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IITPSA
Institute of Information Technology Professionals South Africa

Promoting the ICT Professional
Programming Olympiad

# Programming Olympiad 2022 : Round 1

# (Online Paper)

**Not to be used before 22 Aug 2022**

1. This paper is for ALL participants.
2. All answers must be **TYPED** in the appropriate place online on the contest site.
3. Each correct answer for question 1 earns 6 marks, question 2 earns 9 marks while a correct answer for question 3 earns 10 marks.
4. You have 60 minutes to attempt as many questions as possible.
5. Programs should be readable, concise, and use appropriate variable names.
6. Indicate the question, your name, surname, username, the language and version used in a comment statement at the start of every program, e.g., "***Q3 Koos Smit, sanr001, Python 2.7***"
7. Save your program as Q***n*** Name Surname, username, the language and version, e.g., "***Q3 Koos Smit, sanr001, Python 2.7***"
8. You may assume that the user input will satisfy the problem specification and so you do not need to validate the input.
9. Do not write code to produce only specific answers, as the external judges may use other test cases.
10. Make sure you save the programs you have created in a place where your teacher can find them.
11. **DO NOT MODIFY ANY FILES AFTER THE END OF THE CONTEST AS THIS WILL LEAD TO YOUR DISQUALIFICATION**.
12. The English text is binding.

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## **Question 1**: BMI

Body Mass Index (BMI) is a commonly used metric in healthcare. The formula for BMI is

$$BMI = \frac{Mass\ (kg)}{Height^2\ (m)}$$

Write a program that receives input for the mass (kg) and height (m) of a patient and outputs their BMI rounded down to the nearest whole number.

**Examples:** **Input**: 58 1.73 **Answer:** 19

**Input:** 82 1.82 **Answer:** 24

**Tests your program with the following cases:**

*Give your answer as a number only with no spaces, e.g. 1234*

1a) 40 1.47

1b) 120 1.76

1c) 100 2.20

1d) 228 1.90

## **Question 2**: Letters

Amahle is playing a game at school with her teacher. Her teacher writes a single letter (a-z) on the board. Amahle must then sing the alphabet song in reverse order starting from the letter on the board. Amahle is only allowed to sing every second letter.

Write a program that receives a single letter as input and outputs the letters that Amahle sings.

**Examples:** **Input:** d **Output:** db

**Input:** g **Output:** geca

**Tests your program with the following cases:**

2a) `q`

2b) `k`

2c) `a`

2d) `z`

## **Question 3**: Radio towers

The city has several radio towers of various heights. A pair of radio towers can communicate with each other if their difference in height is less than or equal to 10 m.

Write a program that receives the number of radio towers and the height of each of the radio towers as input and outputs the number of radio tower pairs that can communicate with each other.

**Examples:**

**Input**: 3

1 11 15

**Answer:** 2

**Input:** 5

8 29 22 16 30

**Answer:** 5

**Tests your program with the following cases:**

*Give your answer as a number only with no spaces, e.g. 1234*

3a) `2`

`19 21`

3b) `5`

`1 2 3 4 1`

3c) `10`

`21 43 23 45 28 31 49 13 54 32`

3d) `34`

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5 25 38 6 2 29 33 50 3 29 19 18
9 18 13 22 21 30 41 19 16 40 41
7 35 1 41 22 25 1 40 9 3 46
```