

Exercise 1

Calc. : ✗

A tetrahedral dice is labelled with four numbers: 1, 2, 3 and 4.
 The dice is thrown three times.
 Let X represent the number of times a 1 is obtained.
 Determine the probability distribution of the variable X and calculate its expected value.

6 marks

Exercise 2

Calc. : ✗

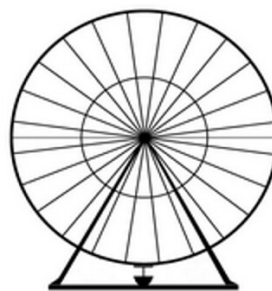
In a family of 4 people (two parents and their two children), each has a smartphone of the same make and model.
 The probability that this “basic” model will fail during the year is 20%.
 Calculate the probability that exactly two of the members of this family will have their smartphone fail during the year.

6 marks

Exercise 3

Calc. : ✗

The graph below shows the height above the ground of a cabin on a Ferris wheel as a function of time.
 The Ferris wheel takes 5 minutes to complete one full rotation.
 The cabin follows a circular path between the heights of 0 m and 65 m above the ground.



1. **Determine** the coordinates of points A and B on the graph above. 2 marks
2. **Explain** how the graph would change if the Ferris wheel were to take 10 minutes to complete a circuit. 2 marks
3. **Describe** any limitations of this model when applied to the practical situation. 2 marks

Exercise 4

Calc. : ✗

For each of the situations A to E described below, state whether the model involves:

10 marks

1. (a) Growth
- (b) Decay
- (c) Neither

and whether the model is:

2. (a) Linear
- (b) Exponential
- (c) Quadratic
- (d) Sinusoidal

A: A population of 100 mice increases by 20% each week under favourable conditions

B: A tree which is 1.2 m tall when planted grows 30 cm each month during the growing season

C: The height, h , of a stone, t seconds after being dropped from the top of a tower is modelled by the function

$$h(t) = 130 - 5t^2$$

D: The number of daylight hours in Blankenloch varies periodically each year between 16 hrs 12 mins and 8 hrs 13 mins

E: The temperature, T , of a liquid, t minutes after being placed in a refrigerator, is given by the function

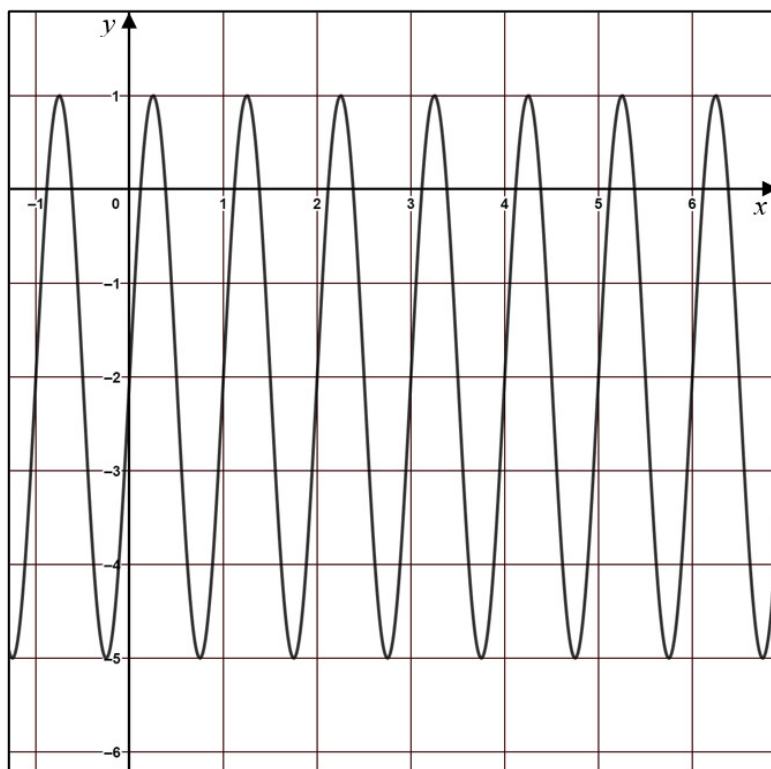
$$T(t) = 98 \cdot 2^{-\frac{t}{50}}$$

Exercise 5

Calc. : ✖

The diagram shows the graphical representation of a sine function, f .

7 marks



Determine the Amplitude (a), the Period (p), the Horizontal Translation (c) and the mean value (d) of the function f .

Use these values to **deduce** the equation of the function, $f(x)$.