## Pre-Leaving Certificate Applied Examination 2023

## Mathematical Applications (200 marks)

## Time: 2 hours

| Name: |
| :--- |
| School: |
| Address: |
| Class: |
| Teacher: |

## General Directions

1. Complete the box above with your details.
2. Write all answers in the boxes or spaces in this answerbook.
3. Show all necessary work in the space provided.
4. Calculators may be used.
5. Answers involving money should be given correct to the nearest cent, unless otherwise indicated.
6. There are 9 questions on this examination paper. Answer all questions. Questions do not necessarily carry equal marks.


## Question 1

A class holds a raffle to raise money for an overnight trip as part of their LCA programme. Tickets cost $€ 2$ each.


The prizes are:

- one prize of $€ 100$
- three prizes of $€ 20$ each.

The class sells 120 tickets in total for the raffle.
(a) (i) How much money does the class raise by selling 120 tickets?


It costs $€ 10$ to print the tickets.
(ii) Work out the total cost of running the raffle, including both the printing and the prizes.

(b) Ciarán buys one ticket.
(i) Write down the probability that Ciarán wins the $€ 100$ prize. Give your answer as a fraction.

(ii) How much money does the class raise in total for their LCA Task?


## Question 2

(a) A fair spinner has eight equal sections.
(i) What is the probability of landing on the letter $A$ ?

(ii) What is the probability of landing on the letter $B$ ?

(iii) What is the probability of landing on the letter $C$ ?

(iv) Put arrows on the scale to show the probability of landing on each of the letters $A, B$ and $C$ above.

Label each arrow with the correct letter.

(b) The graph shows the amount of money spent by the European Union in each of eight years.


(i) Which of these years was the first that over 100 billion euro was spent?

(ii) In which year did the amount spent fall?

(iii) $\frac{9}{20}$ of the amount spent in 2007 was on farming. How much was spent in 2007 on farming?


## Question 3

(a) The diagram shows a triangle $A B C$.

(i) Circle the correct word to describe triangle $A B C$.

Equilateral
(ii) Explain why you chose this word.

(iii) From the diagram above, write down

```
\angleABC=
```

(iv) Circle the correct word to describe angle $\angle A B C$.
Acute
Obtuse
Reflex
(v) Explain your answer.

(b) The diagram on the right shows three angles at a point.

(i) Calculate the value of $x$.

(ii) Work out the value of $x$ in the diagram below.

(iii) In the space below, draw a circle of radius $\mathbf{3} \mathrm{cm}$.
$\square$

## Question 4

(a) Liz earns $€ 550$ per week. Her rate of tax is $20 \%$ and she has tax credits of $€ 75$ per week.
(i) How much tax does Liz pay each week?

(ii) Liz also pays other deductions of €91.50 per week. Find her weekly take-home pay.

(iii) What percentage of her total pay does Liz take home each week?

(b) The number of goals scored by a Premier League football player in each month of the 2021/2022 season is shown in the table.


| Month | Sept | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| No of Goals | 3 | 6 | 8 | 5 | 4 | 3 | 3 | 4 |  |

(i) A journalist commented that the player scored 39 goals last season. Use this information to fill in the number of goals the player scored in May.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Answer: |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

(ii) Draw a trend graph to represent this information.


## Question 5

(a) Joe's pizzas are made in three different sizes.



Mini


Standard


Large

Joe puts olives on all his pizzas. The number of olives depends on the size of the pizza, as shown in the table.

| Size | Diameter, $\boldsymbol{d},(\mathrm{cm})$ | Number of olives, $\boldsymbol{n}$ |
| :---: | :---: | :---: |
| Mini | 20 | 8 |
| Standard | 30 | 18 |
| Large | 40 | 32 |

The relationship between the diameter of the pizza and the number of olives can be expressed by the formula:

$$
n=k d^{2}, \text { where } k \text { is a constant. }
$$

(i) Use a pair of values from the table to show that $k=0 \cdot 02$.

(ii) Joe decides to make a mega-pizza, with diameter 52 cm .

Use the formula to find the number of olives needed for a mega-pizza.

(b) Joe is asked to make a pizza in the shape of a square with sides of length 25 cm . He decides to use the same number of olives as would be needed on a round pizza with the same area.
(i) Show that the area of a square of length 25 cm is $625 \mathrm{~cm}^{2}$.

(ii) Assume the pizza is a circle. Show that a pizza with an area of $625 \mathrm{~cm}^{2}$ has a diameter of 28 cm , correct to the whole number. Use the formula $A=\pi R^{2}$.

(iii) How many olives will be needed to make a mega pizza?

(c) Joe's standard pizza boxes have dimensions as shown.

(i) What is the surface area of one box?

(ii) What is the volume of the box?


## Question 6

Cain and Torie go shopping in a store that is advertising the following:

```
    SALE
    20% OFF
ALL MARKED PRICES
```


(a) Torie buys a shirt marked at $€ 75$. How much does she pay?

(b) Cain saves $€ 17 \cdot 50$ on a pair of jeans. What does he pay for the jeans?

(c) Cain wants to make six cushions for the living room in his new flat. For each cushion, he will need a length of 75 cm of the material that he has chosen. The material costs $€ 6 \cdot 75$ per metre. How much will the material cost for the six cushions?

(d) Scott has bought a mobile phone for $€ 499$, and paid an initial connection fee of $€ 45$. He has agreed to pay the following charges:

| Monthly fee | $€ 35$ |
| :--- | :--- |
| Cost of a call | 29 cents for the first 30 seconds |
|  | 19 cents for every 30 seconds after that |

In the first year, Scott makes calls totalling €385.
(i) Calculate the total amount spent by Scott in the first year on this mobile phone, including all initial costs.

(ii) What is the cost of a 2-minute call on this mobile phone?

(iii) Scott makes a call that costs $€ 1 \cdot 24$. How long, in minutes, is Scott’s call?

(iv) In March, Scott makes 20 calls at an average cost of $€ 1.24$ per call. How much is Scott's phone bill for March?


## Question 7

(a) A real-estate agent charges the following fees for selling property:

- $3 \%$ of the first $€ 100000$ of the sale price;
- $1.5 \%$ of the remainder of the sale price.

In addition, there is a flat fee of $€ 750$ if the property is auctioned.
 Janet sells her house at auction for €360 000.
(i) What is the agent's fee?


The diagram shows the plan of a building site


What total area of land do the house and garage cover?

(ii) What percentage of the building site is taken up by the house and garage? Give your answer correct to 2 decimal places.

(iii) There is a brick wall, $\mathbf{9 0 0} \mathbf{~ m m}$ high, along the northern boundary of the building site. What is the area of the brick wall in square metres?

(iv) 500 bricks are needed to build 10 square metres of wall. How many bricks were used to build the wall in part (iii)?

(v) The guttering around the perimeter of the house is to be replaced. Guttering costs $€ 30$ per metre. How much will the new guttering cost?


## Question 8

In a game, the player going first uses crosses and the player going second uses circles. To win the game, a player must get three crosses or three circles together in a line. The line must be horizontal, vertical or diagonal.
(a) Here is the position in a game.


It is Amy's turn to put a cross on the grid. She wins if she puts a cross in B3.
(i) Write down all the other squares where she could put a cross to win the game.


Amy goes first in the next game.


Assume that she will choose a square at random.
(ii) Write down the probability that she will put her first cross in square F6.


In fact, Amy decides to put her first cross into a corner square.
(iii) What does this mean about the probability that she will put her first cross in square F6? Tick ( $\checkmark$ ) a box below

|  | It is smaller than the answer to part (ii). |
| :--- | :--- |
|  | It is greater than the answer to part (ii). |
|  | It is the same as the answer to part (ii). |

Give a reason for your answer.


## Question 9

(a) (i) Ryan invested €7,500 at $4 \%$ per annum compound interest. Find the amount of the investment at the end of two years. You should use the formula $F=P(1+i)^{t}$ in your calculations.


Darragh wanted to buy a particular bicycle. He checked its price in two bicycle shops. Firstly, in Buy-Cycles, the price of the bicycle before VAT was included was $€ 215$. The VAT rate was $20 \%$. Next, in Bikes-4-All, the normal price including VAT was $€ 330$, but there was a sale with a $25 \%$ reduction on the normal price.
(ii) Find the price Darragh would have to pay for the bicycle in each shop.

(iii) How much would Darragh save by buying the cheaper bicycle?

(iv) Darragh's aunt Breda lives in London and needs to take a trip to Ireland. Breda needs to convert $€ 350$ to pounds sterling. The exchange rate is $\mathbf{€ 1} \mathbf{=} \mathbf{£ 0 . 9 1}$ pounds sterling. Use this exchange rate to convert €350 to pounds sterling.

(b) When Breda arrived in Dublin, herself and Darragh went on a trip to Galway, leaving at 10:00 a.m. They returned home later that day. On the way, they stopped for a break in Athlone. The Distance-Time graph shows part of their journey, the journey as far as Galway.


Use the graph to answer the following:
(i) How long did Breda and Darragh spend in Athlone?

(ii) What is the distance from Dublin to Galway?


Breda and Darragh left Dublin at 10.00 a.m.
(iii) At what time did Breda and Darragh arrive in Galway?

(c) Breda and Darragh stayed in Galway for four hours and then returned home to Dublin. The return journey took $3 \cdot 5$ hours at a steady speed, without any break.
(i) Show this information on the Distance-Time graph on the previous page.

(ii) What was the average speed on the return journey?

(d) The cost of the fuel used by the car for the day trip was $€ 40$. What was the average cost, per km, of the fuel? Give your answer to the nearest cent.

(e) What time was it when Breda and Darragh arrived home?


Page for extra work.
Label any extra work clearly with the question number and part.


Page for extra work.
Label any extra work clearly with the question number and part.


## Blank Page

## Blank Page

