Wonder Project

Water Challenge

Activity 5.1: Improve

Pool together your challenge knowledge to improve your wai network before you join the journey.

STEM superstars are always testing and improving their mahi to find the best solution. It's called iterative thinking.

Manning's equation

$Q = a \times 1.486/n \times R^{2/3} \times \sqrt{S}$

Remember this jumble of letters and numbers? It's the equation by our hoa (friend) Robert Manning that tells us lots of helpful things about what impacts the flow of wai in pipes.

Write down the factors you remember that impact the flow of wai:

I wonder how to make our network even better?

Using your challenge knowledge, Manning's equation, and data from activity 4.2, do a final analysis to decide how you'll improve your prototype. You could think about:

- Pipe internal diameter, length and number
- Number of connectors
- Network elevation, gravity and flow
- How you'll protect the mauri of wai

We will improve our network by:

How will our improvements impact our network's performance?

Our conjecture:

Improve

Improve your wai network to try and solve your challenge scenario. Change one thing each time and then test your network – recording your results in the test tracker.

Test tracker

Test	Improvement	Result						
		Hapori connection point 1			Hapori connection point 2			Observations
		Wai supply (% and ml)	Flow time (s)	Flow rate (ml/s)	Wai supply (% and ml)	Flow time (s)	Flow rate (ml/s)	
Ex.	*Added more pipes leading to the fire station.*	*Fire station: 25% 125ml*	*45s*	*125/45= 2.78ml/s*	*Whare: 75% 325ml*	*20s*	*325/20= 16.25ml/s*	*Water flowed too quickly to the fire station.*
1								
2								
3								
4								
5								

Analysis

What did you learn from your tests?

What changes worked well? What didn't work well?

Does this result match your conjecture? Why/why not?

Don't waste the wai you send through your network!
You can add the same wai to your network in later tests.