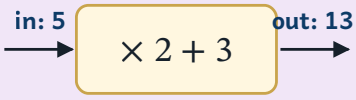
Lesson 104 Finding the rule from a table

CRACKING THE PLAY MACHINE

1. Look at the pairs from the game machine: **2** turns into **7**, **5** turns into **16**, **10** turns into **31**.
2. Test ideas on the first pair. **2** + 5 = 7 works, but so does **2** x 3 + 1 = 7.
3. Try the next pair. **5** + 5 = 10, yet the machine gave **16**, so +5 is wrong.
4. Check x3 then +1: **5** x 3 = 15, 15 + 1 = **16**. It matches.
5. Check the last pair: **10** x 3 = 30, 30 + 1 = **31**. The hidden rule is x3 then +1.

WARM-UP

Use the blank function machines on the page to show the pairs and rules.



1. Write the pairs 3 → 8, 5 → 10 and 7 → 12 on the first machine and label its rule
2. Write the pairs 9 → 29, 13 → 41 and 19 → 59 on the second machine and label its rule
3. Write the pairs 1 → 6, 2 → 11 and 3 → 16 on the third machine and label its rule

PRACTICE

1. At the board-game stall the spinner machine turns **22** into **32**, **23** into **33** and **26** into **36**. What rule is the spinner using? _____
2. In the playground hopscotch game the score machine turns **4** into **12**, **6** into **18** and **8** into **24**. Find its hidden rule. _____
3. The arcade token machine turns **21** tokens into **27** points, **28** into **34** and **42** into **48**. What rule does it follow? _____
4. The video-game bonus machine turns **9** into **37**, **13** into **53** and **19** into **77**. Crack the hidden rule it uses.

   9 → 37, 13 → 53, 19 → 77. What is the rule?

5. At the fair the lucky-dip machine turns **3** into **11**, **4** into **14** and **5** into **17**. Work out its secret rule. _____

ALWAYS, SOMETIMES, NEVER

Always, sometimes or never true? Write A, S or N.

a. One input-output pair is enough to be sure of the hidden rule ☐

b. If two rules both fit the first pair, a new test input can show which is correct ☐

c. The rule x3 then +1 turns 2 into 7 and 5 into 16 ☐

d. A machine that turns 4 into 12 must be using the rule x3 ☐

ALGEBRA