

JUNIOR LYCEUM ANNUAL EXAMINATIONS – 2006

Educational Assessment Unit – Education Division

FORM 5 MATHEMATICS (Non Calculator Paper – Option A) TIME: 20 minutes

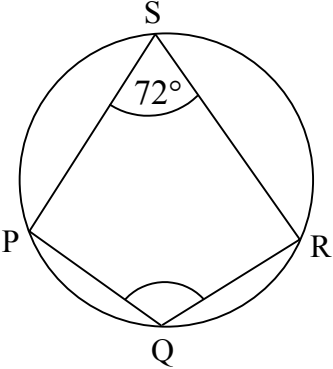
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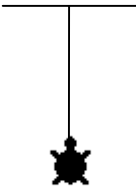
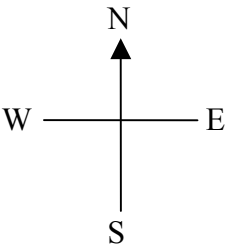
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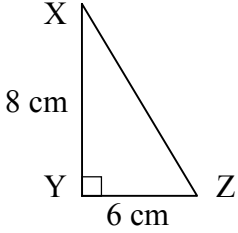
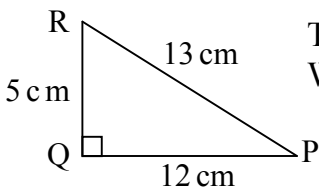
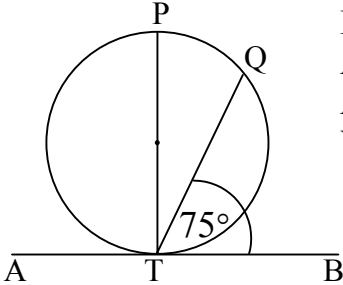
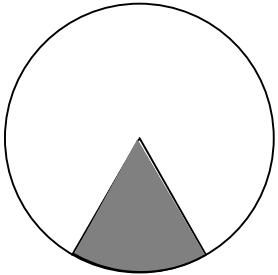
Mark

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.**
 - **You are not required to show your working. However space for working is provided if you need it.**
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No.	QUESTION	SPACE FOR WORKING (IF REQUIRED)
1.	Find the value of $8 \cdot 3 - 2 \times 4$. Ans: _____	
2.	The exterior angle of a regular polygon is 36° . This regular polygon has: (A) 5 sides (B) 6 sides (C) 8 sides (D) 10 sides. Ans: _____	
3.	What is the next even number after 88 ? Ans: _____	
4.	In a bag there are 4 yellow marbles and 8 green marbles. Kenneth picks a marble at random from the bag. What is the probability that Kenneth picks a yellow marble? Ans: _____	
5.	Given that $58 \times 7.8 = 452.4$, what is the value of 5.8×78 ? Ans: _____	
6.	Which of the following is the best estimate for the volume of a cylinder of radius 4 cm and height 5 cm? (A) 120 cm^3 (B) 240 cm^3 (C) 120 cm^2 (D) 240 cm^2 . Ans: _____	
7.	Given that $f(x) = 7x + 5$ find the value of $f(3)$. Ans: _____	
8.	4% of a certain sum of money is Lm18. What is the value of 6% of the same sum of money? Ans: _____	
9.	 <p>PQRS is a cyclic quadrilateral in which $\angle PSR$ is 72°.</p> <p>What is the size of $\angle PQR$?</p> <p>Ans: _____</p>	

No.	QUESTION	SPACE FOR WORKING (IF REQUIRED)
10.	<p>The turtle starts at the position shown. The turtle is given a set of LOGO commands and draws the figure as shown.</p> <p>PD FD 100 RT 90 FD 50 ____ 100 PU HOME</p> <p>Which one of the following is the missing command? (A) FD (B) BK (C) RT (D) LT.</p> <p>Ans: _____</p>	
11.	<p>Adrian was using a spreadsheet. In cell A1 he typed 30. In cell B1 he typed 32. In cell C1 he typed 34. Choose the correct formula that Adrian would type in cell D1 to obtain the average of the entries in cells A1, B1 and C1.</p> <p>(A) = A1+B1+C1 (B) = A1+B1+C1/3 (C) = A1 B1 C1 / 3 (D) = (A1+B1+C1)/3.</p> <p>Ans: _____</p>	
12.	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;">  </div> <div> <p>Maria was facing SW. She turned 90° clockwise. What direction is she now facing?</p> <p>(A) NW (B) NE (C) SE (D) SW.</p> <p>Ans: _____</p> </div> </div>	
13.	<p>The marks obtained by 7 pupils in a Mathematics test were 2, 3, 4, 5, 6, 6, 8. John was one of these pupils and he obtained 5 marks. John's mark is the:</p> <p>(A) mean (B) mode (C) median (D) range.</p> <p>Ans: _____</p>	
14.	<p>Which of the following is the best estimate for $\sqrt{64 + 16}$?</p> <p>(A) 12 (B) 9 (C) 8 (D) 4.</p> <p>Ans: _____</p>	

No.	QUESTION	SPACE FOR WORKING (IF REQUIRED)
15.	 <p>Triangle XYZ is right-angled at Y. YZ is 6 cm long and XY is 8 cm long. What is the length of XZ?</p> <p style="text-align: right;">Ans: _____</p>	
16.	<p>The angles of a triangle are in the ratio of 2 : 3 : 4. The size of the smallest angle is:</p> <p>(A) 9° (B) 40° (C) 80° (D) 120°.</p> <p style="text-align: right;">Ans: _____</p>	
17.	 <p>Triangle PQR is right-angled at Q. What is the value of $\cos P$?</p> <p style="text-align: right;">Ans: _____</p>	
18.	 <p>PT is a diameter of the circle. ATB is a tangent to the circle at T. Angle BTQ is 75°. What is the size of angle PTQ?</p> <p style="text-align: right;">Ans: _____</p>	
19.	<p>Does the point with coordinates (2 , 5) lie on the straight line graph of $y = 3x - 1$?</p> <p style="text-align: right;">Ans: _____</p>	
20.	 <p>The area of a circle is 330.6 cm^2. Find the area of the shaded sector of the circle if the angle at the centre is 60°.</p> <p style="text-align: right;">Ans: _____</p>	

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FORM 5

MATHEMATICS (Main Paper – Option A)

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: _____

**CALCULATORS ARE ALLOWED BUT ALL NECESSARY WORKING MUST BE SHOWN.
ANSWER ALL QUESTIONS.**

1. a) Write 0.625 as a **fraction in its lowest terms**.

b) (i) Write the following numbers correct to **1 significant figure** to give an **estimate** for **P**.

$$P = \frac{(24.37 \times 39.26)^2}{35.73 \times 79.37}$$

(ii) Use your calculator to work out the value of **P** correct to **3 significant figures**.

_____ (4 marks)

2. a) Complete the sequence:

7, 10, 13, 16, _____, _____.

b) The n th term for the sequence above is $3n + 4$. Find the 20th term of this sequence.

_____ (4 marks)

3. a) A shopkeeper bought a washing machine for Lm240. He then sold it at a profit of 15%.

Work out:

(i) the selling price of the washing machine

(ii) the profit.

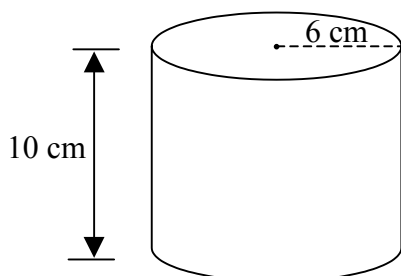
- b) Aaron used a spreadsheet to calculate the interest on his Savings Account.
He entered the following data:

	A	B	C	D	E
1	Principal (Lm)	Rate (%)	Time (Years)	Interest (Lm)	
2	800	1.5	2	=A2*B2*C2/100	
3					

What value did Aaron obtain in cell **D2**?

(5 marks)

4.



A cylinder has a radius of 6 cm and a height of 10 cm.

Work out:

- a) the **volume** of the cylinder, correct to the **nearest whole number**

- b) the **curved surface area** of the cylinder, correct to **one decimal place**.

(4 marks)

5. The formula for the area of a trapezium is: $A = \frac{1}{2}(a + b)h$.

- a) Work out the area of a trapezium when
 $a = 12.5$ cm, $b = 17.5$ cm and $h = 8$ cm.

- b) Make h the subject of the formula.

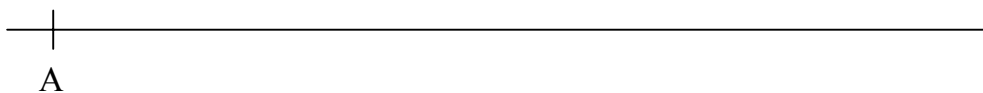
(4 marks)

Name: _____

Class: _____

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

- a) Construct a triangle ABC in which $AB = 8.5$ cm, $BC = 4$ cm, and $\angle ABC = 90^\circ$.
- b) Construct the locus of a point that is equidistant from B and C. Let this locus meet AC at D.
- c) Measure and write down the size of $\angle BDC$.

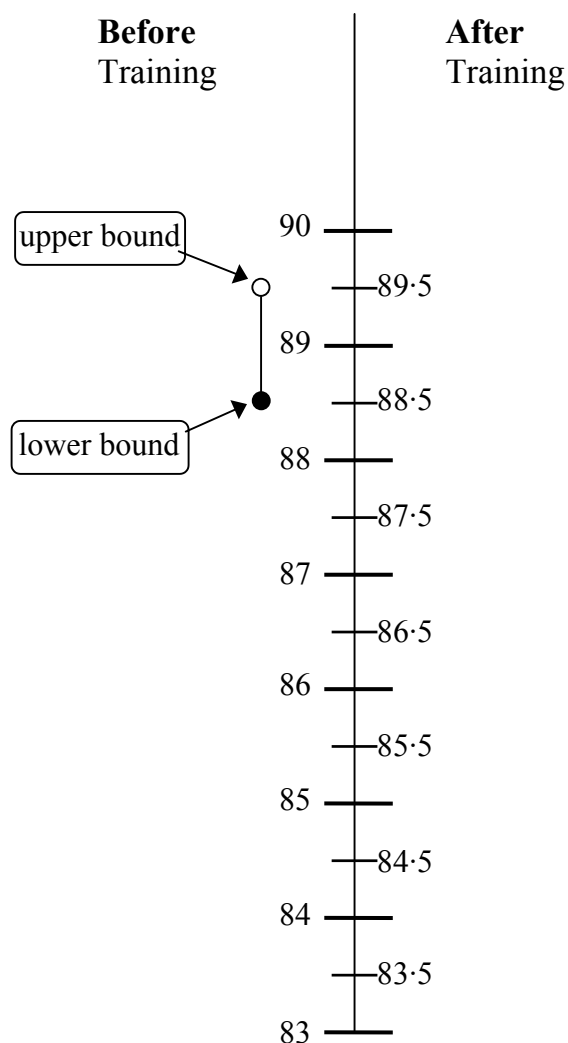


(5 marks)

7. Patrick weighed 89 kg before starting a training programme. He weighed 85 kg after one month. Both weights are correct to the nearest kilogram.

a) The range for Patrick's weight **before** training is shown on the number line. Use the number line to illustrate in the same way the range for Patrick's weight **after** training.

b) Work out the **lower** and **upper** bounds of the weight **loss**.
(You are advised to refer to the number line)



(6 marks)

8. P, Q, R and S are four points on the circumference of a circle centre O.

SQ is a straight line passing through the centre O of the circle.

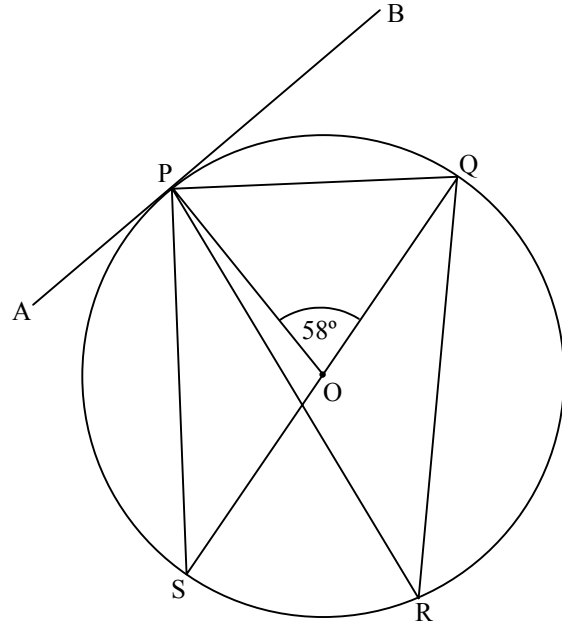
APB is a tangent to the circle at P.

$\angle POQ = 58^\circ$.

Show all your working and give reasons for your answers.

Find each of the following angles:

- a) $\angle PRQ$ b) $\angle QPS$
 c) $\angle PQS$ d) $\angle APS$



(8 marks)

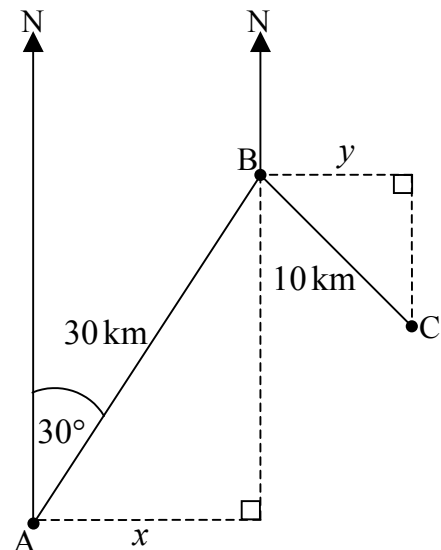
9. A ship sails 30 km on a bearing of 030° from A to B.

The ship then sails 10 km from B to C.

a) How far is B East of A? (distance x)

b) C is 22 km East of A.

(i) How far is C East of B? (distance y)



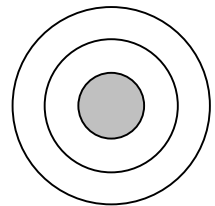
(ii) Work out the bearing of C from B. Give your answer correct to the nearest degree.

(6 marks)

10. Robin shoots arrows at the target shown. He tries to hit the bullseye (the shaded part).

The probability of an arrow hitting the target is $\frac{3}{4}$.

If the arrow **does hit** the target the probability of hitting the bullseye is $\frac{1}{9}$.



a) Work out the probability that:

(i) a shot **hits** the target **AND** the bullseye.

(ii) a shot does **not** hit the bullseye.

b) Robin shoots **two** arrows at the target. Work out the probability that:

(i) the **first** shot hits the bullseye **AND** the **second** shot does **not** hit the bullseye.

(ii) **at least** one shot hits the bullseye

(9 marks)

11.

R	1	2	3	4	5	6
S	3	12	27	48		108

a) Which **one** of the following relationships describes the data given in the above table?

- A) $S \propto R$ B) $S \propto R^2$ C) $S \propto \frac{1}{R^2}$ D) $S \propto R^3$ _____

b) (i) Write down a formula connecting S and R .
(Use k for the constant of proportionality).

(ii) Use the data in the table to work out the value of k .

(iii) Work out the value of S when $R = 5$

(6 marks)

12. A branch bank manager recorded the lengths of times that 120 customers had to wait in the queues to be served. The results are shown on the cumulative frequency curve given.

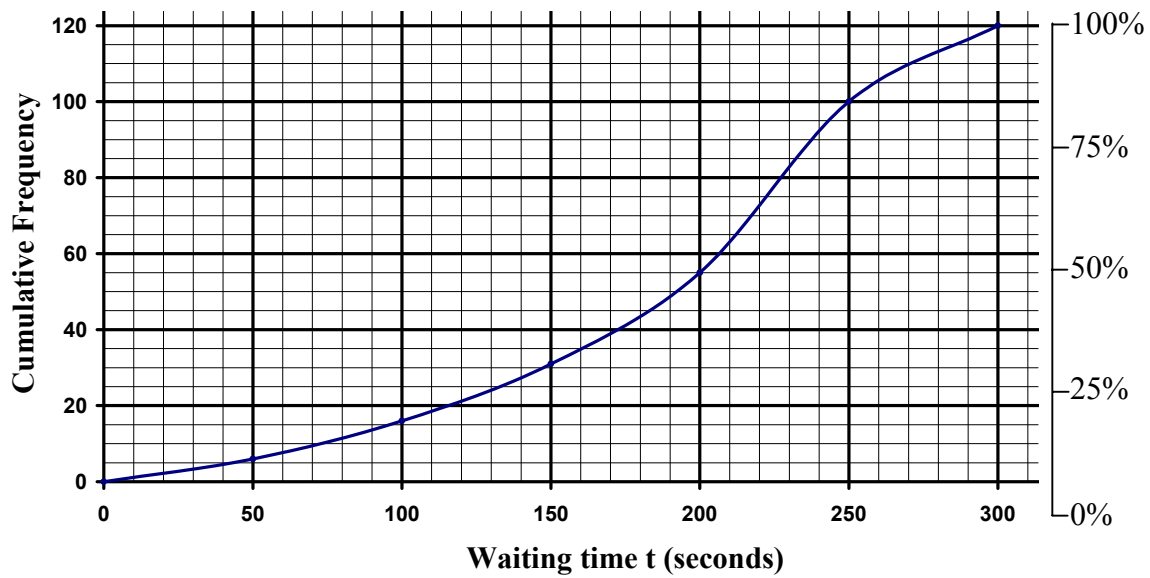
a) Use the cumulative frequency curve given to estimate the number of people who had to wait **more than two minutes**.

b) The branch bank manager reorganized the service at the bank and again recorded the waiting times **after** the changes were made. The distribution of the waiting times is given in the table.

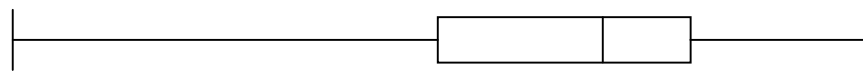
Waiting time t (seconds)	Frequency	Cumulative Frequency
$0 < t \leq 50$	8	8
$50 < t \leq 100$	11	19
$100 < t \leq 150$	18	37
$150 < t \leq 200$	38	
$200 < t \leq 250$	35	
$250 < t \leq 300$	10	120

(i) Complete the last column of the table.

(ii) On the **same** grid and using your answers to part (i) draw the cumulative frequency curve for this distribution.



Box Plot **B** (After changes)



Box Plot **A** (Before changes)

c) Box plot **A** illustrates the distribution of the waiting times **before** the changes. Complete box plot **B** to illustrate the distribution of the waiting times **after** the changes were made.

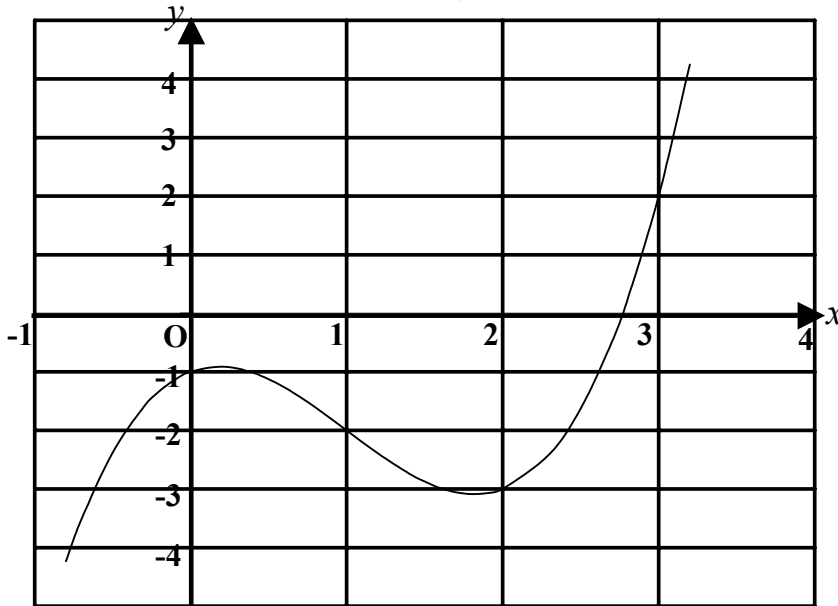
d) Compare the lower quartile, median, upper quartile and the interquartile range **before** and **after** the changes made at the bank.

e) Were the changes made at the bank effective in **reducing** the waiting times? **Explain** by referring to your answer to d)

(10 marks)

13. This is the graph of $y = x^3 - 3x^2 + x - 1$. Use the graph to answer the following questions.

No marks will be awarded for answers unless a valid explanation is given.



a) How many roots has the equation $x^3 - 3x^2 + x - 1 = 0$?
Explain by referring to the graph.

b) (i) How many roots has the equation $x^3 - 3x^2 + x + 1 = 0$?
Explain by referring to the graph.

(ii) Write down the value of the **integer** root.

c) (i) Find the equation of the **straight line** which should be drawn on the **same** graph to solve the equation $x^3 - 3x^2 + 1 = 0$.

(ii) For this **straight line** equation what is the value of y when $x = 0$ **and** what is the value of x when $y = 0$?

(when $x = 0, y = \underline{\hspace{2cm}}$ **and** $x = \underline{\hspace{2cm}}$ when $y = 0$)

(iii) Hence or otherwise draw, on the same axes, the **straight line** graph of the equation found in c) (i).

(iv) How many of the roots of the equation $x^3 - 3x^2 + 1 = 0$ are **positive**?

(9 marks)