Inverse operations
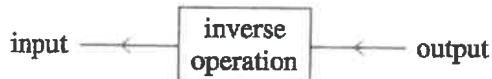
- Using the *inverse* (or reverse) we can find the input for any machine, by using the output.

input ⟵ | inverse operation | ⟵ output

Operation	Inverse operation
+7	−7
−8	+8
×4	÷4
÷6	×6

- Example: Find the input.

? →| + 9 |→ 20

Solution: Change arrows direction and use the inverse operation

? ⟵| − 9 |⟵ 20

? = 11 since 20 − 9 = 11

Exercise 3

Find the input to these systems

1. ● →| +6 |→ 11   5
2. ▲ →| + 4 |→ 13   9
3. [domino] →| − 7 |→ 2   9
4. →| − 12 |→ 24   36
5. →| × 3 |→ 18   6
6. ☺ →| × 5 |→ 45   9
7. $ →| ÷ 8 |→ 4   32
8. [boot] →| ÷ 7 |→ 8   56
9. [fish] →| + 14 |→ 72   58
10. →| + 11 |→ 29   18
11. →| − 13 |→ 31   44
12. ♦ →| − 72 |→ 27   99
13. ∅ →| × 5 |→ 60   12
14. π →| × 9 |→ 72   8
15. ? →| ÷ 4 |→ 8   32
16. →| ÷ 6 |→ 7   42
17. →| × 9 |→ 54   6
18. ? →| × 8 |→ 56   7
19. ☺ →| ÷ 7 |→ 7   49
20. →| ÷ 3 |→ 27   81

Exercise 4

Find the input to these machines

1. ∅ → [+ 8] → [+ 6] → 18   4
2. ● → [+ 2] → [+ 5] → 14   7
3. ▰ → [− 5] → [− 8] → 7   20
4. ✦ → [− 9] → [− 3] → 6   18
5. ∀ → [× 3] → [× 3] → 36   4
6. ∅ → [× 5] → [× 2] → 70   7
7. ☺ → [÷ 6] → [÷ 4] → 4   96
8. ◢ → [÷ 2] → [÷ 5] → 13   130
9. ▬ → [+ 7] → [− 11] → 11   15
10. π → [+ 1] → [− 17] → 1   17
11. ◢ → [+ 3] → [× 2] → 16   5
12. ▲ → [+ 3] → [× 4] → 52   10
13. 🎄 → [+ 4] → [÷ 5] → 3   11
14. 🐟 → [+ 7] → [÷ 9] → 2   11
15. 👢 → [− 2] → [+ 17] → 34   19
16. ● → [− 16] → [+ 61] → 84   39
17. ▨ → [− 11] → [× 8] → 40   16
18. $ → [− 8] → [× 7] → 21   11
19. ✦ → [− 1] → [÷ 11] → 4   45
20. ⚅ → [− 6] → [÷ 8] → 32   262