Mr. Hershey's Valentine's Day Mishap

Mr. Hershey has a big problem! It's Valentine's Day and his factory is in complete chaos. Apparently Mr. Godiva and Ms. Dove snuck in and sabotaged all the candy machines. Many machines were beyond repair; however, machines 4, 12, 37, 30, 36, 45, 75, 100, 500, 1000 were fixable. The problem is that their gears are missing. Replacement gears are available but only those labeled with prime numbers. Can you help Mr. Hershey fix his machines in time to save Valentines Day?

Step 1: Rebuild all of the Machines

- Each gear has a multiplying effect on each other and should match up with the machine's label.(Ex. 2x2x3 would connect to Machine #12)

#12

- Don't forget, always connect the largest gear/s to the machine first and then work your way down.
- Mr. Hershey only has two hours left to run his machines before its bye bye Valentine's. You will need to decide which machines Mr. Hershey has time to run before his deadline. (Which machines will run in 2 hours or less?) Each gear a machine requires adds an hour to its run time. Record the sequence of gears for each machine on your Data Collection Chart and then fill out Run-Time Chart 1. (Machine #12 has been filled in for you.)

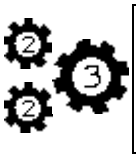
Run-Time Chart 1

Run-Time in Hours	Machine #'s
1	
2	
3	#12
4	
5	
6	

How many machines will make the deadline?

Step 2: Streamline the Whole Process

- That's not enough machines! You will have to find a more efficient method.
- You almost forgot, you can combine cogs of the same "size" to run together thus allowing multiple cogs to run in a shorter amount of time. (Ex. $2x2x3=12=2^2x3$, "2x2x3" would take three hours while "2^2x3" would only take two hours). Fill out the new gear sequence on your Data Collection Chart and fill out the new Run-Time Chart below
- Once you have completed the charts and answered the question below, proceed to Step 3.



#12

Run-Time Chart 2

Run-Time in Hours	Machine #'s
1	
2	
3	
4	
5	
6	

How many Machines will make the deadline?

Data Collection

Step 1:	Step 2:	Machine #
		4
2 x 2 x 3	2^2 x 3	12
		27
		30
		32
		36
		45
		75
		100
		500
		1000

Bonus Section

Step 3: To build the better candy machine.

- Now that you saved Mr. Hershey's factory, it's time for a vacation right? Nope, you did such a great job that Mr. Hershey is ready to put you back to work. It's time to stock up for Easter. He needs bigger and faster machines to meet the demand.
- Right now the most efficient machine is Machine #1000, which you found out runs in just two hours and pumps out 1,000 candies in that time. (Note: Machine # = # of candies produced)
- Design the most efficient machine possible that will pump out between 1,001 and 5,000 candies. To cut the cost of production, try and build a machine doesn't have to combine cogs of the same size(has no exponents). The machines you have worked with so far have only used gears 2, 3, and/or 5. You will have to use larger gears but don't forget, only prime numbered gears are available.

1001 – 5,000

Draw a diagram of your machine.
(Similar to the example of Machine #12 above)

How many candies will your machine put out? _____

How long does it take your machine to run? _____

- Think you've got it? Now try the same thing between 5,001 and 10,000.

5,001 – 10,000

Draw a diagram of your machine.
(Similar to the example of Machine #12 above)

How many candies will your machine put out? _____

How long does it take your machine to run? _____