

Exercise 4	Calc. : 🗡
The height of water in a harbour is modelled by the function h defined by	
$h(t) = 2\sin\left(\frac{\pi}{6}t\right) + 3,$	
where t is the time in hours and $h(t)$ is the height in metres.	
a) Determine the maximum height of the water in the harbour.	1 mark
b) Determine two different values of the time t , when the water is at its highest level.	2 marks
c) On graph paper, draw the graph of the function h for t between 0 and 16 hours.	2 marks
Use 1 cm for 1 hour on the x-axis and 1 cm for 1 metre on the y-axis.	

Exercise 5		Calc. : 🗡
a) The number of plants of a certain species can	be modelled by the function A , given by	
A(t) =	$a \cdot b^t$	
where a is the initial number of plants and t is	the time in years.	
It is given that $\frac{A(1)}{A(0)} = 0.98$.		
Determine b and explain its meaning in this	s context.	2 marks
b) Now consider the population of a second speci- per year. The initial number of plants of this s	es, which decreases at a constant rate of 10% species is 500.	
Determine which one of the following formulae describes the number $B(t)$ of plants of this species after t years.		1 mark
Option 1: $B(t) = 500 \cdot (-0.10)^t$ Option	tion 2: $B(t) = 500 \cdot (1.10)^t$	
Option 3: $B(t) = 500 \cdot (0.90)^t$ Opt	tion 4: $B(t) = 500 - 0.10 \cdot t$	
c) The number of plants of a third species can be modelled by the function C defined by		
$C(t) = 400 \cdot (0.85)^t$, where t is the time in years.		
Using this model, describe how the number of	f plants evolve over many years.	2 marks

Exercise 6	Calc. : 🗡
A multiple-choice test consists of 4 questions. Each question has three possible answers, with	
only one answer being correct.	
One student answers each question at random.	
a) Calculate the probability that the student will answer all 4 questions correctly.	1 mark
	0 1
b) Calculate the probability that the student will get at least one correct answer.	2 marks
c) Determine the expected value of the number of correct answers obtained by the student.	2 marks

Exercise 7	Calc. : 🗡
400 patients have volunteered to take part in medical research.	
153 patients were treated with medicine A, 53 of them were cured.	
247 patients were treated with medicine B, 117 of them were cured.	
A patient is chosen at random.	
Given that the patient is not cured, determine the probability that the patient was treated with	5 marks
medicine B.	

Exercise 8	Calc. : 🗡
5 different books are placed on a shelf.	
a) Calculate the number of ways in which these books can be arranged.	1 mark
b) There are 2 mathematics books and 3 physics books.	
Calculate the number of ways in which the books can be placed on the shelf, if the mathematics books must be together and the physics books must be together.	2 marks
c) Claude would like to borrow any 2 of the 5 books.	
Calculate the number of different pairs of books Claude can borrow.	2 marks

Exercise 9	Calc. : 🗡
In a marine research study, the length of fins of a certain species of sharks is found to be normally	
distributed with mean $\mu = 120$ cm and standard deviation $\sigma = 15$ cm.	
Researchers plan to place a tracking device on a single shark for the study. For the tracking	
device to fit securely, they should select a shark with a fin length greater than 135 cm.	
The researchers isolate the sharks with a fin length above the mean and select one of these at	
random.	
Determine the probability that the device will fit securely.	5 marks

 Calc. : X

 Match the following correlation coefficients with scatter diagrams below:

 a) r = -1 b) r = 0.92 c) r = 0.74 d) r = 0 e) r = -0.73

 and describe the type of correlation and the strength of the relationship.
 5 marks

 Figure 1
 Figure 2
 Figure 3
 Figure 4
 Figure 5