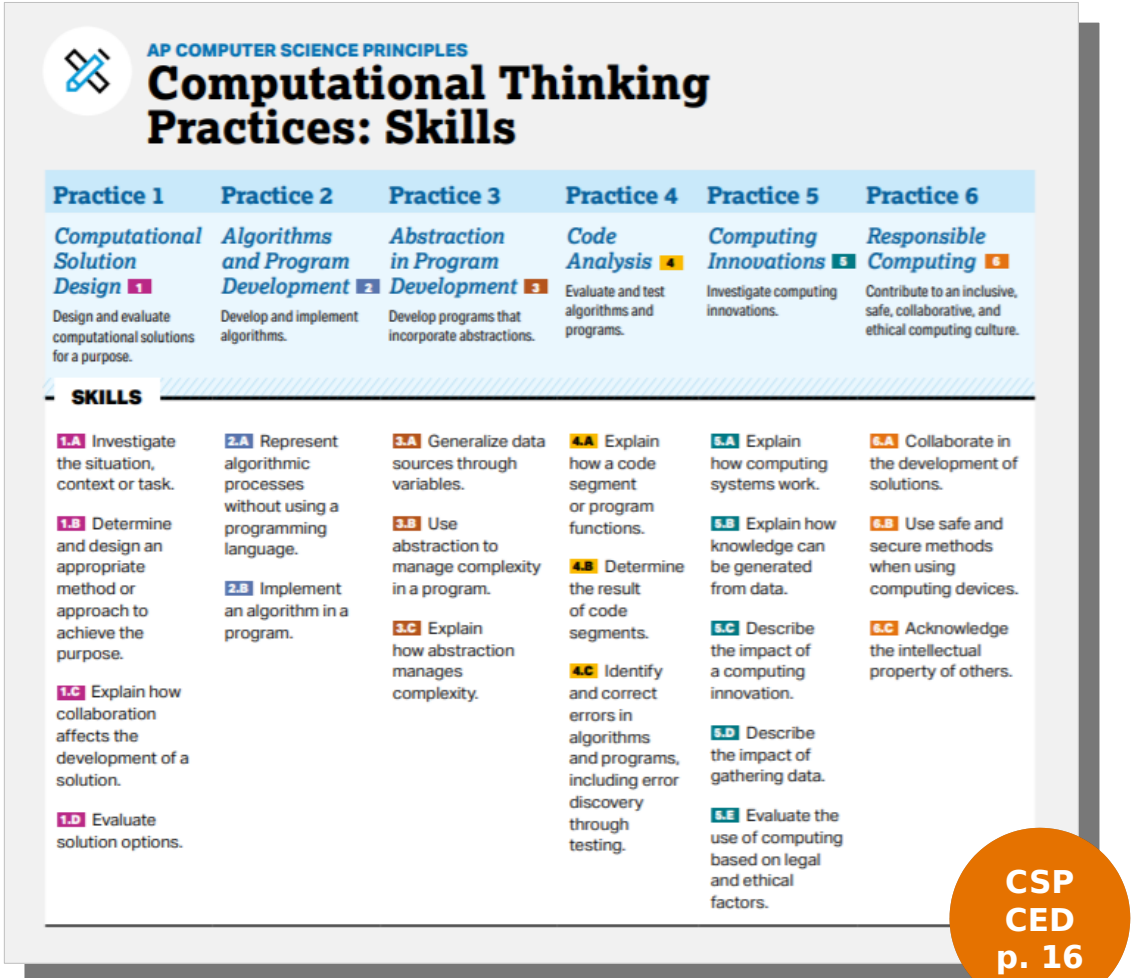
Course Skills

What computer scientists do

- Course skills describe **what students should be able to do** while exploring course concepts. In the AP Computer Science courses, these are called **Computational Thinking Practices: Skills**.
- Course skills also **form the basis of tasks** students are asked to perform on the AP Exam.
- Students will benefit from **multiple opportunities** to develop course skills in a scaffolded manner.
- In Practice 2, 3, and 4 the skills are more scaffolded. Consider how this effects the development of units.



AP COMPUTER SCIENCE PRINCIPLES

Computational Thinking Practices: Skills

Practice 1	Practice 2	Practice 3	Practice 4	Practice 5	Practice 6
Computational Solution Design 1	*Algorithms and Program Development* 2	*Abstraction in Program Development* 3	*Code Analysis* 4	*Computing Innovations* 5	*Responsible Computing* 6
Design and evaluate computational solutions for a purpose.	Develop and implement algorithms.	Develop programs that incorporate abstractions.	Evaluate and test algorithms and programs.	Investigate computing innovations.	Contribute to an inclusive, safe, collaborative, and ethical computing culture.
SKILLS					
1.A Investigate the situation, context or task.	2.A Represent algorithmic processes without using a programming language.	3.A Generalize data sources through variables.	4.A Explain how a code segment or program functions.	5.A Explain how computing systems work.	6.A Collaborate in the development of solutions.
1.B Determine and design an appropriate method or approach to achieve the purpose.	2.B Implement an algorithm in a program.	3.B Use abstraction to manage complexity in a program.	4.B Determine the result of code segments.	5.B Explain how knowledge can be generated from data.	6.B Use safe and secure methods when using computing devices.
1.C Explain how collaboration affects the development of a solution.		3.C Explain how abstraction manages complexity.	4.C Identify and correct errors in algorithms and programs, including error discovery through testing.	5.C Describe the impact of a computing innovation.	6.C Acknowledge the intellectual property of others.
1.D Evaluate solution options.				5.D Describe the impact of gathering data.	
				5.E Evaluate the use of computing based on legal and ethical factors.	

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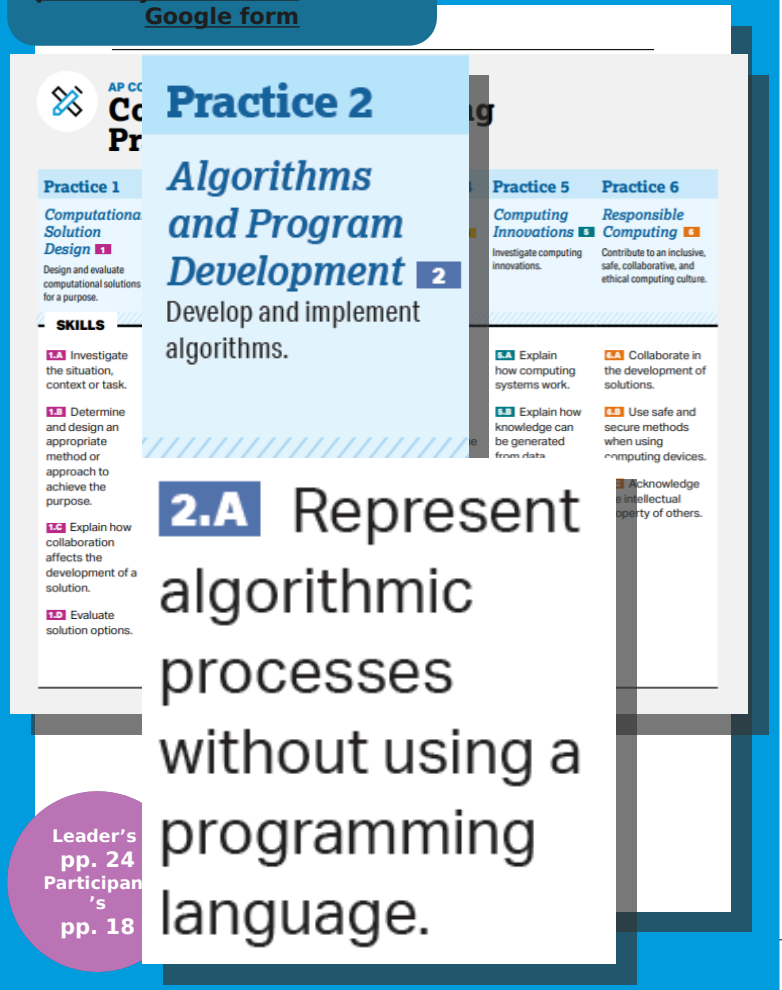
Online Instruction Tip:
Consider using a response system like pollleverywhere.com or use a Google form



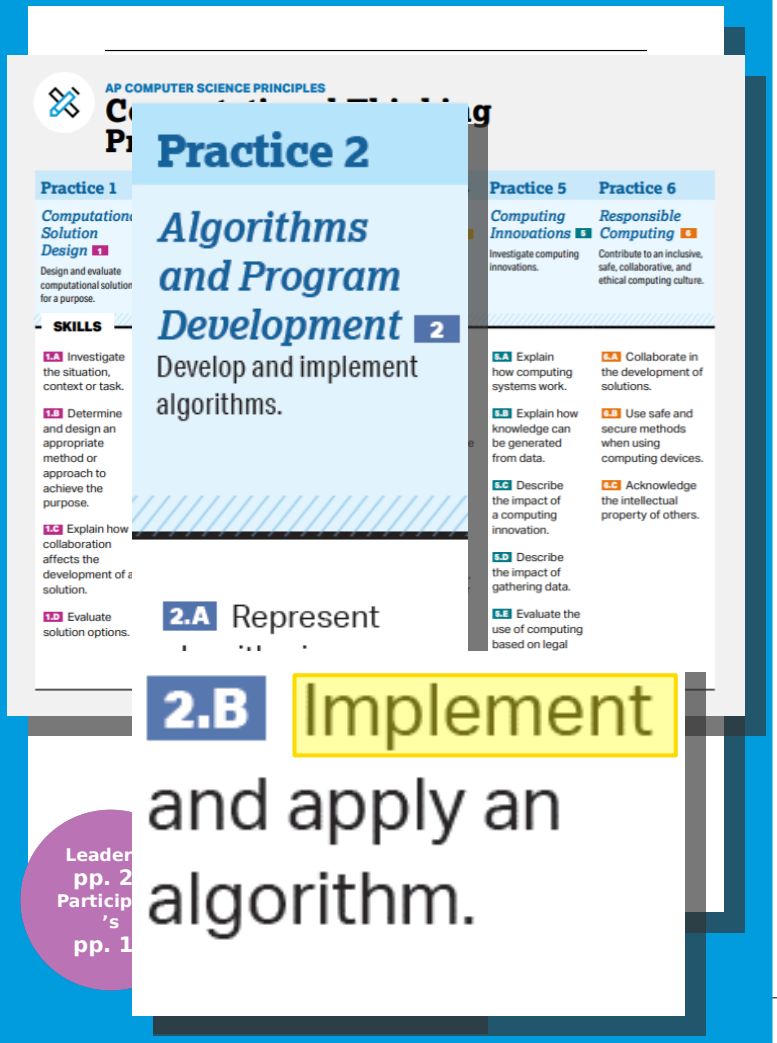
Skills Required in MC

- Turn to question 8 in the sample multiple-choice question in the Exam Information section of the *AP Computer Science Principles Course and Exam Description*, on page 175.
- What skill is being assessed?

8. A list of numbers has `n` elements, indexed from `1` to `n`. The following algorithm is intended to display the number of elements in the list that have a value greater than `100`. The algorithm uses the variables `count` and `position`. Step 3 and 4 are missing.

Step 1: Set `count` to `0` and `position` to `1`.
Step 2: If the value of the element at index `position` is greater than `100`, increase the value of `count` by `1`.
Step 3: (missing step)
Step 4: (missing step)
Step 5: Display the value of `count`.

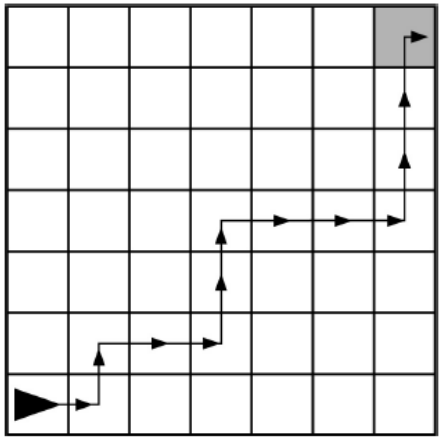
Which of the following could be used to replace step 3 and 4 so that the algorithm works as intended?



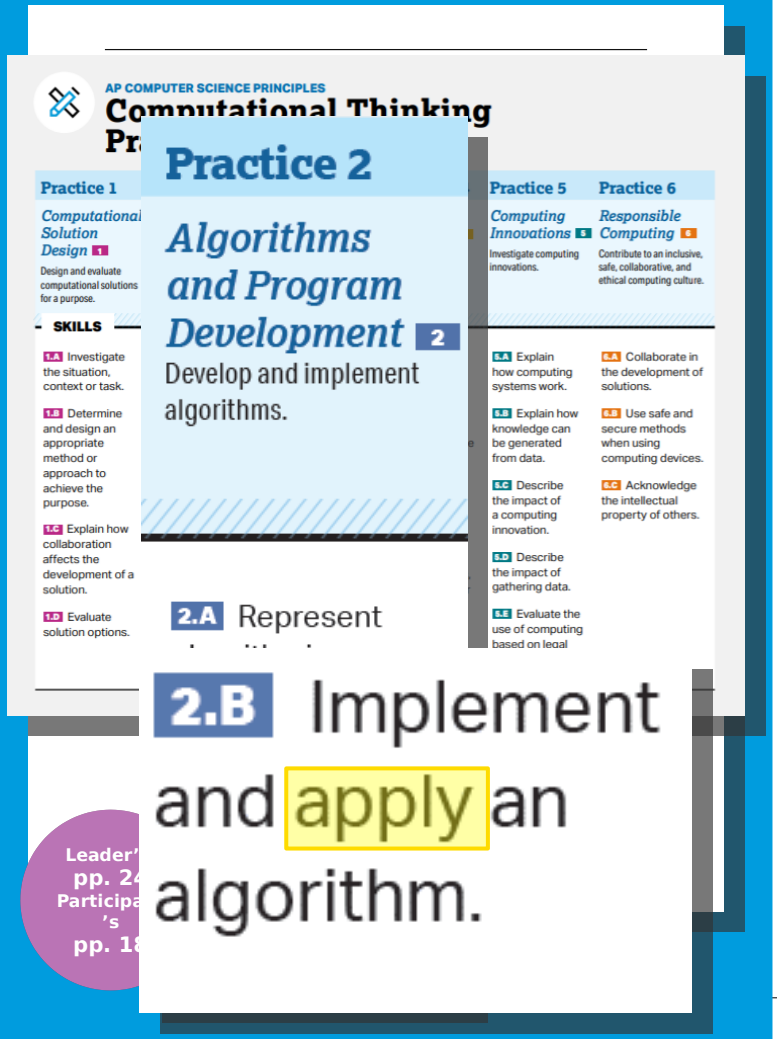
Skills Required in MC

- Turn to question 3 in the sample multiple-choice question in the Exam Information section of the *AP Computer Science Principles Course and Exam Description*, on page 173.
- What skill is being assessed?

3. The following grid contains a robot represented as a triangle. The robot is initially facing right.



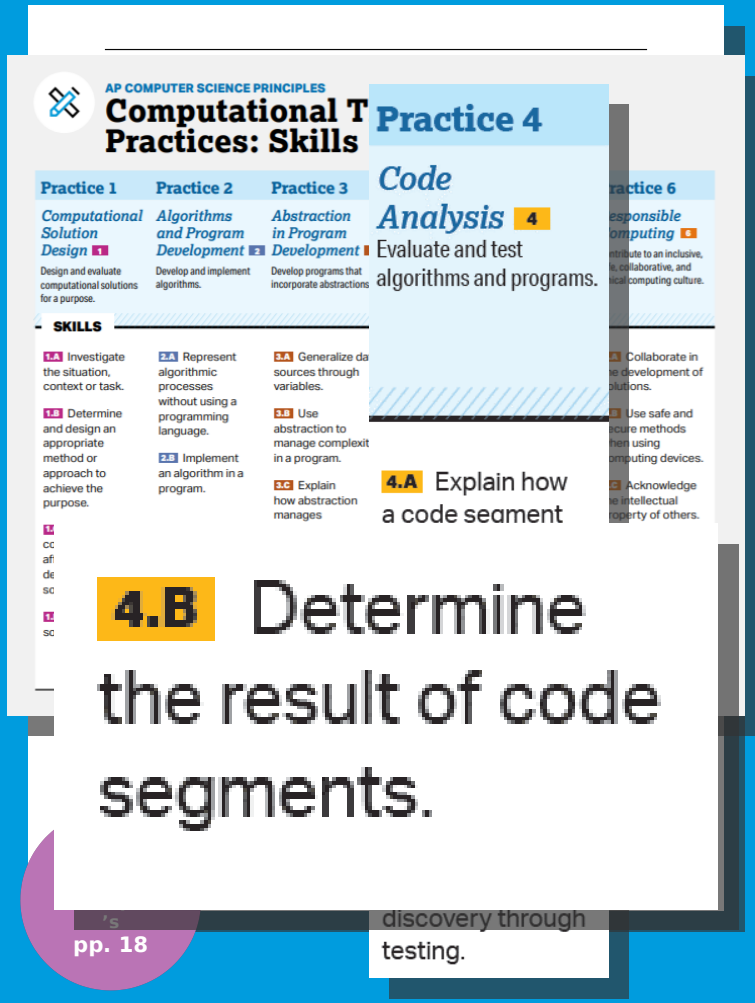
Which of the following code segments can be used to move the robot to the gray square along the path indicated by the arrows?



Skills Required in MC

- Turn to question 2 in the sample multiple-choice question in the Exam Information section of the *AP Computer Science Principles Course and Exam Description*, on page 172.
- What skill is being assessed?

2. Each student that enrolls at a school is assigned a unique ID number, which is stored as a binary number. The ID numbers increase sequentially by 1 with each newly enrolled student. If the ID number assigned to the last student who enrolled was the binary number 1001 0011, what binary number will be assigned to the next student who enrolls?



Skills Required in MC

- Turn to question 6 in the sample multiple-choice question in the Exam Information section of the *AP Computer Science Principles Course and Exam Description*, on page 174.
- What skill is being assessed?

6. In a certain country, a person must be at least 16 years old to drive a car and must be at least 18 years old to vote. The variable `age` represents the age of a person as an integer.

Which of the following expressions evaluates to `true` if the person is old enough to drive but not old enough to vote, and evaluates to `false` otherwise?

I. `(age ≥ 16) AND (age ≤ 18)`

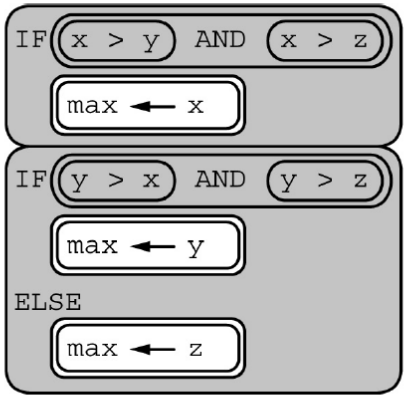
II. `(age ≥ 16) AND (NOT(age ≥ 18))`

III. `(age < 18) AND (NOT(age < 16))`

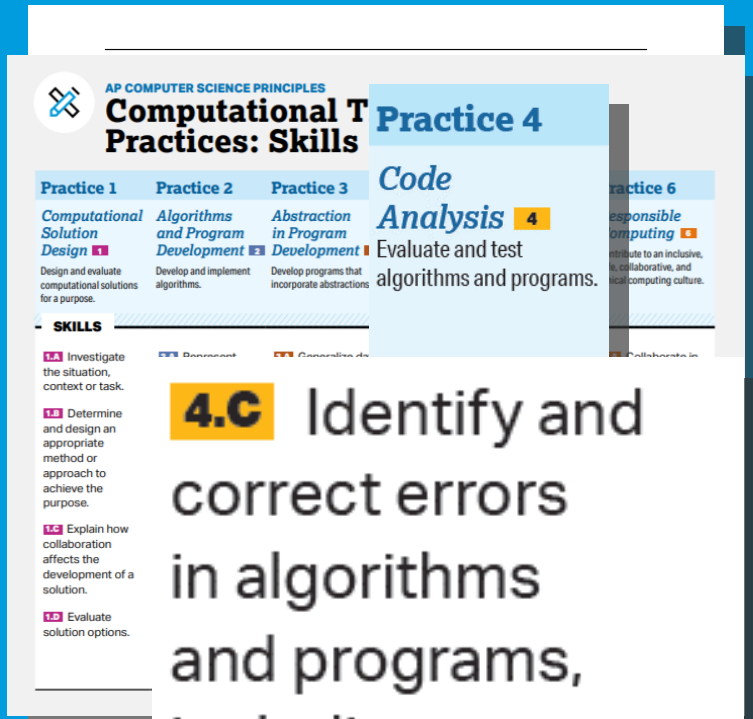
Skills Required in MC

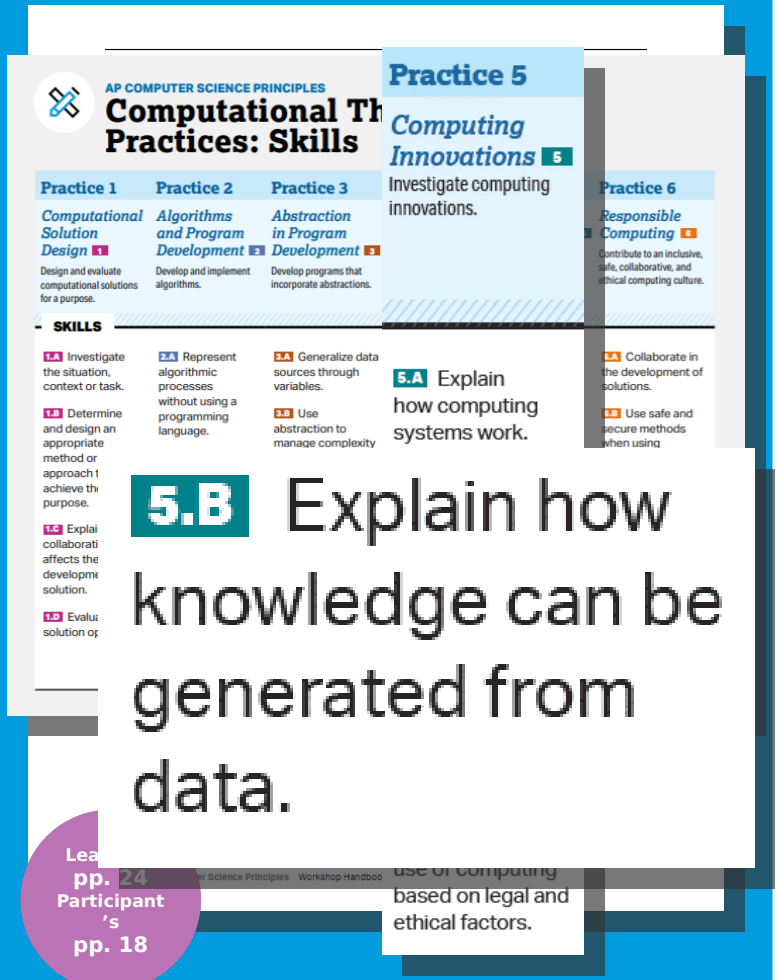
- Turn to question 9 in the sample multiple-choice question in the Exam Information section of the *AP Computer Science Principles Course and Exam Description*, on page 176.
- What skill is being assessed?

9. The following code segment is intended to set `max` equal to the maximum value among the integer variables `x`, `y`, and `z`. The code segment does not work as intended in all cases.



Which of the following initial values for `x`, `y`, and `z` can be used to show that the code segment does not work as intended?

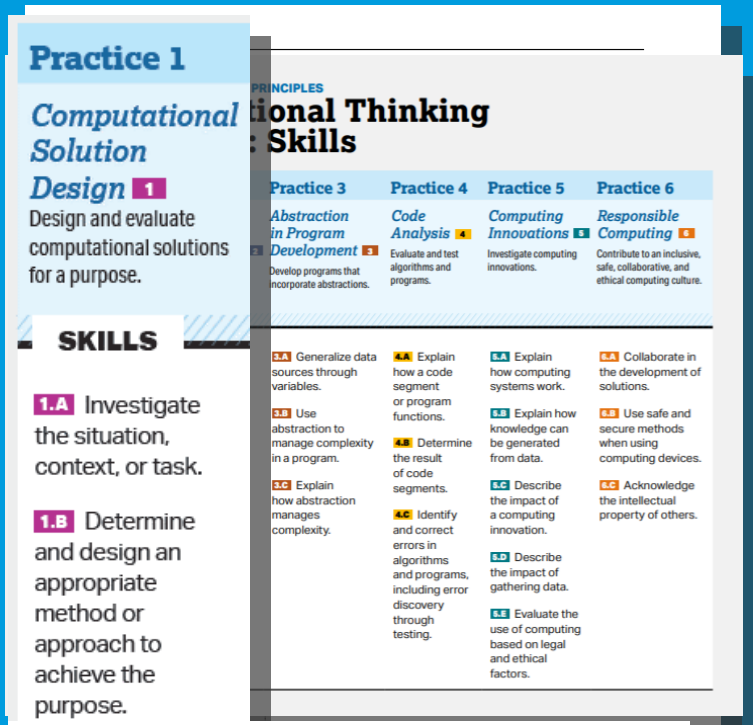




Skills Required in MC

- Turn to question 10 in the sample multiple-choice question in the Exam Information section of the *AP Computer Science Principles Course and Exam Description*, on page 176.
- What skill is being assessed?

10. A digital photo file contains data representing the level of red, green, and blue for each pixel in the photo. The file also contains metadata that describe the data and geographic location where the photo was taken. For which of the following goals would analyzing the metadata be more appropriate than analyzing the data?



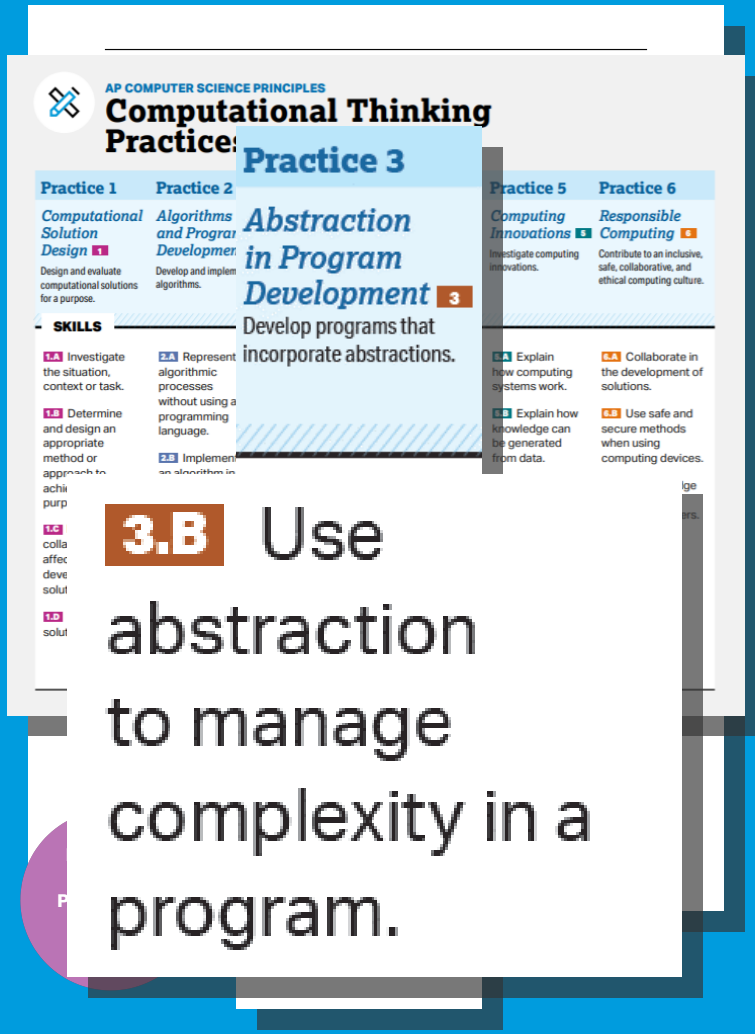
Skills Required in MC

- Turn to question 12 in the sample multiple-choice question in the Exam Information section of the *AP Computer Science Principles Course and Exam Description*, on page 177.
- What skill is being assessed?

12. A certain computer has two identical processors that are able to run in parallel. Each processor can run only one process at a time, and each process must be executed on a single processor. The following table indicates the amount of time it takes to execute each of three processes on a single processor. Assume that none of the processes are dependent on any of the other proce

Process	Execution Time on Either Processor
X	60 seconds
Y	30 seconds
Z	50 seconds

Which of the following best approximates the minimum possible time to execute all three processes when the two processors are run in parallel?



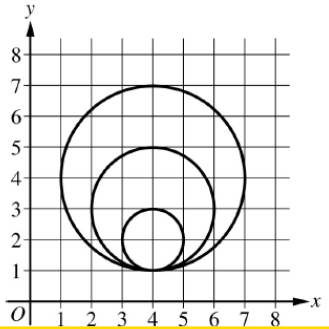
Skills Required in MC

- Turn to question 17 in the sample multiple-choice question in the Exam Information section of the *AP Computer Science Principles Course and Exam Description*, on page 181.
- What skill is being assessed?

17. Consider the following procedure.

Procedure Call	Explanation
`drawCircle(xPos, yPos, rad)`	Draws a circle on a coordinate grid with center `(xPos, yPos)` and radius `rad`

The `drawCircle` procedure is to be used to draw the following figure on a coordinate grid.



Which of the following code segments can be used to draw the figure?

Select two answers.