THE ENGLISH SCHOOL NICOSIA
YEAR 2 MID-PROGRAMME ENTRY EXAMINATIONS 2023

MATHEMATICS 3rd of June 2023

Time allowed: 2 hours

Instructions to candidates
In the boxes below write your name and surname.
Answer all the questions in the spaces provided.
Without sufficient working, correct answers may be awarded no marks.

Information to candidates
This paper has 21 questions.
There are 20 pages in this question paper including the cover page.
Full marks may be obtained for answers to all questions.
The total marks for this paper are 120.
The marks for parts of a question are shown in round brackets, e.g. **(2)**
Total marks for each question are given at the end of that question, e.g. **Total: 4 marks**

Calculators are not allowed.

Advice for candidates
Write your answers neatly and in good English.
Work steadily through the paper.
Do not spend too long on one question.
Show all stages in any calculations.

Materials required for the paper
Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.

1. Round the following numbers to the required degree of accuracy.

a) 368.496 (2 d.p.) ≈	b) 5.932 (1 d.p.) ≈
c) 6992.77 (2 s.f.) ≈	d) 0.0078 (1 s.f.) ≈

(4)

2. Caroline works at *Hollister* and is entitled to an employee discount. Caroline bought a sweater, which was originally priced at $55, for $38.50 with her discount. What is Caroline's employee discount (as a percentage)?

…… % **(3)**

3. Find the surface area of a cube, given that its volume is 27 cm^3.

…… cm^2 **(3)**

4. A bag contains red, blue and yellow counters in the ratio 2:3:5.

a) What fraction of the counters are red?

…… **(1)**

b) 9 of the counters are blue. How many of the counters are yellow?

…… **(2)**

c) How many counters are in the bag?

…… **(1)**

Total: 4 marks

5. Work these out. Show all steps in each calculation.

a) $15 + 6 \div (2^3 - 5) - 6 \times \sqrt{49}$

..... **(4)**

b) $(17 - 6 \times 2)^2 \times \frac{2}{5} + [6 \times (1 - 3)]$

..... **(4)**

Total: 8 marks

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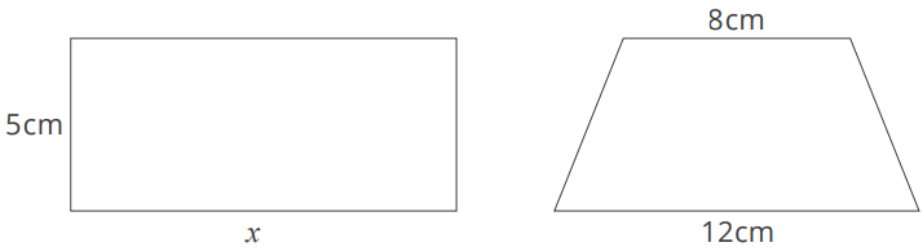
6. The two shapes below have the same height. The area of the trapezium is half the area of the rectangle. Find the value of x.



$x =$ ..... **(4)**

7. Here is a list of the goals scored by 10 teams in England in after playing 10 games.

15 14 8 9 16 13 15 8 15 12

Find:

a) the mode,

…… **(1)**

b) the range,

…… **(1)**

c) the median,

…… **(2)**

d) the mean.

…… **(2)**

Total: 6 marks

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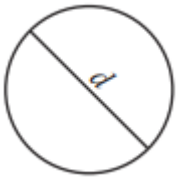
8. The area of the circle is 49π cm^2. Calculate the **diameter** of the circle.



…… cm **(3)**

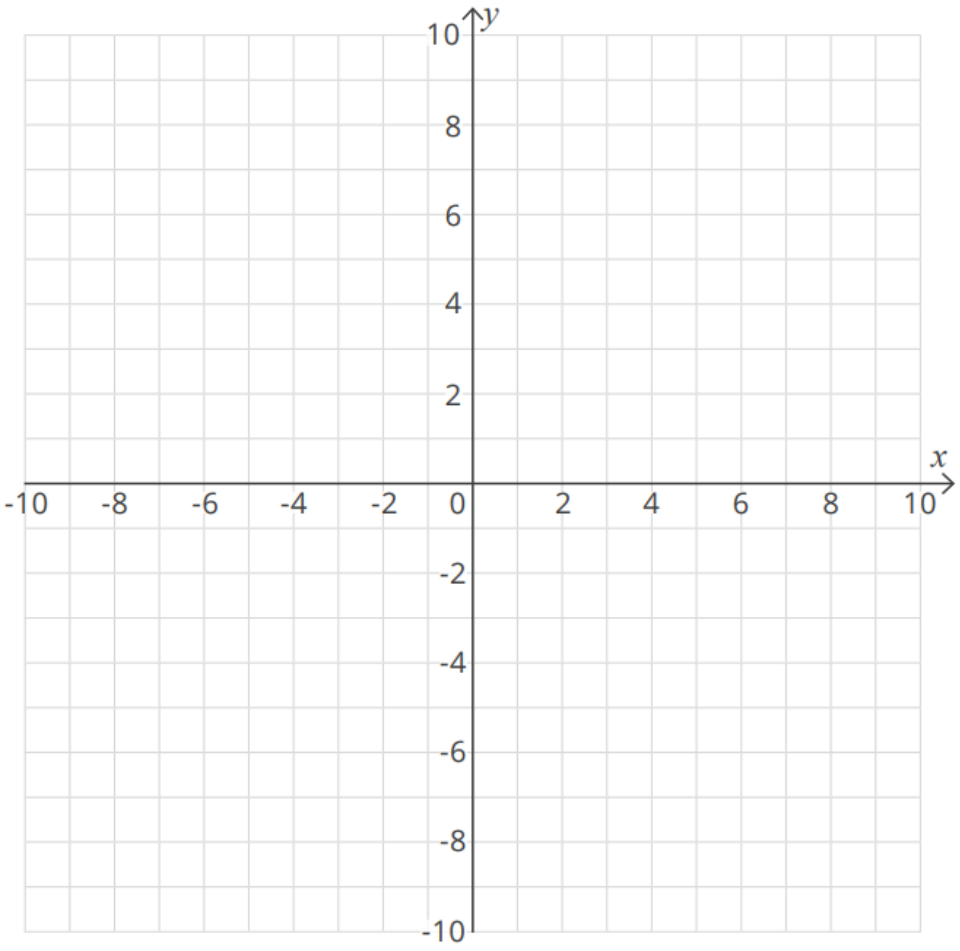
9. Consider the coordinates below.

(2, 5) (-5, -2) (4, 3)

a) Minesh says the coordinates have the relationship $x + y = 7$. Do you agree? You must show all your working and justify your answer.

…… **(2)**

b) On the axes below, plot the coordinates above. Farah plots a fourth point, A, to make a parallelogram. Give a possible pair of coordinates for point A.



(…… , ……)

(3)

Total: 5 marks

10. a) Expand and simplify the expressions below.

i. $3b(4a + 7b)$

…… **(2)**

ii. $3(5n + 1) - 2(3n - 2)$

…… **(3)**

b) If $m = -3$ and $n = -4$, work out the value of $3m^2 + 5$.

…… **(3)**

c) Make p the subject of the formula

$r = 8p^2 + 20$

…… **(3)**

Total: 11 marks

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11. a) The cost of an apple is c pence. What is the cost of 7 apples? Give your answer in terms of c.

…… pence

(1)

b) A plank is T metres long. 7 lengths of n centimetres are removed from the length. What is the length of the remaining piece of wood in centimetres? Give your answer in terms of T and n.

…… **(2)**

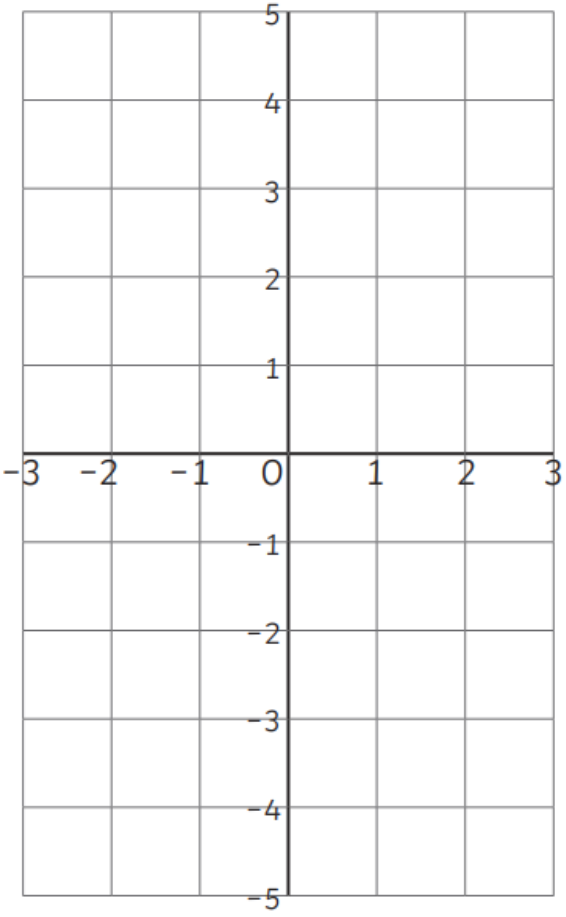
Total: 3 marks

12. a) Complete the table of values for $y = -2x - 1$.

x	−2	−1	0	1	2
$y = -2x - 1$					

(2)

b) Use your table to draw the graph of $y = -2x - 1$.



(2)

Total: 4 marks

13. a) i. Express 420 as a product of prime factors.

…… **(2)**

ii. Given that $198 = 2 \times 3^2 \times 11$, find the highest common factor of 198 and 420.

…… **(2)**

b) The highest common factor of two numbers, a and b, is 8 and the lowest common multiple is 280. Given that a and b are larger than 10, find the value of a and b.

…… , …… **(3)**

Total: 7 marks

14. Last year Kerry's take-home pay was £15 000. She spent 40% of her take home pay on rent. She used the rest of her take home pay for living expenses, clothes and entertainment in the ratio 3 : 1 : 2. How much did Kerry spend on entertainment last year?

…… **(4)**

15. A three-sided spinner is numbered 3, 4, 5. A five-sided spinner is numbered 3, 3, 4, 6, 6. Both are spun at the same time. Complete the sample space diagram below and find the probability that:

		3-sided spinner		
		3	4	5
5-sided spinner	3	(3, 3)	(3, 4)	
	3			
	4			
	6			
	6			

(1)

a) The sum of the scores is an odd number.

…… **(1)**

b) The product of the scores is greater than 16.

…… **(1)**

c) The difference of the scores is exactly one.

…… **(1)**

Total: 4 marks

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16. Solve the equations below:

a) $2x^2 - 7 = 11$

$x =$…… **(4)**

b) $\frac{1}{3}x + 12 = 24$

$x =$..... **(2)**

c) $\frac{3}{4}(x + 2) = 2(x - 3)$

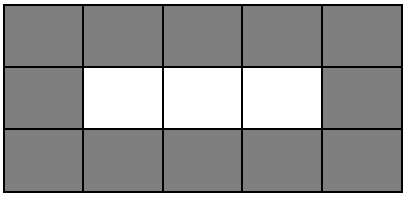
$x =$..... **(4)**

Total: 10 marks

17. Here is a sequence of black tiles (b).

Pattern 1

Pattern 2



Pattern 3

a) Complete this table

Pattern (n)	1	2	3	4	5
Number of black tiles (b)	8				

(1)

b) Find the n^{th} term of the sequence of black tiles.

n^{th} term = …… **(2)**

c) How many black tiles are there in the 25^{th} pattern?

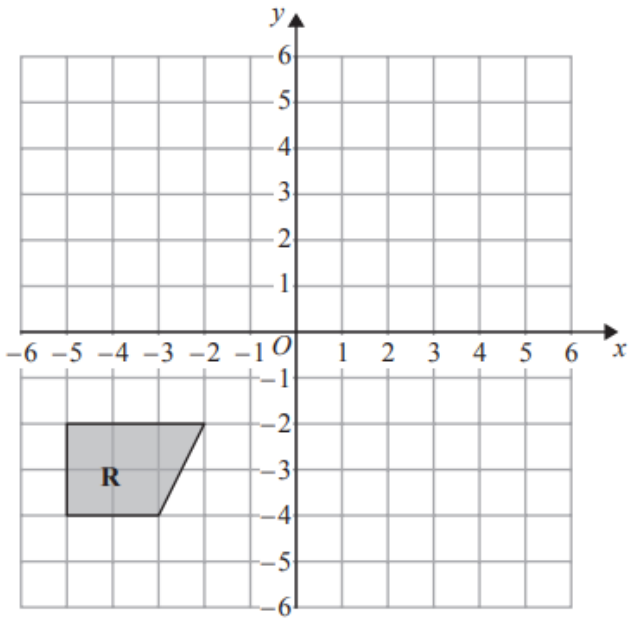
…… **(2)**

d) Which pattern has 126 black tiles?

…… **(2)**

Total: 7 marks

18. a) Reflect shape **R** in the line $y = -x$

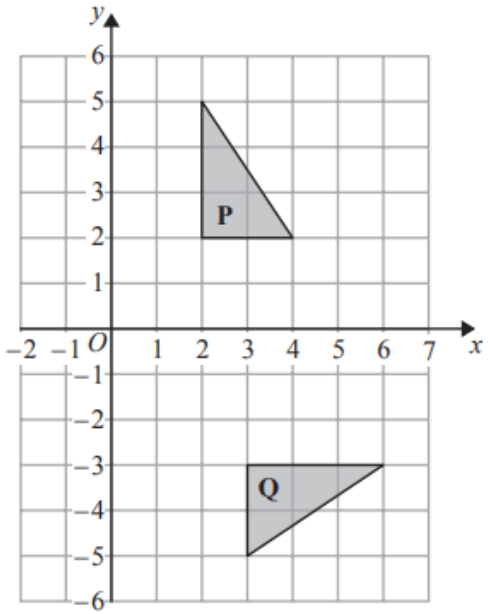


(3)

b) Describe fully the single transformation that maps triangle **P** onto triangle **Q**.

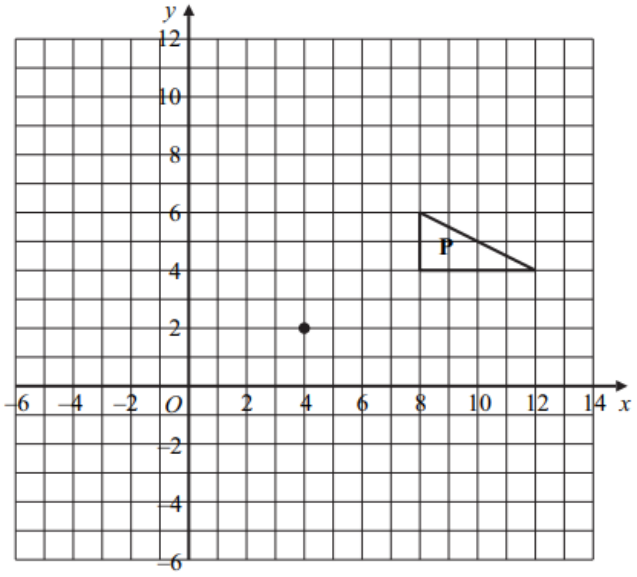
.....

.....



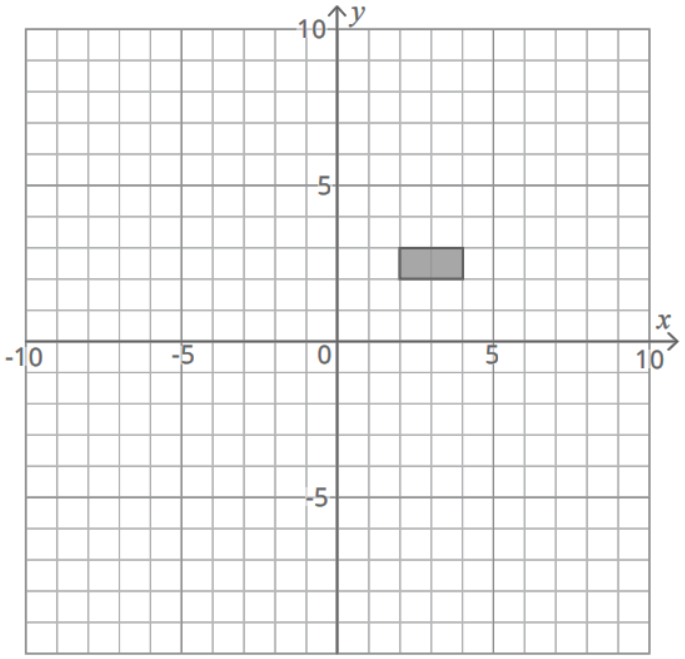
(3)

c) Rotate triangle **P**, 90° anti-clockwise about the point (4, 2).



(2)

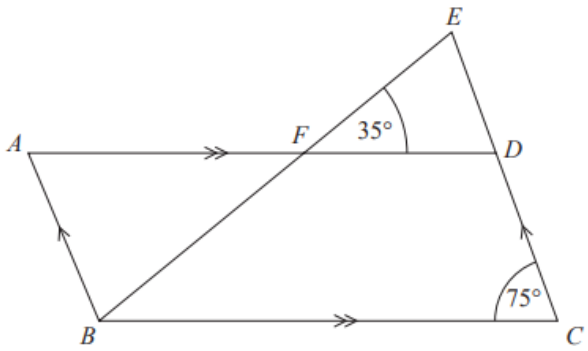
d) Enlarge the shape below with centre of enlargement (1, 1) and scale factor 3.



(2)

Total: 10 marks

19. In the diagram BCE is a triangle
Angle EFD = 35° and Angle BCD = 75°.



a) Find angle FDC.

…… **(1)**

b) i. Find angle ABF

…… **(2)**

ii. Give reasons for your answer.

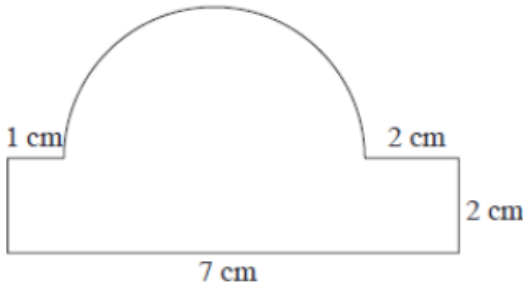
……

……

…… **(3)**

Total: 6 marks

20.



Using $\pi = 3.14$, calculate:

a) the area of the above shape.

Area = ……cm^2

(4)

b) the perimeter of the above shape.

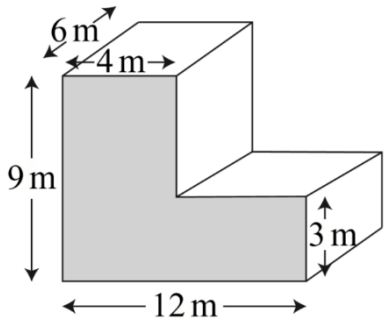
Perimeter = ……cm

(3)

Total: 7 marks

21. For the 3D shape shown below, find

a) the volume.



$V =$ ..... m^3

(3)

b) the total surface area.

Total Surface Area = ... m^2

(4)

Total: 7 marks

THE END

EXTRA PAPER