INTERNATIONAL SINGAPORE MATHS COMPETITION 2016 (Primary 6)

1 hour 30 minutes

Instructions to participants

1. Do not open the booklet until you are told to do so.
2. Attempt ALL 25 questions.
3. Write your answers neatly in the Answer Sheet provided.
4. Marks are awarded for correct answers only.
5. All figures are not drawn to scale.
6. Calculators may be used.

Questions in Section A carry 2 marks each, questions in Section B carry 4 marks each and questions in Section C carry between 6 to 10 marks each.

Jointly organised by

Section A

Each of the questions 1 to 10 carries 2 marks.

1. Study the following table.

Row 1	3 × 3	9
Row 2	3 × 3 × 3	27
Row 3	3 × 3 × 3 × 3	81
:		
:		
Row 100	3 × 3 × ……. × 3	A

What is the last digit of the number represented by A?

2. Let $a \bullet b = a + b - 1$ and $a \circ b = a \times b - 1$.
If $y \bullet (y \circ 4) = 33$, find the value of y.

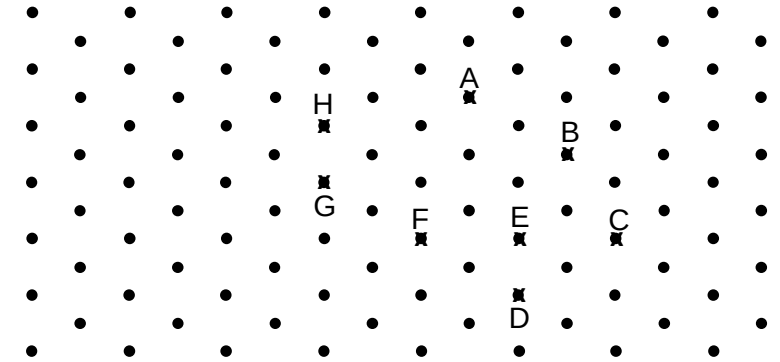
3. The letters A to I represent numbers. The numbers are added vertically and horizontally to give the numbers in the last row (17; P; Q) and the last column (20; 14; 12).

A	B	C	20
D	E	F	14
G	H	I	12
17	P	Q	

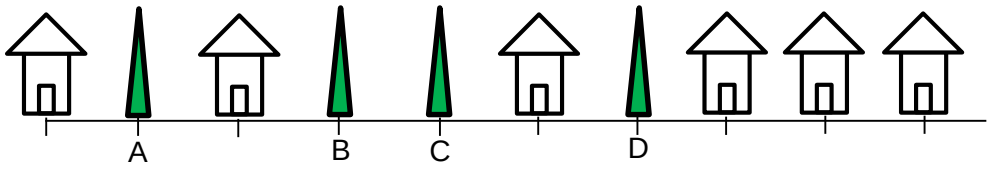
What is the sum of P and Q?

4. One day I noticed that my newspaper had a total of 24 pages and that page 6 and page 20 were on the same double sheet. Which two other pages were also on this sheet?

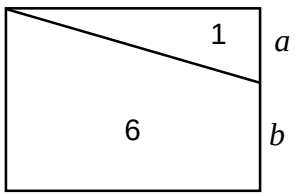
5. There are 8 points on the grid below. Points A, E and G form a triangle. List 3 other different points which form a triangle of the same area.



6. The houses and trees in the diagram are all in a straight line. The trees and houses are all equally spaced. In each of the six houses lives a child. At which tree should the children meet so that the sum of the distances they walk to that tree is the least?



7. In the diagram (not drawn to scale), the sloping line divides the area of the rectangle in the ratio 1 : 6. What is the ratio a : b?



8. In an orchard with m orange trees, every tree produced $2p$ oranges. Some oranges were lost due to a hailstorm and $\frac{3}{4}mp$ oranges remained. What percentage of oranges was lost?

9. Find the largest possible whole number value of x.

$$\frac{1}{6} < \frac{x}{5} < \frac{2}{3}$$

10. There are 4 keys and 4 locks. What is the maximum number of times you need to try the locks so as to match all 4 keys to their locks?

Section B

Each of the questions 11 to 20 carries 4 marks.

11. Study the number sequence given below:

    1, 3, 5, 6, 9, 9, 13, 12, 17, 15, … , 401

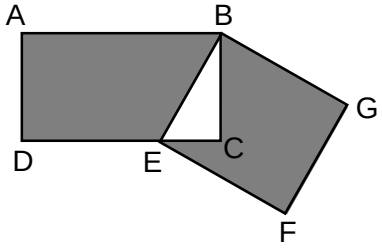
    The first term of the sequence is 1; the second term is 3; the third term is 5, and so on. Which term is the number 401?

12. There are 4 girls and 2 boys of different ages. The oldest child is 10 years old and the youngest child is 4 years old. If the oldest boy is 4 years older than the youngest girl, and the oldest girl is 4 years older than the youngest boy, how old is the oldest boy?

13. The ratio of the prices of a bar of chocolate to a pack of sweets was 7 : 3. If the price of both items increased by \$0.70 each, the new ratio of the prices of chocolates to sweets would be 7 : 4. How much did each item cost before the price increased?

14. Increasing $800 - 10x$ by 10% gives $600 - 6x$. What is the value of x?

15. The figures ABCD and BGFE are overlapping rectangles as shown. The area of triangle BCE is $\frac{3}{10}$ of the area of rectangle ABCD and it is also $\frac{2}{5}$ of the area of rectangle BGFE. Express the difference in area between the shaded areas ABED and BCEFG as a fraction of the area of triangle BCE.

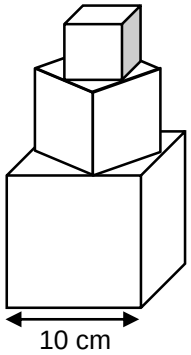


16. Given that $\frac{1}{a} - \frac{1}{b} = \frac{1}{42}$ and $\frac{1}{a} - \frac{1}{b} - \frac{1}{c} = \frac{6}{2016}$ and that a and b are consecutive numbers, find the value of c.

17. The average of three numbers is 18. If one of the numbers is replaced by the number 38, then the average becomes 23. What is the number that was replaced?

18. What is the number of times the hour hand and the minute hand of a clock form a right angle with each other between 0600 and 1200 on the same day?

19. Three cubes were stacked as shown, such that the corners of the cubes on top were touching the mid-points of the cube each of them was placed on. If the side of the bottom cube is 10 cm, what is the total surface area of the structure (including the bottom)?

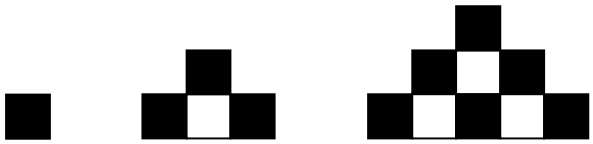


20. Tank A contains salt solution of a concentration of 20%. Tank B contains salt solution of a concentration of 5%. Some salt solution is taken from Tank A and some from Tank B to form a mixture of a concentration of 15%. If the mixture contains 900 g of salt, how much of the salt came from Tank A?

Section C

Questions 21, 22, 23, 24 and 25 carry 6, 7, 8, 9 and 10 marks respectively.

21. Three figures consist of alternate black and white square tiles as shown. If this pattern continues, what fraction of the number of tiles in the 50th figure will be black?



22. There are 240 Primary 6 students.
The ratio of the number of students who like Science to the number who do not is 5 : 3.
The ratio of the number of students who like Mathematics to the number who do not is 7 : 5. The number of students who like both Science and Mathematics is 86.
How many students dislike both Science and Mathematics?

23. My teacher had 3 big boxes of sweets. Each box contained sweets of a different colour. Each pupil was given 5 sweets of two different colours. If each pupil in the class received a different combination of colours. What was the largest possible number of pupils in the class?

24. Before 5 children competed in a race, they were asked to guess the positions that two of their friends would finish in.

Pat's guess: Sam will be 2nd and Qin will be 3rd.
Qin's guess: Roy will be 2nd and Tim will be 4th.
Roy's guess: Tim will be 1st and Pat will be 5th.
Sam's guess: Roy will be 3rd and Pat will be 4th.
Tim's guess: Qin will be 2nd and Sam will be 5th.

If each child correctly guessed the position of only one friend, determine the order in which the five children completed the race.

25. To complete a certain job, Alan would require 20 days, while Ben would require 30 days. With both Alan and Ben working together, Alan took 2.5 days of rest, while Ben also took several days of rest and the job was completed in 14 days. For how many days did Ben rest?

End of Paper