Describing Relationships in Tables

You will need
- linking cubes or counters

GOAL

Describe how the numbers in one column of a table of values relate to the numbers in the other column.

A dance group created a dance to go with a song that has 10 parts. There will be 2 dancers in part 1. For each new part, 3 more dancers will join in.
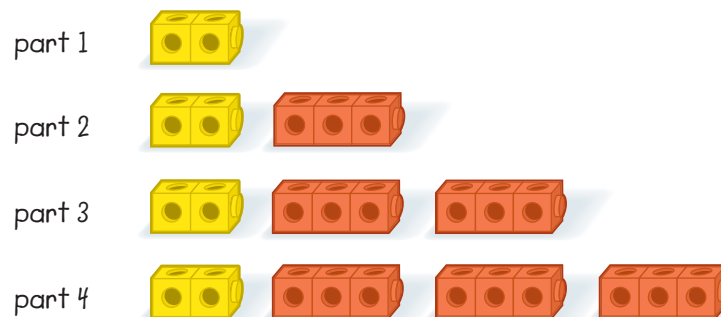
? How many dancers will be on the stage by the end of part 10?

Daniel's Rule

I'll use yellow cubes to show the 2 starting dancers.

I'll add 3 red cubes to show each group of dancers that joins in.

part 1

part 2

part 3

part 4

I'll use my model to start a table of values.

I can write a pattern rule to figure out the number of dancers.

There are 2 dancers in part 1.
For part 2, add 1 group of 3 dancers. $2 + 3 = 5$
For part 3, add 2 groups of 3 dancers. $2 + 3 + 3 = 8$

Here is my pattern rule:
The number of groups of 3 that I need to add to the starting number is always 1 less than the part number.

For part 10, add 9 groups of 3 dancers because $10 - 1 = 9$.

$9 \times 3 = 27$ and $2 + 27 = 29$

There will be 29 dancers on stage by the end of part 10.

Our Dance	
Part number	Number of dancers
1	2
2	5
3	8
4	11

+3
+3
+3

Mai's Rule

The number of dancers increases by 3 each time.

If there were 3 dancers in part 1, the number of dancers would always be 3 times the part number.

I made a column in my table to show multiplying by 3. I noticed that the number of dancers is always 1 less than the 3 times the part number.

So I can write this pattern rule:
Multiply the part number by 3 and subtract 1 from the product.

For part 10, $10 \times 3 = 30$.

$30 - 1 = 29$ dancers

Our Dance		
Part number	x 3	Number of dancers
1	3	2
2	6	5
3	9	8
4	12	11

+3
+3
+3

Reflecting

A. How does Mai's rule compare with Daniel's rule?

B. Mai and Daniel could have used this one-column rule: Start at 2 and add 3 each time. Instead, they used two-column rules that connect the number of dancers to the part number. Which type of rule is more useful for figuring out the number of dancers for any part number? Why?

Checking

1. Raven created a different dance. Her dance starts with three dancers in part 1 and adds two more dancers in each new part.
   a) Use a model, diagram, or table of values to show the number of dancers in parts 1 to 4.
   b) How many dancers will be on the stage by the end of part 10? What rule can you use to figure this out? Show your work.

Practising

My Bank Account	
Week number	Amount in bank account ($)
1	8
2	
3	
4	

2. Martin had $3 in his bank account. To figure out how much money he would have in his account if he put in $5 each week, he used this rule: Multiply the week number by $5 and add $3.
   a) Why does Martin's rule make sense?
   b) Use Martin's rule to continue his table of values to week 4.

3. a) Write a rule that shows how each number in the travel time column of the table below can be used to figure out the corresponding number in the distance travelled column.
   b) Write a rule that shows how each number in the distance travelled column can be used to figure out the corresponding number in the travel time column.

Trip Record

Travel time (min)	Distance travelled (km)
10	5
20	10
30	15
40	20

4. The table below shows how much guitar lessons cost if you also pay at the start to rent a guitar.

Cost of Guitar Lessons and Rental

Number of lessons	Total cost ($)
1	80
2	110
3	140
4	170

a) Write a rule that shows how the number of lessons can be used to figure out the total cost. Explain your thinking.

b) Use your rule to figure out the cost of eight lessons. Show your work.

c) Show how you can check your answer for part b).

d) Why do eight lessons not cost twice as much as four lessons?

Prize Ribbons

Number of cuts	Length of ribbon left on roll (cm)
1	280
2	260
3	240
4	220

5. Arun cut identical prize ribbons from a 300 cm roll. The table at the left shows the length of ribbon left on the roll after 1 to 4 cuts.

a) How long are the ribbon strips that Arun cut?

b) Write a rule you can use to figure out how much ribbon is left on the roll after any number of cuts. Explain what you did.

c) How much ribbon will be left on the roll after 10 cuts?

6. What do you look at when you want to write a pattern rule using a number in one column to figure out the corresponding number in the other column? Use Gabe's table to explain.

Gabe's Table

Column 1	Column 2
1	7
2	9
3	11
4	13