

# AP Computer Science Principles

AP Exam Review

Class 135  
May 3, 2023  
Mr. Miller

Do Nows in Google Classroom!

# Half Days Thursday & Friday

## Thursday, May 4

Period	Time
1	12:49pm – 1:10pm
2	1:14pm – 1:35pm
3	1:39pm – 2:00pm
4	2:04pm – 2:25pm
5	2:29pm – 2:50pm

## Friday, May 5

Period	Time
6	12:58pm - 1:23pm
7	1:27pm - 1:52pm
8	1:56pm - 2:21pm
9	2:25pm - 2:50pm
10	2:54pm - 3:19pm

On Monday, Mr. Miller will be in 1E10 all morning for any last minute questions!

# AP Exam: Info

You must pick your AP Labels up **TODAY** in the cafeteria if you don't have them already! (they will not be distributed Thursday or Friday)

Take one of the labels and stick it on the back of your student ID.

You must bring this label sheet with you on Monday.

Student Last Name, Student First Name  
Your 2020 AP Exam schedule (may not reflect recent changes to your schedule)

5/6 AM US GOPO	5/13 PM PHY E&M
5/7 PM JAPANESE	5/15 PM ENG LANG
5/10 PM US HIST	
5/13 PM PHY MECH	

AP ID: \_\_\_\_\_  
SCHOOL CODE: \_\_\_\_\_  
DOB: \_\_\_\_\_  
GRADE: \_\_\_\_\_

These are your AP ID labels. No one else may use these AP ID labels.

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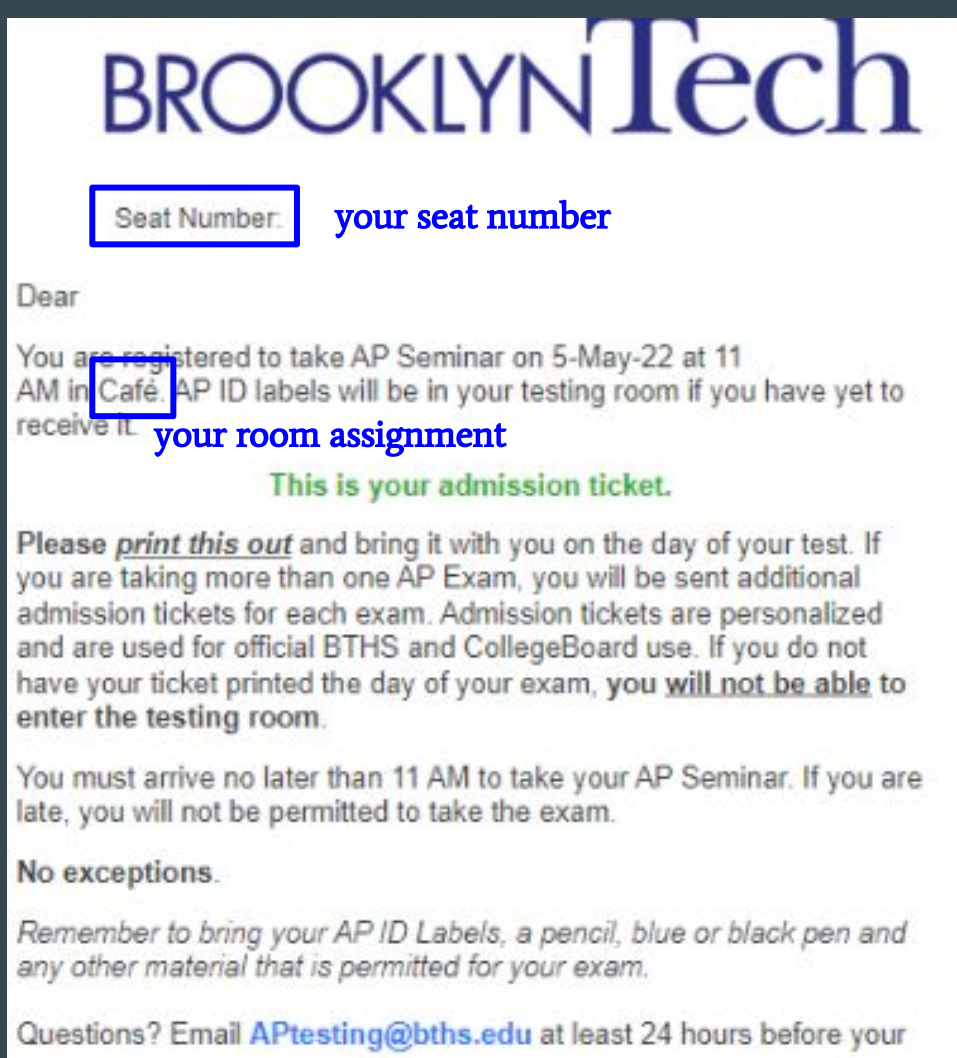
4600395

# AP Exam: Info

An admission ticket for the AP CSP Exam on Monday will be emailed to you later this week from BTHS testing -- you must **print it out and bring it with you on Monday** (it has your room and seat assignment).

This ticket was sent to your **email associated with your College board account** -- if you don't remember which email address you used, ask me and I can look it up.

If you don't get one, check your spam folder.



The image is a screenshot of an email from Brooklyn Tech. At the top, the logo "BROOKLYN Tech" is displayed in a blue serif font. Below the logo, there is a blue rectangular box containing the text "Seat Number:" followed by the instruction "your seat number" in blue. The email body begins with "Dear" followed by a redacted name. The main text states: "You are registered to take AP Seminar on 5-May-22 at 11 AM in Café. AP ID labels will be in your testing room if you have yet to receive it." The word "Café" is redacted with a blue box, and the phrase "your room assignment" is written in blue. Below this, the text "This is your admission ticket." is written in green. A paragraph follows: "Please print this out and bring it with you on the day of your test. If you are taking more than one AP Exam, you will be sent additional admission tickets for each exam. Admission tickets are personalized and are used for official BTHS and CollegeBoard use. If you do not have your ticket printed the day of your exam, you will not be able to enter the testing room." Another paragraph states: "You must arrive no later than 11 AM to take your AP Seminar. If you are late, you will not be permitted to take the exam." This is followed by the heading "No exceptions." and a reminder: "Remember to bring your AP ID Labels, a pencil, blue or black pen and any other material that is permitted for your exam." The email concludes with "Questions? Email [APtesting@bths.edu](mailto:APtesting@bths.edu) at least 24 hours before your

BROOKLYN Tech

Seat Number: your seat number

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Questions? Email [APtesting@bths.edu](mailto:APtesting@bths.edu) at least 24 hours before your

# Agenda

- Finish up the 2021 Practice Exam and submit!
- A detailed answer key has been posted; use it to review any wrong answers (you can also read the solutions on AP Classroom)
- **Review Packets 1-4 for studying now and this weekend:**
  - Packets 1-2 cover all programming
  - Packets 3-4 cover all non-programming
  - ***All vocab you need is in the red boxes*** -- be sure to review all vocab sections in all packets before Monday!

# AP Exam: Info

**Monday, 12:00 pm -- be here by 11:00am**

**2 hours: 12:00 - 2:00**

70 Q's in total:

- 57 multiple-choice questions
- 5 multiple-choice questions with reading passage
- 8 “select two” questions (these will all be at the end)

**Don't leave any blank!** There is no penalty for guessing.

# AP Exam: Info

**BRING** the following:

- #2 pencils + erasers
- Your printed exam ticket (will be emailed to you this week)
- Your AP label sheet
- Your school ID (with AP label stuck on back)
- You are encouraged to bring a (*non-smart*) **wristwatch** just in case there are no clocks that are easily visible (cannot be connected to the internet or make any noise)

Do **NOT** bring:

- scrap paper (you will use exam books for scrap)
- calculators or other electronics
- smart watches

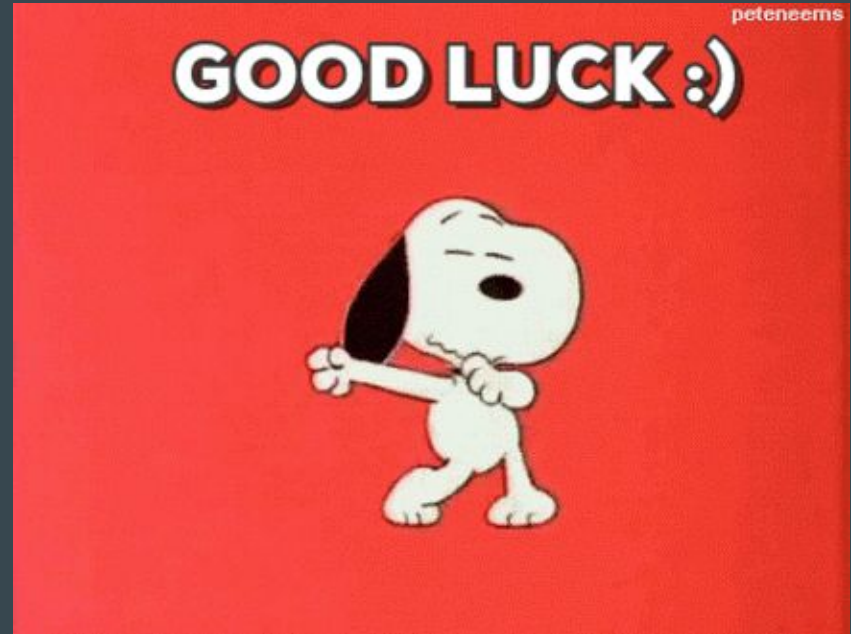
# STUDY RECOMMENDATIONS before Monday

- **Complete both Practice Tests** (2020 and 2021) in AP Classroom and check your answers
- **Look through all 4 Review Packets**
  - Packets 1-2 cover all programming
  - Packets 3-4 cover all non-programming
  - *All vocab you need is in the red boxes throughout the packets*
  - You aren't required to finish all practice problems in all packets; focus on those areas that you need to review the most.
- Any unfinished AP Classroom practice sets from labs



# If you are taking an AP Exam tomorrow

- Good luck tomorrow!!!!
- You aren't required to attend classes after (but you can if you want to)
- If I don't see you tomorrow, good luck on the AP CSP exam Monday! You've got this! 🕶️



# Do Now!

A program contains the following procedures for string manipulation.

Procedure Call	Explanation
<code>Concat (str1, str2)</code>	Returns a single string consisting of <code>str1</code> followed by <code>str2</code> . For example, <code>Concat ("key", "board")</code> returns "keyboard".
<code>Substring (str, start, length)</code>	Returns a substring of consecutive characters from <code>str</code> , starting with the character at position <code>start</code> and containing <code>length</code> characters. The first character of <code>str</code> is located at position 1. For example, <code>Substring ("delivery", 3, 4)</code> returns "live".

Which of the following expressions can be used to generate the string "Happy"?

- Ⓐ `Concat (Substring ("Harp", 1, 1), Substring ("Puppy", 2, 4))`
- Ⓑ `Concat (Substring ("Harp", 1, 2), Substring ("Puppy", 3, 3))`
- Ⓒ `Concat (Substring ("Harp", 1, 2), Substring ("Puppy", 4, 2))`
- Ⓓ `Concat (Substring ("Harp", 2, 2), Substring ("Puppy", 4, 2))`

# Do Now!

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- Ⓒ `Concat (Substring ("Harp", 1, 2), Substring ("Puppy", 4, 2))`
- Ⓓ `Concat (Substring ("Harp", 2, 2), Substring ("Puppy", 4, 2))`

# AP Exam Review

A large crowd of Springfield residents is shown cheering enthusiastically. Many characters have their arms raised in the air, and they all have expressions of excitement and joy. The crowd is diverse, featuring various characters from the town, including men, women, and children. The overall atmosphere is one of high energy and celebration.

Class 134  
May 2, 2023  
Mr. Miller

## Do Nows in Google Classroom!

# Important!

If you don't have your AP labels already, you **must** pick them up **TOMORROW** (Wednesday) in the Cafeteria.

They will **not** be distributed Thursday or Friday.

# Do Now 1

**Abstraction** *is the process of reducing complexity.* In code, abstraction is anything that helps "hide or manage complexity" of your program. Which of these are examples of abstraction in programming?

Select TWO:

- a. Replacing repeated blocks of code with a function.
- b. Documenting your code by adding comments explaining what it does.
- c. Using shorter variable names.
- d. Replacing 5 variables -- name1, name2, name3, name4, and name5 -- with a single list called "names" that includes 5 names.

# Do Now 1

**Abstraction** *is the process of reducing complexity.* In code, abstraction is anything that helps "hide or manage complexity" of your program. Which of these are examples of abstraction in programming?

Select TWO:

- a. Replacing repeated blocks of code with a function. ("procedural abstraction")
- b. Documenting your code by adding comments explaining what it does.
- c. Using shorter variable names.
- d. Replacing 5 variables -- name1, name2, name3, name4, and name5 -- with a single list called "names" that includes 5 names. ("data abstraction")

# Do Now 2

Reminder you will have this Reference Sheet on the AP Exam (all programming questions will be comprised of statements/commands from this sheet):

<https://apcentral.collegeboard.org/media/pdf/ap-computer-science-principles-exam-reference-sheet.pdf>



# Do Now 2

What gets displayed?

```
myList ← [4, 3, 5, 2]  
APPEND(myList, 6)  
INSERT(myList, 1, 3)  
REMOVE(myList, 4)  
myList[2] ← 7  
DISPLAY(myList)
```

Write down a "trace table":

# Do Now 2

What gets displayed?

Write down a "trace table":

```
myList ← [4, 3, 5, 2] → myList: [4, 3, 5, 2]  
APPEND(myList, 6)  
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REMOVE(myList, 4)  
myList[2] ← 7  
DISPLAY(myList)
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# Do Now 2

What gets displayed?

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<code>myList ← [4, 3, 5, 2]</code>	→	<code>myList: [4, 3, 5, 2]</code>
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<code>INSERT(myList, 1, 3)</code>		
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<code>myList[2] ← 7</code>		
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<code>INSERT(myList, 1, 3)</code>	→	<code>myList: [3, 4, 3, 5, 2, 6]</code>
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<code>INSERT(myList, 1, 3)</code>	→	<code>myList: [3, 4, 3, 5, 2, 6]</code>
<code>REMOVE(myList, 4)</code>	→	<code>myList: [3, 4, 3, 2, 6]</code> 5 removed
<code>myList[2] ← 7</code>		
<code>DISPLAY(myList)</code>		

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<code>REMOVE(myList, 4)</code>	→	<code>myList: [3, 4, 3, 2, 6]</code>	5 removed
<code>myList[2] ← 7</code>	→	<code>myList: [3, 7, 3, 2, 6]</code>	
<code>DISPLAY(myList)</code>			

# Do Now 2

What gets displayed?

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<code>myList ← [4, 3, 5, 2]</code>	→	<code>myList: [4, 3, 5, 2]</code>	
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<code>INSERT(myList, 1, 3)</code>	→	<code>myList: [3, 4, 3, 5, 2, 6]</code>	
<code>REMOVE(myList, 4)</code>	→	<code>myList: [3, 4, 3, 2, 6]</code>	5 removed
<code>myList[2] ← 7</code>	→	<code>myList: [3, 7, 3, 2, 6]</code>	
<code>DISPLAY(myList)</code>	→		

`[3, 7, 3, 2, 6]`

# 2020 Practice Exam Most Missed Questions

Consider the following algorithms. Each algorithm operates on a list containing  $n$  elements, where  $n$  is a very large integer.

- I. An algorithm that accesses each element in the list twice
- II. An algorithm that accesses each element in the list  $n$  times
- III. An algorithm that accesses only the first 10 elements in the list, regardless of the size of the list

Which of the algorithms run in reasonable time?

- (A) I only
- (B) III only
- (C) I and II only
- (D) I, II, and III



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## From the AP Extra Lab

**Reasonable** time algorithms are any algorithm that run in **polynomial** time:

- Constant time
- Linear time
- Sublinear time
- Quadratic time ( $n^2$ )
- Cubic time

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Consider the following algorithms. Each algorithm operates on a list containing  $n$  elements, where  $n$  is a very large integer.

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  - III. An algorithm that accesses only the first 10 elements in the list, regardless of the size of the list      **reasonable**
- Which of the algorithms run in reasonable time?      this algorithm takes 10 steps

## From the AP Extra Lab

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  - III. An algorithm that accesses only the first 10 elements in the list, regardless of the size of the list      **reasonable**
- Which of the algorithms run in reasonable time?      this algorithm takes 10 steps -- **constant!**

## From the AP Extra Lab

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- III. An algorithm that accesses only the first 10 elements in the list, regardless of the size of the list    **reasonable**
- Which of the algorithms run in reasonable time?    this algorithm takes 10 steps -- **constant!** **reasonable**

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  - II. An algorithm that accesses each element in the list  $n$  times this algorithm takes  $n * n = n^2$  steps -- quadratic!
  - III. An algorithm that accesses only the first 10 elements in the list, regardless of the size of the list reasonable
- Which of the algorithms run in reasonable time? this algorithm takes 10 steps -- constant! reasonable

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- I. An algorithm that accesses each element in the list twice      this algorithm takes  $2n$  steps -- **linear!** **reasonable**
  - II. An algorithm that accesses each element in the list  $n$  times      this algorithm takes  $n*n = n^2$  steps -- **quadratic!**
  - III. An algorithm that accesses only the first 10 elements in the list, regardless of the size of the list      **reasonable**
- Which of the algorithms run in reasonable time?      this algorithm takes 10 steps -- **constant!** **reasonable**

## From the AP Extra Lab

**Reasonable** time algorithms are any algorithm that run in **polynomial** time:

- Constant time
- Linear time
- Sublinear time
- Quadratic time ( $n^2$ )
- Cubic time

**Unreasonable** time:

- Exponential ( $2^n$ )
- Factorial

If there had been an answer choice that involved "**doubling**" each time, *that* is  $2^n$ , or exponential, which is **not** reasonable

(A) I only

(B) III only

(C) I and II only

(D) I, II, and III

# Today's Agenda

Have out scrap paper and the **AP CSP Reference**

Continue working on **Practice Exam #2: 2021 Practice Exam** on AP Classroom.

If you finish early, begin working through the Review Packets 1-4



5 questions with reading passage

8 choose-two questions

**Don't forget! FOR LISTS ON THE AP EXAM, THE FIRST INDEX IS 1, NOT 0**

# AP Computer Science Principles

Thank you for getting  
Create Tasks finalized!  
Almost everyone has it  
submitted, awesome  
work all 🤙

AP Exam Review

Class 133  
May 1, 2023  
Mr. Miller

# AP Exam: Info

**Next Monday, May 8, 12:00pm, be here by 11:00 am.**

You are not required to attend classes the morning of May 8 (although you can if you want to); if you don't attend classes in the morning, **be sure to arrive by 11:00am**

Same policy applies for other AP exams you might be taking (if you have a morning exam, you can leave right after it)



# AP Exam: Info

- Multiple Choice test is 70% of AP Score, the Create Task is 30%
- In July, College Board releases scores
- You will receive an overall AP Score out of 5:
  - 5 is excellent (and will earn you college credit at many schools!)
  - 4 is good
  - 3 is passing

# AP Exam: Info

An admission ticket for the AP CSP Exam on Monday will be emailed to you later this week from BTHS testing -- you must **print it out and bring it with you on Monday** (it has your room and seat assignment).

This ticket was sent to your **email associated with your College board account** -- if you don't remember which email address you used, ask me and I can look it up.

If you don't get one, check your spam folder.

The image is a screenshot of an email from Brooklyn Tech. At the top, the logo "BROOKLYN Tech" is displayed in a blue serif font. Below the logo, there is a blue rectangular box containing the text "Seat Number:" followed by the instruction "your seat number" in blue. The email body begins with "Dear" followed by a redacted name. The main text states: "You are registered to take AP Seminar on 5-May-22 at 11 AM in Café. AP ID labels will be in your testing room if you have yet to receive it." The word "Café" is redacted with a blue box, and the phrase "your room assignment" is written in blue. Below this, the text "This is your admission ticket." is written in green. A paragraph follows: "Please print this out and bring it with you on the day of your test. If you are taking more than one AP Exam, you will be sent additional admission tickets for each exam. Admission tickets are personalized and are used for official BTHS and CollegeBoard use. If you do not have your ticket printed the day of your exam, you will not be able to enter the testing room." Another paragraph states: "You must arrive no later than 11 AM to take your AP Seminar. If you are late, you will not be permitted to take the exam." Below this is the heading "No exceptions." followed by the instruction: "Remember to bring your AP ID Labels, a pencil, blue or black pen and any other material that is permitted for your exam." At the bottom, it says "Questions? Email [APtesting@bths.edu](mailto:APtesting@bths.edu) at least 24 hours before your

BROOKLYN Tech

Seat Number: your seat number

Dear

You are registered to take AP Seminar on 5-May-22 at 11 AM in Café. AP ID labels will be in your testing room if you have yet to receive it. your room assignment

This is your admission ticket.

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Questions? Email [APtesting@bths.edu](mailto:APtesting@bths.edu) at least 24 hours before your

# AP Exam: Info

You will be receiving AP labels soon (if you haven't already).

*Take one of the labels and stick it on the back of your student ID.*

**You must bring this sticker sheet with you on Monday.**

Student Last Name, Student First Name  
Your 2020 AP Exam schedule (may not reflect recent changes to your schedule)

5/6 AM US GOPO	5/13 PM PHY E&M
5/7 PM JAPANESE	5/15 PM ENG LANG
5/10 PM US HIST	
5/13 PM PHY MECH	

AP ID: \_\_\_\_\_  
SCHOOL CODE: \_\_\_\_\_  
DOB: \_\_\_\_\_  
GRADE: \_\_\_\_\_

These are your AP ID labels. No one else may use these AP ID labels.

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# AP Exam: Info

**BRING** the following:

- #2 pencils + erasers
- Your printed exam ticket (will be emailed to you this week)
- Your AP label sheet
- Your school ID (with AP label stuck on back)
- You are encouraged to bring a (*non-smart*) **wristwatch** just in case there are no clocks that are easily visible (cannot be connected to the internet or make any noise)

Do **NOT** bring:

- scrap paper (you will use exam books for scrap)
- calculators or other electronics
- smart watches

# AP Exam: Info

2 hours: 12:00 - 2:00

70 Q's in total:

- 57 multiple-choice questions
- 5 multiple-choice questions with reading passage
- 8 “select two” questions (these will all be at the end)

**Don't leave any blank!** There is no penalty for guessing.

# Tested Topics

- **Programming & Algorithms (~40%, or 28 / 70 Q's) - Units 1, 2, 3, 7**
  - Predicting output, finding errors in code, “what does this code do?”
  - Programming problems involving if-else, loops, list operations, AND OR NOT, variables, math operators, random, strings (text), procedures with parameters
  - “Robot in a maze” problems (move forward, turn right, etc.)
  - Binary/linear search
  - Algorithm efficiency, reasonable time, decidable problems
  - Simulations
- **Data (~20%, or 14 / 70 Q's) - Units 4, 7**
  - Bits, binary numbers, binary → decimal conversion
  - Lossy and lossless data compression
  - Analyzing data sets, spreadsheets
  - Metadata, cleaning data, filtering/sorting, graphing

# Tested Topics

- **Impacts of Computing & Safe Computing (~25%, or 18 / 70 Q's) - Unit 7**
  - Beneficial and harmful effects
  - Digital divide
  - Crowdsourcing, crowdfunding, “citizen science”
  - Legal and ethical concerns of AI, bias in data
  - Copyright, Creative Commons, open source, open access
  - Personally Identifiable Information (PII), data uses by companies
  - Location tracking (GPS), cookies, ad targeting, search engines
  - Multi-factor authentication
  - Symmetric & public key encryption
  - Digital certificates, certificate authorities
  - Phishing, viruses, malware, keyloggers

# Tested Topics

- **The Internet & Computer Systems (~15%, or 10 / 70 Q's) - Units 4, 7**
  - How the internet works, packets, routing, bandwidth
  - Protocols (TCP / IP / HTTP) and their benefits
  - IPv4 vs. IPv6
  - World Wide Web
  - Redundancy, fault tolerance, scalability
  - Sequential and parallel computing
  - Distributed computing

The stuff we did in Units 5 & 6 (tuples, classes, objects, PyGame) is **NOT** tested.



# Today's Agenda

You will have 3 class days (2 hours) to work on **Practice Exam #2: 2021 Practice Exam** on AP Classroom with your partner and other classmates. Talk through each problem and submit it when you are finished. If you don't quite get it done by Thursday, be absolutely certain to finish it before Monday (**it is the single best practice test available**).

You may use the **AP CSP Reference**, which will also be provided during the exam.

This one will be based on accuracy, so work carefully and talk through the problems. You should all get perfect scores! 🕶️



5 questions with reading passage

8 choose-two questions

**Don't forget! FOR LISTS ON THE AP EXAM, THE FIRST INDEX IS 1, NOT 0**

# Review Packets

Four review packets have been posted. They contain the vocab you need to know with practice problems sorted by topic. You can use these packets in the evenings to study from.

You are not required to finish all problems or submit these packets, but if you work through all of them and understand all the vocab/problems, you have a very good chance at getting a perfect 70/70 on the exam! 🧐

If you finish the practice exam early, begin reviewing these guides!

**BY MAY 8**, be sure you have finished all practice AP practice sets and both Practice Exams in AP Classroom.