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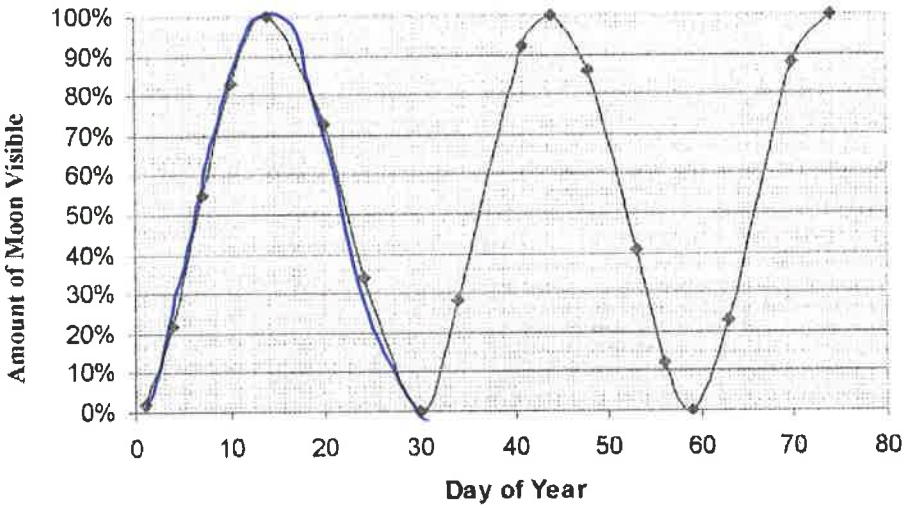
# Periodic Functions and their Characteristics

A periodic function is a function that repeats itself in a pattern or cycle.

A cycle is... one complete pattern of y-values

A period is... length of one cycle.

Consider the periodic function below. It tells you what percentage of the moon is visible based on the day of the year.




1) Trace one cycle on this function.

2) What is the period of this function? 30 days

3) What is the range of this function? $\{y \in \mathbb{R} \mid 0 \leq y \leq 100\%\}$

When working with periodic function we also talk about the following characteristics

4) **Amplitude** = $\dfrac{\textbf{maximum value} - \textbf{minimum value}}{2}$

$= \dfrac{100-0}{2}$

$= 50$

5) **Equation of Axis:** $y = \dfrac{\textbf{maximum value} + \textbf{minimum value}}{2}$

$y = \dfrac{100+0}{2} \quad y = 50$

Calculate these values for the graph above.

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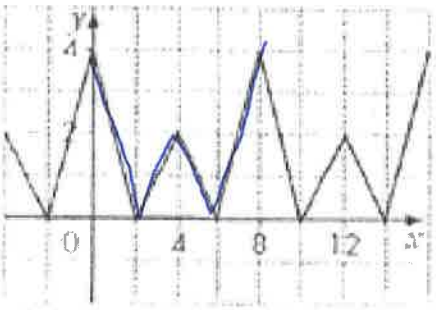
**Example**: Which of the following are periodic functions?

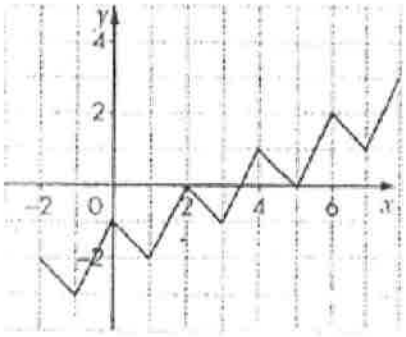



periodic

period = 8

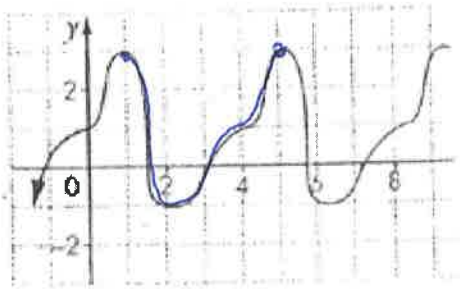
amplitude = 2

axis at $y = 2$




Not periodic

(y-values are increasing)




periodic

period = 4

amplitude = $\frac{3-(-1)}{2}$

amp. $= 2$

axis at $y = \frac{3+(-1)}{2}$

$y = 1$

*Find the period, amplitude and equation of axis for the functions that are periodic above.*

**Text page 235 #1, 2, 3, 6 and page 263 #14a**

**Text page 246 #9d- g (find all angles between 0 and 360), 10cf, 13, 18 (hint for 18 – draw a picture)**