Introductory Computer Science

Use this key to check answers and read the explanations.

1. What is a single binary digit, such as 0 or 1, called?
   - A. A bit
   - B. A byte
   - C. A pixel
   - D. A character

   Correct answer: A. A bit
   A bit is one binary digit. A byte contains eight bits.

2. Which device sends letters or symbols to a computer when you press its keys?
   - A. Speaker
   - B. Projector
   - C. Keyboard
   - D. Monitor

   Correct answer: C. Keyboard
   A keyboard sends input to a computer. Projectors, speakers, and ordinary monitors present output.

3. Which description best fits an algorithm for completing a task?
   - A. A list of goals with the steps left unspecified
   - B. A precise series of steps that can be followed
   - C. A collection of unexpected program results
   - D. A picture of the computer running the task

   Correct answer: B. A precise series of steps that can be followed
   An algorithm gives a procedure for reaching a result. It can be described clearly before it is implemented in code.

4. A game needs to store its current score and update it when points are earned. What can hold that changing value?
   - A. A program's title
   - B. A comment
   - C. A fixed numeric literal
   - D. A variable

   Correct answer: D. A variable
   A variable lets the program refer to the current value by name and assign a new value when the score changes.

5. How many different patterns can be made from exactly two bits?

A. Two
B. Four
C. Three
D. Eight

Correct answer: B. Four
The two positions can each hold 0 or 1. The possible patterns are 00, 01, 10, and 11.

6. A program checks whether two bus stops are connected by routes. Which simplified model keeps the information needed for this job?

A. Stops and route connections between them
B. Street names and landmarks without bus stops
C. The number and fuel capacity of buses
D. Bus stop names in alphabetical order

Correct answer: A. Stops and route connections between them
An abstraction keeps the details that matter for a task. For this task, the program needs the stops and their connections.

7. A classroom check-in requires an ID card AND a signed form. When does this condition become true?

A. When neither item is present
B. When only the ID card is present
C. When only the signed form is present
D. When both items are present

Correct answer: D. When both items are present
A logical AND yields true only when both of its conditions are true.

8. A program starts with x equal to 4. It sets x to x + 2, then sets x to x × 3. What value does x hold at the end?

A. 12
B. 14
C. 18
D. 6

Correct answer: C. 18
The first update changes x from 4 to 6. The second multiplies the current value 6 by 3, giving 18.

9. A program displays LONG when the time is at least 30 minutes. Otherwise it displays SHORT. What appears at exactly 30 minutes?

A. LONG only
B. SHORT only
C. Both LONG and SHORT
D. Neither message

Correct answer: A. LONG only
At least 30 includes exactly 30. The first branch runs, and the otherwise branch is skipped.

10. A number starts at 2. A loop repeats the instruction «Double the current number, then add 1» exactly three times. What is the final number?

A. 24
B. 11
C. 17
D. 23

Correct answer: D. 23
The first repeat produces 5, the second produces 11, and the third produces 23.

11. What decimal number does the binary number 1011 represent?

A. 13
B. 9
C. 11
D. 7

Correct answer: C. 11
From right to left, the bit positions are worth 1, 2, 4, and 8. The 1 bits turn on 8, 2, and 1, which total 11.

12. A linear search reads [6, 12, 7, 11, 7, 2] from left to right and stops when it finds 7. How many values does it inspect?

A. Two
B. Three
C. Four
D. Five

Correct answer: B. Three
It checks 6, then 12, then the first 7. The later 7 is never reached.

13. Binary search is looking for 18 in the sorted list [3, 7, 9, 12, 16, 18, 23]. It has just checked the middle value, 12. What is the remaining search range after this comparison?

A. [16, 18]
B. [3, 7, 9]
C. [12, 16, 18, 23]
D. [16, 18, 23]

Correct answer: D. [16, 18, 23]
The target 18 is larger than 12. Since the list is sorted, 12 and every value to its left can be ruled out.

14. A program starts a total at 0 and reads [2, 5, 8, 1]. For each value, it adds the value if it is even, then adds 1 regardless. What is the final total?

A. 14
B. 10
C. 13
D. 16

Correct answer: A. 14
The even numbers add 2 + 8, and all four passes add 1 each. The total is 10 + 4 = 14.

15. For each x in [1, 3], a program checks every y in [2, 4, 6]. It counts a pair only when y is greater than x. How many pairs does it count?

A. Six
B. Four
C. Five
D. Three

Correct answer: C. Five
All three y values are greater than 1. Only 4 and 6 are greater than 3. That gives 3 + 2 = 5 pairs.