CODING & ROBOTICS PRIMARY SCHOOL OLYMPIADS:

GRADES 4 - 7

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GRADE 7

DATE: 26 AUGUST 2025

TIME: 60 MINUTES

INSTRUCTIONS:

1. This booklet has multiple-choice questions, true or false, computational questions, practical and problem-solving questions
2. The total of this booklet is out of fifty marks.
3. You have 60 minutes for the paper.
4. Read the questions carefully before answering.
5. Visit the website: www.saolympiads.co.za.

NAME OF LEARNER:	
SCHOOL:	**GRADE:**

SECTION A: MULTIPLE CHOICE QUESTIONS

1. What is the main purpose of a loop in programming? (1)

   A. To perform a sequence once
   B. To stop the execution of the program
   C. To repeat a set of instructions under specific conditions
   D. To declare variables

2. Which sensor is most likely used to detect obstacles in a robot's path? (1)

   A. Enhance temperature sensor
   B. Gyroscope
   C. Ultrasonic sensor
   D. Humidity sensor

3. What does a microcontroller do in a robot? (1)

   A. Provides power to motors
   B. Acts as the brain of the robot
   C. Serves as the frame and body
   D. Functions as the robot's limbs

4. What is the role of an actuator in robotics? (1)

   A. To receive signals from the controller
   B. To provide energy to the robot
   C. To convert electrical signals into motion
   D. To enhance the robot's appearance

5. Which is a fundamental aspect of computational thinking? (1)

   A. Using strong passwords
   B. Breaking down problems into smaller parts
   C. Creating presentations
   D. Sending emails

6. Which device can be programmed to perform tasks and make decisions on its own? (1)

   A. Calculator
   B. Microcontroller
   C. Television
   D. Electric fan

7. What is a common use of algorithms in computer science? (1)

   A. To enhance graphics
   B. To sort and search data efficiently
   C. To increase the speed of the processor
   D. To improve the sound quality of a system

8. Which programming structure is used to make decisions? (1)

   A. Loop
   B. Function
   C. Array
   D. Conditional statement

9. What is the main function of the if statement in programming? (1)

A. To repeat a block of code multiple times
B. To execute a block of code based on a condition
C. To define variables
D. To stop the execution of a program

10. What does debugging mean in the context of programming? (1)

A. Enhancing existing features
B. Finding and fixing errors in the code
C. Upgrading software
D. Cleaning the computer

11. Which component is essential for a robot to interact with its environment? (1)

A. Battery
B. Sensor
C. Wheel
D. Paint

12. Which tool is used to design complex algorithms in robotics? (1)

A. Screwdriver
B. Computer software
C. Pencil and paper
D. A set of gears

13. What type of data does a light sensor in a robotics project detect? (1)

A. Sound waves
B. Light intensity
C. Temperature
D. Electrical current

14. Which technology allows a robot to perform tasks without human intervention? (1)

A. Manual control
B. Teleoperation
C. Automation
D. Mechanical control

15. What is the purpose of using loops in programming? (1)

A. To decrease memory usage
B. To make the code shorter and more manageable
C. To execute a set of instructions repeatedly
D. To display output on the screen

16. How does a for loop differ from a 'while' loop?

A. A 'for' loop is used for single iteration only
B. A 'while' loop can execute a block of code a fixed number of times
C. A 'for' loop can iterate a specific number of times
D. A 'while' loop does not require initialisation

17. What is the role of data in programming? (1)

A. To provide instructions to devices
B. To define the user interface
C. To store and manipulate values needed by a program
D. To enhance the speed of computations

18. Which is true about functions in programming? (1)

A. They are only used in Java programming
B. They make the code less efficient
C. They allow for code reuse and organization
D. They cannot return a value

19. What does the term parameter refer to in coding? (1)

A. A variable used to store data
B. A type of loop
C. An error in a program
D. An input to a function

20. What is the benefit of modular programming? (1)

A. It restricts the use of global variables
B. It makes programs harder to debug
C. It enables the reuse of code across multiple programs
D. It combines all code into a single module for simplicity

SECTION B: TRUE OR FALSE STATEMENTS

1. A robot can operate without sensors. (1)

   A. True
   B. False

2. Logic gates are used in robotics to control decision making. (1)

   A. True
   B. False

3. Every function in programming must return a value. (1)

   A. True
   B. False

4. In programming, an infinite loop is often used intentionally. (1)

   A. True
   B. False

5. Debugging is a process that occurs after testing the code. (1)

   A. True
   B. False

(5)

SECTION C: COMPUTATIONAL

'when green flag clicked' block	'move (10) steps' block
'forever' block	'turn (pick random -180 to 180) degrees' block
'if <random > 50> then' block	'change colour effect by (25)' block
'if on edge, bounce' block	'wait (0.1) seconds' block

1. Using the lines above, create an algorithm in Scratch where a sprite moves in a random pattern on the screen without crossing the edges. (5)

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'when green flag clicked' block	'forever' block
'wait (0.2) seconds' block	'set y to (random 0 to 100)' block
'when space key pressed' block	'change y by (10)' block
'change y by (-10)' block	'change colour effect by (30)' block

2. Using the lines above, design a simple game where a sprite jumps over an obstacle when the spacebar is pressed. (5)

(10)

SECTION D: PRACTICAL APPLICATION AND PROBLEM SOLVING

1. In a Scratch project, program a robot sprite to navigate through a maze. The robot should turn right whenever it touches the maze walls. Write down the steps in order. (7)

'forever' block	'move (10) steps' block
'turn (90 degrees) right' block	'if <touching colour [maze wall colour]>' block
'turn (360 degrees) left' block	'go to x:0 y:0' block
'when green flag clicked' block	'turn (90) degrees right' block
'wait (0.01) seconds' block	'turn (45 degrees) left' block

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2. In a Scratch project, create an animation where a sprite moves in a circle continuously when the 'S' key is pressed. Outline the blocks you would use to implement this feature. (8)

‘go to x:0 y:0’ block	‘set rotation style [left-right] ’ block
‘forever’ block	‘when S key pressed’ block
‘if <right sensor detects more light> then’ block	‘set rotation style [don't rotate]’ block
‘wait (0.1) seconds’ block	‘when green flag clicked’ block
‘move (10) steps’ block	‘turn (15) degrees right’ block
‘else if right sensor detects more light’ blockp	‘wait (0.2) seconds’ block

TOTAL MARKS = 50