Qualifying Examination for
Supply Learning Support Educators

January 2023

Subject: **Mathematics**

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	10
Mark										

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

1. (a) Write down:

   (i)   a prime number between 25 and 30   Ans: _____

   (ii) a factor of 52   Ans: _____

   (iii) a multiple of 15 less than 50.   Ans: _____

   (b) Write the following in order, starting from the smallest:

$$0.32 \ , \ \frac{7}{20} \ , \ 30\% \ , \ \frac{1}{3} \ , \ 33\%$$

   _____ , _____ , _____ , _____ , _____

                                                         (5 marks)

2.   The diagram below shows a prism with a triangular cross-section.

Diagram not drawn to scale

   Calculate:

   (a)   the area of triangle ABC;

                                              Ans: _____

   (b)   the volume of the prism.

                                              Ans: _____

                                                         (4 marks)

2

3. (a) Simplify: $3a + 2b - a - 7b$

Ans: _____

(b) Expand and simplify: $2(x + 4) + 3(x + 1)$

Ans: _____

(c) Factorise completely: $3x^2 + 18xy$

Ans: _____

(6 marks)

4.
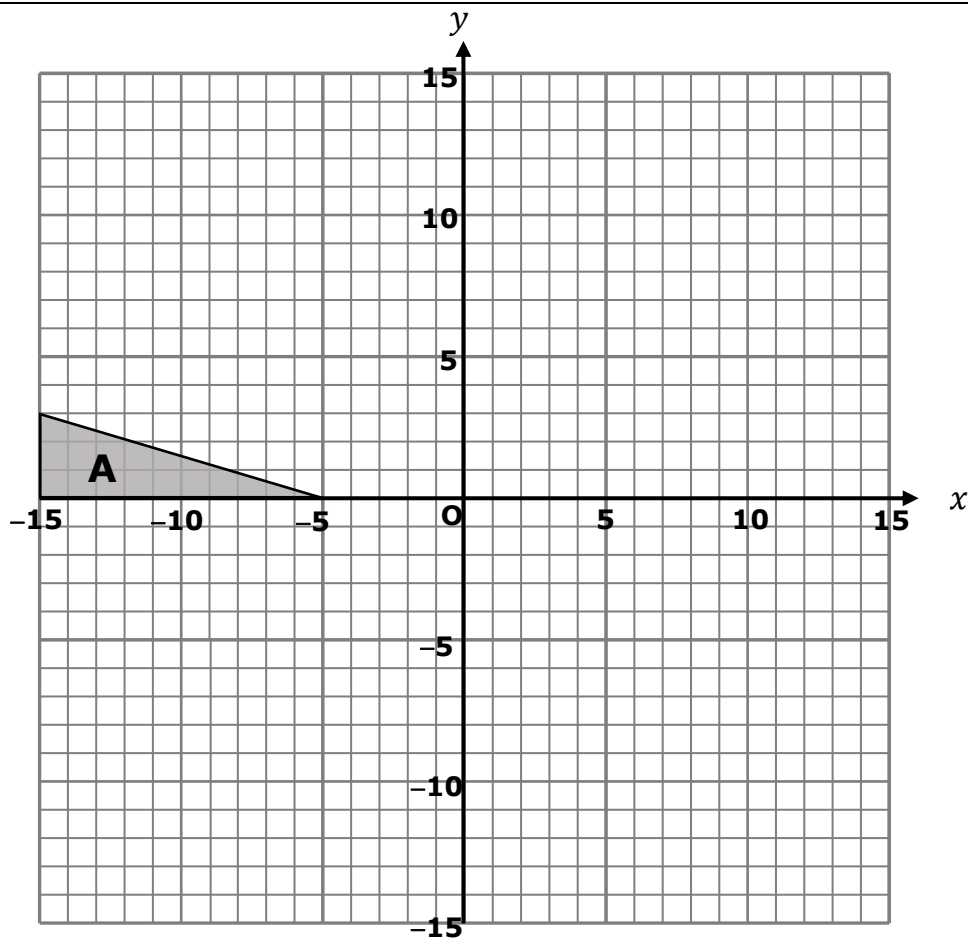
(a) Reflect Shape **A** in the y-axis. Label the image **P**.

(b) Translate Shape **A** by $\begin{pmatrix} 5 \\ -10 \end{pmatrix}$. Label the image **Q**.

(c) Rotate Shape **A** through 90° clockwise about (0, 0). Label the image **R**.

(6 marks)

5. Jo works in a bakery.

    He uses a recipe for 16 peanut butter cookies.

Recipe (16 cookies)
200 g peanut butter
175 g sugar and
125 g flour

    (a) Write the following ratio in its simplest form.

    peanut butter : sugar : flour

    Ans: _____

    (b) How much sugar is needed to make 80 cookies?

    Ans: _____

    (c) The peanut butter cookies are packed in packets of eight. The bakery
    receives an order for 24 packets. How much peanut butter is needed
    for this order?

    Ans: _____

    (d) The cost of baking 8 cookies is €4.80. The bakery wants to make a
    15% profit. Calculate the profit made on 24 packets.

    Ans: _____

    (9 marks)

6. (a) Simplify: $\dfrac{a^3 \times a^{11}}{a^4}$

    Ans: _____

4

(b)   Use a calculator to work out $\dfrac{19.3^2 + \sqrt{389}}{12.8}$.

Write your answer correct to 1 decimal place.

Ans: _____

(4 marks)

7.   (a)   Using ruler and compasses only, construct a triangle ABC on the given line below, such that AB = 11 cm, AC = 9 cm and BC = 7.5 cm.

(b)   Construct the perpendicular bisector of side AB.

(c)   Construct the angle bisector of $B\hat{A}C$.

(d)   Find the point of intersection of the constructions in (b) and (c). Label this point X.

(e)   Join point X to point B. Measure $X\hat{B}A$.

A
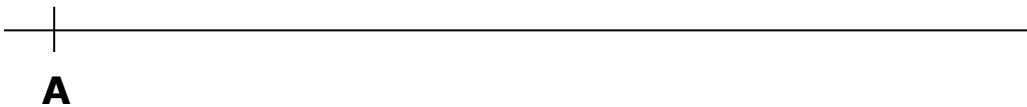
Ans: $X\hat{B}A$ = _____

(6 marks)

8. (a) Make r the subject of the formula: $5(2r + p) = 1 - 3r$

Ans: _____

(b) Work out the value of r when $p = -5$.

Ans: $r =$ _____

(5 marks)

9. A four-sided spinner has numbers 1 to 4 marked on it. It is spun twice, and the two scores are noted.

(a) Complete the table below to show all the possible outcomes.

First spin

		1	2	3	4
	1	1,1	1,2		
Second	2				
spin	3				
	4				

(b) Find the probability that the two scores are:

(i) One even and one odd;

Ans: _____

(ii) Both factors of 8;

Ans: _____

(iii) Both prime numbers.

Ans: _____

(5 marks)

10. Solve the simultaneous equations:

$$2x - y = 11$$
$$x - y = 8$$

Ans: x = _____ , y = _____

(4 marks)

11. (a) Karl wants to buy a leather sofa. The price of the leather sofa excluding VAT is €1200.

(i) What is the selling price of this leather sofa including VAT at 18%?

Ans: _____

(ii) The shop offers a 20% discount on the selling price during summer. How much does the leather sofa cost during the summer sale?

Ans: _____

(b) Karl invests €5500 in a bank paying 2.25% per annum simple interest. Calculate the interest Karl earns after 8 years.

Ans: _____

(7 marks)

12. Given that $f(x) = \dfrac{3 - 8x}{6}$ work out the value of x for which $f(x) = \dfrac{1}{3}$.

Ans: $x = $ _____

(2 marks)

13. O is the centre of the circle ABCD, $\widehat{ACD} = 64°$ and AD = AC.

Diagram not drawn to scale
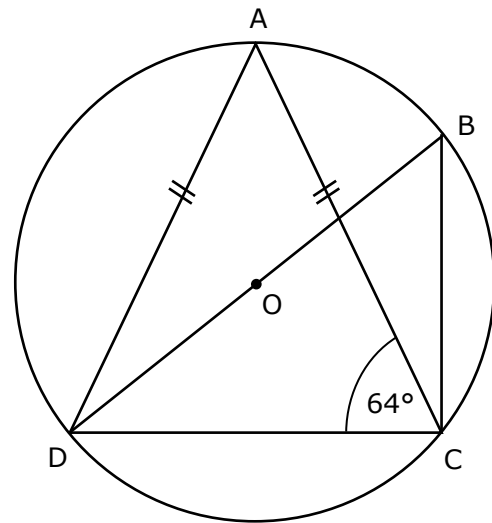
Calculate the size of the following angles, giving reasons for your answers.

(a) $\widehat{DAC}$

Ans: _____ Reason:_____

(b) $\widehat{DBC}$

Ans: _____ Reason:_____
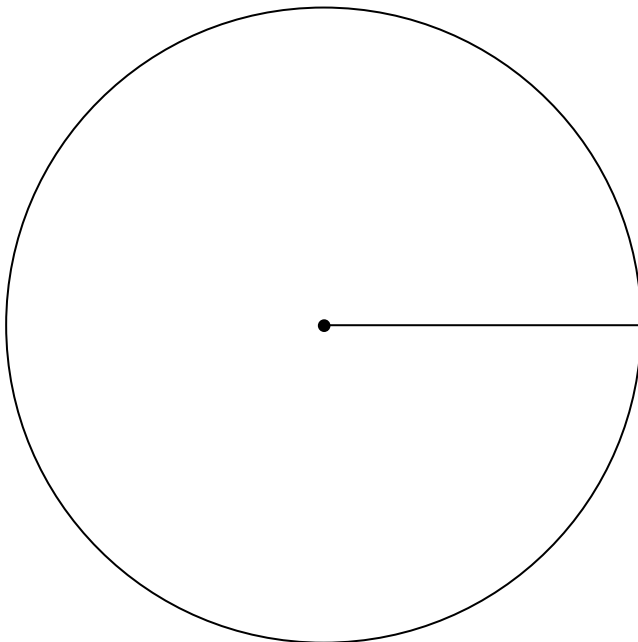
(c) $\widehat{ADB}$

Ans: _____ Reason:_____

(7 marks)

14. Three hundred students were asked what type of music they prefer.
The following information was recorded.

Type of Music	Pop	Hip-Hop	Rock	R & B	Latin
Frequency	90	75		50	30

(a) How many students prefer rock music?
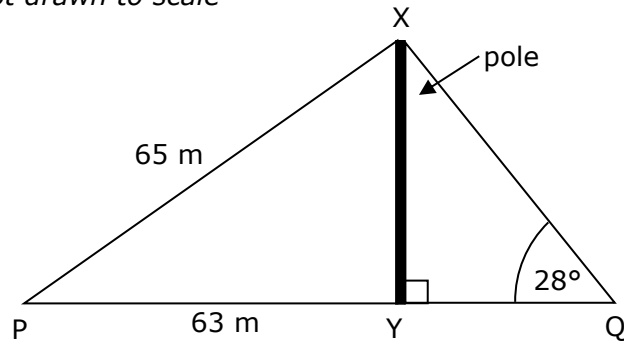
Ans: _____

(b) Draw a pie chart to show this data.

(c) What percentage of the group prefer latin music?

Ans: _____

(9 marks)

15. The diagram below shows a vertical pole XY. The pole is supported by a cable, XP, 65 m long and another cable, XQ, which makes an angle of 28° with the horizontal ground. Point P is 63 m from the base Y of the pole.

Diagram not drawn to scale

Calculate, giving your answer correct to 1 decimal place where necessary:

(a)   the height of the pole XY;

Ans: _____

(b)   the length of the cable XQ;

Ans: _____

(c)   the size of XP̂Y.

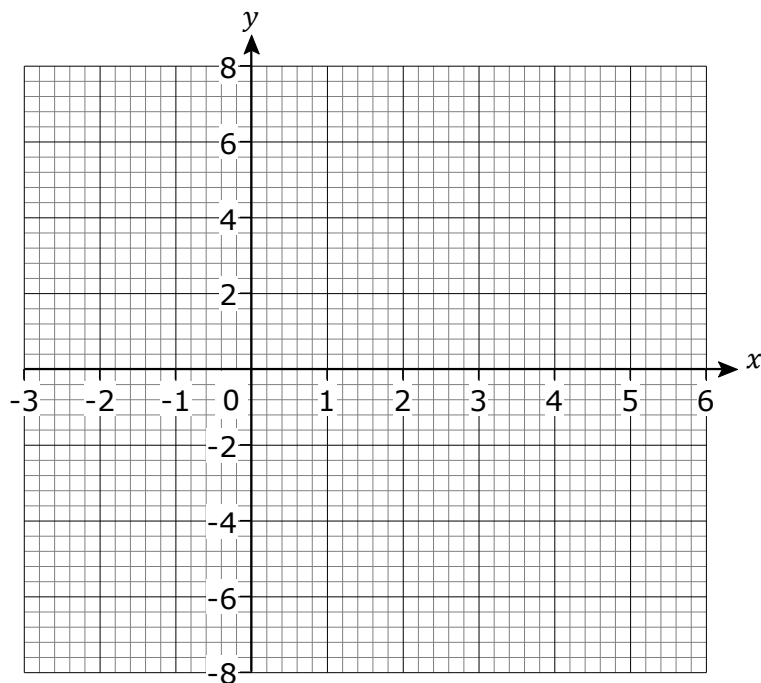Ans: _____

(8 marks)

16. (a) Complete the table to show the corresponding values of x and y for the equation $y = x^2 - 3x - 4$.

x	-2	-1	0	1	2	3	4	5
x^2	4					9		
$-3x$			0			-9		
-4				-4				-4
y		0				-4		

(b) Draw the graph of $y = x^2 - 3x - 4$ for values of x between -2 and 5.

(c) Use your graph to find:

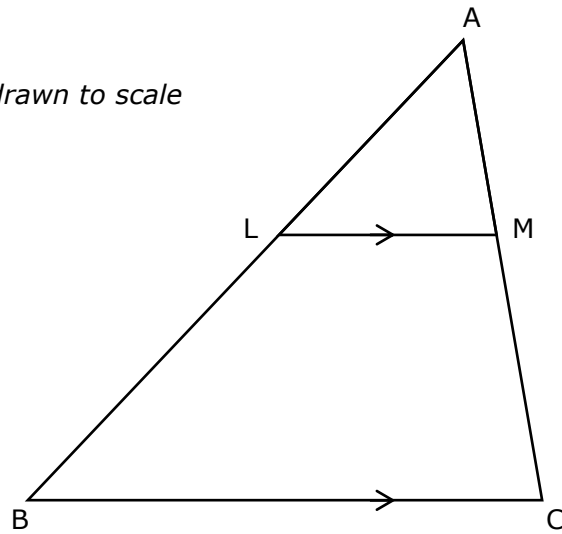(i) The minimum value of y.

Ans: $y = $ _____

(ii) The values of x when $y = 2$.

Ans: $x = $ _____ , _____

(7 marks)

11

17.   L and M are points on the sides AB and AC respectively of a triangle ABC, such that LM is parallel to BC.

Diagram not drawn to scale

(a)   Show that triangle ALM and triangle ABC are similar, giving reasons.

(b)   If AB = 11.5 cm, AC = 9.5 cm and AL = 4.6 cm, calculate AM.

Ans: _____

(6 marks)

End of Paper