

Uncle Joe asked Mo and Lana to order 54 new wheels for the 21 new skateboards and bicycles in his repair shop. How many skateboards and how many bicycles are in Uncle Joe's repair shop?

1. List the important information you need to solve the problem.

- 54 wheels
- Bikes have 2 wheels
- 21 vehicles
- Skateboards have 4 wheels

2. Try to find a combination of 21 bicycles and skateboards that will have 54 wheels. Show all your strategies/ideas, even if they didn't work out.

One strategy: Look at extremes, What if there are 0 bicycles? $x = \# \text{ of bikes}$, $y = \# \text{ of skateboards}$
 $w = \# \text{ of wheels}$

I (Keep it 21 vehicles)

x	y	w
0	21	84
1	20	82
2	19	80
⋮	⋮	⋮
6	15	72
⋮	⋮	⋮
15	6	54

Way too big.

Skip a few

Skip more

II (Keep it 54 wheels)

x	y	w
0	13.5	54
1	13	54
3	12	54
5	11	54
⋮	⋮	⋮
15	6	54

Can't have half a skateboard

Trade 1 skateboard for 2 bikes

Keep counting until adds to 21

3. Are there any equations you could write that would help solve this problem? Be sure to write what your variables stand for.

$x = \# \text{ of bikes}$ $x + y = 21 \leftarrow \# \text{ of vehicles}$

$y = \# \text{ of skateboards}$ $2x + 4y = 54 \leftarrow \# \text{ of wheels}$

4. Is there anything unrealistic about this problem?

Bikes & skateboards have different types of wheels

5. Imagine the problem is slightly different. You now know there are 54 wheels in the repair shop, but you don't know the number of bikes and skateboards. How will this change the solution?

There is more than one way to have 54 wheels. Multiple solutions.

6. Find a combination of bikes and skateboards that has 54 wheels. Is your combination the only solution?

15 bikes & 6 skateboards.
27 bikes & 0 skateboards.

7. List all possible solutions that have 54 wheels.

	2 bikes	(27, 0)	(21, 3)	(15, 6)	(9, 9)	(3, 12)
Trade for 1 skateboard	skateboard	(25, 1)	(19, 4)	(13, 7)	(7, 10)	(1, 13)
		(23, 2)	(17, 5)	(11, 8)	(5, 11)	

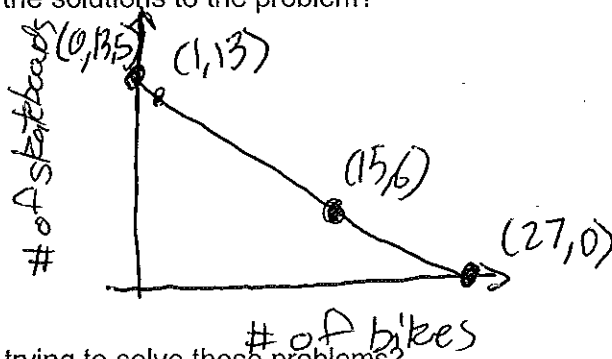
8. Is there an equation that would help understand this problem?

$2x + 4y = 54$ OR $4y = 54 - 2x$
OR $2x = 54 - 4y$ OR $x = 27 - 2y$

9. Is there a visual way to represent all the solutions to the problem?

With a graph!

A graph is a picture of all solutions



10. What mistakes did you make when trying to solve these problems?

Mixing up x & y
Trading bikes for skateboards wrong.

11. What lessons can you take away from solving these problems?

Start with a guess & find a pattern.