

Luna's Space Adventure

Grade 4 · Input-output tables · 4.5B

Name _____

Date _____



Astronaut Luna is exploring a far-off corner of space. Solve each problem to help Luna's mission go smoothly!

Follow the rule Each row's rule is on the left. Do it to each number in.

In	1	4	7	9	10
+ 6	7				
× 8	8				
× 6 - 2		22			

Find the rule Which rule makes every out from its in?

In 1, 3, 6, 8 → Out 8, 24, 48, 64	+ 12	× 8	× 9
In 1, 3, 7, 10 → Out 2, 8, 20, 29	× 3 - 1	× 8	+ 7
In 2, 3, 6, 7 → Out 12, 17, 32, 37	+ 11	× 5 + 2	+ 12
In 2, 3, 4, 8 → Out 12, 13, 14, 18	× 2 - 1	+ 10	+ 15

Position and value

Each value comes from its position. Find the rule, then the missing values.

Position	1	2	3	4	5	12
Value	9	18	27			

Rule? _____

Value at position 24? _____

Write the rule Write each rule with n for the number in: $n \times 3 + 1$.

In 2, 7, 9 → Out 3, 13, 17	_____	In 2, 3, 4 → Out 4, 7, 10	_____
In 1, 3, 6 → Out 6, 12, 21	_____	In 2, 6, 9 → Out 16, 40, 58	_____

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ANSWER KEY



Astronaut Luna is exploring a far-off corner of space. Solve each problem to help Luna's mission go smoothly!

Follow the rule Each row's rule is on the left. Do it to each number in.

In	1	4	7	9	10
+ 6	7	10	13	15	16
× 8	8	32	56	72	80
× 6 - 2	4	22	40	52	58

Find the rule Which rule makes every out from its in?

In 1, 3, 6, 8 → Out 8, 24, 48, 64

In 1, 3, 7, 10 → Out 2, 8, 20, 29

In 2, 3, 6, 7 → Out 12, 17, 32, 37

In 2, 3, 4, 8 → Out 12, 13, 14, 18

$+ 12$ $\times 8$ $\times 9$
 $\times 3 - 1$ $\times 8$ $+ 7$
 $+ 11$ $\times 5 + 2$ $+ 12$
 $\times 2 - 1$ $+ 10$ $+ 15$

Position and value

Each value comes from its position. Find the rule, then the missing values.

Position	1	2	3	4	5	12
Value	9	18	27	36	45	108

Rule? position $\times$ 9
 Value at position 24? 216

Write the rule Write each rule with n for the number in: $n \times 3 + 1$.

In 2, 7, 9 → Out 3, 13, 17 $n \times 2 - 1$

In 2, 3, 4 → Out 4, 7, 10 $n \times 3 - 2$

In 1, 3, 6 → Out 6, 12, 21 $n \times 3 + 3$

In 2, 6, 9 → Out 16, 40, 58 $n \times 6 + 4$



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GUIDE

1 What this sheet practises

Input-output tables: following a rule, finding the rule, finding values from their position, and writing a rule with a letter.

2 A problem from the sheet, worked out

Follow the rule Each row's rule is on the left. Do it to each number in.

In	1	4	7	9	10
+ 6	7	10	13	15	16
$\times 8$	8	32	56	72	80
$\times 6 - 2$	4	22	40	52	58

How: Do the rule to each number in. To find a rule, look at how the outs change as the ins go up by one: up by 3 each time means $\times 3$, then fix it with + or -.

3 Words to know

input the number that goes in

output the number that comes out

rule what is done to every input

position a term's place in a pattern: 1st, 2nd, 3rd

4 Watch for

- Finding a rule from the first pair only (+ 4 fits $1 \rightarrow 5$, but not $2 \rightarrow 9$).
- Doing $\times 3 + 1$ as $3 + 1$ first, then multiplying.
- Counting on from the last value instead of using the position.

5 Where it fits

BEFORE

3.OA.D.9

Find and explain patterns in addition and multiplication tables.

THIS SHEET

4.5B

Use an input-output table to make a pattern that follows a rule linking each term to its position.

NEXT

5.OA.B.3

Make two patterns from rules, pair them up and graph the pairs.

6 Helping at home

Make a 'machine': your child says a number, you say the out, and they guess your rule. Then swap.

