



Fitness Tracking

This is a maths activity to be done after or in parallel with the science activity ‘Preparing for space: weightlessness’ in the ‘Gravity and weightlessness’ section.

<p>Curriculum</p> <p>Key links</p>	<p>KS2 Pupils should be taught to use simple formulae.</p> <p>KS2 Generate and describe linear number sequences</p> <p>KS3 Model situations or procedures by translating them into algebraic expressions or formulae and by using graphs</p> <p>KS3 Interpret mathematical relationships both algebraically and graphically</p> <p>KS3 Use compound units such as speed (fitness/time)</p>
<p>Learning objective</p>	<p>At the end of this activity pupils will be able to interpret graphs showing rules generated by live data.</p>
<p>Age range</p>	<p>9-12 years</p>
<p>Time required</p>	<p>One lesson to set up. Then 10 minutes once a week over a sustained period e.g. two months.</p>
<p>Equipment required</p>	<p>HP Prime software and/or calculators or other statistical graphing software. Equipment for fitness tests.</p>
<p>Extension activities</p>	<p>Consider you food intake and requirements to maintain or lose weight. Naturally, this requires very high sensitivity.</p>





Astronauts need to be very fit. They are working very hard all throughout their missions. On the international space station, there is no gravity. We keep our muscles working all the time pushing against the force of gravity just by walking, moving about, lifting things etc. On the ISS, astronauts do not do this. If they did not exercise hard to make up for it, then their muscles would waste away.

The astronauts have a medical team working with them to keep them fit. Each astronaut is set personal targets according to their individual needs. They monitor these targets to see if they are doing better or less well than they had planned.

Exercise maintains a healthy body, and it consumes energy. The balance is between getting fit and staying fit and losing weight. An astronaut does not need to lose any weight! They need to eat enough to fuel the work and exercise that they do.

TEACHER'S NOTE:

The activity is designed for students to generate information that will show up on a graph that they can then make sense of. We can compare a target graph with a 'best fit' graph made with our data. The activity describes an example showing how to use the technology. Measuring pupil's personal information is very sensitive, so we suggest different types of data to collect so everyone can be different.

RESOURCES:

1. A student support sheet with the outline of the project and the example with instructions for creating a graph on the HP Prime.
2. A presentation with two visual prompt slides.
3. An HP Prime will be needed to generate the graphs and do the tracking.

WEB LINKS:

Web links are shown throughout the description of the activity where they are needed.





ACTIVITY: A 'FITNESS' PLAN

A: OUTLINE

1. Decide on a way to measure 'fitness'.
2. Decide how long you will run your plan for?
3. Set a target for your fitness at the end of the plan.
4. Decide on your keeping fit activities.
5. Measure your fitness regularly.
6. Compare your change in fitness with the change needed to meet your target.
7. Make changes to your activities if needed.

B: FITNESS MEASURES.

It is very important to choose a measure that is fun and suits you. It is doubly important that you are not competing against anyone else!

There are good mental fitness measures you can use.

See here: <http://www.humanbenchmark.com/>

There are good physical fitness measure you can use.

See here: <http://bit.ly/1FvPGbi> and <http://bit.ly/1Jycxhf>

Recovery heart rate is simple and fun, but is not accurate in children. However, for this activity it would be fine. See here: <http://bit.ly/1YK0IFf>



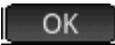


C: MONITORING AND TRACKING EXAMPLE

Using the reaction timer test on *humanbenchmark*, the very best performers can reach 100ms. My first attempts were about 350ms. I will work on this for two months and set a target of 150ms. I will practice improving my reaction time using a reaction timer app on my mobile phone for 5 minutes a day. I will measure my 'fitness' once a week.

Get started tracking when you have made your second measurement!

On the HP Prime

1. Press Apps 
2. Click the Statistics 2 Var(iable) App  icon
3. On the screen click **Reset** then **OK** then **Start**   
4. Column C1 is for the weeks you measure. Column C2 is for your measurements. Column C3 is for your target which starts in week 1 and finishes in week 8. Column C4 is for your start and target to compare.

Statistics 2Var Numeric View				
	C1	C2	C3	C4
1	1	350	1	350
2	2	320	8	150
3				

1

Edit More Go To Sort Make Stats

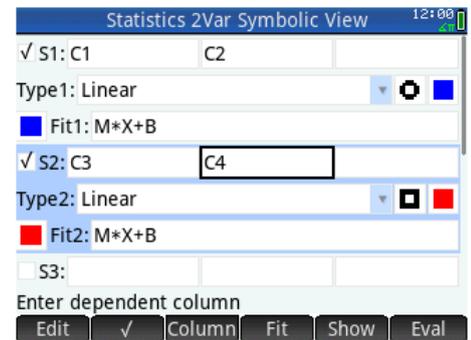
5. Set up the graph to look nice in the screen. Press   and enter these values. (You will need to change the 100 and 400 values to suit the fitness measure you are using. 100 is a bit below the target and 400 is a bit above the starting measurement).

Statistics 2Var Plot Setup	
X Rng:	0 10
Y Rng:	100 400
X Tick:	1
Y Tick:	1
Enter minimum horizontal value	
Edit	Page 1/2





- Press **Symb** to select the columns to shop. C1 and C2 are already selected as a blue line S1. So click in the spaces next to **S2**: press Column and choose columns C3 and C4 for the red line.



- Press **Plot** to look at the graph. On screen click **Menu** then **Fit**.

That's good! The red line is my target and the blue line is the rate I am improving at. So, I am doing better than my target.

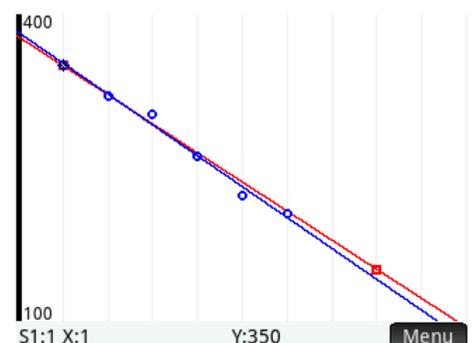
When I have taken more measurements, I can enter them into the table.



- Press **Num** to enter more data.

	C1	C2	C3	C4
1	1	350	1	350
2	2	320	8	150
3	3	302		
4	4	261		
5	5	223		
6	6	204		
7				

- Press **Plot** to look at the graph again. It looks like I'm just going to beat my target!





D: SOME QUESTIONS TO ASK WHEN THE EXPERIMENT IS OVER.

- By how much did a beat/miss my target?
- How much did I need to go down (or up) by each week to meet my target?
- (KS3) Write a rule to work out where you should be at a given week.
Write it in words, then write it in algebra using a letter for the week number.

Reaction Time Rule

My first time was 350ms and my target was 150ms. I needed to go down by 200ms in 8 weeks. That is $200 \div 8 = 25$ ms every week.

So my rule is: start at 350 and go down 25ms per week. The **rate** of decrease is 25ms/week.

In algebra, I can use the letter w for the number of weeks and T for my target in that week.

$$T = 350 - 25w$$

