GOVERNMENT OF MALTA
MINISTRY FOR EDUCATION, SPORT, YOUTH
RESEARCH AND INNOVATION
DEPARTMENT OF EXAMINATIONS

Qualifying Examination for Supply Learning Support Educators

October/November 2023

Subject: Mathematics

Date: Thursday 2nd November 2023

Time: (One hour and thirty minutes)

Instructions to candidates:

- Answer ALL questions.
- Write your answers in the space available on the examination paper.
- 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 scientific calculators with statistical functions and of mathematical instruments is allowed.
- Candidates are allowed to use transparencies for drawing transformations.
- This paper carries a total of 100 marks.

Question No.	1	2	3	4	5	6	7	8	9
Mark									

Question No.	10	11	12	13	14	15	16	17	Total
Mark									

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1. a) Write down a square number that is also an odd number.

Ans: _____

   b) Write down any two prime numbers that lie between 10 and 20.

Ans: _____

   c) Calculate the value of: $7 - 8 \times (-3)$

Ans: _____

(3 marks)

2. a) Write 0.32 as a fraction in its simplest form.

Ans: _____

   b) Work out $\frac{1}{8}$ of 576 m.

Ans: _____

   c) Simplify $\dfrac{3^5 \times 3^{-3}}{3^6}$, giving your answer as a fraction.

Ans: _____

(5 marks)

3. Fill in the correct value for each angle:

    a) Each angle of an equilateral triangle is equal to _____.

    b) Opposite angles of a cyclic quadrilateral add up to _____.

    c) The angle subtended by the diameter of a circle on the circumference is _____.

    d) The sum of the exterior angles of a polygon is _____.

    e) One exterior angle of a regular pentagon is _____.

    f) North-East written as a three-figure bearing is _____.

    (6 marks)

4. On the grid below:

    a) Draw the reflection of shape T in the line LM.
        Label the image A.

    b) Draw a 90° anticlockwise rotation of shape T about its vertex N.
        Label the image B.
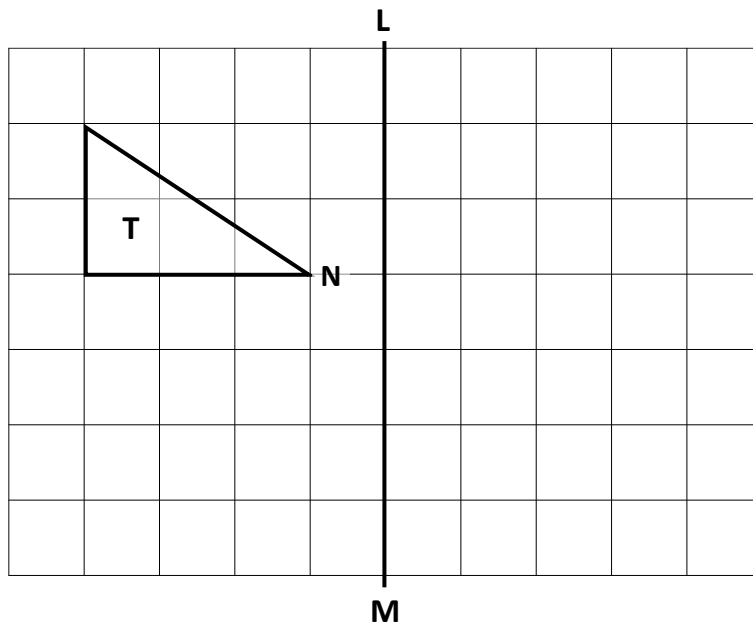
    (4 marks)

5. Petra and Keith are playing a game. They have the following four cards:

Petra's cards	1	3	5	7
Keith's cards	1	2	3	4

Petra and Keith each pick one of their own cards randomly.
They **multiply** the numbers on the cards.

a) Complete the probability space below to show all the possible outcomes.

Petra's Cards

×	1	3	5	7
1	1	3		
2	2	6		
3	3			
4	4			

Keith's Cards (row label for rows 1–4)

b) What is the probability that the answer is an even number?

Ans: _____

c) What is the probability that the answer is a prime number?

Ans: _____

(4 marks)

6. Marie uses the following lemon-cake recipe:

> 250 grams flour
> 200 grams castor sugar
> 130 grams butter
> 6 eggs
> Juice and grated rind of lemon

a) Write down the ratio of **castor sugar : flour**
in its simplest form.

Ans: _____ : _____

b) Marie bakes four cakes. How much butter does she use?

Ans: _____

c) Marie spends €19.22 to buy the ingredients for the four lemon cakes.
She divides each cake into 8 equal slices and sells each slice at €1.50.
Work out the profit made on the sale of these four cakes.

Ans: _____

(4 marks)

7. a) A boat costs €24 000. Calculate the final price of the boat including VAT at 18%.

Ans: _____

b) Luke buys the boat. He pays a deposit of €12 000, and he pays the rest in 20 equal monthly payments. Work out the amount Luke pays each month.

Ans: _____

(5 marks)

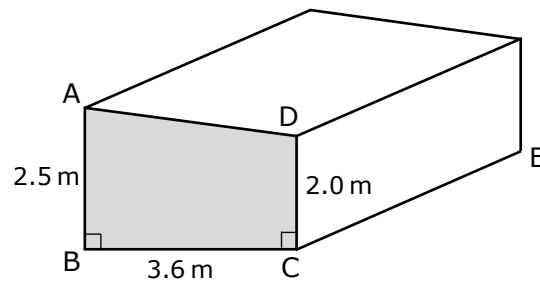8. The diagram shows a shed that has the shape of a prism with a cross-section in the form of a trapezium.

Diagram not drawn to scale

a) Calculate the area of the cross-section ABCD.

Ans: _____

b) The volume of the shed is 40.5 m³. Calculate the length CE of the shed.

Ans: _____

c) Use Pythagoras theorem to calculate the length AD of the sloping roof.

Ans: _____

(7 marks)

9. Angela and Brad start walking from the same point P. Angela walks 50 m on a bearing of 140°. Brad walks 75 m on a bearing of 230°.

a) Draw a scale drawing using 1 cm to represent 10 m showing the new positions of Angela and Brad. Label the positions of Angela and Brad using A and B respectively. Point P is already drawn.

North

P

b) Use your scale drawing to find the real distance between Angela and Brad.

Ans: _____

c) Use trigonometry to calculate ∠PBA. Give your answer correct to 1 decimal place.

Ans: _____

(9 marks)

10.a) The function $f(x)$ is defined by $f(x) = x^2 - 9$. Find $f(-2)$.

Ans: _____

b) Expand and simplify completely:

$$\frac{3(x + 3) - (x - 3)}{6}$$

Ans: _____

c) The four angles of a quadrilateral measured in degrees are:
x, $(2x - 40)$, $3x$ and $(x - 20)$.

Form an equation and solve it to find the value of x.

Ans: _____

d) The side of a square is $(1 - 3x)$ cm long where $x = -2$.
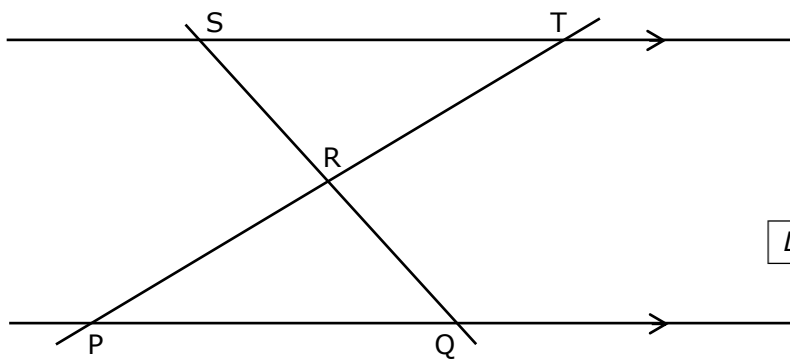
Calculate the perimeter of the square.

Ans: _____

e) Make b subject of the formula: $a = \dfrac{b + 4}{2}$

Ans: _____

(11 marks)

11. Points S, T, P and Q lie on a pair of parallel lines as shown in the diagram.

SQ and TP intersect each other at R.

Diagram not drawn to scale

a) Show that triangles STR and QPR are similar.

b) SR = 6.2 cm, RQ = 5.9 cm and PQ = 10 cm. Calculate the length of ST.
Give your answer correct to 1 decimal place.

Ans: _____

(5 marks)

12. Listed below are the masses, in grams, of eight new-born kittens:

89.4 92.6 93.1 96.2 96.8 99.7 100.2 108

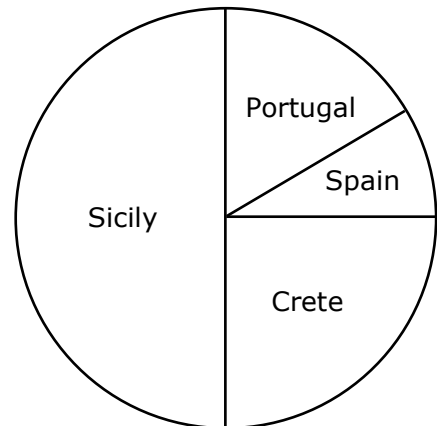Calculate:

a) the median mass;

Ans: _____

b) the mean mass;

Ans: _____

c) the range.

Ans: _____

(6 marks)

13. This pie chart illustrates the number of tourists who visited a summer resort in one of four countries during the year 2022.

a) What percentage of the tourists visited Crete?

Ans: _____

b) Two thousand tourists visited a resort in Portugal.

Use the information in the pie chart to complete the frequency table below.

Country	Sicily	Spain	Crete	Portugal
Frequency				2000

(5 marks)

14. Three tables and two chairs cost €1900 while two tables and four chairs cost €1800.

Let c represent the price in euro of one chair and let t represent the price in euro of one table.

a) Write down two equations in terms of c and t.

Ans: _____

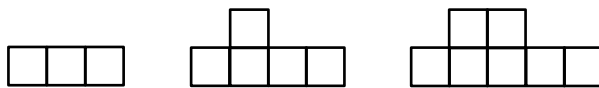Ans: _____

b) Solve the simultaneous equations found in part a).

Ans: $c = $ _____ ; $t = $ _____

(6 marks)

15. a) Draw Design 4 in the pattern shown below:

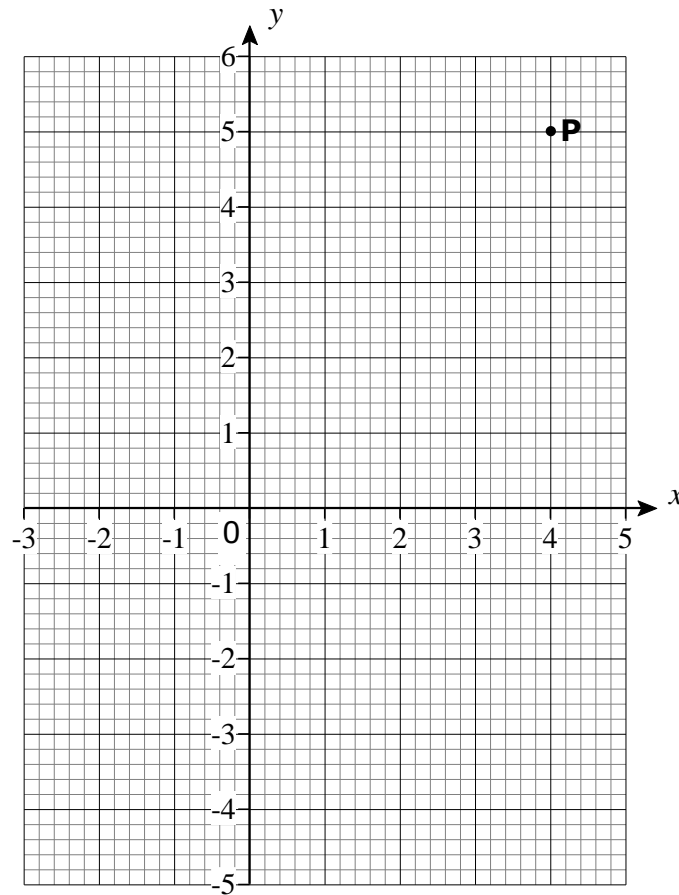**Design 1**   **Design 2**   **Design 3**   **Design 4**

b) Complete the table:

Design	1	2	3	4	5		10
Number of small squares	3	5	7				

c) Write an expression for the total number of squares in design n.

Ans: _____

(5 marks)

16.

a) On the graph above, plot point Q(−2, −1) and draw the line passing through P and Q.

b) i) What is the gradient of the line PQ?

Ans: _____

   ii) What is the y-intercept of the line PQ?

Ans: _____

c) Complete the following table for the equation: $y = x^2 - 2x - 3$

x	-2	-1	0	1	2	3	4
x^2	4					9	
$-2x$		2			-4		
-3	-3	-3	-3	-3	-3	-3	-3
y			-3			0	

d) Draw the graph of $y = x^2 - 2x - 3$ on the grid above.

e) Write down the values of x where the graph of $y = x^2 - 2x - 3$ intersects with line PQ.

Ans: $x =$ _____ ; $x =$ _____

(9 marks)

17. Points A, B and C lie on the circumference of a circle centre O. $\angle OBC = 60°$.
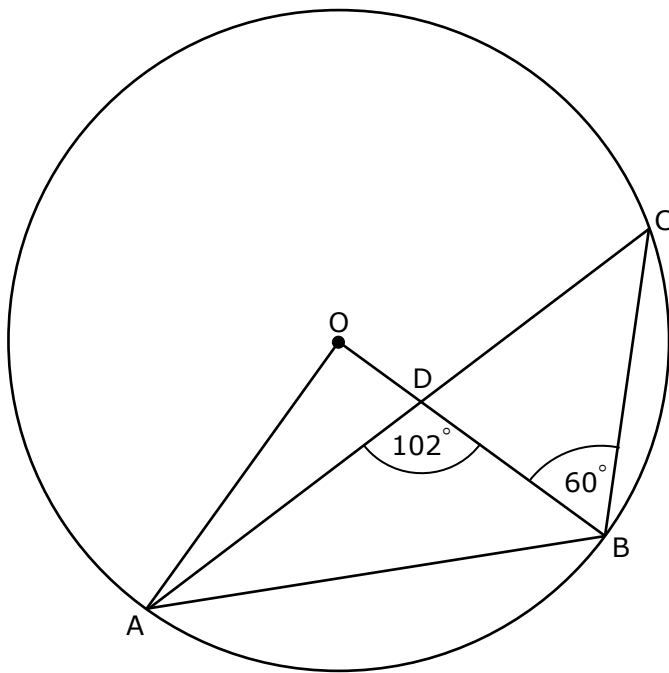
OB and AC intersect at D and $\angle ADB = 102°$.

Diagram not drawn to scale.

Calculate the size of the following angles, giving a reason for each of your answers:

a) $\angle ACB$

Ans: _____

Reason: _____

b) $\angle AOB$

Ans: _____

Reason: _____

c) $\angle OBA$

Ans: _____

Reason: _____

(6 marks)

End of Paper