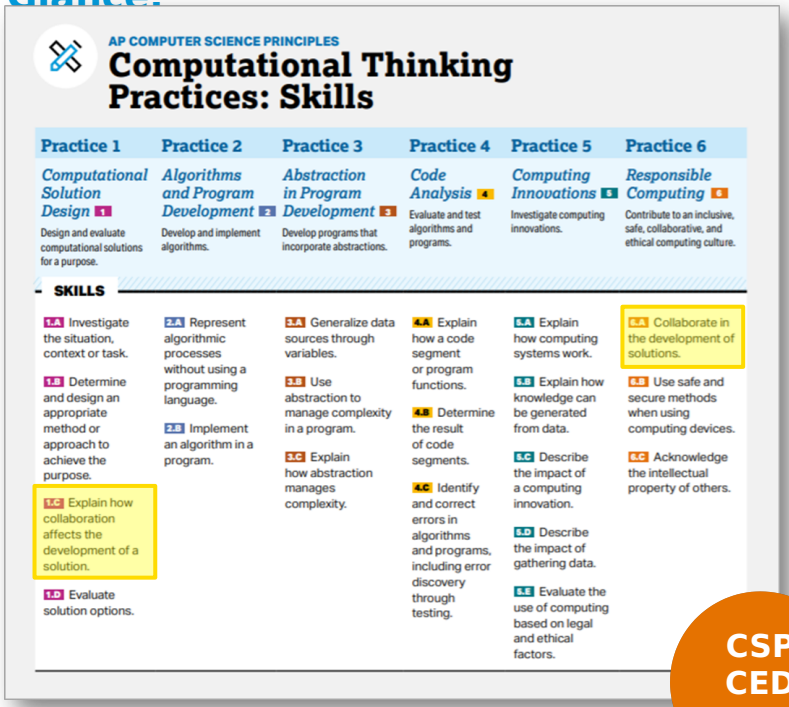
Topic Questions

Questions assess content area and skill on the Big Idea at a Glance.

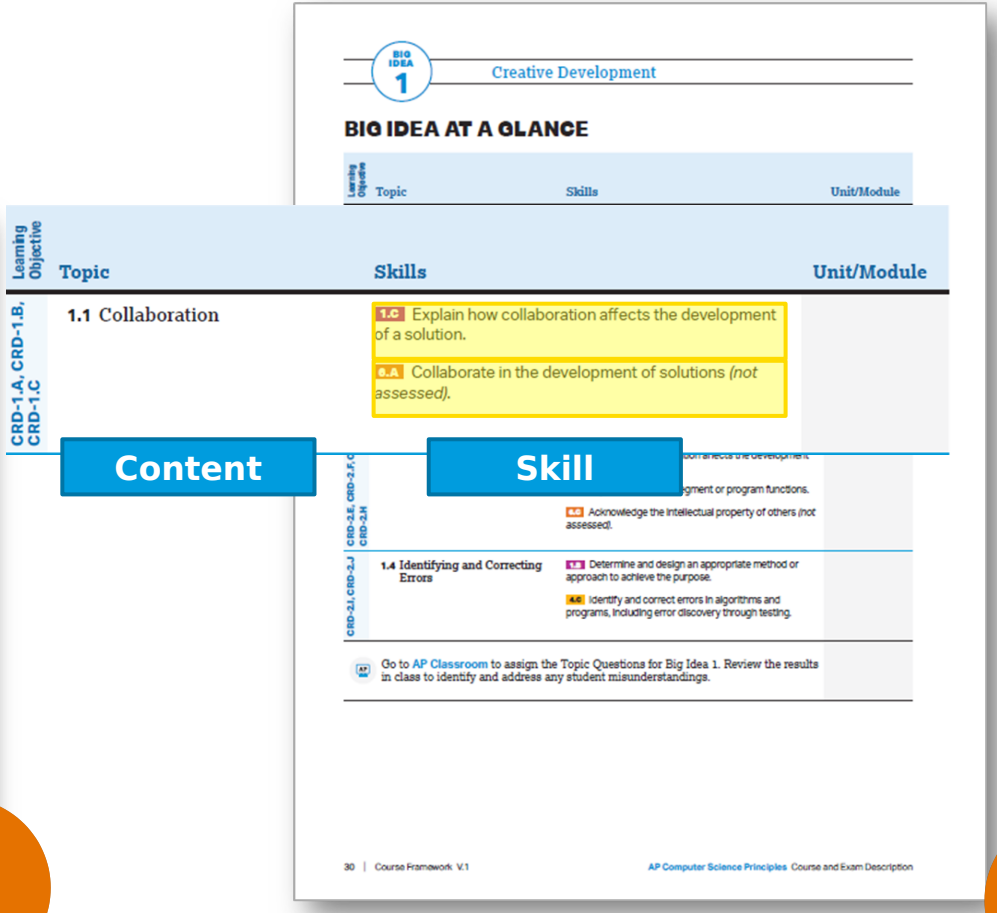


AP COMPUTER SCIENCE PRINCIPLES

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.	

CSP CED p. 16



BIG IDEA 1 — Creative Development

BIG IDEA AT A GLANCE

Learning Objective	Topic	Skills	Unit/Module
CRD-1.A, CRD-1.B, CRD-1.C	1.1 Collaboration	1.C Explain how collaboration affects the development of a solution. 6.A Collaborate in the development of solutions *(not assessed)*.	
CRD-2.E, CRD-2.F, CRD-2.G, CRD-2.H		6.C Acknowledge the intellectual property of others *(not assessed)*.	
CRD-2.I, CRD-2.J	1.4 Identifying and Correcting Errors	1.B Determine and design an appropriate method or approach to achieve the purpose. 4.C Identify and correct errors in algorithms and programs, including error discovery through testing.	

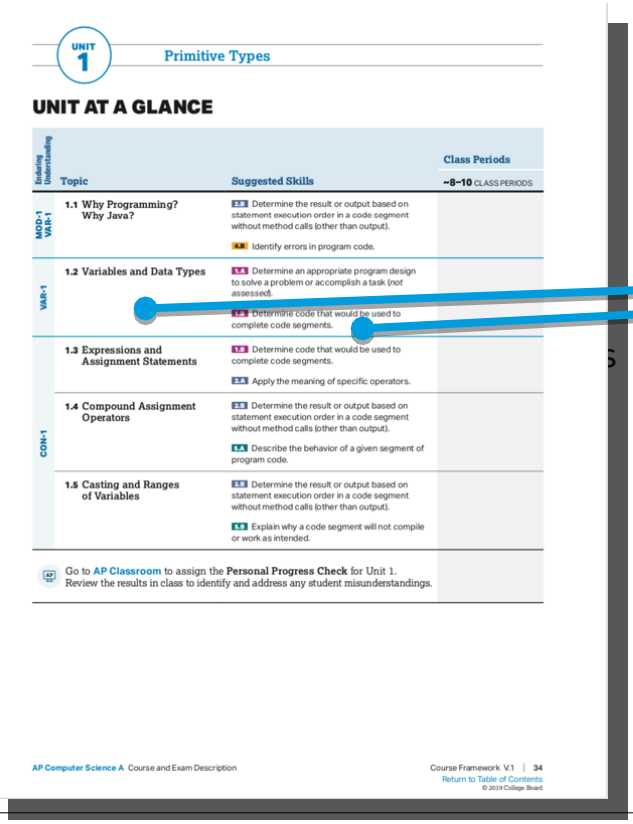
Go to AP Classroom to assign the Topic Questions for Big Idea 1. Review the results in class to identify and address any student misunderstandings.

30 | Course Framework V.1 — AP Computer Science Principles Course and Exam Description

Content **Skill**

CSP CED p. 30

AP Classroom:
Unit at a Glance

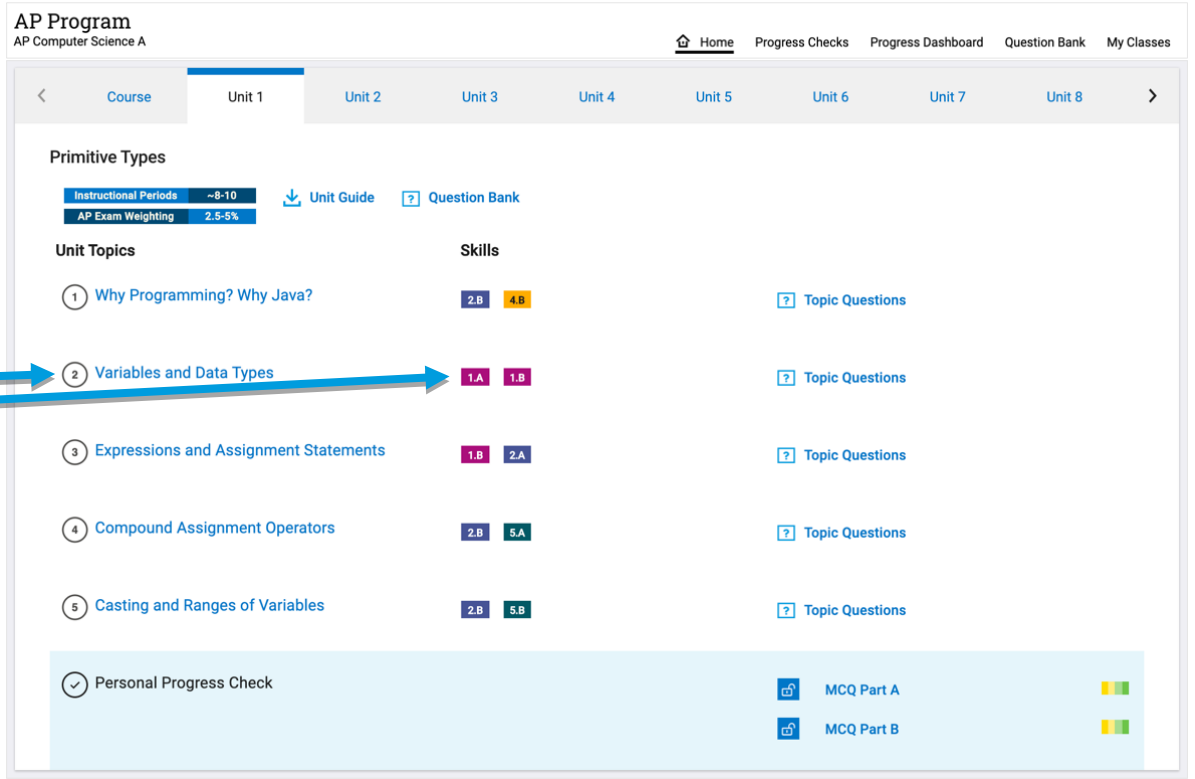


UNIT 1 Primitive Types

UNIT AT A GLANCE

Enduring Understanding	Topic	Suggested Skills	Class Periods ~8–10 CLASS PERIODS
MOD-1 VAR-1	1.1 Why Programming? Why Java?	2.B Determine the result or output based on statement execution order in a code segment without method calls (other than output). 4.B Identify errors in program code.	
VAR-1	1.2 Variables and Data Types	1.A Determine an appropriate program design to solve a problem or accomplish a task (*not assessed*). 1.B Determine code that would be used to complete code segments.	
CON-1	1.3 Expressions and Assignment Statements	1.B Determine code that would be used to complete code segments. 2.A Apply the meaning of specific operators.	
	1.4 Compound Assignment Operators	2.B Determine the result or output based on statement execution order in a code segment without method calls (other than output). 5.A Describe the behavior of a given segment of program code.	
	1.5 Casting and Ranges of Variables	2.B Determine the result or output based on statement execution order in a code segment without method calls (other than output). 5.B Explain why a code segment will not compile or work as intended.	

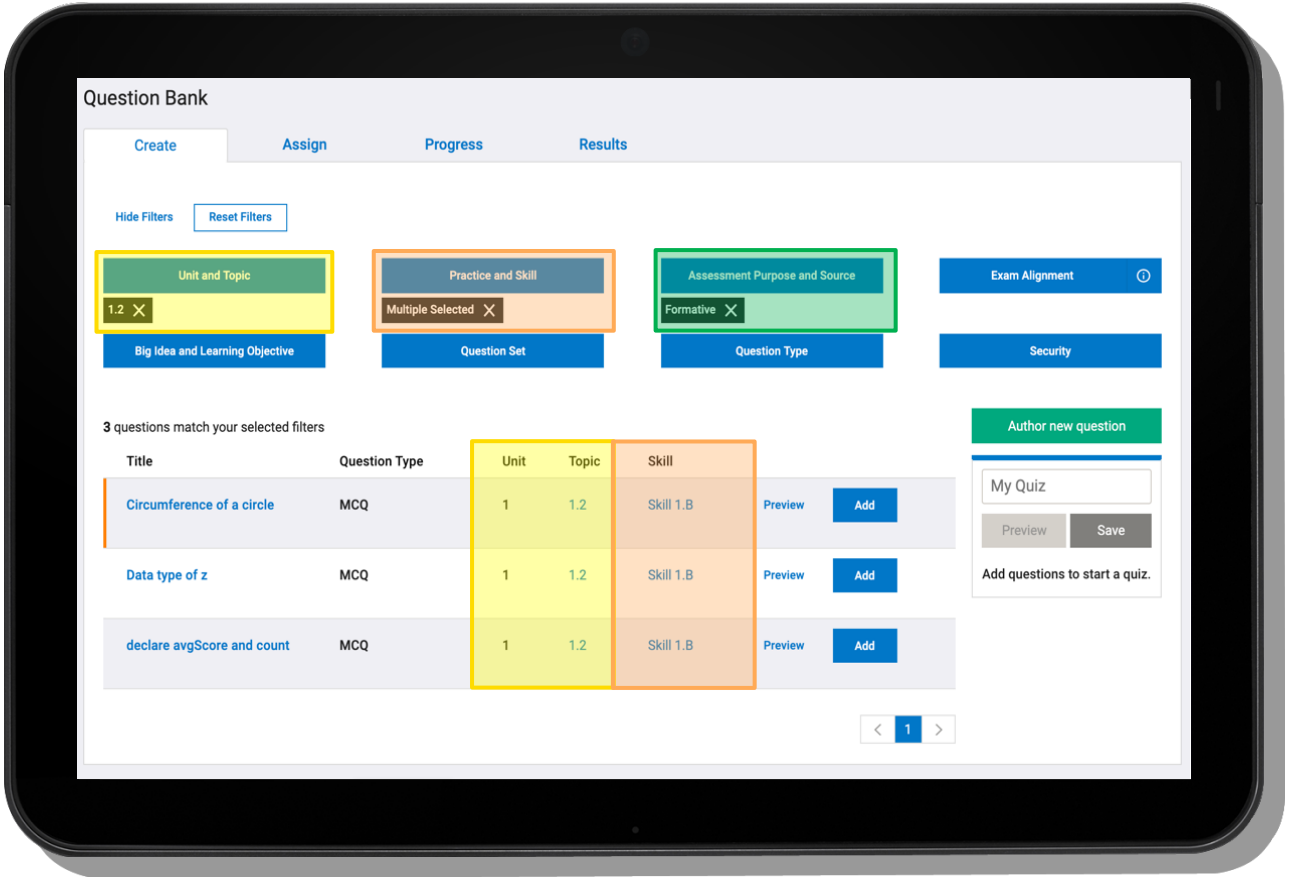
Go to AP Classroom to assign the **Personal Progress Check** for Unit 1. Review the results in class to identify and address any student misunderstandings.



Topic Questions: AP Classroom

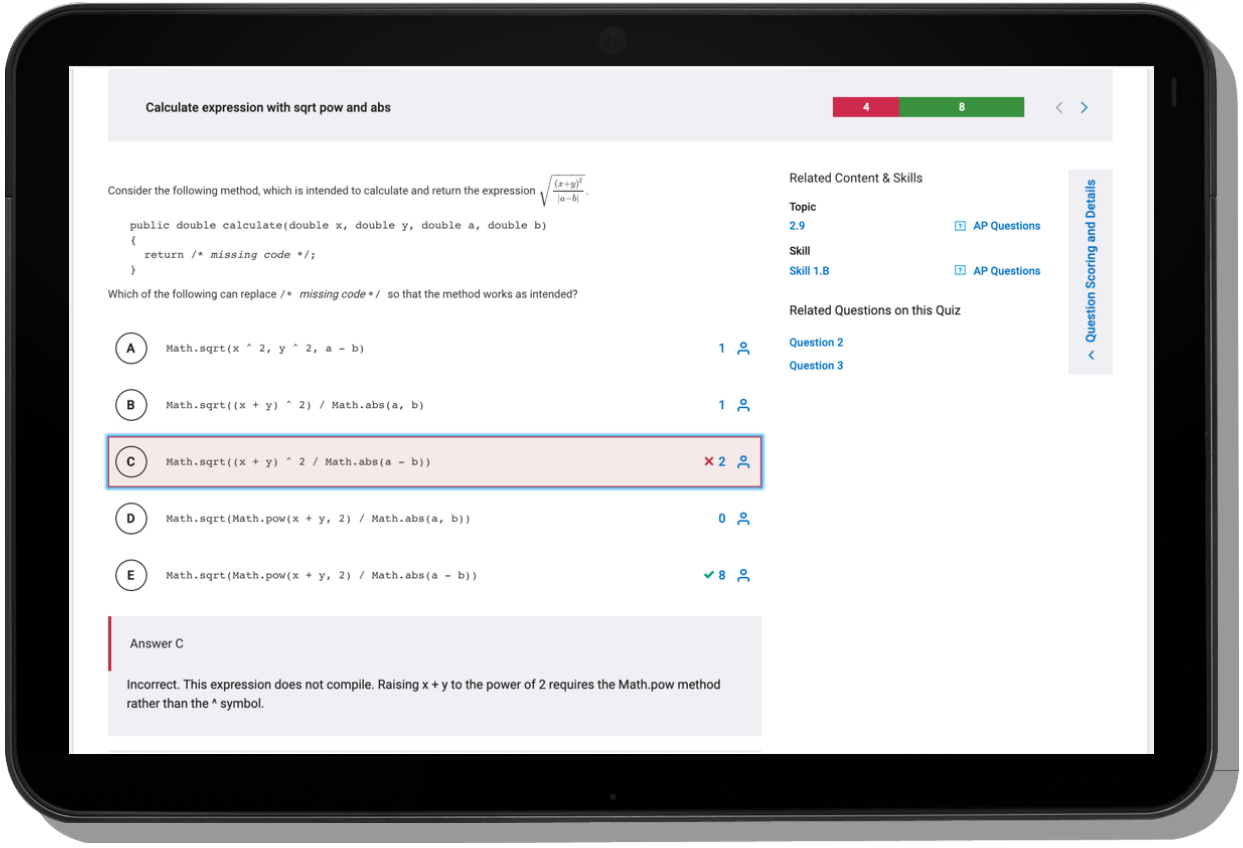
Teachers can assign topic questions to students online or on paper.

- Topic question links in each big idea show MCQ and PTs for each topic
- Teachers preview and decide which questions to add to their own quizzes in the Question Bank



Question Analysis

Feedback for every formative AP question explains the correct answer and every incorrect answer to help students reflect and improve.



Topic Questions: Skills should be spiraled

AP CSP
Big Idea 3, Topic 3.3
Skill 2.A

Practice 2

Algorithms and Program Development 2
Develop and implement algorithms.

2.A Represent algorithmic processes without using a programming language.

2.B Implement and apply an algorithm.

A student is creating an algorithm to display the distance between the numbers `num1` and `num2` on a number line. The following table shows the distance for several different values.

Value of `num1`	Value of `num2`	Distance Between `num1` and `num2`
5	2	3
1	8	7
-3	4	7

Which of the following algorithms displays the correct distance for all possible values of `num1` and `num2` ?

A
Step 1: Add `num1` and `num2` and store the result in the variable `sum`.
Step 2: Take the absolute value of `sum` and display the result.

B
Step 1: Subtract `num1` from `num2` and store the result in the variable `diff`.
Step 2: Take the absolute value of `diff` and display the result.

C

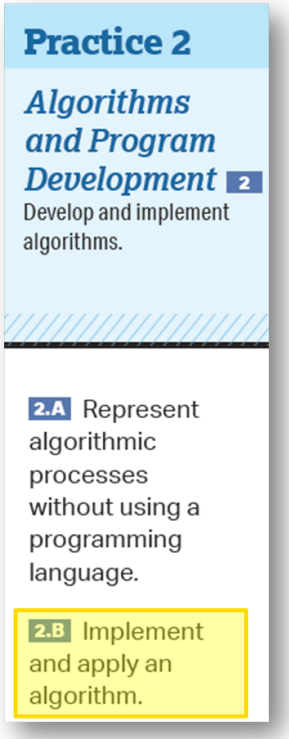
D

Answer: B

Correct. Subtracting `num1` from `num2` will give the difference between the two numbers. Taking the absolute value of the difference will give the distance as a positive number.

Topic Questions: Skills should be spiraled

AP CSP
Big Idea 3, Topic 3.5
Skill 2.B



To qualify for a particular scholarship, a student must have an overall grade point average of 3.0 or above and must have a science grade point average of over 3.2. Let `overallGPA` represent a student's overall grade point average and let `scienceGPA` represent the student's science grade point average. Which of the following expressions evaluates to `true` if the student is eligible for the scholarship and evaluates to `false` otherwise?

Answer: C

A, B: Correct. This expression will evaluate to `true` if only if the student's overall GPA is greater than or equal to 3.0 and the student's science GPA is strictly greater than 3.2.

C: `(overallGPA ≥ 3.0) AND (scienceGPA > 3.2)`

D: `(overallGPA ≥ 3.0) AND (scienceGPA ≥ 3.2)`

Topic Questions: Skills should be spiraled

AP CSP
Big Idea 2, Topic 2.1
Skill 2.B

Practice 2

Algorithms and Program Development 2

Develop and implement algorithms.

2.A Represent algorithmic processes without using a programming language.

2.B Implement and apply an algorithm.

Consider the following numeric values.

- Binary 1011
- Binary 1101
- Decimal 5
- Decimal 12

Which of the following lists the values in order from least to greatest?

A. Decimal 5, binary 1011, decimal 12, binary 1101

B.

C.

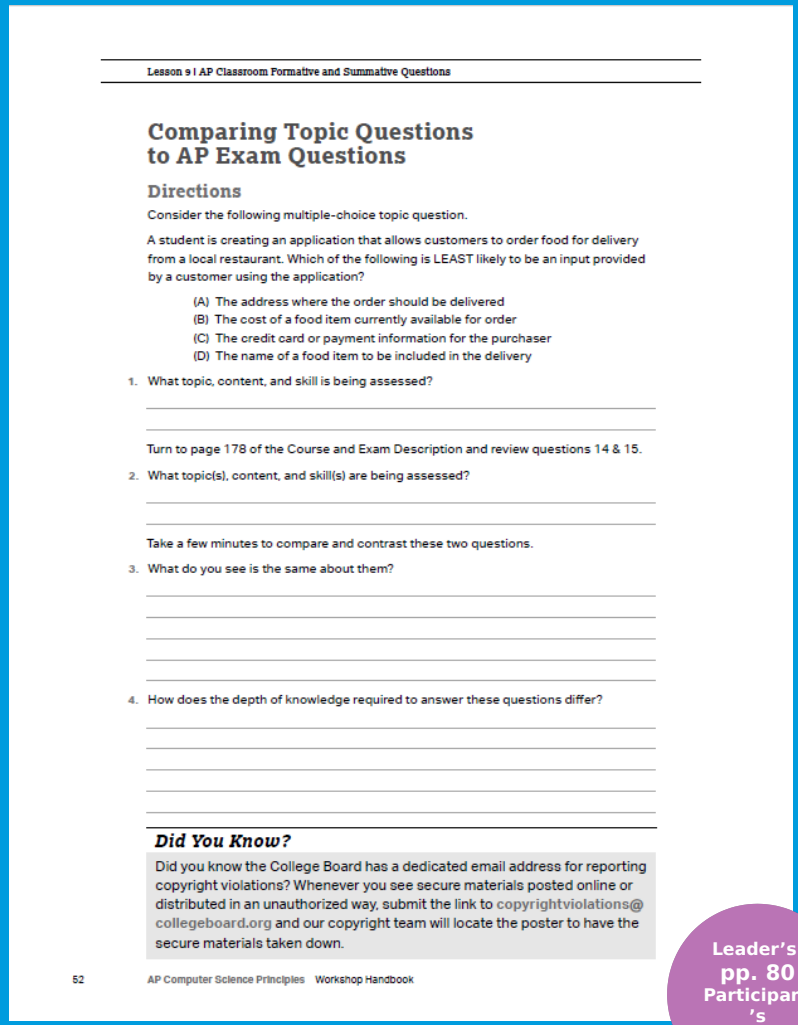
D.

Answer: A

Correct. Binary 1011 is equivalent to $2^3+2^1+2^0$, or decimal 11, and the binary 1101 is equivalent to $2^3+2^2+2^0$, or decimal 13. The order of the numbers (written in their equivalent decimal format) is 5, 11, 12, 13.

Comparing Topic Questions to AP Exam Questions

- Because there are no Units, most topic questions are pitched at a proficient level, but some are emerging.
- This example would be considered “Emerging” and isn’t representative of what students will see on the AP Exam.
- But it does allow for a scaffolding of content and skills and will provide feedback to both teacher / student.
- This activity allows participants to compare and contrast a formative topic question with summative questions that assess the same Topic, Learning Objective and Skill.



Lesson 9 | AP Classroom Formative and Summative Questions

Comparing Topic Questions to AP Exam Questions

Directions

Consider the following multiple-choice topic question.

A student is creating an application that allows customers to order food for delivery from a local restaurant. Which of the following is LEAST likely to be an input provided by a customer using the application?

(A) The address where the order should be delivered
(B) The cost of a food item currently available for order
(C) The credit card or payment information for the purchaser
(D) The name of a food item to be included in the delivery

1. What topic, content, and skill is being assessed?

Turn to page 178 of the Course and Exam Description and review questions 14 & 15.

2. What topic(s), content, and skill(s) are being assessed?

Take a few minutes to compare and contrast these two questions.

3. What do you see is the same about them?

4. How does the depth of knowledge required to answer these questions differ?

Did You Know?

Did you know the College Board has a dedicated email address for reporting copyright violations? Whenever you see secure materials posted online or distributed in an unauthorized way, submit the link to copyrightviolations@collegeboard.org and our copyright team will locate the poster to have the secure materials taken down.

52 AP Computer Science Principles Workshop Handbook

Leader’s pp. 80
Participant’s pp. 52

Create Performance Task Topic Questions

Meant to be paired with existing programming projects

- Aligned with the summative video and written response prompts for the Create Performance Task
- Scaffolded to provide incremental practice prior to the summative Create Performance Task

Summative Create PT Written Response 3b.

Capture and paste two program code segments you developed during the administration of this task that contain a list (or other collection type) being used to manage complexity in your program.

i. The first program code segment must show how data have been stored in the list.

ii. The second program code segment must show the data in the same list being used, such as creating new data from the existing data or accessing multiple elements in the list, as part of fulfilling the program's purpose.

Then, provide a written response that does all three of the following:

iii. Identifies the name of the list being used in this response

iv. Describes what the data contained in the list represents in your program

v. Explains how the selected list manages complexity in your program code by explaining why your program code could not be written, or how it would be written differently, if you did not use the list.

Create Performance Task Topic Questions

3b – Row 2 – 1 Use of Var

- The text in [gray] from the summative prompt will be removed.
- The text in red will be added to create the formative prompt.

Formative Create PT Written Response 3b.

Capture and paste two program code segments you developed during the administration of this task that contain a variable [list (or other collection type)] being used [to manage complexity] in your program.

i. The first program code segment must show an assignment being made to the variable [how data have been stored in the list.]

ii. The second program code segment must show the variable [data in the same list] being used [, such as creating new data from the existing data or accessing multiple elements in the list,] as part of fulfilling the program's purpose.

[Then,] provide a written response that [does all three of the following:]

iii. Identifies the name of the variable [list] being used in this response

iv. Describes what the data contained in the variable [list] represents in your program

v. [Explains how the selected list manages complexity in your program code by explaining why your program code could not be written, or how it would be written differently, if you did not use the list.]

Create Performance Task Topic Questions

3b – Row 2 – 1 Use of Var

- So, the final text is…

Formative Create PT Written Response 3b.

Capture and paste two program code segments you developed during the administration of this task that contain a variable being used in your program.

i. The first program code segment must show an assignment being made to the variable

ii. The second program code segment must show the variable being used as part of fulfilling the program's purpose.

Provide a written response that:

iii. Identifies the name of the variable being used in this response

iv. Describes what the data contained in the variable represents in your program.

Create Performance Task Topic Questions

3b – Rows 2 and 3 – 2 Value of Var

- The text in [gray] from the summative prompt will be removed.
- The text in red will be added to create the formative prompt.

Formative Create PT Written Response 3b.

Capture and paste two program code segments you developed during the administration of this task that contain a variable [list (or other collection type)] being used [to manage complexity] in your program.

i. The first program code segment must show an assignment being made to the variable [how data have been stored in the list.]

ii. The second program code segment must show the variable [data in the same list] being used [, such as creating new data from the existing data or accessing multiple elements in the list,] as part of fulfilling the program's purpose.

[Then,] provide a written response that [does all three of the following:]

iii. Identifies the name of the variable [list] being used in this response

iv. Describes what the data contained in the variable [list] represents in your program

v. Explains why you chose to use this variable in your program [how the selected list manages complexity in your program code by explaining why your program code could not be written, or how it would be written differently, if you did not use the list.]

Create Performance Task Topic Questions

3b – Rows 2 and 3 – 2 Value of Var

- So, the final text is…

Formative Create PT Written Response 3b.

Capture and paste two program code segments you developed during the administration of this task that contain a variable being used in your program.

i. The first program code segment must show an assignment being made to the variable

ii. The second program code segment must show the variable being used as part of fulfilling the program's purpose.

Provide a written response that:

iii. Identifies the name of the variable being used in this response

iv. Describes what the data contained in the variable represents in your program

v. Explains why you chose to use this variable in your program.

Create Performance Task Topic Questions

3b – Row 2 – 4 Use of Lists

- The text in [gray] from the summative prompt will be removed.

Formative Create PT Written Response 3b.

Capture and paste two program code segments you developed during the administration of this task that contain a list (or other collection type) being used [to manage complexity] in your program.

i. The first program code segment must show how data have been stored in the list.

ii. The second program code segment must show the data in the same list being used, such as creating new data from the existing data or accessing multiple elements in the list, as part of fulfilling the program's purpose.

[Then,] provide a written response that [does all three of the following:]

iii. Identifies the name of the list being used in this response

iv. Describes what the data contained in the list represents in your program

v. [Explains why you chose to use this variable in your program how the selected list manages complexity in your program code by explaining why your program code could not be written, or how it would be written differently, if you did not use the list.]

Create Performance Task Topic Questions

3b – Row 2 – 4 Use of Lists

- So, the final text is...

Formative Create PT Written Response 3b.

Capture and paste two program code segments you developed during the administration of this task that contain a list (or other collection type) being used in your program.

i. The first program code segment must show how data have been stored in the list.

ii. The second program code segment must show the data in the same list being used, such as creating new data from the existing data or accessing multiple elements in the list, as part of fulfilling the program's purpose.

Provide a written response that:

iii. Identifies the name of the list being used in this response

iv. Describes what the data contained in the list represents in your program.

How would you use AP Question Bank?

Brainstorm ways you would use the Topic questions and other questions in the AP Question bank.

- Consider uses both inside and outside the classroom
- How you accommodate students with limited access to technology?

Modification for Online Consultant Training: Share all the ways that you can see using the Topic Questions and Practice Exam questions in the AP Question bank here

Topic Questions: Implementation Methods

Topic Questions should be **assigned using one or more** of the following models:

1. As **homework immediately before the topic** is taught to assess student understanding of topic and/or skill
2. As **homework immediately after the topic** is taught in class
3. At the top of the class as a "**bell ringer**"
4. At the end of class as an **"exit ticket"**

Data review should occur immediately after administration of the topic questions. Teachers are encouraged to:

- Enable student access and encourage review of rationales;
- Review class misunderstandings to plan subsequent teaching.

In summary:

- Topic Questions can be assigned **as a set, all at once, or in parcels** with a variety of use cases.
- Topic Questions can be assigned **online or on paper**.