Junior Lyceum Entrance Examination into Form I – May 2003

MATHEMATICS

CHIEF EXAMINER'S REPORT

General Comments about the examination paper

The purpose of the examination was to assess the mathematical knowledge, skills and understanding of the candidates at the end of their Primary Education.

The paper setters used a specification grid to ensure that all the set questions were within the syllabus, that these were pitched at appropriate levels to cater for a wide range of abilities, that all the different areas of the syllabus were tested and that the established weighting for the different areas of the syllabus was preserved.

The candidates had to answer 20 questions carrying a total of 100 marks. The first ten questions carried 4 marks each and the remaining ten carried 6 marks each. These questions were presented on a 12-page booklet, with ample space to allow the candidates display the necessary working. Clear diagrams contributed further to make the paper child-friendly. Particular attention was given to the language used in the questions to ensure that the language was accessible to all candidates, even to those with special assessment needs.

General comments about the performance of the candidates

The average mark for the paper was 58, the median mark was 64 whilst the standard deviation was 26.7.

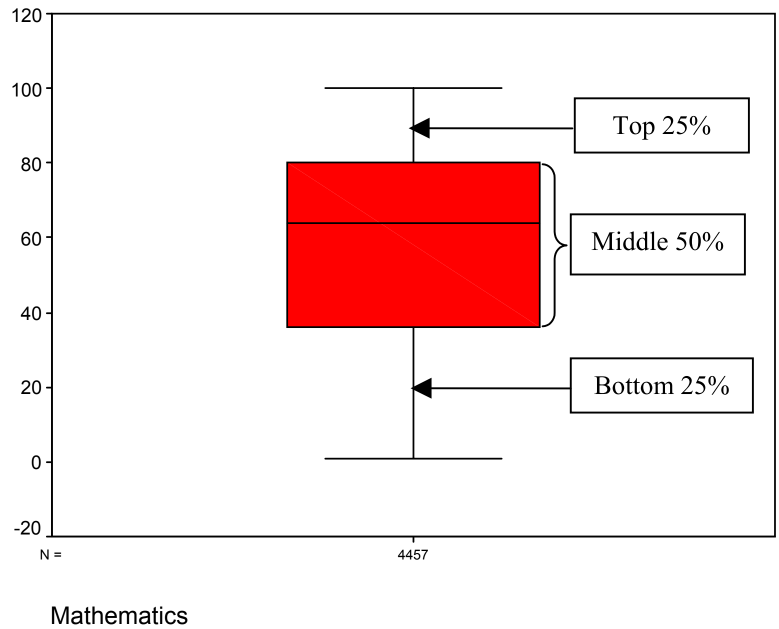
67% of the candidates secured a pass in the Mathematics paper, the pass mark being set at 50.

56.5% scored above the average mark of 58.

The scored marks were distributed as follows:

the bottom 25% scored in the range 0 to 35;
the next 25% scored in the range 36 to 63;
the next 25 % scored in the range 64 to 80;
the top 25% scored in the range 81 to 100.

The following box-plot summarises this information.



The candidates' responses to the questions brought to light the various attainment levels reached in the subject. A good number of candidates falling particularly in the upper 25% demonstrated their accurate and efficient methods of calculation, their profound knowledge and understanding of basic mathematical concepts, their versatility in reasoning and in expressing oneself clearly using the proper mathematical language as well as their clear way of presenting one's work. At the other extreme, those candidates belonging to the bottom 25% group showed that they were still insecure in most of the areas mentioned above. For example, they couldn't distinguish between odd and prime numbers; they could not realise the difference in meaning between 5.7 and 57; they used the word "lines" instead of "sides"; they gave a measurement of 130º for an angle that actually measured 50º.

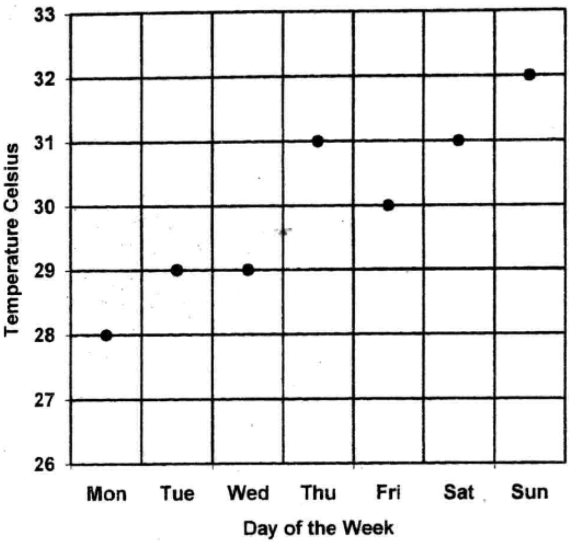
It has also been observed that, year after year, the number of children making use of calculation methods recommended in the syllabus is increasing. The markers noted that more candidates are making good use of the repeated subtraction method instead of the conventional long division method, the time-line to work out time difference, and the method of decomposition for multiplication. On the other hand the markers remarked that many candidates are not reflecting enough on their solutions to check the reasonableness of their results. Some other candidates do not read the question properly to give their answers as requested while others do not show their working and therefore will not be able to earn the method marks.

There were some candidates who displayed all their working in one continuous line in multi-step problems. Candidates should appreciate that the working associated with each step has to be written separately so as to preserve mathematical logic and preciseness.

In addition a very large number of candidates were not able to express mathematical ideas and reasons in the appropriate mathematical language.

Notice the correct presentation of the two-step solution in the first example and the incorrect layout in the second example.

6. Look at this graph. It shows the **highest temperatures** reached last week.
Work out the **average temperature**.

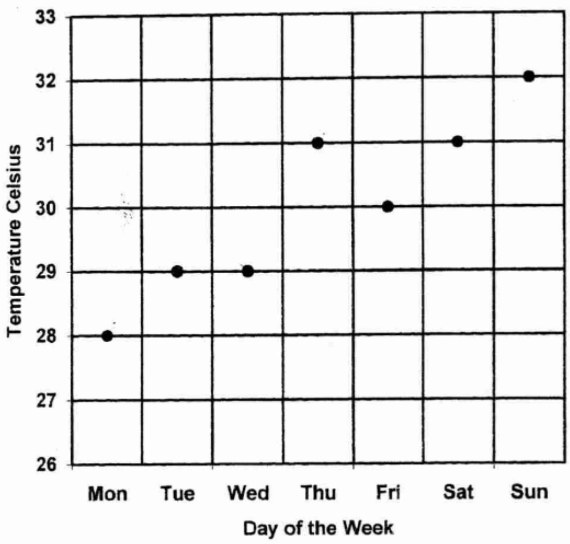


28 +
29
29
31
30
31
32
210

7)210 = 30

30 **degrees Celsius**

6. Look at this graph. It shows the **highest temperatures** reached last week.
Work out the **average temperature**.



28 +
29
29
31
30
31
32
7)210
030

30 **degrees Celsius**

The following exemplars bring out some of the strengths and weaknesses demonstrated by the candidates in this examination.

Note the correct use of the time-line to work out the time interval. Note also the correct use of a formal method of working out a time interval.

7. These are the opening times of a swimming pool.

Saturday and Sunday
9:00 a.m. to 6:00 p.m.
Monday to Friday
10:00 a.m. to 6:00 p.m.

a) How many **hours** is the pool open on **Sunday**?

9am — 3hr — 12 — 6 hr — 6pm

12 − 9 = 3

9 **hours**

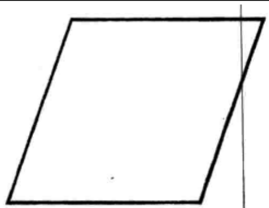
b) On **Thursday** Maria arrives at the swimming pool at **3:50 p.m.**

She arrives 2 **hours** 10 **minutes before** the pool **closes**.

5 (60)
6:00 −
3:50
2:10

In part (a) this candidate has demonstrated his sound knowledge of the properties of a square and has made proper use of the appropriate mathematical language to explain his reasoning.

16. a) Look at this shape. **Why** is it **not a square**?



Because it has not got 4 lines of Symmetry. (Not 1 yet)

b) A circle has a **diameter** of **11·4 cm**.
Work out its **radius**.

2)11·4 cm = 05·7cm

5·7 **cm**

c) Maria is facing **North-East.**
She **turns clockwise** to face **South-West**.

She turns through an angle of 180 **degrees**

or 2 **right angles**.

The candidate made good use of the "repeated subtraction method", demonstrated a clear understanding of the process and presented his work in a logical way.

11. Maria's class is having a party.
She has **Lm5** to spend on Cola cans.
Each Cola can costs **23c**.

a) Work out the **greatest number** of Cola cans she can buy for **Lm5**.

500c ÷ 23

500c −	
115c	23c × 5
385c −	
230c	23 × 10
155c −	
115c	23 × 5
40 −	
23c	23 × 1
17c	

21 cans

b) What **change** is left?

17 cents

The candidate showed sound understanding of the concepts associated with fractions and percentages and applied his knowledge and skills correctly.

12. There are **30 pupils** in a Year 6 class.
40% are **girls**.

a) What **percentage** are **boys**?

100 % −
40 %
60 %.

60 %

b) How many are **boys** and how many are **girls**?

Boys = $\frac{60}{100} = \frac{6}{10} = \frac{3}{5}$ 5⟌30
6×3 = 18

Girls = $\frac{40}{100} = \frac{4}{10} = \frac{2}{5}$ 5⟌30
6×2 = 12

18 **boys**; 12 **girls**

c) **75%** of the **girls** like netball.
How many **girls** like netball?

$\frac{75}{100} = \frac{3}{4}$ ~~4⟌30~~
4⟌12
3×3 = 9 girls

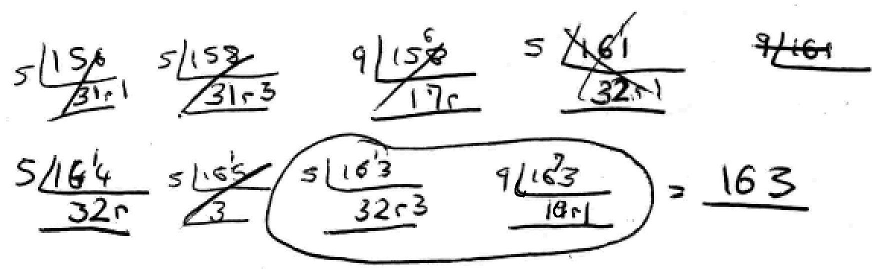
9. **girls**

The candidate made good use of the trial-and-improvement method to solve this non-routine problem, presented his strategy in an ordered way and expressed his mathematical reasoning clearly.

20. Maria has **between 155 and 165** used mobile phone-cards.

When she puts them in **lots of 5**, she has **3 left**.
When she puts them in **lots of 9**, she has **1 left**.

a) How many **phone-cards** does she have?



163 **phone-cards**

b) Explain **why** Maria **cannot pack all** her phone cards **in equal lots**.

Maria cannot pack all her phone cards in equal lots, because 163 is a prime number, that ~~meant~~ means, it cannot be devided with any number.

Markers' Comments

The following remarks were made by the markers and refer to the strengths and weaknesses demonstrated by the candidates in each question.

Question 1
A high proportion of the candidates answered correctly. In item (b) the most common mistake was the omission of the decimal point. In item (d) instead of dividing 3600 by 36 some multiplied 3600 by 36.

Question 2
A good number of candidates confused prime numbers with odd numbers.

Question 3
Items a, b and d were quite straightforward. In item (c) some candidates failed to give the correct value for the sum of the angles in a triangle.

Question 4
Candidates found difficulty in arranging the measures in the correct order, indicating that children need to develop a better understanding of the measuring units before attempting any conversions from one unit to another.

Question 5
Many forgot to multiply the area of one of the faces by six but a good number calculated the volume of the cube correctly.

Question 6
In general this was answered correctly by many with the exception of some who simply added the data extracted from the graph but failed to work out the average.

Question 7
The most common mistake in part (a) was giving the time interval between 9 a.m. and 6 p.m. as 3 hours. In part (b) the time interval was often computed wrongly, the most common answer being 2 h 50 min instead of 2 h 10 min.

Question 8
In general this was answered correctly by a good number of candidates, except for those who committed arithmetical mistakes while multiplying and subtracting.

Question 9
The most common mistake was in not giving the fractions in their lowest terms.

Question 10
This was a challenging question for many students. It tested their understanding of fractions and their ability to work with them. Quite a good number failed to give the correct answers.

Question 11
A good number used the repeated subtraction method correctly and interpreted the remainder appropriately. However those who used other methods got lost in their working, committing various arithmetical mistakes.

Question 12
The most common mistakes were adding or subtracting the 30 pupils to or from 40% and calculating 75% of 30 pupils instead of finding 75% of 12 girls.

Question 13
In general this was answered correctly by a good number of candidates. Some gave the wrong measurement in both units.

Question 14
Part (a) was generally answered well. Parts (b) and (c) however offered some difficulty, indicating that some candidates did not understand clearly the situation presented in the problem. Some good candidates noticed that they could displace the six squares on the upper right hand to the bottom.

Question 15
The majority of the candidates fared very well in this problem in spite of the fact that they did not deduce the results by predicting them from the emerging patterns.

Question 16
The majority of the candidates found it very difficult to give the correct reason and to express oneself using the proper mathematical language.

Question 17
Most marks were lost in computational errors. Otherwise this was a straightforward "real life" problem.

Question 18
Once again candidates encountered difficulty in carrying out correctly the conversion of units. A case in point is converting $2\ \ell\ 90\ m\ell$ to 2900 mℓ

Question 19
The usual mistakes when working with time were committed. Candidates forget that there are 60 minutes in 1 hour and not 100 minutes!

Question 20
This was the most challenging question in the paper. Only a few managed to answer it correctly. Once again this brought out the confusion between odd and prime numbers. It also highlighted the difficulty that candidates find when they come to explain their reasoning and thinking.

Implications for Teaching and Learning

Most of the following recommendations have already been presented in previous reports. They are being presented here again for the sake of emphasis and completeness.

1. Teachers and parents should continue to encourage children to make more use of the methods and approaches described in the Year 4, 5 and 6 Syllabus. These methods are based on understanding and therefore enable the children to learn Mathematics in a more meaningful way.

2. Children should be encouraged to justify their answer to a problem by checking the reasonableness of the result. They should appreciate that checking is an essential part of the problem solving process.

3. Teachers and parents need to help pupils acquire a range of strategies to solve word problems, particularly in problems involving two or more steps.

4. Misconceptions and errors in children's work need to be tackled with the whole class as well as on an individual basis as these offer an excellent opportunity to clear difficulties encountered by many other children.

5. Due to being anxious to solve a problem and get it right, children often tend to adopt what they feel is a standard written method rather than a range of strategies related to the nature of the problem. Children therefore need to be more engaged in problem solving approaches that make them think. They need to be given more opportunities to talk about the way they reach a solution to a problem and need to appreciate that there is often more than one way of solving a problem. Moreover during discussions they should be encouraged to use the appropriate mathematical language to verbalise their thoughts and reasoning.

6. The teaching of place value needs to be strengthened and the importance of accuracy when setting out work in calculations involving decimal fractions should be emphasised.

7. Teachers should provide opportunities for children to develop their early algebraic skills; for example, to generalise from patterns or to solve "missing number" problems.

8. Before children use the protractor to measure an angle, they should first give an estimate for the size of the angle and use this estimation to decide on the appropriate scale they should choose. Children should therefore be given ample opportunities to develop the skill of estimation of angles before they embark on measuring the angles with a protractor.

9. Accuracy in measuring the lengths of lines and the sizes of angles needs to be emphasised.

10. Children need to be given more opportunities to read and use scales (temperature, weighing, measuring, graphs, . . .) in a variety of contexts and relate them to the divisions on a number line.

11. Teachers should provide pupils with more opportunities to develop familiarity with the units of measurement before tackling conversions from one unit to another.

12. Teachers should provide pupils with more practice in solving a variety of problems involving percentages, aiming to consolidate their understanding of percentage as number of parts per 100.

13. More use of the time-line is recommended. When students use a formal method to find a time-interval, they should make use of the time-line to check the accuracy and reasonableness of the result.