

Finding Formulas from Tables of Values (Inductive Reasoning)

Example: In the table of values below, find a formula for y in terms of x .

solution:

| | | | | | | |
|-----|---|---|---|---|----|----|
| x | 1 | 2 | 3 | 4 | 5 | 6 |
| y | 3 | 5 | 7 | 9 | 11 | 13 |

Since the y -values all differ by 2, think about doubling x . If you write down the doubles of x : 2, 4, 6, ... you will notice that the y -values are all 1 more than the corresponding double.

The formula is, therefore,

$$y = 2x + 1.$$

Problems

For each table below, find a formula for y in terms of x .

1.

| | | | | | | |
|-----|---|----|----|----|----|----|
| x | 1 | 2 | 3 | 4 | 5 | 6 |
| y | 7 | 14 | 21 | 28 | 35 | 42 |

1.

| | | | | | | |
|-----|---|---|----|----|----|----|
| x | 1 | 2 | 3 | 4 | 5 | 6 |
| y | 5 | 8 | 11 | 14 | 17 | 20 |

2.

| | | | | | | |
|-----|---|----|----|----|----|----|
| x | 1 | 2 | 3 | 4 | 5 | 6 |
| y | 0 | -1 | -2 | -3 | -4 | -5 |

3.

| | | | | | | |
|-----|----|----|----|----|----|----|
| x | 1 | 2 | 3 | 4 | 5 | 6 |
| y | 11 | 15 | 19 | 23 | 27 | 31 |

4.

| | | | | | | |
|-----|---|---|----|----|----|-----|
| x | 1 | 2 | 3 | 4 | 5 | 6 |
| y | 3 | 0 | -3 | -6 | -9 | -12 |

The last four tables are much more difficult. For each problem it will be useful to think about the values you get when you square x , so we've entered them in the table for you.

The problem is the same though, find a formula for y in terms of x .

| | | | | | | |
|--|--|--|--|--|--|--|
| | | | | | | |
|--|--|--|--|--|--|--|

5.

| | | | | | | |
|-------|---|---|----|----|----|----|
| x | 1 | 2 | 3 | 4 | 5 | 6 |
| x^2 | 1 | 4 | 9 | 16 | 25 | 36 |
| y | 6 | 8 | 13 | 20 | 29 | 40 |

6.

| | | | | | | |
|-------|---|---|----|----|-----|-----|
| x | 1 | 2 | 3 | 4 | 5 | 6 |
| x^2 | 1 | 4 | 9 | 16 | 25 | 36 |
| y | 7 | 4 | -1 | -8 | -17 | -28 |

7.

| | | | | | | |
|-------|---|---|----|----|----|----|
| x | 1 | 2 | 3 | 4 | 5 | 6 |
| x^2 | 1 | 4 | 9 | 16 | 25 | 36 |
| y | 2 | 6 | 12 | 20 | 30 | 42 |

8.

| | | | | | | |
|-------|---|----|----|----|----|----|
| x | 1 | 2 | 3 | 4 | 5 | 6 |
| x^2 | 1 | 4 | 9 | 16 | 25 | 36 |
| y | 4 | 10 | 18 | 28 | 40 | 54 |