Engineering Maths Tutorial 5

1) The horizontal displacement of a pendulum in a grandfather clock (in cm) is given by $d = 6\sin\left(\pi t + \frac{\pi}{2}\right)$ (t in seconds). State the:

   a) Amplitude

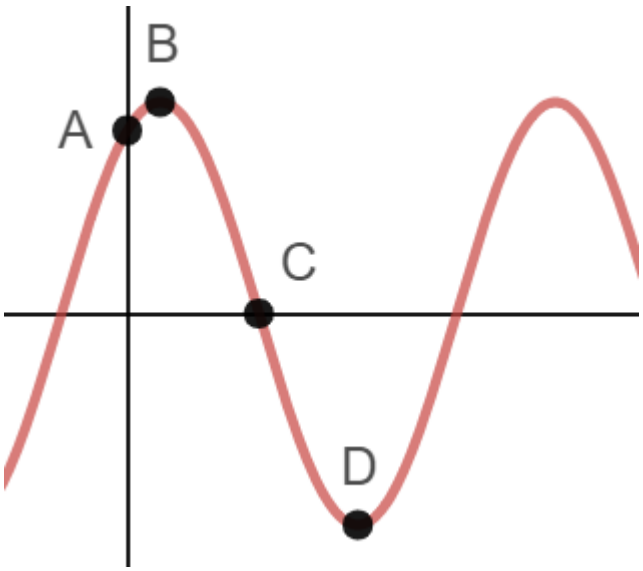
   b) Period

   c) Frequency

   d) Phase time

   of the motion.

2) The graph of $y = 10\sin\left(2\pi x + \frac{\pi}{3}\right)$ is drawn below. Find the coordinates of A, B, C and D:



3) a) The percent of the moon illuminated on day $t + 1$ in April 2018 is given by $M = 50 + 50\cos(0.217t)$. ($M = 0\%$ is the New Moon, $M = 100\%$ is the Full Moon).

   i) On what day(s) in April 2018 is there a Full Moon?

   ii) What percentage of the moon do you expect to be illuminated on April 10th?

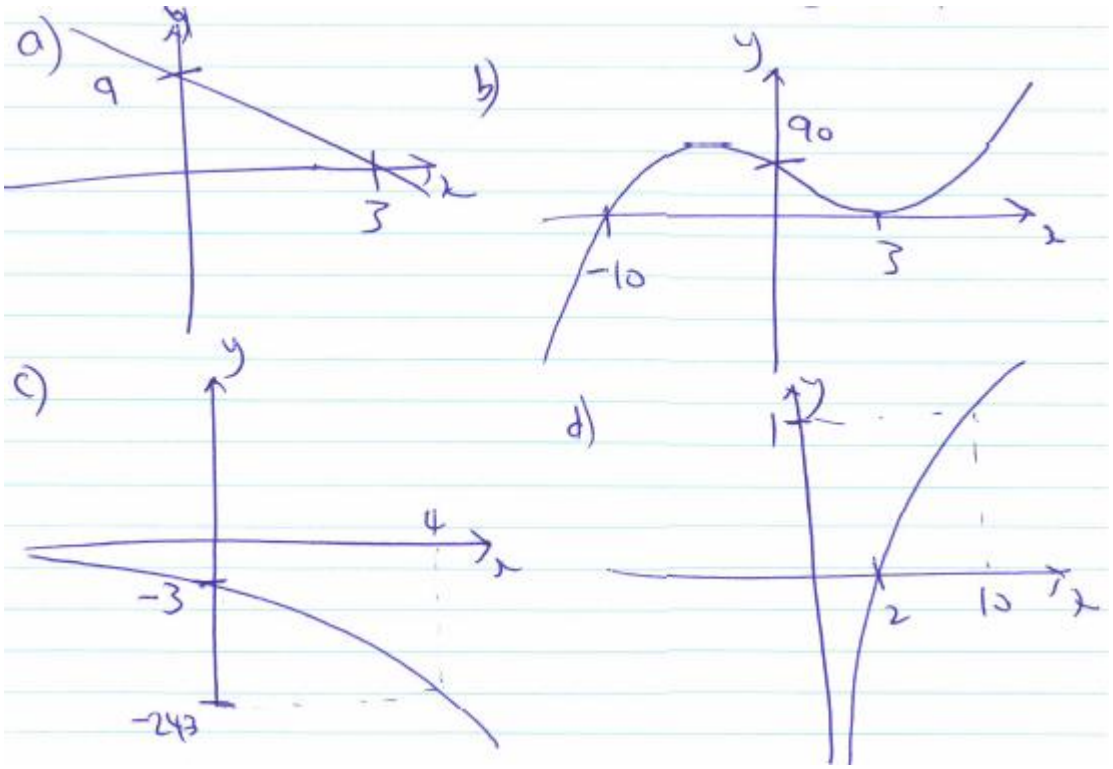
   b) The number of hours of daylight on day *t* of the year is given by

   $H = 12.1 + 2.6\cos(0.172[t + 10])$ for Hamilton.

   i) How many hours of daylight do you expect there to be on March 23td?

ii) On what days of the year (you don't have to find the exact date) are their exactly 10 hours of daylight?

4) Find equations of the following graphs



5) For the straight line $6x - 4y = 30$, find:
   a) The *x*-intercept
   b) The *y*-intercept
   c) The gradient

6) For the parabola $y = x^2 + 14x + 40$, find
   a) The *y*-intercept
   b) The *x*-intercepts
   c) The axis of symmetry

7) If the area of the shape below is 5 m^2, find x. NOTE: Diagram **NOT** to scale!