

Biorhythms



Student Activity

7 8 9 10 11 12



TI-Nspire



Investigation



Student



30 min

Introduction

Ever had one of those days when you wake up feeling lethargic, mentally drained or seem to catch every cold going around. Alternatively some days you wake up feeling bullet proof, full of energy and shooting goals like a professional or smashing through your personal best times. What causes us to move between these extremes, is it diet, sleep or some sort of circadian rhythm?

In the 1890s a German doctor, Wilhelm Fliess, observed similar events when monitoring his patients. Some were depressed one week and fine the next; some seemed to be immune to the cold of the moment and yet caught everything two weeks earlier. Fliess started recording how his patients felt to see if there was a pattern.



The statistics he gathered led him to believe he had discovered certain cycles (rhythms) that were fundamental to a person's life. He theorised that everyone has internal clocks that start at birth and continue until they die. The two clocks he proposed were a 23 day cycle that influences physical condition, the other, a 28 day cycle influencing emotions.

In the 1920s, Alfred Teltscher, an Austrian engineering teacher, added the 'mind' (or 'intellectual') period of 33 days (which completes what is known as the three primary cycles (physical, emotional and intellectual), based upon his observation that his students' work followed a 33-day pattern.

More recently the 38-day intuitional cycle, the 43-day aesthetic cycle, and the 53-day spiritual cycle have been added. Some claim there are cycles that are combinations of the three primary cycles. The passion cycle is the physical joined with the emotional cycle. The wisdom cycle is the emotional joined with the intellectual cycle. And the mastery cycle is the intellectual joined with the physical cycle.

Having said all that, and for all the prophetic studies, Biorhythms is not exactly a science. Whilst our bodies do have naturally occurring cycles that help explain things like 'jet lag'; events such as feeling down are statistically in line with natural probability and more accurately aligned with diet and physical activity. For the sceptics, cynics and realists, you can put the study of Biorhythms on the bookshelf somewhere between "Astrology – a self-fulfilling prophetic vagueness" and "Where to find the Pixies, Gnomes and Fairies in your Garden".

Despite the scientific inaccuracies presented by Biorhythms, they're fun to calculate. In this activity you will be required to graph each of the following cycles:

- Intellectual
- Emotional
- Physical

Preparation cycle:

This is not a new cycle, rather the basic computations required to commence calculations and preparations for the determination of each 'cycle' equation.

Question: 1

Determine the number of days that you have been alive as of today. You can use a spreadsheet, Google or you can use your calculator!



Use the dbd() command in TI-Nspire. (dbd = **D**ays **B**etween **D**ates)
The syntax is as follows:

$$\text{dbd}(\text{MM.DDYY}, \text{MM.DDYY})$$

Example: How many days between August 27th 1998 and October 9th 2015:

$$\text{dbd}(08.2798, 10.0915) = 6252$$

Question: 2

Determine the number of days you have progressed into each cycle. (Use modular arithmetic)

- Intellectual 33 days
- Emotional 28 days
- Physical 23 days



Modular arithmetic is a great way to find the remainder of a division problem. Suppose you were asked: "What will the time be 49 hours from now? Common sense would say ... "add one hour to the current time" since $49 = 2 \times 24 + 1$. We're not interested in the number of days elapsed, just the time.

Using modular arithmetic this would appear as follows:

$$\text{mod}(49, 24)$$

The '**mod**' command can be found in the calculator menu: Number – Number Tools - Mod

Question: 3

The period of the function $p(x) = \sin(x)$ is 2π . (Radians) What would be the period of the function: $f(x) = \sin(2\pi x)$?

Question: 4

What would be the period of the function: $f(x) = \sin\left(\frac{2\pi}{17}x\right)$?

Question: 5

Given $p(x) = \sin\left(\frac{2\pi}{13}x\right)$ and $q(x) = p(x-3)$, sketch both graphs on the calculator and describe the graph of $q(x)$ in relation to $p(x)$.



The **Window** settings for the Biorhythms questions should be:

Xmin: -1

Xmax: 62

Xscale: 7

Ymin: -3

Ymax: 3

Yscale: 1

The **Document** or **Graphs & Geometry** settings should have the angle set to **Radians**.

Intellectual cycle: (33 days)

Question: 6

Write down the equation for your intellectual cycle? (With today representing: $x = 0$)

Question: 7

How many days until your next 'most intellectual' day?

Emotional cycle: (28 days)

Question: 8

Write down the equation for your emotional cycle? (With today representing: $x = 0$)

Question: 9

A critical day (good or bad) is when your cycle passes through zero. When are your next two emotionally critical days?

Physical cycle: (23 days)

Question: 10

Write down the equation for your physical cycle? (With today representing: $x = 0$)

Question: 11

If you're most likely to catch a cold during the lowest four days of your cycle, determine the dates during which this will occur.

Well Being

Question: 12

If awesome days occur when the sum of all three cycles produce a total greater than 2, determine approximately how many of these days you should experience in a year.

Question: 13

The 'wisdom' cycle is the sum of the intellectual and emotional cycles. Graph the sum of these two cycles over a two year period. You will notice it appears to be cyclic. Estimate from the graph how many days over which the graph cycles (period) and compare this to the calculated period. Explain why these amounts are so different.

Question: 14

A zero day is when all cycles are set to zero and are just commencing. How old is a person when they experience their second zero day? (The first one occurs when you are born)

