

SECONDARY 2

NAME OF PARTICIPANT: _____ DATE: _____

SCHOOL NAME: _____

GENERAL INSTRUCTIONS:

1. Do not open the booklet until you are told to do so.
2. You are given 90 minutes to attempt all 25 questions.
3. Ensure to enter the necessary information asked in the Answer Sheet such as your name, participant number, country, and year level.
4. Record your answers neatly on the Answer Sheet provided.
5. Marks are awarded for correct answers only. There is no penalty for incorrect answers.
6. Calculators are not allowed.
7. All figures are not drawn to scale. They are intended only as aids.
8. Start answering when the proctor gives the signal.

Part 1 (Questions 1 to 10):

There are 10 multiple-choice questions. Choose the best answer from the four possible choices

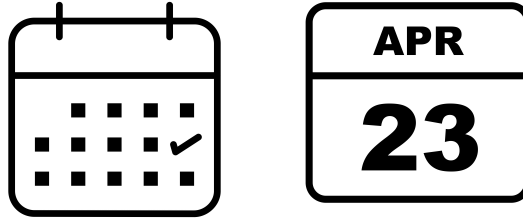
Each question carries 2 marks

Part 2 (Questions 11 to 25):

There are 20 open-ended questions, each requiring a single answer. Write your answer on the box provided in the Answer Sheet

Questions 11 to 20, each carries 3 marks

Questions 21 to 25, each carries 5 marks

Part 1: 1st to 10th Multiple Choice

Question 1

- If April 23 falls on Tuesday, then March 23 of the same year was a:
 - Saturday
 - Sunday
 - Monday
 - Wednesday
 - Thursday
- The page numbers of a book sum to 1999. One page number was counted twice. Which page number was that?
 - 42
 - 44
 - 45
 - 46
 - 50
- In a party, the first time the door bell rang 1 guest arrived. On each succeeding ring, two more guests arrived than on the previous ring. After 20 rings, the number of guests at the party was:
 - 39
 - 58
 - 210
 - 361
 - 400
- If a pup is worth a pooch and a mutt, a pup and a pooch are worth one bird dog, and two bird dogs are worth three mutts, then the number of pooches a pup is worth is:
 - 2
 - 3
 - 5
 - 6
 - 9
- If $a^b = 3$, then the value of $a^{4b} - 5$ is:
 - 7
 - $3a^4 - 5$
 - 22
 - 76
 - 81
- Positive integers which read the same backwards as forwards are called *palindromes*; for example, 11, 252, and 31013 are palindromes. The number of palindromes less than 10^6 , but greater than 10 is:
 - 999
 - 10^3
 - 1089
 - 1989
 - 2209
- Jessie have just won 50 of 75 games on the computer. The number of games out of the next 30 games that Jessie must win in order to have won 60% overall is:
 - 10
 - 13
 - 15
 - 20
 - 25
- If x is a positive integer, then $x + \sqrt{x}$ cannot possibly equal:
 - 20
 - 30
 - 60
 - 90
 - 110

9. The number of different pairs of positive integers (x, y) that satisfies $x^y = 7^{20}$ is:
 A. 4 B. 5 C. 6 D. 7 E. more than 7



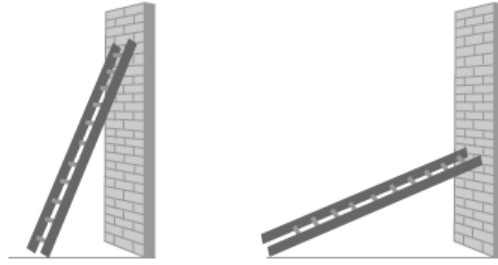
Question 10

10. A fair six-sided die, with faces numbered 1 to 6, is tossed two times. The probability that the two outcomes are in strictly ascending order, for example a 1 and then a 3, (equality is NOT allowed) is:
 A. $\frac{5}{12}$ B. $\frac{1}{2}$ C. $\frac{1}{3}$ D. $\frac{1}{4}$ E. $\frac{5}{6}$

Part 2: 11 th to 30 th Open-ended Questions

11. If the month of July has 5 Tuesdays, and three of them fall on even-numbered days, what is the date of the third Tuesday in July?
12. A box contains 20 yellow discs, 9 red discs, and 6 blue discs. If discs are selected at random, then the smallest number of discs that need to be selected to be assured of selecting at least two discs of each color is?
13. If $a@b = \frac{a+b}{a-b}$, find n such that $3@n = 3$.
14. Find all real values of x for which $\sqrt{4x^2 + 12x + 9} = 2x + 3$.
15. Find the number of positive factors of 2020.
16. In the system

$$\begin{cases} 8y - 3x \leq 16 \\ 3x + 8y \geq -18 \end{cases}$$
 for which solution (x, y) is $x + y$ minimum?
17. If x and y are positive numbers such that $x^2 + y^2 = 8$ and $xy = 2$, find $x + y$.
18. How many positive integers less than 2016 are divisible by 28 but not by 12?
19. The sum of two numbers is 9 and their product is 25. What is the sum of their cubes?



Question 20

20. A ladder is leaning against a house with its lower end 15 feet from the house. When the lower end is pulled 9 feet farther from the house, the upper end slides 13 feet down. How long is the ladder (in feet)?
21. A square is inscribed in a circle of radius 1. Find the perimeter of the square.
22. A circle and a square intersect so that two sides of the square are radii of the circle. If a side of the square is 2 cm, what is the area of the region inside the square but outside the circle?
23. In $\triangle ABC$, $m\angle A$ is 34° , and the exterior angle of vertex B is complementary to $\angle C$. Find $m\angle B$ in degrees.
24. Solve for x in the equation $3 + \sqrt{x} = \sqrt{3x - 11}$.
25. The y-intercept of two perpendicular lines are b and -2 . The x-intercept are 3 and a , respectively. If $a + b = 15$, find the sum of the slopes of the two lines.