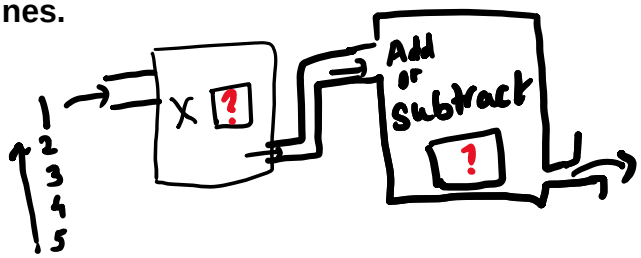
Times Tables Shifts Solution for nrich

Myself **Shubhangee (Facilitator)** had worked collaboratively on '**Times Tables Shifts**' with a group of 14 students, in online mode, in '**Ganit Kreeda', Vicharvatika, India.** The names of the students are:

Nikhil, Abhyudh, Viyaan, Aditi, Mridula, Pushan, Larisa, Laira, Shravani, Veyhant, Anika, Kiaan, Kaira, Shreehari.

We worked for 3 sessions on this task in a very systematic way.

The task was introduced to them in the form of game and kids were challenged to find the rules of 2 machines.
One machine is multiplying the set of 1 to 5 numbers by some number and then answers are given to other machine. Second machine is either adding or subtracting some number from it. Kids were supposed to guess the rules of 2 machines.



After few examples, kids worked using interactivity on level 1.
In the beginning kids used trial and error to find the right answer.
Slowly, kids found out the relation between the difference between 2 consecutive numbers is same as the table number.
Veyhant, Nikhil, Kiaan, Viyaan and Shreehari started using this concept to find the table. Once they know the table, they used to check if the starting number is bigger or smaller than the table number. Accordingly, they used to find out whether the table is shifted up or down by the common difference.

Then kids worked on the few questions at home.

1. Shift 5's table up by 2. Do you see any pattern? Explain.
2. Now, shift 5's table down by 3. Do you see any pattern? Explain.
3. Shift 4's table up by 1. Do you see any pattern? Explain.
4. Shift 6's table down by 1. Do you see any pattern? Explain.

Shravani, Nikhil and Veyhant's work is summarised here.

						Pattern Observed
5 Tables	**5**	**10**	**15**	**20**	**25**	**Difference between 2 cons no.s = 5 and units place digits are 5,0,5,0,…**
Up by 2	**7**	**12**	**17**	**22**	**27**	**Difference between 2 cons no.s = 5 and units place digits are 7,2,7,2,7….**

Down by 3	**2**	**7**	**12**	**17**	**22**	**Difference between 2 cons no.s = 5 and units place digits are 2,7,2,7,2….**

						Pattern Observed
4 Tables	**4**	**8**	**12**	**16**	**20**	**Difference between 2 cons no.s = 4**
Up by 1	**5**	**9**	**13**	**17**	**21**	**Difference between 2 cons no.s = 4**

4. Shift 6's table down by 1. Do you see any pattern? Explain

						Pattern Observed
6 Tables	**6**	**12**	**18**	**24**	**30**	**Difference between 2 cos no.s = 6.**
down by 1	**5**	**11**	**17**	**23**	**29**	**Difference between 2 cos no.s = 6.**

Conclusion: The difference of the number is the same as the table you are working with.

Then kids worked on **following questions** and Mridula, Nikhil, Veyhant, Pushan, Abhyudh and Shravani's work is summarised here.

What is the same between numbers in a times table and numbers in the shifted times table?
A. The difference between two numbers of the shifted time table is the same as the normal table.

2. What can you learn from the difference between any two numbers in a shifted times table?
A. the difference is the same from the normal table.

3. How do you find the shift once you've worked out the table?
A. Add or subtract the original number from the time table.

4.What can you say if the numbers from the shifted table are all odd?
A. We can say that an odd number is subtracted or added from an even number table.
5. What about if they are all even?
A.we can say that an even number is added or subtracted from an even number table.

6. Or a mixture of odd and even?
A. We can say that an odd or even number is added or subtracted from an odd number table.

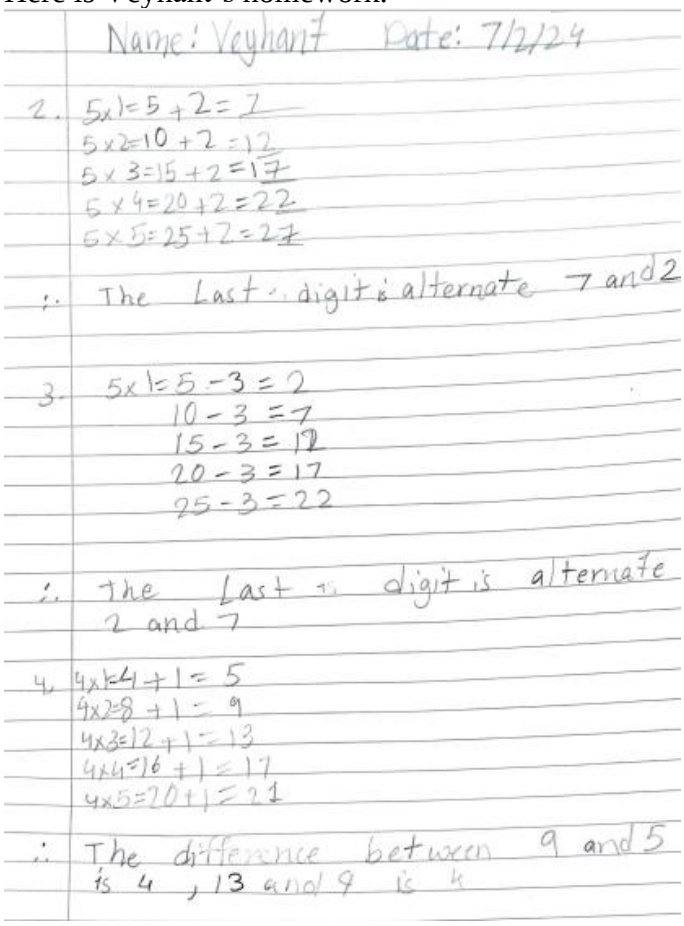
7. What can you say if the unit digits are all identical?

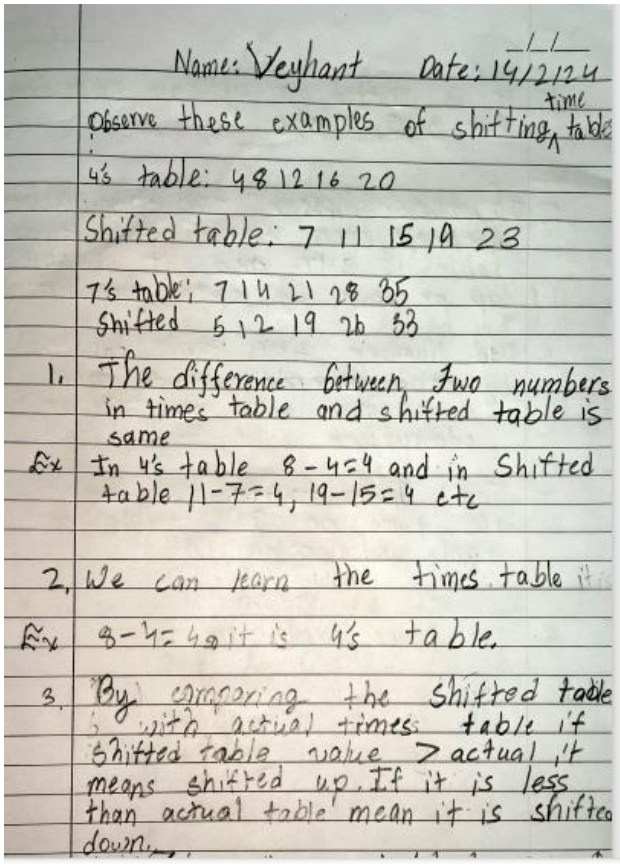
A. We can say that the table is a multiple of ten means it can be table of 10 / 20/ 30/…

8. What if there are only two different unit digits?

A. We can say that it can be table of 5 / 15 / 25 / 35 /…

Here is Veyhant's homework.





Name: Veyhant Date: 14/2/24

Observe these examples of shifting time table

4's table: 4 8 12 16 20

Shifted table: 7 11 15 19 23

7's table: 7 14 21 28 35

Shifted 5 12 19 26 33

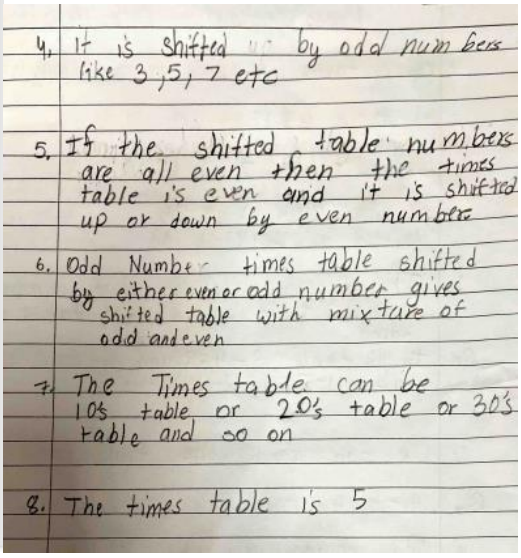
1. The difference between two numbers in times table and shifted table is same

Ex In 4's table 8-4=4 and in Shifted table 11-7=4, 19-15=4 etc

2. We can learn the times table if

Ex 8-4=4 it is 4's table.

3. By comparing the shifted table with actual times table if shifted table value > actual, it means shifted up. If it is less than actual table mean it is shifted down.



4. It is shifted by odd numbers like 3, 5, 7 etc

5. If the shifted table numbers are all even then the times table is even and it is shifted up or down by even numbers

6. Odd Number times table shifted by either even or odd number gives shifted table with mixture of odd and even

7. The Times table can be 10's table or 20's table or 30's table and so on

8. The times table is 5

All the kids worked on level 1,2 and 3 using interactivity.
Here is Nikhil's and Mridula'solution:

Level 1, 2- in each of the problems, the difference between the shifted numbers is always the same. So, the value of the difference gives the table.
Level 3 -

- Arrange the numbers in ascending order.
- Find out the difference between each consecutive pair.
- The HCF of all the difference is the Table number.

Veyhant's solution:

Name: Yeyhant vivan.R Date: 2/2/26

Shifting Times Table

In level 1 and level 2, to find the table we have to find the difference between any 2 consecutive numbers.
To find shift we have to compare the numbers with the actual table numbers.

Ex Level 1 13 20 27 34 41

The difference between 20 and 13, 27 and 20 is 7 so 7 table the actual table 7 is
7, 14, 21, 28, 35
The difference we get by comparing is 6 also 13 > 7, it is shifted up by 6

Ex Level 2 34 52 70 88 106

The difference between 52 and 34 is 18 so 18 table. The actual table 18 table is
18, 36, 54, 72, 90
The difference we get by comparing is 16 also 18 < 34 it is shifted up by 16

It can be any table (multiples of 10 table) that is 10, 20, 30, ...

The difference 89 109 149 269 289
20 40 120 20

20 table is 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300 By comparing 20 and 89, 100 and 109, 140 and 149 we get shift value as up by 9

ii) By finding the difference between the given numbers we can find the number to be skipped in the table

Skip value 3 2 1 4
Ex 27 63 87 99 147
difference 36 24 12 48

12 × 2 = 24
12 × 3 = 36 } 2 skip
12 × 4 = 48 } → 63
12 × 5 = 60
12 × 6 = 72 } 2 skip
12 × 7 = 84 → 87

Ex Level 3 90 78 174 126 54

i) Arrange the numbers in ascending order

54 78 90 126 174
24 12 36 48

ii) These are multiples of 12. We can assume it's 12 table. Compare with actual 12 table

12, 24, 36, 48, 60, 72, 84, 96, 108, 120
We can compare 54 and 48, 72 and 78, 84 and 90, 120 and 126. The shift is up by 6

∴ 12 Table up by 6

Ex 289 89 109 149 269

i) Arrange the numbers in ascending order

89 109 149 269 289

Since the unit digit is same