## Pre-Leaving Certificate Applied Examination 2022

## Mathematical Applications <br> (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.

ANSWER QUESTION ONE AND THREE OTHER QUESTIONS.
ALL QUESTIONS CARRY EQUAL MARKS.


## Question 1

(a) Find the value of $\sqrt{128}$, correct to 2 decimal places.

(b) Jamie has a gross weekly income of $€ 580$. Each week he pays $€ 55.52$ in income tax, $€ 21.88$ in PRSI, and $€ 18.40$ in USC. Calculate his net weekly income.

(c) The perimeter of a triangle is 50 cm . If two of the sides measure 22 cm and 12 cm , find the length of the third side.

(d) Convert $140^{\circ}$ Fahrenheit to Celsius using the formula: $C=\frac{5}{9}(F-32)$

(e) A regular unbiased die is rolled. What is the probability of rolling an odd number?

(f) 3 people travel 5 kilometres together in a taxi. The charge is $€ 1 \cdot 80$ per person, plus $€ 1 \cdot 10$ for each kilometre travelled. Work out the total cost of the taxi fare.

(g) A shop sells bags of crisps for 80 cent each, with a special offer of "buy 3 bags of crisps, get one free". A teacher buys a bag of crisps for each of her ten students. Work out the total cost of the ten bags of crisps.

(h) In a maths quiz, an easy question is worth 1 point, a hard question is worth 5 points and an extreme question is worth 7 points. If Joe answers 3 easy questions, 4 hard questions and 2 extreme questions what is his total score?

(i) A prize of $€ 300$ is divided between Anna and Sarah in the ratio 3:2. Calculate how much money each person gets.

(j) Find the value of $X$ in the diagram.


## Question 2: Research Element on Statistics and Probability

The pie chart shows the breakdown of the $€ 3600$ spent on a family holiday.
(a) How much was spent on food?


The stem and leaf diagram below shows the ages of 25 people who joined a gym over one weekend.

| 1 | 4 | 4 | 6 | 9 |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 2 | 1 | 3 | 7 | 7 | 7 | 8 |
| 3 | 3 | 6 | 6 | 7 | 9 |  |
| 4 | 0 | 2 | 3 | 3 | 8 | 8 |
| 5 | 1 | 3 | 4 | 7 |  |  |

Key: 5|1 means 51 years
(b) The gym randomly chooses a person who joined the gym that weekend to get a prize. What is the probability that the prize winner was under 30? (Give your answer in its simplest form.)

(c) The prize winner can choose one gym bag (out of 3), one t-shirt (out of 5) and one pair of gym shorts (out of 4). How many different combinations of prizes can the winner choose?


The histogram shows the number of seconds a group of 54 pupils take to solve a timed puzzle.

(d) What fraction of pupils took between 10 and 20 seconds to solve the puzzle?

(e) What is the least number of pupils who could have solved the puzzle in less than 12 seconds?


This scatter diagram shows the weights, in kg, and the heights, in cm , of 20 male athletes.

(f) What is the difference in height between the tallest and the shortest athlete?

(g) One athlete who is 175 cm tall is particularly heavy for his height.
(i) What is the ratio of his height to his weight? Give your answer in its simplest form.

(ii) What is his height in m ?


## Question 3

The Lightning Bus Company runs a bus service from Cork to Dublin three times a day, using the following timetable.

|  |  | Red Bus | Green Bus | Yellow Bus |
| :--- | :---: | :---: | :---: | :---: |
| Cork City | Depart | $08: 00$ | $12: 30$ | $18: 00$ |
| Fermoy | Depart | $08: 40$ | $13: 05$ | $18: 30$ |
| Mitchelstown | Depart | $09: 00$ | $13: 35$ | $18: 50$ |
| Cahir | Depart | $09: 30$ | $13: 50$ | $19: 10$ |
| Cashel | Depart | $09: 50$ | $14: 10$ | $19: 30$ |
| Newlands Cross | Depart | $11: 30$ | $15: 45$ | $21: 00$ |
| Dublin City | Arrive | $12: 00$ | $16: 15$ | $21: 30$ |

(a) At what time does the latest bus leave Cork City?

(b) How many minutes does it take the Green Bus to get from Fermoy to Cashel?

(c) Which bus takes the least amount of time to get from Cork City to Dublin? Show all your working out.

(d) The table below shows the fares for a student ticket, for the Lightening Bus Company. For example, a student ticket from Mitchelstown to Cashel costs €5.

(i) What is the cost of a student ticket from Fermoy to Newlands Cross?

(ii) Sam bought a student ticket for $€ 12$. Where was he travelling from and to?

(e) An extract from an electricity bill is shown.

| Present reading | Previous reading | Unit cost | Standing charge | Vat rate |
| :---: | :---: | :---: | :---: | :---: |
| 17081 units | 17051 units | $€ 0.12$ | $€ 15.00$ | $15 \%$ |

Calculate the values below, and insert them into the table:
(i) The number of units of electricity used
(ii) The total cost of these units
(iii) The total bill, including the standing charge, before VAT is added
(iv) The VAT
(v) The total cost of the bill


| (i) | (ii) | (iii) | (iv) | (v) |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |

## Question 4

(a) Ronan is estimating the volume of his cuboid shed. He estimates the width of the rectangular base to be 3 m , the length of the base to be 6 m , and the height of the shed to be 3 m .
(i) Based on Ronan's estimates, what is the area of the base of the shed?

(ii) Based on Ronan's estimates, what is the volume of the shed?

(iii) Do you think the shed below has a larger or smaller volume than Ronan's shed? Explain your answer.

(b) A shed company lists the base areas, in metres square, of the 20 sheds it has for sale, and lists them as follows.

| 11 | 6 | 16 | 5 | 16 | 9 | 22 | 9 | 13 | 10 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 8 | 13 | 13 | 15 | 6 | 10 | 9 | 17 | 7 | 9 |

(i) Find the range of the base areas of the sheds.

(ii) Find the median number of the base areas of the sheds.

(iii) Calculate the mean shed base area.

(iv) What percentage of sheds had a bigger base than the modal base size?

(v) The shed company sells a shed at random. What is the probability that the shed had a base area of $16 \mathrm{~m}^{2}$ ?


## Question 5

(a) Only two of the 2D nets in the table below can be folded to make a 3D cube. Tick ( $\checkmark$ ) 'cube' or 'not cube' for each net.


Cube $\square$ Not cube

Cube $\square$


Not cube $\qquad$


Cube $\qquad$ Not cube $\qquad$


Cube $\square$ Not cube $\square$


Cube $\qquad$ Not cube $\square$
(b) Use the Theorem of Pythagoras $a^{2}+b^{2}=c^{2}$, to calculate the length of the diagonal line marked $X$ on the cube shown, if the side of the cube is 3 m . Give your answer to one decimal place.

(c) Rex the puppy has a favourite food, that comes in cylindrical tins with a height of 12 cm and a diameter of 10 cm . Calculate the volume of one of these tins, in $\mathrm{cm}^{3}$, correct to the nearest whole number.

$$
V=\pi r^{2} h
$$


(d) Rex likes to pull the clothes of the clothes line, in the garden shown. When clothes are on the line, Rex gets tied to the post so he can't reach the clothes.
Construct and shade the maximum area where Rex can play when he is tied to the post.
$\square$
(e) If the distance from the post is 3 m , find the area that Rex can play in, using the formula: $A=\pi r^{2}$, correct to one decimal place.

(f) If the length of the garden is 18 m , and the width of the garden is half the length, find the area that Rex cannot reach when he is tied to the post, to one decimal place.


