MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

SECONDARY EDUCATION APPLIED CERTIFICATE LEVEL
2023 SUPPLEMENTARY SESSION

SUBJECT:	**Mathematics**
PAPER NUMBER:	Level 2-3
DATE:	31st August 2023
TIME:	9:00 a.m. to 11:05 a.m.

Answer **ALL** questions.

Show clearly all the necessary steps, explanations and construction lines in your working.

Unless otherwise stated, diagrams are drawn to scale.

The use of non-programmable electronic calculators with statistical functions and mathematical instruments is allowed.

Candidates are allowed to use transparencies for drawing transformations.

This paper carries a total of 100 marks.

Section A												
Section B	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	
Mark												
Section C	Q1	Q2	Q3	Q4	Q5	Q6						
Mark												
										Total		

Section A – Multiple Choice Questions

Circle the letter representing the correct answer.
Each question carries one mark.
This section carries a total of 10 marks.
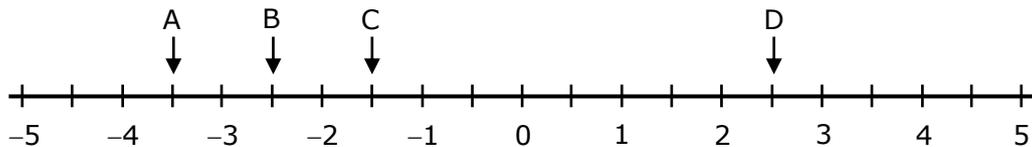
Questions and Answers

1. Convert 2.15 litres to millilitres.

   a) 215 ml   b) 21500 ml   c) 2150 ml   d) 2015 ml

2. The pointer on a spinner turns two and a half revolutions.
   What angle does the spinner turn through?

   a) 25°   b) 900°   c) 225°   d) 450°

3. Which letter points at −2.5?

   a) A   b) B   c) C   d) D
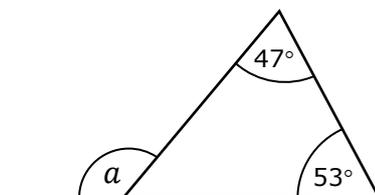
4. Estimate the length of a football pitch.

   a) 118 cm   b) 118 mm   c) 1.18 km   d) 118 m

5. Julie invests €3000 for 2 years at 4% per year simple interest.
   What interest does Julie gain from her investment?

   a) €8   b) €2400   c) €240   d) €3240

6. Work out the size of the angle marked a.

   Diagram not drawn to scale

   a) 100°   b) 90°   c) 53°   d) 80°

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7. Sandra spends 185 GBP (Great Britain Pound) on tickets to watch a football match. How much does she spend in euro if the exchange rate is €1.16 for 1 GBP?

a) €186.16   b) €159.48   c) €183.84   d) €214.60

8. The total cost, €T, for renting a car is given by the formula:

$$T = c + 120d$$

where c is the basic charge and d is the number of days for which the car is rented. Make d subject of the formula.
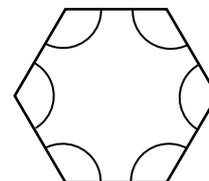
a) $d = 120T - 120c$

b) $d = T - 120 - c$

c) $d = \dfrac{T}{120} - c$

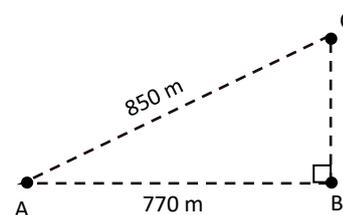d) $d = \dfrac{T - c}{120}$

9. The base of a gazebo has the shape of a hexagon.
Work out the sum of the interior angles of the hexagonal base.

a) 900°   b) 360°   c) 720°   d) 1080°

10. Boats A, B and C are at sea as shown in the diagram.
Calculate the distance of boat C from boat B.

Diagram not drawn to scale

a) 360 m   b) 80 m   c) 1147 m   d) 1620 m

Section B

Write your answers in the available space on the examination paper.
This section carries a total of 65 marks.

1.   Sonia is designing a tiling pattern for her kitchen floor using **two** different shapes.

   (a)   Use the given shape and another shape of your choice to create a tessellating pattern
         for Sonia's kitchen floor. Cover as much as possible of the grid provided below.
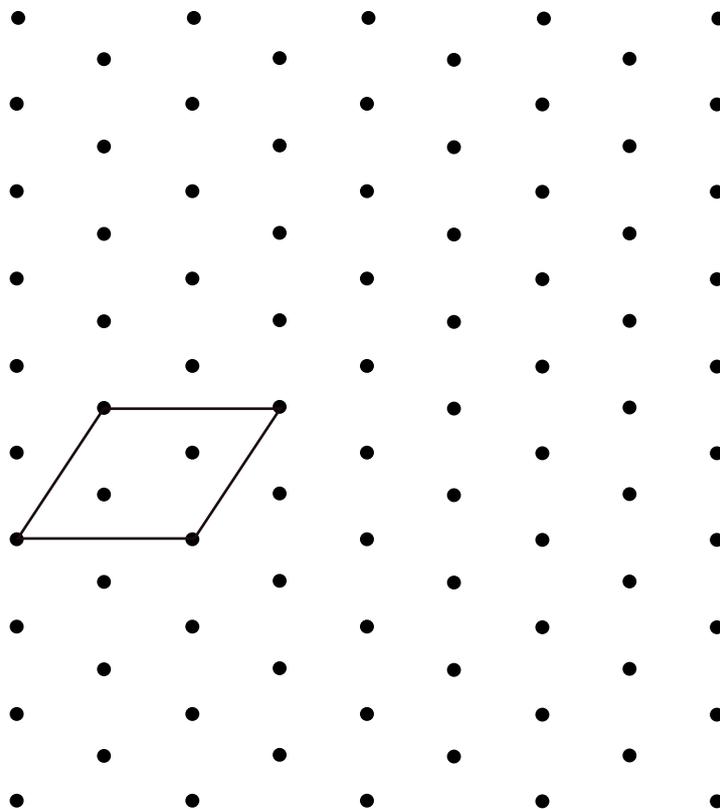
(2)

(b)   The tiling pattern in Duncan's kitchen floor consists of yellow tiles and blue tiles.
He uses 50 yellow tiles and 75 blue tiles to cover the kitchen floor.

(i)   Write the ratio of the number of yellow tiles to the number of blue tiles in its
simplest form.

Yellow tiles : Blue tiles

(1)

(ii)   Duncan decides to use the same tiling pattern to tile the floor of the whole house.
He needs 750 tiles in all. How many yellow tiles and how many blue tiles does
he need?

(3)

(Total: 6 marks)

2.   A green box has the shape of a cuboid with sides 29 cm, 29 cm and 21 cm.
A red box has the shape of a cube with sides 25 cm.

(a)   Calculate the difference in volume between the two boxes.

25 cm

29 cm

29 cm

21 cm
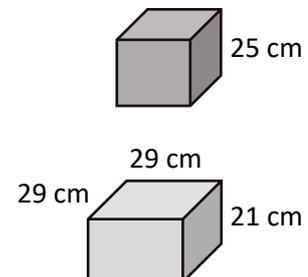
(3)

(b)   Inside which of the two boxes would a ball of radius 12 cm fit completely?
Explain your reasoning.

(2)

(Total: 5 marks)

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3.   David buys a mountain bike.
      The wheels of the mountain bike have a radius of 35 cm.

      (a)   Calculate the circumference of the front wheel of the David's bike.

vectorstock.com

                                                                                                    (2)

      (b)   Calculate how far David has cycled when the front wheel has rotated 800 times.
            Give your answer correct to the nearest metre.

                                                                                                    (2)

      (c)   David cycles at 4.1 m/s.
            How long does it take him to travel the distance found in part (b)?
            Give your answer correct to the nearest minute.

                                                                                                    (3)
                                                                                        (Total: 7 marks)

4.   Tom and Lorna prepare a fruit salad using fruit that they have in their refrigerators.
      Tom has $\frac{1}{4}$ kg of strawberries, $\frac{1}{5}$ kg of blueberries, and $\frac{3}{4}$ kg of bananas.
      Lorna has $\frac{2}{5}$ kg of apples, and $\frac{3}{4}$ kg of grapes.

      (a)   Calculate the total mass of fruit that Tom and Lorna have between them.

                                                                                                    (2)

      When preparing the fruit salad, 470 g of fruit is thrown away because it is too ripe.

      (b)   Calculate the mass of fruit that is used for the fruit salad. Give your answer in grams.

                                                                                                    (2)

      (c)   What fraction of all the fruit is thrown away?
            Give your answer in its simplest form.

                                                                                                    (2)
   **(Total: 6 marks)**

5.   The two tables below show the height of eight sport athletes, four males and four females, correct to the nearest centimetre.

| Females	Height in cm
Raquel	165
Maria	160
Jael	179
Ester	168

Males	Height in cm
George	176
Isaac	175
Liam	192
Mark	161

(a)   What is the median height of all the athletes?

(2)

(b)   What is the range of heights of all the athletes?

(1)

(c)   Write the ratio of the mean height of female athletes to the mean height of male athletes.

(3)

(d)   Determine which male and which female to eliminate so that the remaining three males and three females have the same mean height.

(3)

(Total: 9 marks)

6. Nadya needs to cut a piece of wood that is like the triangle shown in the sketch.
    She starts by drawing the shape on paper.

    (a) Use ruler and protractor to construct triangle PQR.
         Point Q has already been marked for you.

R

6.5 cm

55°

P   8.5 cm   Q

_____|
                                         'Q
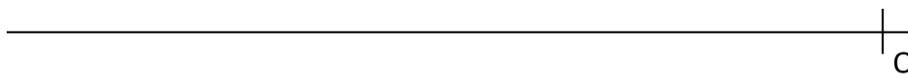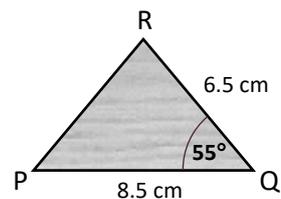
(3)

    (b) Measure side PR.

(1)

(Total: 4 marks)

7. Luke is a shop assistant. He receives an annual gross salary of €16 540.
    His tax is calculated as follows:

    - the first €10 000 is tax free,
    - the next €5000 at 15%,
    - the rest at 25%.

    After tax, Luke also pays €1040 annually on Social Security Contribution.
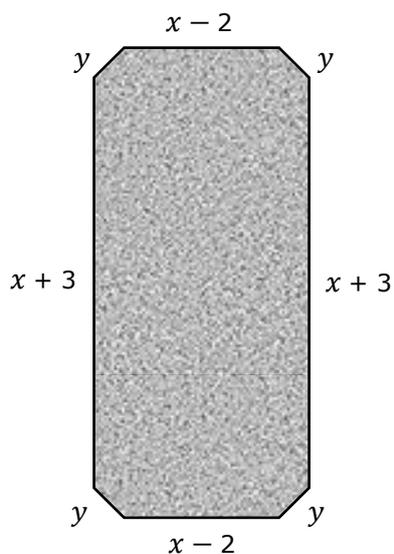   Calculate his annual net income.

(Total: 5 marks)

8.   A carpenter is building a shelving unit as shown below.

Diagram not drawn to scale
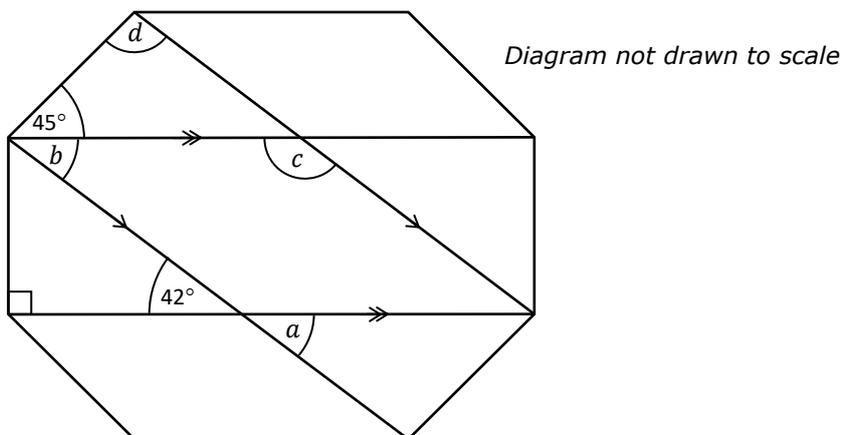
Calculate the size of the angles marked a, b, c and d.
Give reasons for your answers.

(Total: 8 marks)

9. The diagram below shows a carpet. All sides of the carpet are measured in metres.

$x - 2$

y y *Diagram not drawn to scale*

$x + 3$ $x + 3$

y y

$x - 2$

(a) Write an expression for the perimeter of the carpet in terms of x and y.
Write your answer in its simplest form.

(2)

(b) The perimeter of the carpet is 32.8 m. Given that $x = 7$, find the length of each slant edge, y.

(3)

(Total: 5 marks)

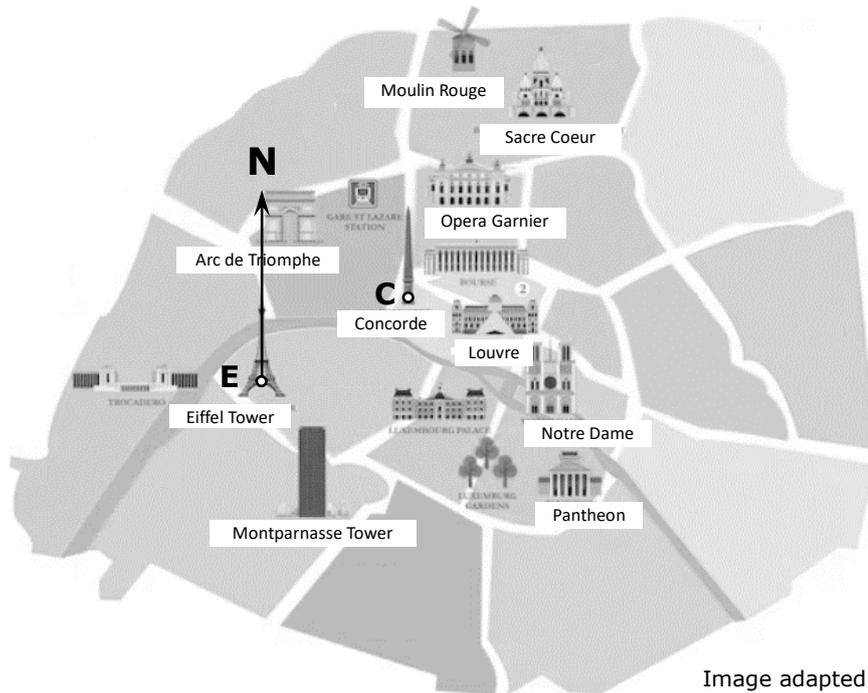10. The map below shows some of the main attractions of Paris.

Image adapted from *freepik.com*

(a) Measure the three-figure bearing of Concorde from the Eiffel Tower.
(Hint: Use the spots at E and C to measure the bearing)

(1)

(b) Calculate the bearing of the Eiffel Tower from Concorde.

(2)

(c) James is on the Eiffel Tower facing North. He turns to a bearing of 160°.
Which tourist attraction is he facing now?

(1)

(Total: 4 marks)

11. The floor of a rectangular meeting room, measuring 5.4 m by 3 m, is to be tiled.
The chosen tile comes in two different sizes, each with a different package cost as shown below:

Package A	Package B
Size of tile: 30 cm × 30 cm Cost per tile: €4 Labour costs: €290	Size of tile: 60 cm × 60 cm Cost per tile: €18 Labour costs: €170

(a) Calculate the number of tiles needed:

(i) if Package A is chosen;

(2)

(ii) if Package B is chosen.

(1)

(b) Work out the total cost, including labour, of tiling the meeting room, for each of the two packages. State which package is the cheaper.

(3)

(Total: 6 marks)

Section C
Real Life Situation – Barbeque Night at the Band Club

Write your answers in the available space on the examination paper.
This section carries a total of 25 marks.

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1.   The Band Club is organising a Barbeque Night. The organising committee plans to hire tables for the event.

   (a)   The cost of hiring tables is as follows:

   - 6-person table at €15 per table

   - 8-person table at €18 per table

   Nardu thinks that up to 80 persons will attend the event.
   He suggests that four 6-person tables and seven 8-person tables are enough.
   How much does it cost to hire these tables if the Band Club is given a 12% discount on the total cost?

   (3)

   (b)   Marisa believes that more than 80 persons will attend the event. She thinks that the organising committee must hire enough tables to seat up to 120 persons.

   Suggest a combination of both 6-person tables and 8-person tables that seats exactly 120 persons.

   (2)

(Total: 5 marks)

2. The Barbeque Night is held in the yard of the Band Club. One side of the yard is 16 m wide. Five 8-person tables are placed in a line as shown in the diagram below.

16 m

C
0.4 m x x x x C
0.4 m

Diagrams not drawn to scale
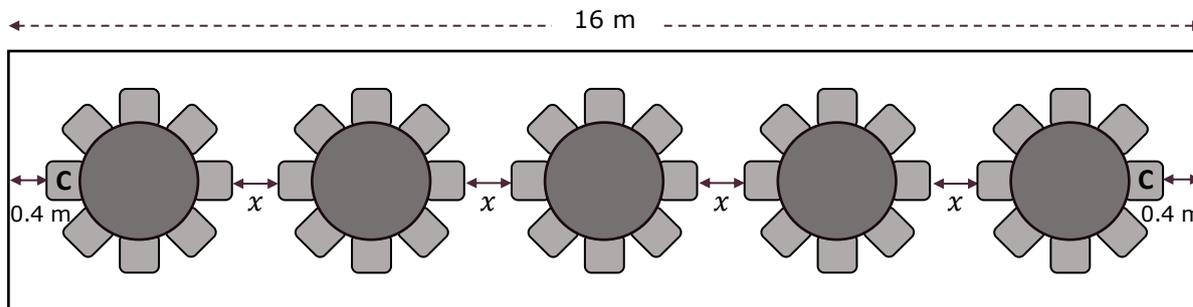
Each table has a diameter of 1.52 m and each chair is at a distance of 0.5 m from the table.
Each of the two chairs, marked C above, are 0.4 m away from the wall.
All the other distances marked by x are equal.

Calculate the length of x.

0.5 m   0.5 m

1.52 m
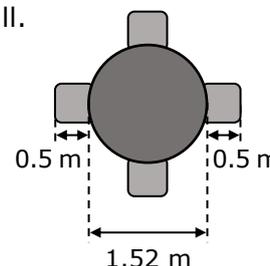
(Total: 4 marks)

3. A total of 120 persons attended the Barbeque Night. The possibility space below shows the number of persons for each combination of first plate and second plate choices.

Second Plate

		Beef	Chicken	Fish	Vegetarian
First Plate	Pasta	18	20	7	0
	Salad	12	15	12	5
	Dips	9	6	9	7

What is the probability that a person selected at random chose:

(a) the Salad and Chicken combination?

(1)

(b) Vegetarian for the second plate?

(1)

(Total: 2 marks)

4. The Barbeque Night started at 20:00 with a speech by the President of the Band Club. It finished with a fireworks display that stopped at 00:30.

    (a) A live band played from 20:40 to 23:15. For how long did the live band play?

    (2)

    (b) Marija and her friends were seated at 19:25. Marija waited for one hour and forty minutes to be served the first plate. Angelo, who was seated at another table, was served 15 minutes after Marija. At what time was Angelo served the first plate?

    (2)

    (c) The event came to an end with a fireworks display which finished 00:30. If the fireworks display lasted 36 minutes, at what time did it start?

    (2)

    (Total: 6 marks)

5. A line of party flags was used to decorate one of the walls of the yard as shown in the diagram below. Use Trigonometry to calculate the length of the line of the party flags that was used to decorate this wall. Give your answer correct to one decimal place.
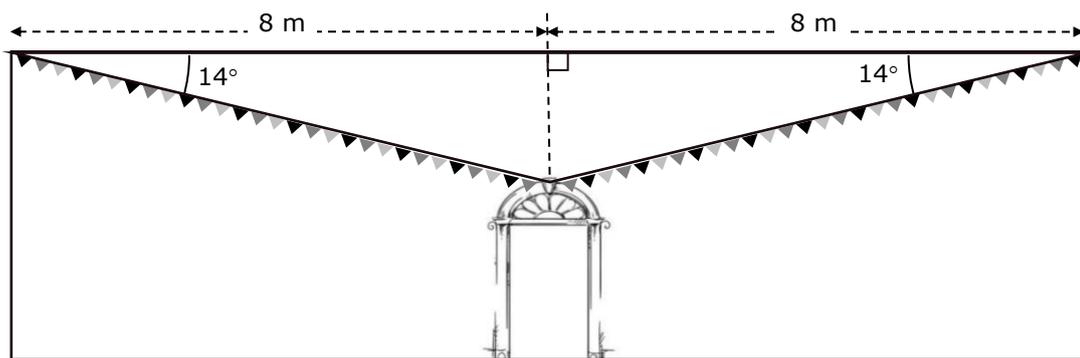

Diagram not drawn to scale   Image adapted from *istockphoto.com*

(Total: 3 marks)

6. The diagram below shows a plan of the yard where the barbeque was held. The yard has one rectangular and two identical triangular garden areas, and a semicircular pond.
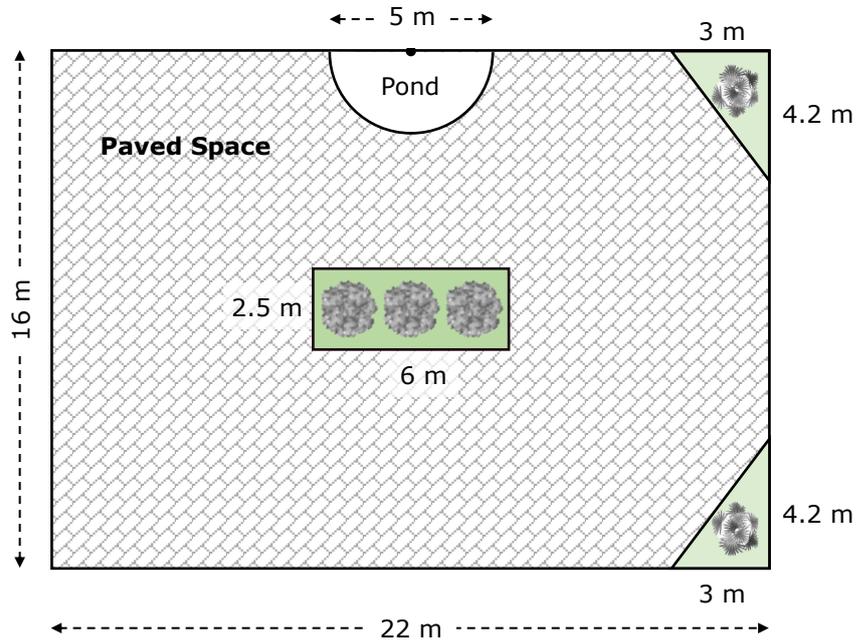

Diagram not drawn to scale

Work out the area of the paved space in the yard.

(Total: 5 marks)

End of Paper