



TExES Computer Science 8–12 (241)

Mini Practice Exam

Certification Prep

150 Minutes · 50 Questions · Selected-response (multiple choice)

DIRECTIONS: Choose the best answer for each question. Leave no questions unanswered.

Time Allowed: 150 Minutes · **Questions:** 50 Questions · **Format:** Selected-response (multiple choice)

1. What is the value of the expression $17 \bmod 5 + 3 * 2$?
 - (A) 0
 - (B) 8
 - (C) 10
 - (D) 14
2. Which of the following best describes the purpose of the *requirements analysis* phase of the Software Development Life Cycle (SDLC)?
 - (A) Writing pseudocode and selecting data structures for the solution
 - (B) Identifying what the software must do and documenting stakeholder needs
 - (C) Testing the completed software for syntax and runtime errors
 - (D) Creating user documentation and training materials
3. A variable is declared as `double x ← 9.8`. The expression `(int) x` is evaluated. What value does the cast produce?
 - (A) 10
 - (B) 9.8
 - (C) 9
 - (D) 0
4. A school network administrator discovers that several computers are sending spam emails without users' knowledge. Investigation reveals that hidden software was installed through a phishing email attachment. Which type of malware is most likely responsible?
 - (A) Ransomware
 - (B) Trojan
 - (C) Worm
 - (D) Adware
5. A teacher wants students to test whether a program correctly handles unexpected input such as negative numbers and empty strings. Which testing strategy is the teacher emphasizing?
 - (A) Unit testing
 - (B) Integration testing
 - (C) Boundary and invalid input testing
 - (D) Regression testing

6. Consider the following pseudocode segment.

```
int x ← 15
int y ← 4
if ( x MOD y > 2 )
    x ← x - y
else
    x ← x + y
end if
```

What is the value of *x* after the code segment executes?

- (A) 3
- (B) 11
- (C) 19
- (D) 15

7. Which of the following BEST describes the purpose of a Local Area Network (LAN)?

- (A) Connecting computers across multiple countries using satellite links
- (B) Connecting devices within a limited geographic area such as a building
- (C) Providing wireless Internet access to mobile devices across a city
- (D) Routing packets between the public Internet and private networks

8. Consider the following pseudocode.

```
int[] data ← {3, 7, 1, 9, 2, 8}
int target ← 9
int pos ← -1
for ( int i ← 0; i < data.length; i ← i + 1 )
    if ( data[i] = target )
        pos ← i
    end if
end for
```

What is the value of *pos* after the code executes?

- (A) -1
- (B) 3
- (C) 4
- (D) 9

9. A computer science teacher uses the term *abstraction* when describing how to manage complexity in a large program. Which of the following best illustrates this concept?

- (A) Rewriting all code in a single function to reduce file size
- (B) Hiding implementation details behind a well-defined interface
- (C) Adding comments to every line of code for documentation
- (D) Using shorter variable names to improve execution speed

10. Consider the following truth table.

p	q	Result
T	T	F
T	F	T
F	T	T
F	F	T

Which logical expression produces the Result column?

- (A) p AND q
- (B) p OR q
- (C) NOT (p AND q)
- (D) NOT (p OR q)

11. Which of the following data types would be most appropriate for storing a student's grade point average (e.g., 3.75)?

- (A) int
- (B) float
- (C) char
- (D) Boolean

12. A software developer is asked to break a complex problem into smaller, manageable sub-problems, then solve each sub-problem independently before combining the solutions. Which design strategy is being described?

- (A) Black box testing
- (B) Object-oriented design
- (C) Top-down design with stepwise refinement
- (D) Rapid prototyping

13. Consider the following pseudocode segment.

```
int total ← 0
for ( int k ← 1; k ≤ 4; k ← k + 1 )
    total ← total + k * 2
end for
```

What is the value of `total` after the loop finishes?

- (A) 8
- (B) 10
- (C) 16
- (D) 20

14. A teacher asks students to use a spreadsheet to create a model that simulates population growth under different conditions, then analyze the results. This activity most directly supports which Technology Applications objective?

- (A) Using productivity tools to format documents
- (B) Using simulations and models to explore complex concepts and develop hypotheses
- (C) Evaluating the accuracy of information obtained from the Internet
- (D) Understanding the historical impact of technology on society

15. A sorted array contains the values {2, 5, 8, 11, 14, 17, 20, 23}. A binary search is performed to find the value 17. How many comparisons are needed to locate it?

- (A) 1
- (B) 2
- (C) 3
- (D) 6

16. A student's program compiles without errors but produces incorrect output. The student discovers that a loop counter is incrementing by 2 instead of 1. What type of error is this?

- (A) Syntax error
- (B) Runtime error
- (C) Logic error
- (D) Compilation error

17. Consider the following pseudocode.

```
for i ← 1 to 3
  for j ← 1 to 2
    print i * j
  end for
end for
```

How many values are printed in total, and what is the last value printed?

- (A) 5 values; last value is 5
- (B) 6 values; last value is 6
- (C) 6 values; last value is 3
- (D) 9 values; last value is 9

18. A robot uses the command `move[motor] <- value` where a positive value moves the motor forward, a negative value moves it backward, and 0 stops it. The robot has a `left` motor and a `right` motor. Which of the following code segments would cause the robot to spin in place (point turn) to the left?

- (A) `move[left] <- 50 and move[right] <- 50`
- (B) `move[left] <- 0 and move[right] <- 50`
- (C) `move[left] <- -50 and move[right] <- 50`
- (D) `move[left] <- 50 and move[right] <- -50`

19. Which of the following describes the difference between a compiled language and an interpreted language?

- (A) Compiled languages can only run on one operating system, while interpreted languages are cross-platform.
- (B) A compiled language translates the entire source code to machine code before execution; an interpreted language translates and executes code line by line.
- (C) Compiled languages do not use variables, while interpreted languages do.
- (D) An interpreted language is always faster than a compiled language because it skips the compilation step.

20. Consider the following pseudocode segment.

```
int count ← 1
int total ← 0
while ( count ≤ 100 )
    if ( count MOD 3 = 0 )
        total ← total + 1
    end if
    count ← count + 1
end while
```

What is the value of `total` after the loop finishes?

- (A) 3
- (B) 33
- (C) 34
- (D) 100

21. A project manager creates a Gantt chart showing tasks, dependencies, deadlines, and assigned team members for a software project. Which phase of the SDLC does this activity most directly support?

- (A) Requirements analysis
- (B) Design
- (C) Project planning
- (D) Maintenance

22. A teacher asks a student to write a function that takes two integers and returns their average as a decimal value. Which function signature and return type is most appropriate?

- (A) `void average(int a, int b)`
- (B) `int average(int a, int b)`
- (C) `double average(int a, int b)`
- (D) `String average(int a, int b)`

23. Which of the following is equivalent to $\text{NOT } (p \text{ OR } q)$ according to De Morgan's laws?

- (A) $(\text{NOT } p) \text{ OR } (\text{NOT } q)$
- (B) $(\text{NOT } p) \text{ AND } (\text{NOT } q)$
- (C) $p \text{ AND } q$
- (D) $\text{NOT } p \text{ OR } q$

24. A program encounters a division by zero during execution. What type of error is this?

- (A) Syntax error
- (B) Logic error
- (C) Runtime error
- (D) Linking error

25. A computer science teacher assigns a project where student teams must design a database schema. Each team member proposes a different approach, and the team must evaluate trade-offs before selecting a final design. Which instructional strategy does this activity best exemplify?

- (A) Direct instruction with guided practice
- (B) Collaborative problem solving with multiple perspectives
- (C) Independent drill-and-practice
- (D) Lecture-based concept introduction

26. Consider the following pseudocode segment for selection sort. Assume the array `data` initially contains {8, 3, 5, 1}.

```
for ( int i ← 0; i < data.length - 1; i ← i + 1 )
    int minIndex ← i
    for ( int j ← i + 1; j < data.length; j ← j + 1 )
        if ( data[j] < data[minIndex] )
            minIndex ← j
        end if
    end for
    int temp ← data[i]
    data[i] ← data[minIndex]
    data[minIndex] ← temp
end for
```

What is the state of the array after the FIRST complete pass of the outer loop (when `i = 0` finishes)?

- (A) {1, 3, 5, 8}
- (B) {1, 8, 5, 3}
- (C) {3, 8, 5, 1}
- (D) {1, 3, 8, 5}

27. Which of the following best describes the difference between a low-level programming language and a high-level programming language?

- (A) Low-level languages are easier for humans to read; high-level languages are closer to machine code.
- (B) Low-level languages are closer to machine code and hardware; high-level languages use more human-readable syntax.
- (C) Low-level languages cannot perform mathematical calculations; high-level languages can.
- (D) Low-level languages are always interpreted; high-level languages are always compiled.

28. Consider the following pseudocode segment.

```
for ( int r ← 1; r ≤ 3; r ← r + 1 )
    String line ← ""
    for ( int c ← 1; c ≤ r; c ← c + 1 )
        line ← line + "*"
    end for
    print line
end for
```

What is the output?

- (A) *** / *** / *** (three identical lines of three stars)
- (B) * / ** / *** (triangle pattern, growing)
- (C) *** / ** / * (triangle pattern, shrinking)
- (D) * / * / * (three single stars)

29. A UML class diagram shows a solid line with a hollow arrowhead pointing from class Dog to class Animal. What relationship does this represent?

- (A) Dog contains an instance of Animal (composition)
- (B) Dog inherits from Animal (inheritance)
- (C) Dog uses a method from Animal (dependency)
- (D) Dog and Animal are unrelated classes

30. Consider the following pseudocode segment.

```
int[] arr ← {4, 9, 2, 7, 5}
int result ← arr[0]
for ( int i ← 1; i < arr.length; i ← i + 1 )
    if ( arr[i] > result )
        result ← arr[i]
    end if
end for
print result
```

What is the output?

- (A) 2
- (B) 4
- (C) 5
- (D) 9

31. In a game that uses a two-dimensional coordinate system, two circular objects have centers at (3, 4) and (7, 1) with radii 2 and 3 respectively. The distance between the centers is 5. Has a collision occurred (do the objects overlap or touch)?

- (A) Yes, because the distance equals the sum of the radii.
- (B) Yes, because the distance is less than both radii combined.
- (C) No, because the distance is greater than both radii.
- (D) No, because the distance is greater than the sum of the radii.

32. Which of the following programming style conventions MOST improves the readability of code?

- (A) Using single-character variable names to minimize typing
- (B) Writing all code on as few lines as possible to reduce file size
- (C) Using descriptive identifiers, consistent indentation, and comments
- (D) Avoiding the use of functions to keep all logic in one place

33. What is the worst-case time complexity for searching for a value in an unsorted array of n elements using linear search?

- (A) $O(1)$
- (B) $O(\log n)$
- (C) $O(n)$
- (D) $O(n^2)$

34. A file with the extension `.csv` is best described as which of the following?

- (A) A compressed archive containing multiple files
- (B) A plain text file where data values are separated by commas
- (C) An encrypted file that requires a password to open
- (D) A database file that can only be opened with specialized software

35. Consider the following class definitions.

```
class Vehicle
  private String make
  private int year

  String getMake()
    return make
  end getMake

  void setMake( pass-by-value String m )
    make ← m
  end setMake
end class Vehicle

class Truck extends Vehicle
  private int towCapacity

  int getTowCapacity()
    return towCapacity
  end getTowCapacity
end class Truck
```

Which of the following statements about these classes is true?

- (A) Truck can directly access the `make` variable without using `getMake()`.
- (B) Truck inherits the `getMake()` and `setMake()` methods from `Vehicle`.
- (C) `Vehicle` can call `getTowCapacity()` because `Truck` extends it.
- (D) `Truck` and `Vehicle` have no relationship to each other.

36. Which of the following is a characteristic of the procedural programming paradigm but NOT the object-oriented paradigm?

- (A) The use of loops and conditionals
- (B) Organizing a program primarily as a sequence of procedure/function calls
- (C) The use of variables and data types
- (D) The ability to reuse code

37. Consider the following pseudocode segment involving a string.

```
String word ← "COMPUTER"
String result ← ""
for ( int i ← word.length - 1; i ≥ 0; i ← i - 1 )
    result ← result + word.substring(i, i + 1)
end for
print result
```

What is the output?

Note: The substring(i, j) method returns the characters in a string starting at index i (inclusive) and ending at index j (exclusive).

- (A) COMPUTER
- (B) RETUPMOC
- (C) COMPUT
- (D) RETUPMO

38. A software team divides responsibilities so that one group writes the user interface, another writes the database layer, and a third writes the business logic. Before integration, each group tests its own module independently. This practice is best described as:

- (A) Acceptance testing
- (B) Regression testing
- (C) Unit testing in a modular development approach
- (D) Black box testing

39. Consider the following recursive function.

```
int mystery ( pass-by-value int n )
    if ( n ≤ 1 )
        return 1
    end if
    return n * mystery(n - 1)
end mystery
```

What is the value of mystery(5)?

- (A) 5
- (B) 15
- (C) 25
- (D) 120

40. Consider the following propositions:

- p : It is raining.
- q : I carry an umbrella.

Which of the following represents the statement “If it is raining, then I carry an umbrella”?

- (A) $p \wedge q$
- (B) $p \vee q$
- (C) $p \Rightarrow q$
- (D) $q \Rightarrow p$

41. A program is supposed to print the even numbers from 2 to 10. The programmer writes the following code:

```
for ( int i ← 2; i < 10; i ← i + 2 )  
    print i  
end for
```

The output is 2, 4, 6, 8 but the expected output is 2, 4, 6, 8, 10. Which of the following fixes the error?

- (A) Change $i \leftarrow i + 2$ to $i \leftarrow i + 1$
- (B) Change $i < 10$ to $i \leq 10$
- (C) Change $i \leftarrow 2$ to $i \leftarrow 0$
- (D) Change $\text{print } i$ to $\text{print } i + 2$

42. Consider the following pseudocode using a Stack class with methods $\text{push}(x)$, $\text{pop}()$, and $\text{peek}()$.

```
Stack s ← new Stack()  
s.push(10)  
s.push(20)  
s.push(30)  
int a ← s.pop()  
s.push(40)  
int b ← s.peek()  
int c ← s.pop()  
print a  
print b  
print c
```

What is the output?

- (A) 10, 20, 30
- (B) 30, 40, 40
- (C) 30, 20, 20
- (D) 10, 40, 30

43. How many bytes are required to store an array of 500 characters if each character uses 16 bits?

- (A) 500 bytes
- (B) 1,000 bytes
- (C) 8,000 bytes
- (D) 16,000 bytes

44. A school district is considering integrating AI-powered tutoring systems into computer science courses. Which consideration is most important for the teacher when evaluating this technology?

- (A) Whether the AI system can fully replace teacher instruction
- (B) Whether the system aligns with curriculum goals, supports diverse learners, and protects student data
- (C) Whether the system is the newest available product on the market
- (D) Whether the system can grade all assignments without teacher input

45. Consider the following pseudocode segment.

```
class Shape
    void draw()
        print "Drawing a shape"
    end draw
end class Shape

class Circle extends Shape
    void draw()
        print "Drawing a circle"
    end draw
end class Circle

Shape s ← new Circle()
s.draw()
```

What is the output?

- (A) Drawing a shape
- (B) Drawing a circle
- (C) Drawing a shape Drawing a circle
- (D) An error occurs because Shape cannot reference a Circle object.

46. In the design of a software system, a developer treats a sorting module as a “black box” — providing input and checking output without examining the internal code. Which design concept does this illustrate?

- (A) Stepwise refinement
- (B) Information hiding and encapsulation
- (C) Rapid application development
- (D) White box testing

47. A teacher has an unsorted list of 100 student test scores and needs to find the highest score. Which algorithm strategy is most efficient?

- (A) Sort the list first, then return the last element
- (B) Use binary search to locate the maximum
- (C) Traverse the list once, tracking the maximum value seen so far
- (D) Compare every pair of elements and return the winner

48. Which of the following best describes the purpose of an Integrated Development Environment (IDE)?

- (A) A tool used exclusively for managing project timelines and team communication
- (B) A software application that provides a code editor, debugger, and build tools in a single interface
- (C) A hardware device that connects multiple computers for collaborative coding
- (D) A testing framework used only for running automated test suites

49. A committee of 10 teachers must choose a chairperson and a secretary. How many different ways can these two positions be filled?

- (A) 20
- (B) 45
- (C) 90
- (D) 100

50. Consider the following pseudocode segment.

```
int[] [] grid ← { {5, 10, 15},  
                  {20, 25, 30},  
                  {35, 40, 45} }  
  
int sum ← 0  
for ( int r ← 0; r < 3; r ← r + 1 )  
    sum ← sum + grid[r][r]  
end for  
print sum
```

What is the output?

- (A) 45
- (B) 60
- (C) 75
- (D) 90

ANSWER KEY — Answer Key — Mini Practice Exam (50 Questions)

Use this key to score by domain and identify areas needing review.

#	Answer	Domain	Competency
1	B	III	008
2	B	II	004
3	C	III	007
4	B	IV	011
5	C	II	005
6	B	III	008
7	B	I	001
8	B	III	009
9	B	II	006
10	C	IV	010
11	B	III	007
12	C	II	004
13	D	III	008
14	B	I	002
15	B	III	009
16	C	II	005
17	B	III	007
18	C	IV	012
19	B	II	006
20	B	III	008
21	C	II	004
22	C	III	007
23	B	IV	010
24	C	II	005
25	B	I	003
26	A	III	009
27	B	II	006
28	B	III	008
29	B	II	004
30	D	III	007
31	A	IV	013
32	C	II	005
33	C	III	009
34	B	I	001
35	B	III	008
36	B	II	006
37	B	III	007
38	C	II	005
39	D	III	009
40	C	IV	010
41	B	II	005
42	B	III	007
43	B	II	006
44	B	I	003
45	B	III	008
46	B	II	004
47	C	I	001
48	B	II	004

#	Answer	Domain	Competency
49	C	IV	010
50	C	III	007

ANSWER EXPLANATIONS — Answer Explanations — Mini Practice Exam

Brief rationale for each correct answer.

1. Order of operations: $17 \bmod 5 = 2$, then $3 * 2 = 6$, then $2 + 6 = 8$. MOD has the same precedence as multiplication, not addition.
2. Requirements analysis focuses on *what* the system must do — gathering and documenting stakeholder needs before any design or coding begins. Options A, C, and D describe the design, testing, and deployment phases respectively.
3. Casting a double to int truncates the decimal portion (does not round). So (int) 9.8 yields 9. This demonstrates casting between data types.
4. A Trojan disguises itself as legitimate software and performs malicious actions once installed. Unlike worms, Trojans do not self-replicate.
5. Boundary and invalid input testing specifically checks how a program handles edge cases and unexpected data such as negative numbers and empty strings. Unit, integration, and regression testing serve different purposes.
6. $15 \bmod 4 = 3$, and $3 > 2$ is true, so the if-branch executes: $x = 15 - 4 = 11$.
7. A LAN (Local Area Network) connects devices within a limited geographic area such as a single building, campus, or home. WANs cover broader geographic regions including multiple countries.
8. The loop checks each element; at index 3, `data[3] = 9` matches `target`, so `pos` is set to **3**. The loop continues but no later element matches, so `pos` remains 3.
9. Abstraction involves hiding unnecessary implementation details while exposing only essential features through a well-defined interface, which is the core concept for managing complexity in large programs.
10. NOT (p AND q) — also called NAND — produces F only when both p and q are true, matching the given truth table exactly.
11. A GPA of 3.75 requires a decimal (floating-point) representation, making `float` the appropriate type. `int` stores only whole numbers; `char` stores a single character; `Boolean` stores only true/false.
12. Top-down design with stepwise refinement is the process of decomposing a complex problem into smaller sub-problems, solving each independently, then combining the solutions. Black box testing is a testing technique, not a design strategy.
13. Tracing the loop: $k = 1$: total=2; $k = 2$: total=6; $k = 3$: total=12; $k = 4$: total=12 + 8 = **20**.
14. Using spreadsheets to create models, simulate conditions, and analyze results directly aligns with Competency 002 — exploring complex concepts using simulations and models.
15. Binary search on {2,5,8,11,14,17,20,23}: first comparison at mid index 3 gives 11 (less than 17, search right); second comparison at mid index 5 gives 17 (found). Only **2 comparisons** needed.
16. The program compiles and runs but produces incorrect output — the classic definition of a logic error. Syntax errors prevent compilation; runtime errors crash the program during execution.
17. The outer loop runs 3 times, the inner loop 2 times each = 6 total prints. The last iteration has $i=3$, $j=2$, so the last value is $3 \times 2 = 6$. This tests nested iterative control structures.
18. For a point turn to the left, the left motor goes backward (−50) and the right motor goes forward (+50), rotating the robot around its center. Option A goes straight; option D spins right.
19. A compiled language translates the entire source to machine code before any execution (e.g., C, C++); an interpreted language translates and executes line by line at runtime (e.g., Python). Cross-platform ability depends on implementation, not the compilation model.

20. The loop counts integers from 1 to 100 divisible by 3. Multiples of 3 up to 99: $99 \div 3 = 33$ values.
21. Creating Gantt charts with timelines, task assignments, and dependencies is a project planning activity — scheduling and resource allocation within the SDLC.
22. The average of two integers may not be a whole number (e.g., $(3+4)/2 = 3.5$), so the return type must be double. This tests creating user-defined functions with appropriate signatures.
23. De Morgan's first law: $\text{NOT } (p \text{ OR } q) \equiv (\text{NOT } p) \text{ AND } (\text{NOT } q)$. The negation of a disjunction becomes the conjunction of the individual negations.
24. Division by zero is a runtime error — the code is syntactically correct and compiles, but the program crashes when the illegal operation is attempted during execution.
25. The activity requires students to collaborate, share perspectives, and evaluate alternatives. This is part of teaching pedagogy.
26. Selection sort first pass on {8,3,5,1}: finds minimum value 1 at index 3, swaps with index 0, yielding {1, 3, 5, 8}.
27. Low-level languages (assembly, machine code) are closer to hardware with less human-readable syntax; high-level languages (Python, Java) abstract away hardware details with more readable syntax.
28. Nested loop trace: $r = 1$ prints *; $r = 2$ prints **; $r = 3$ prints ***. Output is the growing triangle pattern.
29. In UML, a solid line with a hollow (unfilled) arrowhead represents inheritance (generalization). A solid diamond represents composition; a dashed line represents dependency.
30. The array traversal finds the maximum: starting with `result = 4`, index 1 gives 9 which is larger, so `result = 9`. No later element exceeds 9. Output: **9**.
31. Two circles collide when the distance between centers $\leq$ sum of radii. Here distance = 5 and sum of radii = $2 + 3 = 5$, so the objects *touch* (collision is true).
32. Descriptive identifiers, consistent indentation, and comments are the primary conventions that improve code readability. Single-character names and minimizing lines reduce readability.
33. In the worst case, linear search checks every element (target is last or absent), requiring n comparisons — giving $O(n)$ time complexity.
34. A CSV (Comma-Separated Values) file is a plain text file where data values are separated by commas, commonly used to exchange tabular data between applications.
35. `Truck` extends `Vehicle`, so it inherits all public methods including `getMake()` and `setMake()`. The private `make` field is not directly accessible from `Truck`.
36. Procedural programming organizes code primarily as a sequence of procedure calls operating on data. Both paradigms use loops, conditionals, variables, and code reuse, so only option B is exclusive to procedural programming.
37. The loop iterates from the last character (index 7) to the first (index 0), appending each character to `result`, reversing "COMPUTER" to **"RETUPMOC"**.
38. Each team independently tests its own module before integration — this is unit testing within a modular (collaborative) development approach. Acceptance testing involves end users; regression testing checks for side effects after changes.
39. The function computes $n!$ (factorial): `mystery(5) =  $5 \times 4 \times 3 \times 2 \times 1 = 120$` .
40. "If p , then q " is a conditional (implication) written $p \Rightarrow q$. Option D ($q \Rightarrow p$) reverses the direction, meaning "If I carry an umbrella, then it is raining."
41. The condition `i < 10` stops before reaching 10. Changing it to `i <= 10` includes 10 in the range, fixing this classic off-by-one boundary error.

42. Stack trace: push 10, 20, 30; a = pop() = 30; push 40; b = peek() = 40 (stack unchanged); c = pop() = 40. Output: **30, 40, 40**.
43. $500 \text{ characters} \times 16 \text{ bits} = 8,000 \text{ bits}$; $8,000 \div 8 = 1,000 \text{ bytes}$.
44. Evaluating emerging technology requires considering alignment with learning objectives, accessibility for all students, and data privacy. This is part of teaching pedagogy.
45. s is declared as Shape but holds a Circle object. Polymorphism (method overriding) causes the Circle version of draw() to execute, printing **"Drawing a circle"**.
46. Treating a module as a black box — testing through inputs and outputs without examining internal code — illustrates information hiding and encapsulation, where internal details are hidden behind the module's interface.
47. A single traversal tracking the running maximum is $O(n)$ —optimal because every element must be checked at least once. Sorting would be $O(n \log n)$, and binary search requires sorted data. This tests developing common algorithms for practical problems.
48. An IDE combines a source code editor, debugger, compiler/interpreter, and build automation tools in a single application to streamline the development process.
49. Order matters (chairperson $\neq$ secretary), so this is a permutation: $P(10, 2) = 10 \times 9 = 90$. A combination (order irrelevant) would give $C(10, 2) = 45$.
50. The loop accesses the main diagonal: grid[0][0] = 5, grid[1][1] = 25, grid[2][2] = 45; sum = $5 + 25 + 45 = 75$.

Domain Score Tracker

Use this table to identify weak areas after grading. Circle the number of each question you answered correctly, then tally your score per domain.

Domain	Questions	Score	Total
I — Technology Applications Core	7, 14, 25, 34, 44, 47	—	6
II — Program Design & Development	2, 5, 9, 12, 16, 19, 21, 24, 27, 29, 32, 36, 38, 41, 43, 46, 48	—	17
III — Programming Language Topics	1, 3, 6, 8, 11, 13, 15, 17, 20, 22, 26, 28, 30, 33, 35, 37, 39, 42, 45, 50	—	20
IV — Specialized Topics	4, 10, 18, 23, 31, 40, 49	—	7
Total Score		—	50

Distribution note: Domain I = 12%, Domain II = 34%, Domain III = 40%, Domain IV = 14%. These percentages are within acceptable range for a 50-question diagnostic exam (target distribution: 12.5%/35%/40%/12.5%).

Notes:

- **Question 47** (hex-to-decimal conversion) is tagged Domain I — Competency 001. This topic straddles Domains I and III; on the real exam, number-base questions may appear under either competency.
- **Question 48** (IDE purpose) is tagged Competency 004 but could reasonably be tagged Competency 005 (development tools). Either classification is acceptable during debrief.