33 > 2x$

$2x < 33$

$\div 2 \quad \div 2$

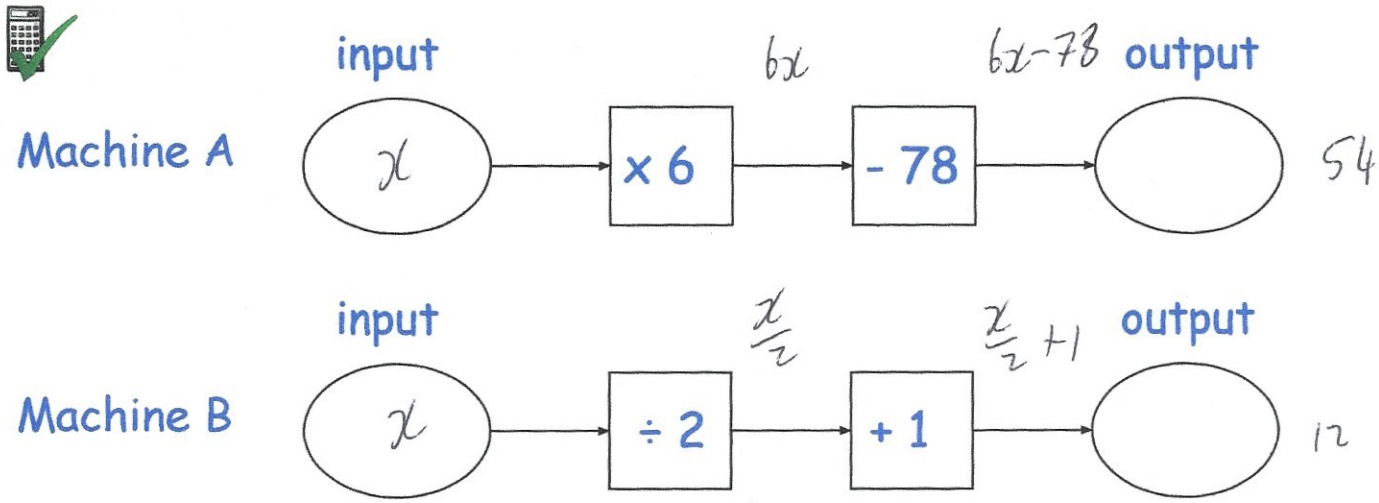
$x < 16.5$

$x < 16.5$

.....

(3)

23. Here are two number machines.



Both machines have the same input.

The ratio of the output of A to the output of B = 9 : 2

Work out the value of the input.

$2 \times \text{output A} = 9 \times \text{output B}$

$12x - 156 = \frac{9}{2}x + 9$

$12x - 156 = 4.5x + 9$

$-4.5x \qquad -4.5x$

$7.5x - 156 = 9$

$+156 \qquad +156$

$7.5x = 165$

$\div 7.5 \qquad \div 7.5$

$x = 22$

22

(5)