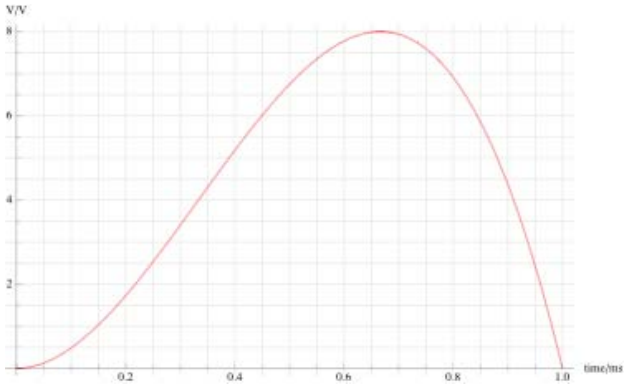
Extension Worksheet – Option F, Worksheet 2

1 The graph shows the variation with time (in ms) of the voltage of an analogue signal.

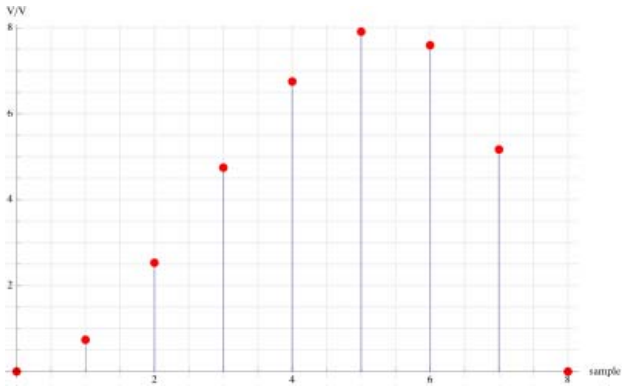


a State what is meant by an analogue signal. [1]

The signal is sampled with a sampling frequency of 8.0 kHz and the samples are converted into 3 bit binary numbers according to the following scheme:

Analogue signal voltage	PAM signal voltage
[0,1)	0
[1,2)	1
[2,3)	2
[3,4)	3
[4,5)	4
[5,6)	5
[6,7)	6
[7,8)	7

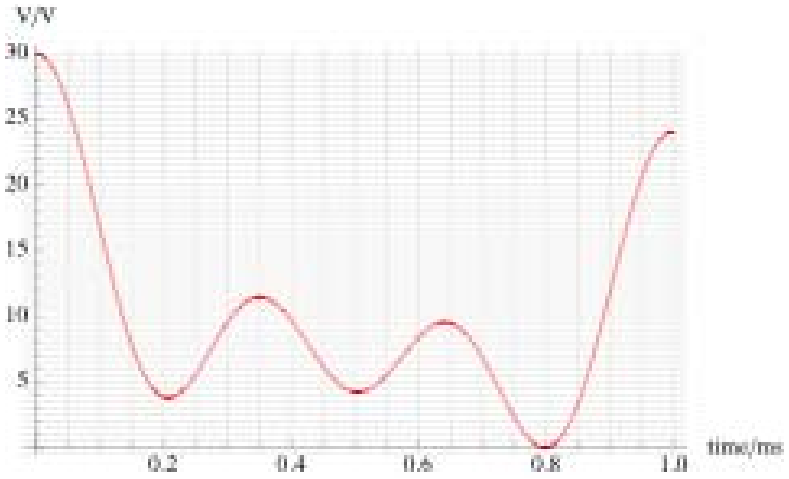
The **first** sample is taken at time zero. The diagram shows the samples at the 8 sampling times.



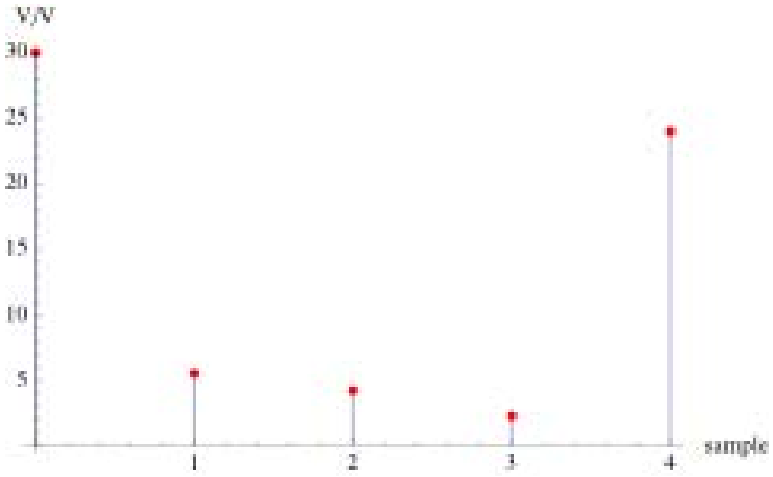
b State the binary number that corresponds to the **fifth** sample. [2]

c State and explain one advantage and one disadvantage of using a higher sampling frequency. [4]

2 The graph shows the variation with time (in ms) of the voltage of an analogue signal.



The signal is sampled five times in the interval from $t = 0$ to $t = 1.0$ ms (beginning at $t = 0$). The samples are shown below.



a Calculate the sampling frequency. [2]

b Suggest why, for the purpose of reconstructing the original signal, this is not an appropriate sampling frequency. [2]

c State and explain a value of an appropriate sampling frequency. [2]

d State and explain the minimum number of bits in the binary number that should be used to represent each sample. [3]