Unit 11: Review for the AP Exam

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 3**
Length: **20 blocks**
Status: **Published**

Instructional Notes

In this unit, students wlll students will get a practice exam in the same format as the AP Computer Science in Java test and complete both multiple choice and free response questions from previously administered exams. Students will also be given mini-lessons to review concepts as needed, as well as online video review instruction.

Prior Knowledge:

Students should be able to recall any topic from the course with minimal reminders.

Instructional Notes:

At this point, the students have learned all of the JAVA they need to know for the AP Exam. Formative assessing should guide differentiated insructional decisions with regard to reviewing particular topics. CodeHS has a review course available to prepare for the AP exam- this can be a good guiding structure for review. Using materials from previous AP Exams, especially the student samples, scoring guidelines, and chief reader reports available at collegeboard.com would greatly benefit students as they prepare.

Technology Integration:

Computer Science naturally integrates technology on a daily basis.

Enduring Understandings

We can prepare for novel problems by experiencing new ones.

Essential Questions

How can we prepare for an exam?

Student Learning Objectives

Students will able to:

Explain the format of the AP Computer Science A exam

Identify course topics that they have a strong understanding of

Identify course topics that they need to review

Vocabulary & Learning Experiences

Essential Academic Vocabulary

none

Planned Learning Experiences

The AP Computer Science A framework details the concepts and skills students must master to be successful on the AP exam. To address those concepts and skills effectively, it helps to incorporate a variety of instructional approaches and best practices into daily lessons and activities. The following list presents strategies that can help students develop mastery of the skills by engaging them in learning activities that apply their understanding of course concepts.

Programming and Problem-Solving Strategies:

- Code Tracing
- Create a Plan
- Error Analysis
- Identify a subtask
- Look for a Pattern
- Marking the Text
- Pair Programming
- Predict and compare
- Simplify the problem
- 'Think Aloud

Cooperative Learning Strategies:

- Ask the expert
- Discussion Group
- Jigsaw
- Kinisthetic learning
- Sharing an responding

- Student Response system
- Think-pair-share
- Unplugged activities
- Using manipulatives

Making Connections Strategies:

- Activating prior knowledge
- Diagramming
- Bote-taking
- Paraphrasing
- Quickwrite
- Vocabulary Organizer

These strategies above should be implemented throughout the course as appropriate to the specific skill being learned. As a guideline, college board in the AP Computer Science A Course and Exam Description have created a suggested list of activities and strategies to tie along with the skills of the course. In using this guideline [pgs 170-179], the students will develop compuational thinking practictes that are fundamental to the discipline of computer science as well as successful completion of the AP Exam.

Resources

- Code HS
- Google Classroom
- AP Classroom
- JavaNotes
- atomic toddler
- Practice It!
- Codingbat

AP Review Specific Resources

AP Central: Important Advice, Teacher's Guide, Exam Info and FRQs, and Labs

Computer Science Resource Bank,

Java Review for the AP CS A Exam

This great resource, written by Barbara Ericson, is loaded with review questions and clear explanations.

Java Review

Assessments

Formative Assessments

Java Post Test

CodeHS Review Course

CodeHS 25 question unit quizzes

Runestone Academy Review course

Warm Ups and Exit Tickets as needed (based on student feedback)

Summative Assessments

AP Exam

NJSLS Standards - Mathematics

NJSLS Standards in Mathematics Copied and Pasted as well as linked.

NJSLS Standards - Mathematics

Standards for mathematical practices

1 Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course

if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

2 Reason abstractly and quantitatively.

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

3 Construct viable arguments and critique the reasoning of others.

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account

the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

4 Model with mathematics.

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw

conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

5 Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

6 Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

7 Look for and make use of structure.

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 – 3(x – y) 2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

8 Look for and express regularity in repeated reasoning.

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same

calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation (y – 2)/(x – 1) = 3. Noticing the regularity in the way terms cancel when expanding (x – 1)(x + 1), (x – 1)(x2 + x + 1), and (x – 1)(x3 + x2 + x + 1) might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

NJSLS 2020- Computer Science and Design Thinking

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.

Modifications/Accommodations

Modification: Special Education

- Refer to the College Boards accommodations for SPED students, and provide students with the appropriate accommodations for taking the AP exam.
- If students are not actively preparing for the actual exam, give students as much time as they'd like to complete the exercises.

Modification: English Language Learners

- Refer to the College Boards accommodations for ELL students, and provide students with the appropriate accommodations for taking the AP exam.
- If students are not actively preparing for the actual exam, give students as much time as they'd like to complete the exercises.