

JUNIOR LYCEUM ANNUAL EXAMINATIONS 2005

Educational Assessment Unit – Education Division

FORM 5

MATHEMATICS (Non Calculator Paper)

TIME: 20 min

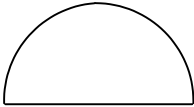
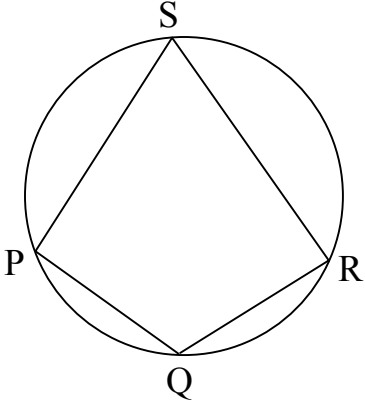
Name: _____


Class: _____


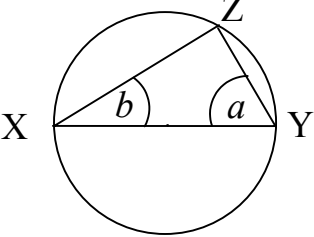
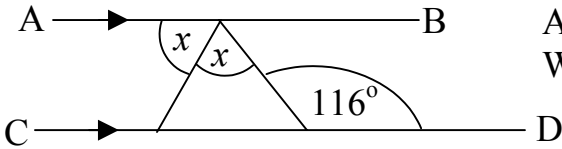
Mark

INSTRUCTIONS TO CANDIDATES

- **ANSWER ALL QUESTIONS. THERE ARE 20 QUESTIONS TO ANSWER.**
 - **EACH QUESTION CARRIES 1 MARK.**
 - **CALCULATORS, RULERS, PROTRACTORS AND OTHER MATHEMATICAL INSTRUMENTS ARE NOT ALLOWED.**
 - **ON YOUR DESK YOU SHOULD HAVE NOTHING EXCEPT FOR A PEN, PENCIL AND EXAMINATION PAPER.**
 - **TO ANSWER QUESTIONS INVOLVING NUMERICAL CALCULATIONS YOU ARE ADVISED TO CHOOSE AND USE THE MORE EFFICIENT TECHNIQUES (MENTAL OR PENCIL-AND-PAPER).**
 - **YOU ARE NOT REQUIRED TO SHOW YOUR WORKING. HOWEVER SPACE FOR WORKING IS PROVIDED IF YOU NEED IT.**
-

No.	QUESTION	SPACE FOR WORKING (IF REQUIRED)
1.	Find the value of $\frac{1}{5}$ of $\frac{1}{5}$ of 25. Ans: _____	
2.	 <p>The perimeter of a semi-circle of radius 10 cm is approximately:</p> <p>A) 30 cm B) 50 cm C) 60 cm D) 80 cm.</p> <p style="text-align: right;">Ans: _____</p>	
3.	What is the value of $10 \div 3\frac{1}{3}$? Ans: _____	
4.	What is the square root of one million ? Ans: _____	
5.	I walked a distance of 2 km in 40 minutes. What was my average speed in km/h? Ans: _____	
6.	Find the value of $4x^2$ when $x = 5$. Ans: _____	
7.	 <p>PQRS is a cyclic quadrilateral. When $\angle PSR$ is increased by 15°, then $\angle PQR$ is:</p> <p>A) increased by 15°</p> <p>B) decreased by 15°</p> <p>C) increased by 30°</p> <p>D) decreased by 30°</p> <p style="text-align: right;">Ans: _____</p>	

No.	QUESTION	SPACE FOR WORKING (IF REQUIRED)
8.	<p>The turtle starts at the position shown. Make a sketch of what the turtle draws to satisfy these LOGO commands.</p> <p>PD FD 70 RT 90 FD 140 LT 90 FD 70</p>	
9.	<p>Karen was using a spreadsheet. In cell A1 she typed 12. In cell A2 she typed 6. In cell A3 she typed the formula = A1 – A2/3. What value did Karen obtain in cell A3?</p> <p style="text-align: right;">Ans: _____</p>	
10.	<p>A bag contains 4 green, 5 yellow and 3 brown balls. Mario picked a ball at random from this bag. What is the probability that it is not green? Give your answer as a fraction in its lowest terms.</p> <p style="text-align: right;">Ans: _____</p>	
11.	<p>The value of <i>n</i> when $2^n = 8$ is: A) 8 B) 4 C) 3 D) 2.</p> <p style="text-align: right;">Ans: _____</p>	
12.	<p>John shared a number of sweets. He gave $\frac{1}{4}$ of them to his sister Sue and $\frac{1}{3}$ of the remainder to his brother Daniel. What fraction of the original number of sweets did Daniel receive?</p> <p style="text-align: right;">Ans: _____</p>	
13.	<p>4 pens and 3 rubbers together cost 76 cents. 3 pens and 2 rubbers together cost 53 cents. What is the total cost of 2 pens and 2 rubbers?</p> <p style="text-align: right;">Ans: _____</p>	

No.	QUESTION	SPACE FOR WORKING (IF REQUIRED)
14.	The marks obtained by 9 students in a test are: 11, 12, 13, 13, 14, 15, 15, 15, 16. What is the median mark? Ans: _____	
15.	 Estimate the area of this rectangle in cm^2 . Ans: _____	
16.	 XY is a diameter of the circle. Z is a point on the circumference. Which one of the following is NOT true? A) $a + b = 90$ B) $a = 90 - b$ C) $b = 90 - a$ D) $a + b = 180$ Ans: _____	
17.	VAT is charged at 18%. The selling price of an item is A) 100% B) 72% C) 118% D) 18% of its original value. Ans: _____	
18.	 AB and CD are two parallel lines. What is the size of angle x ? Ans: _____	
19.	12 electric poles are erected in a straight line along a road, leaving a space of 50 metres between each pole. What is the distance between the first and the last pole? Ans: _____	
20.	Write down a different equation of a straight line that is parallel to $y = 2x + 7$. Ans: _____	

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FORM 5

MATHEMATICS (Main Paper)

TIME: 1h 40min.

1	2	3	4	5	6	7	8	9	10	11	12	13	Total Main	Non Calculator	GLOBAL MARK

DO NOT WRITE ABOVE THIS LINE

Name: _____

Class: _____

INSTRUCTIONS:

CALCULATORS ARE ALLOWED BUT ALL NECESSARY WORKING MUST BE SHOWN.

ANSWER ALL QUESTIONS.

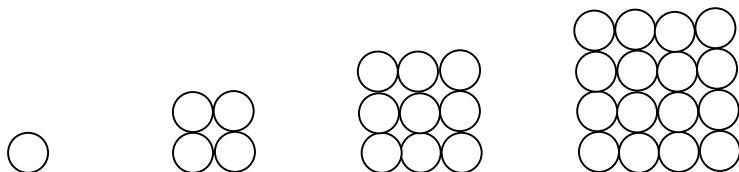
1. **Lm1 is equivalent to €2.38.** Use this rate of exchange for both parts of this question.

a) Change Lm 500 to euro.

b) What is the value of 1 euro in Maltese currency? Give your answer correct to the nearest cent.

_____ (4 marks)

2. Shapes containing equal circles follow the pattern as shown.



Write down the number of circles in:

a) the next shape _____

b) the 10th shape _____

c) the n^{th} shape _____

_____ (3 marks)

3. a) Simplify: (i) $y^5 \times y^3 \div y^2$ (ii) $4^2 + 3^0 - 2^{-1}$.

b) Find the value of n when $a^n = \frac{1}{a^4}$

_____ (4 marks)

4. a) Factorise completely $24 - 4x$.

b) Given that $P = 3n - m^2$:

(i) find the value of P when $n = 5$ and $m = -2$.

(ii) make n the subject.

_____ (5 marks)

5. The figure shows part of a spreadsheet that Claire used to work out a problem on a **triangle**.

	A	B	C	D
1	base in cm	height in cm	area in cm ²	
2	24	19		
3				

a) **Underline** the correct formula that Claire used in cell **C2** to obtain the area of the triangle.

=A2 + B2/2

=(A2 + B2)/2

=A2*B2/2.

b) What value did Claire obtain in cell **C2** ?

c) In cell **A2**, Claire entered 37 for the base of **another** triangle. What value in cell **B2** did Claire enter to obtain an area of 259 in cell **C2** ?

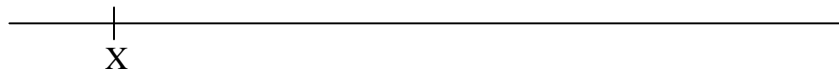
_____ (5 marks)

Name: _____

Class: _____

6. Use ruler and compasses only. All construction lines and arcs must be clearly shown.

- a) Mark a point Y on the given line so that XY is 7.5 cm long.
- b) Construct the **perpendicular bisector** of the line XY.
- c) Mark a point Z on this perpendicular bisector such that XZ is of length 5 cm and Z is **above** XY.
- d) Finally construct a circle with centre Z that passes through X and Y.



7. The sound intensity I (measured in decibels, dB) is **inversely** proportional to the **square** of the distance, d metres, from the source.

a) Write down a formula connecting I and d . (Use k for the constant of proportion).

b) At an open air Rock Concert the sound intensity is measured 4 m away from a loudspeaker and found to be 64 dB.
Work out the value of k .



c) Work out the sound intensity 6 m away from the speaker, correct to 3 significant figures.

d) A sound intensity greater than 130 dB may damage the ear. Work out the distance from the speaker at which the sound intensity is 130 dB, correct to 3 significant figures.

(7 marks)

8. For the function $f(x) = 5x - 3$, work out:

a) $f(-4)$

b) the range of values of x for which $f(x) < 12$

c) $f^{-1}(x)$

d) $f^{-1}(-23)$

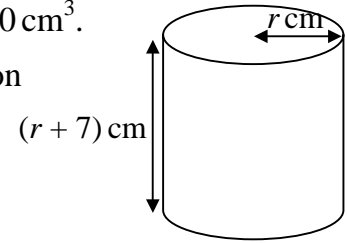
(8 marks)

9. A manufacturer of Fizzy drinks needs a cylindrical can which must have a height that is 7 cm more than the radius, r cm. The volume of the can is to be 300 cm^3 .

- a) Show that the volume may be given in terms of r by the equation

$$r^2(r + 7) = 95.49297$$

(where r is given correct to 5 decimal places)



- b) Use the method of trial and improvement to find a **positive** solution to this equation, correct to two decimal places. (**Show all your working**).

You are advised to use the equation as given in part a)

(6 marks)

10. PTQ is a tangent to the circle. $AT = AB$.

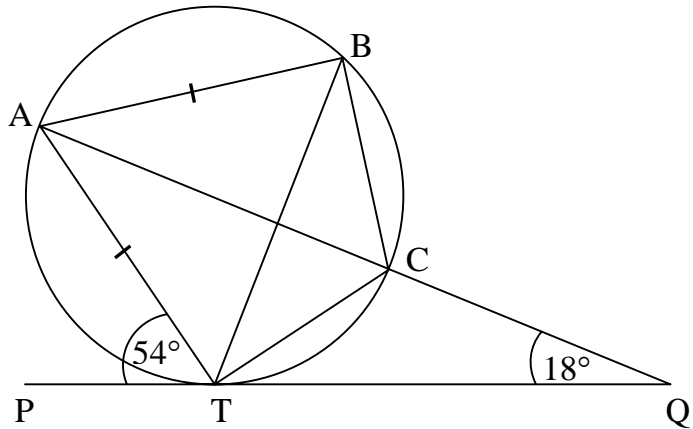
$$\angle PTA = 54^\circ \text{ and } \angle PQA = 18^\circ.$$

Show all your working and give reasons for your answers.

- a) Work out the size of:

(i) $\angle TAQ$

(ii) $\angle ATB$



- b) Prove that AC is a diameter of the circle.

(7 marks)

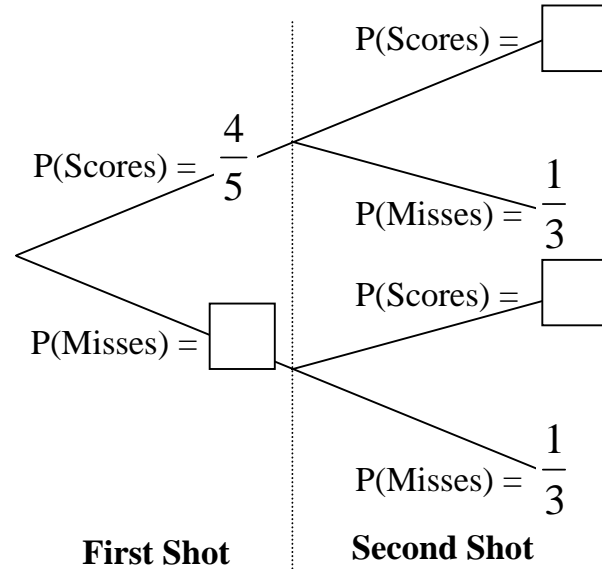
11. Nadine has two free shots in a game of netball. The table below shows the probability that she scores or misses with **each** shot.

- a) Fill in the missing fractions in the table.
 b) Complete the probability tree diagram using the fractions **from the table**.
 c) Use the tree diagram to work out the probability that Nadine:
 (i) misses **both** shots



	First Shot	Second shot
Scores	$\frac{4}{5}$	
Misses		$\frac{1}{3}$

(ii) scores **only one** shot



(iii) scores **at least one** shot.

(9 marks)

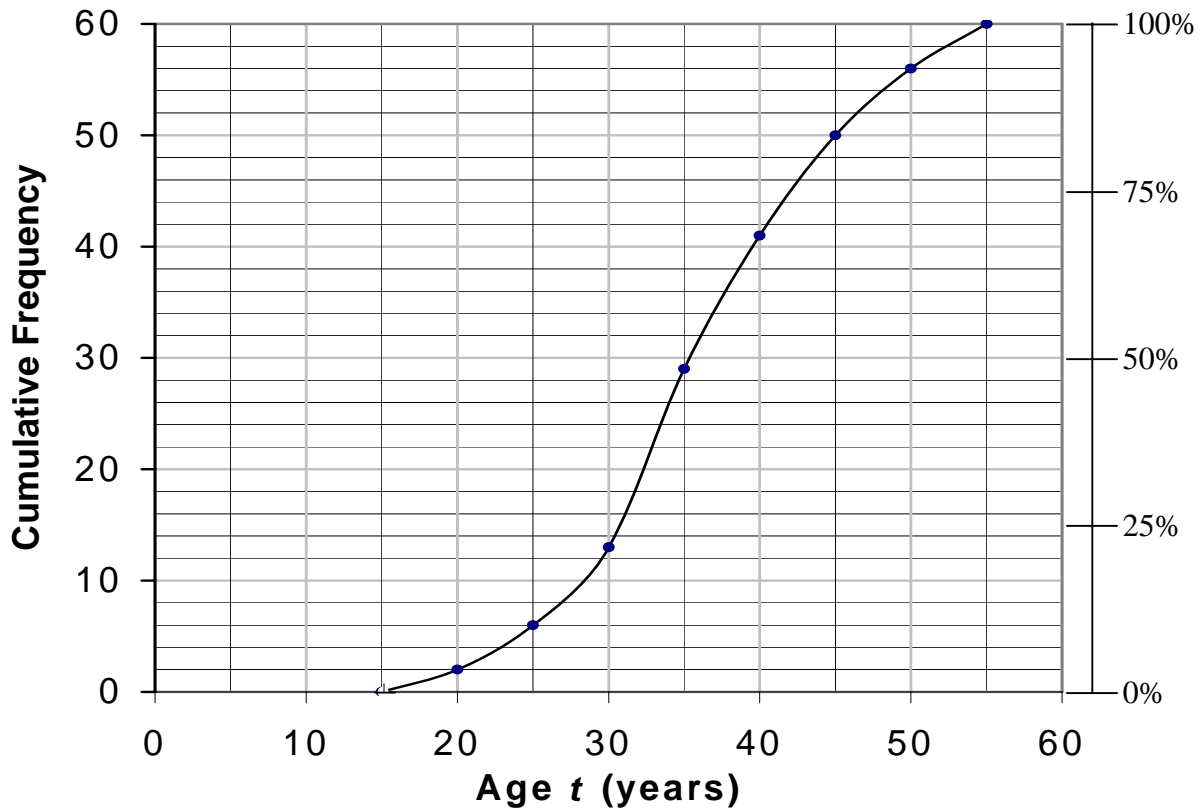
12. The table shows the distribution of the ages of 60 male and 60 female members of a tennis club.

- a) Complete the last column of the table.
 b) The cumulative frequency curve shown on the next page was drawn using the given data for men. On the same grid and using your answers to part a) draw the cumulative frequency curve for the data for women.

Age t (years)	Frequency Men	Cumulative Frequency Men	Frequency Women	Cumulative Frequency Women
$15 \leq t < 20$	2	2	4	4
$20 \leq t < 25$	4	6	13	17
$25 \leq t < 30$	7	13	17	34
$30 \leq t < 35$	16	29	14	48
$35 \leq t < 40$	12	41	7	
$40 \leq t < 45$	9	50	3	
$45 \leq t < 50$	6	56	2	
$50 \leq t < 55$	4	60	0	

c) Use the curve drawn in part b) to estimate :

- (i) the **median** age for **women** (ii) the **interquartile range** for **women**.



Box Plot **B** (Women) |-----|

Box Plot **A** (Men) |-----|

d) Box plot **A** illustrates the distribution of the men's ages.

Complete box plot **B** to illustrate the distribution of the women's ages.

e) Use the above information to determine which **one** of the following statements is **NOT** true.

- P) The men's median age is more than the women's median age.
- Q) Most of the women are 24 years or older.
- R) The men's ages were all greater than the women's median age.
- S) The men's ages have a greater range than the women's ages.

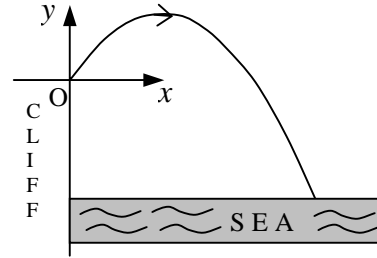
Statement _____ is **NOT** true.

(10marks)

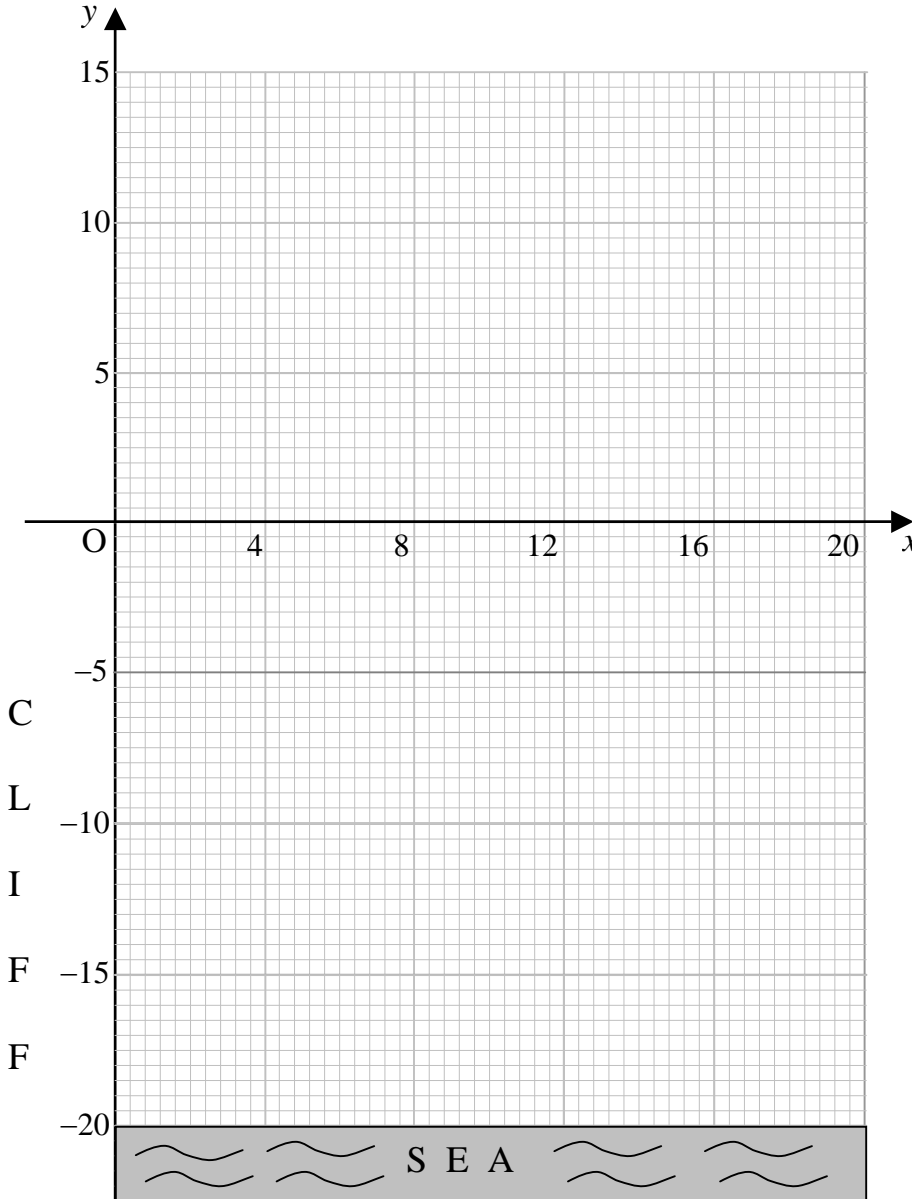
13. A stone is thrown from the top of a cliff. The height of the cliff above sea level is 20 m. The position of the stone from the top of the cliff relative to the axes shown, is given by the equation $y = 3x - 0.2x^2$. All units are in metres.

a) (i) Complete the table for $y = 3x - 0.2x^2$.

x	0	4	8	12	16	20
y	0		11.2		-3.2	-20



(ii) On the grid below draw the graph of $y = 3x - 0.2x^2$ for $0 \leq x \leq 20$.



b) From your graph:

(i) Find the greatest height of the stone **above the sea level**

(ii) find the horizontal distance from the cliff when the stone is level with the cliff top.

(8 marks)