CS pathshala
Bringing computational thinking to schools

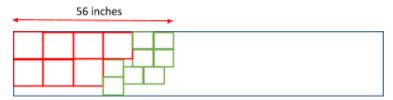| Overall goal of the lesson	Evaluation and improvement of algorithms
Prior knowledge required	Algorithms

MODULE 1:	**Module time: 2 *** 35 minutes
Goal:	Evaluation and improvement of algorithm efficiency and execution
Description:	Tackle simple problem from everyday life, come up with multiple ways to solve it and compare these ways to see which one is optimal
Material required:	**Physical:** Writing material, printouts of the marksheet and 3 stickies used in Example 2, some sticking tape to tack them to the board **Electronic:** None
Procedure Details:	1. Example – introduce like this: These are the marks of Ms Shanti's class in English (please print the marksheet and stick up on board before starting). Of course, parents want to know the rank of their child. But they want some more information too: e.g., ● Anil got 33 marks more than the lowest and 45 marks less than the highest. ● Anil was 10 marks below the class average. ● Anil got 3 marks more than the child just below him and 8 marks less than the child just above. ● Anil was closer to the class average than the rest of the class as a whole. So now Ms Shanti is going to create the report for each child just like parents want it! Let's see how we can help her! 2. Slide 10 – Ms Shanti goes through the *whole* list to find out what is Anil's rank. 3. Slide 11 – emphasise the 'work' done by Ms Shanti: whole list scan to find lowest, whole list scan to find highest, whole list scan to calculate average, then line 2 4. Slide 12 – again emphasise the repeated scans of the whole list 5. Slide 13 – here, expect that some child should point out that we have just calculated the average on the previous slide. After getting average explain that we have to see what is the difference between each child's marks and the average – it doesn't matter if a child got more or less than the average we only want the difference. You can show this by drawing double headed arrow between two numbers. Once we get all the differences we have to take average of *that*. Tell them this is 'average deviation'. Anil's deviation turns out to be less than the average deviation. 6. Slide 14 – summing up Anil's report card. 7. Slide 15 – now the important thing is, as we work through Ram's report card we are going to discover that many of the activities we have *already done* for Anil's report card and *the values are the same*. Once we create the sorted list – please replace the marksheet with Sticky 1 on the board. 8. Slide 16 – simple to follow. Put up Sticky 2 on the board.

	9. Slide 17 – be open to children suggesting more improvements – e.g., they might say – when we are locating Ram's rank, at that time only we can note down who is above him & below him!
	10. See if the children point out the improvement before we show it on the slide. Once we mention the sticky, please put up Sticky 3 on the board.
	11. Slide 19 shows what we have done so far.
	12. Slide 20 does the next report – Kumar's – mention that because marks are shown in ascending order 1st rank (Kirti) is last on Sticky 1 so we have to count from the back to get the rank. You should ask the children on this slide – isn't Ms Shanti's work much easier now?
	13. We add one more piece of info to Sticky 2 in this slide – please add it with a marker pen.
	14. Recap of what we learned.

ANSWERSHEET

1. As shown below

2. The trick, of course, is to save intermediate results.

Suppose teacher calls 5. So we need to do 1 X 3 X 5. Write down on a piece of paper:

1 X 3 = 3
1 X 3 X 5 = 3 X 5 = 15

Now suppose teacher calls 8. So we need to do 1 X 3 X 5 X 7. But we already have the answer for 1 X 3 X 5 on our piece of paper. So now we just do 15 X 7 = 105 and we write down
1 X 3 X 5 X 7 = 15 X 7 = 105

Now suppose teacher calls 3. So we need 1 X 3 – we already have the answer on our piece of paper!

If teacher calls 10. We need 1 X 3 X 5 X 7 X 9. But we already have answer for 1 X 3 X 5 X 7 – it is 105! So we just do 105 X 9 = 945

By saving intermediate results, our work becomes easy and quick.

MARKSHEET - ENGLISH

ANIL - 45
RAM - 28
KUMAR - 60
ABHI - 37
ROHAN - 88
ARUN - 42
RAHUL - 12
KIRTI - 90
SITA - 55
SHALU - 64
PRITI - 72
POOJA - 39
ASHA - 80
ASHOK - 70
BHARAT - 53
KAVYA - 69
RAMANA - 77
RUHI - 60
POORVI - 19
AKSHAY - 40

STICKY 1 – SORTED MARKS

RAHUL - 12
POORVI - 19
RAM - 28
ABHI - 37
POOJA - 39
AKSHAY – 40
ARUN - 42
ANIL - 45
BHARAT - 53
SITA - 55
KUMAR - 60
RUHI - 60
SHALU - 64
KAVYA - 69
ASHOK - 70
PRITI - 72
RAMANA - 77
ASHA - 80
ROHAN - 88
KIRTI - 90

STICKY 2

Lowest score: 12
Highest score: 90
Average score: 55

STICKY 3 - DEVIATIONS

Rahul - 43
Poorvi - 36
Ram - 27
Abhi - 18
Pooja - 16
Akshay – 15
Arun - 13
Anil - 45
Bharat - 2
Sita - 0
Kumar - 5
Ruhi - 5
Shalu - 9
Kavya - 14
Ashok - 15
Priti - 17
Ramana - 22
Asha - 25
Rohan - 33
Kirti - 35