# CIRCULAR FUNCTIONS
APPLICATION TASK

Due Date: _____

Biorhythms

It is believed that your body's activities perform in definite cycles or rhythms. There are three types of cycles: emotional, physical and intellectual. Every cycle has good days, low days and critical days and the cycles continue from birth to death. It is believed that at the high points of your cycle you are at your best. These are days when athletes run their best times. The low points are not bad days but days when your mind and body are at rest. The critical days are the days when the cycles hit the horizontal axis. These are the days to be careful of.

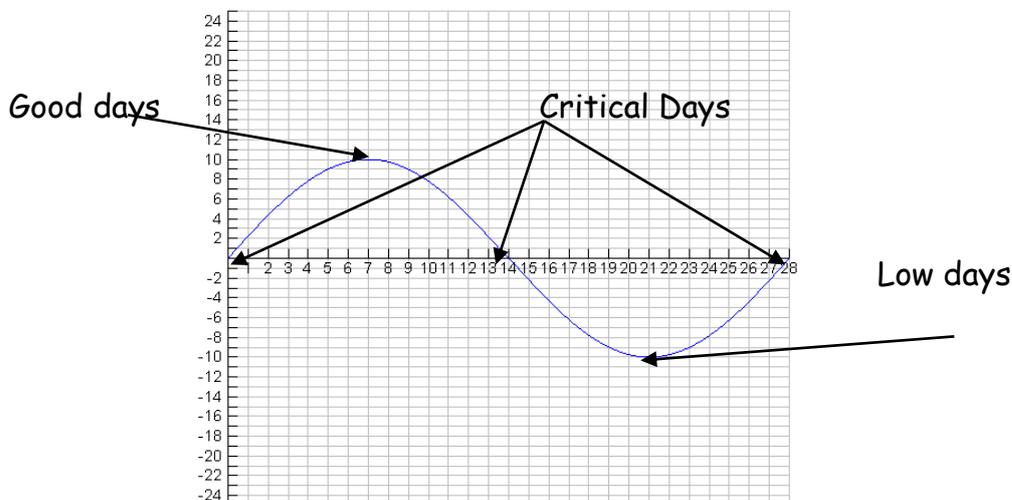### Intellectual Cycle
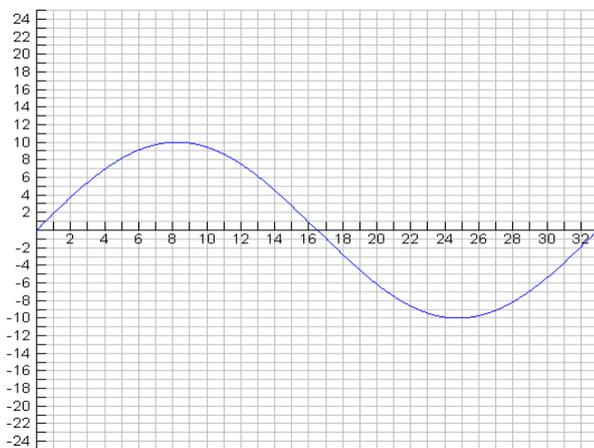
Physical Cycle
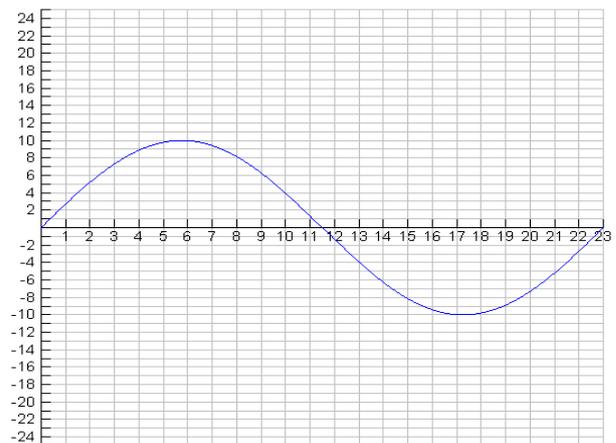
This cycle determines your memory, alertness and reasoning ability

This cycle determines your strength, endurance and energy on any given day.

Emotional Cycle

Good days

Critical Days

Low days

This cycle determines your happiness, sadness, moodiness and creativity.

Part A
1. State the equations for each of the biorhythm graphs shown:

Intellectual:_____

Physical:_____

Emotional:_____

For women the emotional cycle has twice the intensity of the other two cycles (dilation of 2 in the direction of the y-axis) and for men the physical cycle has twice the intensity.

Your Biorhythms

All cycles begin from the day you were born. The first step is to find out how many days you have been alive.

Use the attached spreadsheet and enter your DOB. You can calculate how many days you have been alive till 'today'.

How many days have you lived till today?
Results

- If your birthday is Oct 6, 1995.
- If today is Jul 23, 2012.

    (Next birthday is after 75 days)
- The person has lived for **6134** days.(**D**)

    (16 years 9 months and 15 days)

Calculate where you are in Each Cycle

| Divide D by 23 (physical cycle) |
| Ignore the whole number part (subtract it) |
| Multiply what's left by 23, and round to the nearest integer |
| Repeat the above by for the emotional cycle (divide by 28) |

Repeat the above by for the intellectual cycle (divide by 33)

(See the Example at the end if in doubt).

Part B
Modelling the Cycles

1)   What is the amplitude of your   (i) emotional cycle?

                                             (ii) physical cycle?

                                             (iii) intellectual cycle?

2)   Starting from September 6th and over a domain of 66 days, draw a graph of each of your biorhythm cycles on the same set of axes. You may use a graphing package like Graphmatica or FX – Draw or similar.*

3)   Determine three equations that would accurately model your emotional, physical and intellectual cycles using $y = a\sin[n(x-h)] + k$

4)   What dates are your good days, low days and critical days for each of the graphs?

5)   Describe your emotions on 10/9/14?

6)   What is the first date that you will have an intellectual level of 8.8?

Part C
The Composite Graph

The composite graph is determined by adding all three cycles together, this process is called "addition of ordinates" and is calculated by adding corresponding y-values and plotting the results.

On days where the composite graph has critical days pilots are not allowed to fly, train drivers are not allowed to drive….

1) To create the composite graph we add the y values of each graph together and plot these points. You can complete a table similar to this for every 4 days.

Date	6/9/16	10/9/16	14/9/16						
Day	0	4	8						
Physical	5								
Emotional	7								
Intellectual	3.5								
Total	15.5								

(Use Table on your calculator to get the required values for all 3 functions).

2) Draw your composite graph on Graphmatica by entering the sum of all three functions.

3) By determining your good, low and critical days interpret your composite graph.

4) Which days should you stay in bed? Which days will you be at your best?

More information about biorhythms can be found by doing some research on the topic on the Internet.

*Download Graphmatica or FX-Draw from the network if it is not installed on your laptop.

Examples of calculations:

Taking D = 6134

Physical cycle:

$$\frac{6134}{23} = 266.69565$$
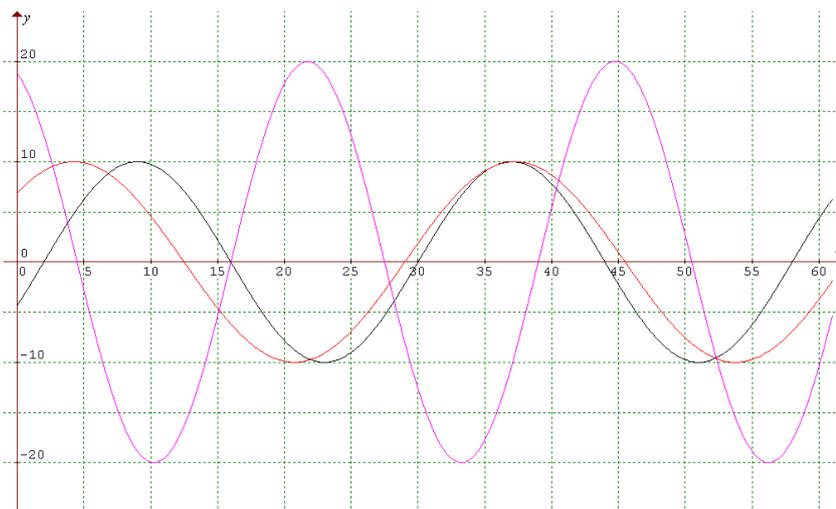
$$266.69565 - 266 = .69565217 \times 23 = 16$$

Therefore the physical cycle will have the equation: $y = 20\sin[\frac{2\pi}{23}(t-16)]$

Similarly the other two cycles will be:

Emotional: $y = 10\sin[\frac{2\pi}{28}(t-2)]$

Intellectual: $y = 10\sin[\frac{2\pi}{33}(t-29)]$

The three graphs were drawn in Graphmatica as below:

To enter equations in Graphmatica over the specified domain type:

$y = 10\sin(2pi/28)*(x-2))\{0,61\}$

You can annotate your graphs, use colours etc. Just play with the software to examine its possibilities.

The Composite Graph (Task 3) for the above Example drawn in Graphmatica is shown below: