



ANNUAL MATHLYMPICS

FOR ALL SINGAPORE PRIMARY SCHOOLS

Preliminary Round 2018

1 hour 30 minutes

Instructions to Mathlympians

1. Do not open the booklet until you are told to do so.
2. Attempt ALL 28 questions.
3. Diagrams are not drawn to scale.
4. Write your answers neatly on the ANSWER SHEET provided.
5. Marks are awarded for correct answers only.
6. **No mathematical tables or 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 5 marks each.

Jointly organised by



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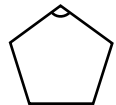


Section A

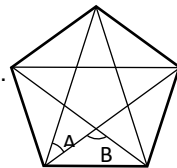
Each of the questions 1 to 10 carries 2 marks.

1. Abel's age in 2019 will be equal to the sum of the digits of his year of birth. If Abel is an adult, how old is Abel now?
2. Given that $6^2 = 6 \times 6$; $6^3 = 6 \times 6 \times 6$; $6^4 = 6 \times 6 \times 6 \times 6$; etc, what is the sum of the last two digits of 6^{2018} ?
3. Find the sum of all the numbers less than 1000 that are divisible by both 5 and 7.
4. Three friends, Caria, Dennis and Emma are out shopping for packets of candies. As Caria did not bring any money, Dennis and Emma split the bill equally. Caria took half of all the packets, Dennis took a third of the remaining packets and Emma took the rest. The next day, Caria came with \$15 to return to her friends. How much should she return to Emma?
5. Fifty students with index numbers 1 to 50 are waiting in a room. A teacher comes in and calls out the first 3 prime numbers in sequence. Students with index numbers corresponding to the called-out prime numbers and their multiples, left the room. How many students remained in the room?
6. A number is a palindrome if it is the same backwards as forwards. An example of a palindrome is 12321. Find the largest palindrome that can be formed from the product of two 2-digit numbers.
7. The first five terms of a sequence is 52 45 38 31 24 .
Write an expression to find the n th term of this sequence.

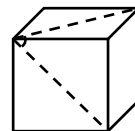
8. The figure shown is a polygon known as a pentagon. Because each of the sides are equal, we call it a regular pentagon. Find one of the interior angles of a regular pentagon.



9. The figure shows a star drawn inside a regular pentagon. Find the difference of $\angle A$ and $\angle B$.



10. What is the angle inside the cube that is between the 2 diagonals as shown below?



Section B

Each of the questions 11 to 20 carries 4 marks.

11. Solve $\frac{4 \times A + \frac{1}{2} + 3 \times 2018 + 2A \times 22}{4 \times A + \frac{1}{6} + 2 \times 1009 + A \times 12} \times 3$

12. The product of a 6-digit number, 1ABCDE and 3, is ABCDE1, that is, $\frac{\overset{1}{\times} \text{ABCDE}}{\text{ABCDE} \underset{1}{\times}} \overset{3}{\text{}}$.
What is the 5-digit number ABCDE?

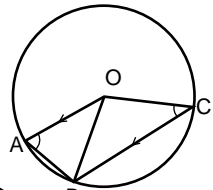
13. How many 3-digit numbers which are multiples of 7 end with the digit 4?

14. When two prime numbers are separated by a single number, they are known as prime pairs. An example of a prime pair is 29 and 31. What is the highest common factor of all the numbers found between each 3-digit prime pairs?

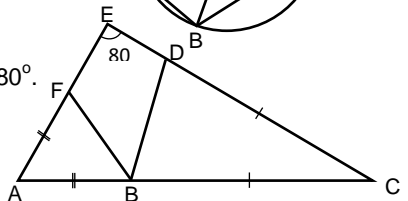
15. Jan's father is thrice the age of Jan. In n years' time, Jan's father will be twice Jan's age then. How many times is Jan's father's age in n years compared to the age of Jan now?

16. The volume of a solid cuboid is 144 cm^3 . The perimeter of the top face of the cuboid is 22 cm. If each side of the cuboid is a whole number of centimetres and longer than 2 cm, find the height of the cuboid.

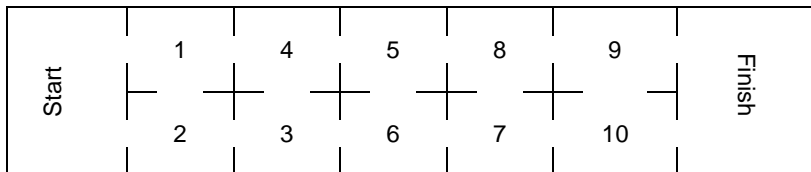
17. In the diagram, O is the centre of the circle and A, B and C are points on the circumference. OA is parallel to CB. The ratio of $\angle OAB$ and $\angle OCB$ is 5 : 2. Find $\angle AOC$.



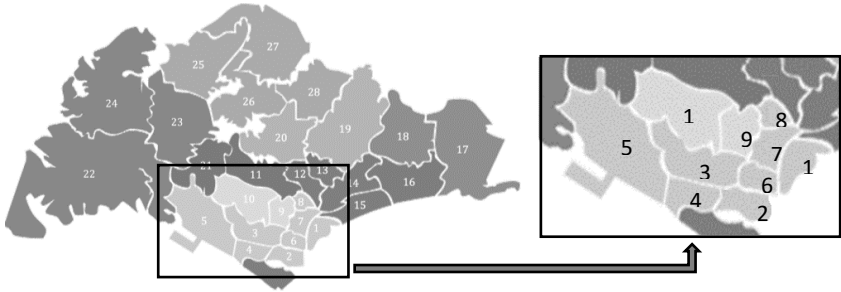
18. Given that $AB = AF$ and $BC = CD$ and $\angle DEF = 80^\circ$. Find $\angle DBF$.



19. The diagram below shows the layout of 10 connected rooms. How many ways are there to get from the Start corridor to the Finish corridor if you can only move from a room of a smaller number to one with a larger number?



20. Below is Singapore's 28 District Code map.



At most how many ways are there of colouring the central district (No. 1 – 10) using three different colours such that adjacent districts do not share the same colour?

Section C

Each of the questions 21 to 28 carries 5 marks.

21. On the first day, Elisa read $\frac{1}{6}$ of a story book. The next day, she finished another 40 pages. On the third day, what she read was 1.4 times as many pages as the first 2 days combined. She finished the last $\frac{1}{3}$ of the book on the fourth day. How many pages are there in the book?
22. Amy planned to cover the 8 m by 8 m floor of her living room with a square carpet in the middle and with wooden tiles along the borders. The carpet and wooden tiles cost \$40/m² and \$15/m² respectively and she paid \$1360 in total. What is the width of the wooden tiled border?
23. If we write out the digits of all the positive integers into a sequence of digits starting from 1, that is, 1 2 3 4 5 6 7 8 9 1 0 1 1 1 2 ..., we will encounter the first of three consecutive 5s in the 100th position of the sequence. At which position will we encounter the first of five consecutive 5s?
24. Find how many consecutive zeros there are at the end of the product of the following multiplication: $166 \times 172 \times 178 \times \dots \times 598$.
25. $\frac{1}{A + \frac{1}{B + \frac{1}{C}}} = \frac{7}{10}$. Each letter represents a distinct digit. What are they?

26. Polygon X is a regular polygon. It touches one side of a regular pentagon as shown in the figure. Find the number of sides Polygon X has.

