

5.4 Number machines

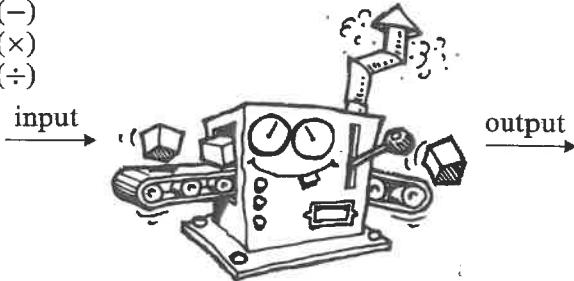
- A number machine performs an *operation* on numbers.

- A simple *operation* could be

| | |
|----------|-----|
| add | (+) |
| subtract | (−) |
| multiply | (×) |
| divide | (÷) |

or

- The *input* number goes into the machine.
- The *output* number comes out of the machine.



Examples

| input | machine | output | output solution | reason |
|--------------------|---|---------------------|---------------------|--------|
| 1. $5 \rightarrow$ | $\boxed{+ 7} \rightarrow ?$ | $? = 12$ | $(5 + 7 = 12)$ | |
| 2. $8 \rightarrow$ | $\boxed{- 3} \rightarrow \blacklozenge$ | $\blacklozenge = 5$ | $(8 - 3 = 5)$ | |
| 3. $3 \rightarrow$ | $\boxed{\times 6} \rightarrow \blacksquare$ | $\blacksquare = 18$ | $(3 \times 6 = 18)$ | |

Exercise 1

Find the outputs from these number machines.

| | |
|--|---|
| 1. $4 \rightarrow \boxed{+ 5} \rightarrow \text{smiley face}$ | 2. $7 \rightarrow \boxed{+ 11} \rightarrow \text{triangle}$ |
| 3. $10 \rightarrow \boxed{- 3} \rightarrow \text{square}$ | 4. $14 \rightarrow \boxed{- 9} \rightarrow \text{rectangle}$ |
| 5. $6 \rightarrow \boxed{\times 7} \rightarrow \text{wavy line}$ | 6. $8 \rightarrow \boxed{\times 2} \rightarrow \text{fish}$ |
| 7. $25 \rightarrow \boxed{\div 5} \rightarrow ?$ | 8. $24 \rightarrow \boxed{\div 4} \rightarrow \text{smiley face}$ |
| 9. $39 \rightarrow \boxed{+ 13} \rightarrow \blacksquare$ | 10. $7 \rightarrow \boxed{\times 9} \rightarrow \blacktriangle$ |
| 11. $64 \rightarrow \boxed{- 46} \rightarrow \text{dice}$ | 12. $66 \rightarrow \boxed{\div 6} \rightarrow \text{bracelet}$ |
| 13. $8 \rightarrow \boxed{\times 9} \rightarrow \text{fish}$ | 14. $73 \rightarrow \boxed{+ 37} \rightarrow \text{cross}$ |
| 15. $45 \rightarrow \boxed{\div 5} \rightarrow \blacklozenge$ | 16. $51 \rightarrow \boxed{- 15} \rightarrow \blacksquare$ |
| 17. $33 \rightarrow \boxed{\times 3} \rightarrow \blacktriangle$ | 18. $8 \rightarrow \boxed{\times 8} \rightarrow \text{triangle}$ |
| 19. $120 \rightarrow \boxed{\div 20} \rightarrow \pi$ | 20. $52 \rightarrow \boxed{\div 4} \rightarrow \emptyset$ |

Exercise 2

Find the output.

1. $6 \rightarrow [+5] \rightarrow [+2] \rightarrow ?$

2. $3 \rightarrow [+6] \rightarrow [+8] \rightarrow \text{●}$

3. $13 \rightarrow [-9] \rightarrow [-3] \rightarrow \blacktriangle$

4. $17 \rightarrow [-8] \rightarrow [-5] \rightarrow \diamond$

5. $4 \rightarrow [\times 2] \rightarrow [\times 5] \rightarrow \pi$

6. $3 \rightarrow [\times 3] \rightarrow [\times 3] \rightarrow \emptyset$

7. $20 \rightarrow [\div 5] \rightarrow [\div 2] \rightarrow \blacktriangledown$

8. $48 \rightarrow [\div 4] \rightarrow [\div 6] \rightarrow \blacktriangleright$

9. $17 \rightarrow [+71] \rightarrow [-8] \rightarrow \blacksquare$

10. $34 \rightarrow [+43] \rightarrow [-70] \rightarrow \text{J}$

11. $5 \rightarrow [+4] \rightarrow [\times 3] \rightarrow \text{fish}$

12. $7 \rightarrow [+9] \rightarrow [\times 0] \rightarrow \text{smiley}$

13. $12 \rightarrow [+6] \rightarrow [\div 6] \rightarrow \diamond$

14. $39 \rightarrow [+13] \rightarrow [\div 4] \rightarrow \text{wavy lines}$

15. $89 \rightarrow [-15] \rightarrow [+4] \rightarrow \text{wavy lines}$

16. $73 \rightarrow [-5] \rightarrow [+9] \rightarrow \text{bar chart}$

17. $42 \rightarrow [-38] \rightarrow [\times 7] \rightarrow \text{J}$

18. $100 \rightarrow [-81] \rightarrow [\times 3] \rightarrow \blacksquare$

19. $85 \rightarrow [-58] \rightarrow [\div 9] \rightarrow \text{pirate hat}$

20. $76 \rightarrow [-67] \rightarrow [\div 9] \rightarrow \text{dice}$

In Questions 21 to 25 there are several operations.

21. $5 \rightarrow [\times 3] \rightarrow [-10] \rightarrow [\times 2] \rightarrow [\div 10] \rightarrow \text{umbrella}$

22. $7 \rightarrow [\times 9] \rightarrow [\times 2] \rightarrow [-66] \rightarrow [\div 12] \rightarrow \text{circle with dot}$

23. $50 \rightarrow [\times 10] \rightarrow [-123] \rightarrow [+13] \rightarrow [\div 10] \rightarrow [\div 13] \rightarrow \uparrow$

24. $17 \rightarrow [\times 5] \rightarrow [+25] \rightarrow [\div 11] \rightarrow [\times 13] \rightarrow [\div 2] \rightarrow [+7] \rightarrow \text{plus sign}$

25. $13 \rightarrow [+84] \rightarrow [\times 0] \rightarrow [+14] \rightarrow [\times 5] \rightarrow [-15] \rightarrow [\div 11] \rightarrow !$