

Real World Application Concepts

This document provides real world examples to specific expectations of ICS20. Examples are taken from various fields in order to present computer related topics in settings more familiar to students. Teachers can then use these examples as starting point when making lessons that addresses the corresponding expectations.

Expectations are provided before each set of examples

B 1.1 use correct terminology to describe programming concepts

Use the **Thingamajig** or the **doohickey** to run the **whatchamacallit**.
Use the **keyboard** or the **mouse** to run the **program**.

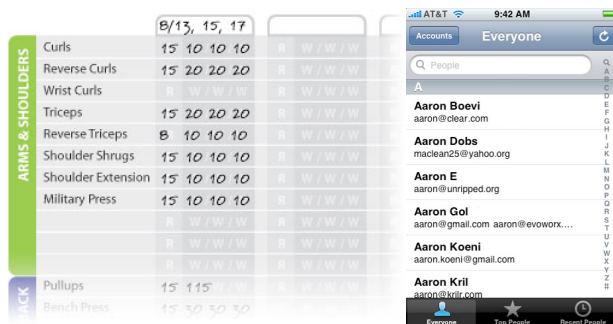
B 1.2 describe the types of data that computers can process and store

You can't make butter by churning orange juice.

Opening

Computers store all data as a series of 0's and 1's, but does a computer treat all information in the exact same way?

Examples



	8/13, 15, 17			
ARMS & SHOULDERS				
Curls	15 10 10 10	R	W / W / W	
Reverse Curls	15 20 20 20	R	W / W / W	
Wrist Curls	R	W / W / W	R	W / W / W
Triceps	15 20 20 20	R	W / W / W	
Reverse Triceps	8 10 10 10	R	W / W / W	
Shoulder Shrugs	15 10 10 10	R	W / W / W	
Shoulder Extension	15 10 10 10	R	W / W / W	
Military Press	15 10 10 10	R	W / W / W	
		R	W / W / W	
		R	W / W / W	
		R	W / W / W	
BACK				
Pullups	15 115	R	W / W / W	
Bench Press	15 30 30 30	R	W / W / W	

Accounts	Everyone
Q	
A	
Aaron Boevi	aaron@clear.com
Aaron Dobs	macleand25@yahoo.org
Aaron E	aaron@unripped.org
Aaron Gol	aaron@gmail.com aaron@evoworx....
Aaron Koeni	aaron.koeni@gmail.com
Aaron Kril	aaron@kril.com
D	
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Questions

What types of data do we see? [text, number with and without decimals, date]

B 1.3 explain the difference between constants and variables used in programming

Taken from constantly "always applies". Most likely, there will always be 7 days in a week or 24 hours in day, in our lifetime

The weather always changes over time. It is variable.

B 1.4 determine the expressions and instructions to use in a programming statement, taking into account the order of operations

When you create a painting you work on the background first and then you add smaller details like birds. Drawing around the birds would be very awkward. The order of precedence is background, mid ground and then foreground.

B 1.5 identify situations in which decision and looping structures are required

When you use a roundabout with a car you circle around in a loop until you make a decision of which exit to use.

B 1.6 describe the function of Boolean operators, comparison operators and arithmetic operators and use them correctly in programming

And - Your parents or guardians ask you to - do the dishes **and** clean the floor. What happens if you only wash the dishes? You are not rewarded, since you were supposed to do both.

Or - Your parents or guardians ask you to do the dishes **or** clean the floor. What happens if you only wash the dishes? You are rewarded, since you were supposed to do one or the other.

NOT - Like opposite day - it's the reverse.

B 2.1 use a visual problem-solving model

Input	Processing	Output
Milk	Churning	Butter
Sound (guitar, voice, etc . . .	Echo, Reverb	Speakers or headphones
Video (Webcam, Video Camera)	Editing	.dv, .avi, DVD, Blue Ray movies
Word Processing	Font change, style change	Document output
Joystick	Video game moves	Video Screen, Optoma LED portable projector

B2.2 use variables, expressions, and assignment statements to store and manipulate numbers and text in a program.

Variable Examples: Temperature Price of a soft drink Cell phone number of a teenager?

Assignment Statement: Assigned a phone number by your cell provider
 Typing in the price of the soft drink into the store database
 Measuring the temperature outside

Manipulate numbers and text in variables:

Finding all the phone numbers from one provider that start with 647-555 in database.

Changing the price of the soft drink into the store database.

Being able to multiply the price of the soft drinks by the number being bought in one transaction and put into another variable.

Find the average temperature from readings over the past 31 days.

B 2.3 write keyboard input and screen output statements that conform to program specifications

You type something on the keyboard you expect the command to be done or the symbol on the key to show on the screen.

B 2.4 write a program that includes a decision structure for two or more choices

Making a one choice between two or more items to buy and how much money you have to pay is based on that choice:

Item	You will pay then
Wrangler Jeans	29.99
Levis Jeans	59.99
Tommy Hilfiger	99.99

Making a career path decision based on your strengths and weakness. For Example: If you enjoy and are good in music you will consider a career in music, on the other hand if you are not great at geography and don't enjoy learning about it you will choose not go into that career path.

Sequential IF vs nested IF

Nested IF : You choose to apply to three universities and there is a first, second, and third choice. If your first choice accepts you then you skip your other choices automatically even if they accepted you.

Sequential IF: Each choice is considered

Mom and Dad gave a list of chores and at the end of the day you did the chore or not, putting a checkmark for done or an x for not done. All chores have to be given a check or x.

B 2.5 write programs that use looping structures effectively

Specific Expectation

B2.5 write programs that use looping structures effectively (e.g., simple animation, simple board games, coin toss);

Examples

Can you mentally add numbers in your head? What if the numbers represent side lengths of a shape? What does the sum represent? (Perimeter)

Index of a book ... use a dictionary (keyword lookup can lead to multiple pages)

Matching games for decision making:

- Sock matching game ... a game that you might play with a child when learning what things are similar or IQ tests questions that ask which of these are similar
- Reading and comprehension game ... select the red car (options include the word red, a yellow car and red car, for example)

Elevator ... ascends/descends until it arrives at a destination ... conditional loop ... can demonstrate nested loops the outside loop is for

Musical chair game as a conditional loop

Decision making and looping ... put bank card into an ATM to perform 1 or more transactions

Decision making and looping ... selecting from a list of news articles only the science and technology stories

Decision making and drug conflicts ... doctors must decide before prescribing medication if there are any potential conflicts when a patient requires more than one medication

Decision making and Sudoku ... can't put a number into a cell unless you certain criteria are met

Decision making ... mercury based thermostat switch to turn on air conditioning or heat

Writing programs ... as an approach to essay (thesis, outline), scientific method (logical order of doing things), GRASS (given a problem break down a problem),

B 2.6 explain the difference between syntax, logic and run-time errors

Syntax Errors

Incorrect	Correct
how are you doing	How are you doing?
3 2	3 + 2

In programming: misspelling keywords or defined variables.

Search: [Common Syntax Errors](#)

Logic Errors

Depositing money into a bank account results in a smaller balance.

Withdrawing money from your account then noticing the balance remains unchanged.

Runtime Errors

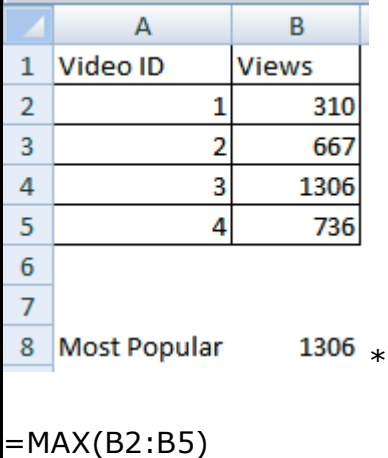
My program just crashed! Reboot!

Aw snap, something went wrong!

Try this on your calculator: 52/0. (Division by zero)

B 2.7 compare and contrast the use of different programming environments to solve the same problem

Examples

Item	Excel	Python																											
Find the most popular video viewed on website.com.	 <table border="1"><thead><tr><th></th><th>A</th><th>B</th></tr></thead><tbody><tr><td>1</td><td>Video ID</td><td>Views</td></tr><tr><td>2</td><td>1</td><td>310</td></tr><tr><td>3</td><td>2</td><td>667</td></tr><tr><td>4</td><td>3</td><td>1306</td></tr><tr><td>5</td><td>4</td><td>736</td></tr><tr><td>6</td><td></td><td></td></tr><tr><td>7</td><td></td><td></td></tr><tr><td>8</td><td>Most Popular</td><td>1306 *</td></tr></tbody></table> <p>=MAX(B2:B5)</p>		A	B	1	Video ID	Views	2	1	310	3	2	667	4	3	1306	5	4	736	6			7			8	Most Popular	1306 *	<pre>max([310, 667, 1306, 736]) 1306</pre>
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B 3.1 write clear and maintainable code using proper programming standards

If you go to a sit down restaurant you find that the forks are placed to the left of your seat, spoons and knives on the right. This is the proper standard expected.

North America has a convention of car traffic on the right side of the road. Britain has a convention of car traffic driving on the left side of the road. Conventions keep things in order, to prevent chaos, in this case accidents between cars.

You try to speak in clearly and use words that the other person will understand to get your message across to them. If you mumble the words or use words that the other person does not understand, your message will not be understood at all and communication breaks down.

3.2 write clear and maintainable internal documentation to a specific set of standards

Write clear and maintainable internal documentation...

Any set of instructions written for any item you buy. Doesn't matter if it fits the packaging or is an actual booklet or online. Any lawyer would want it that way to protect your back. (Coffee WARNING: CONTENTS HOT!)

You want people to understand what your product does or can do. In our case a program so that other people understand your logic in writing the program.

3.3 use a tracing technique to understand program flow and to identify and correct logic and run-time errors in a computer program

Policemen who have various techniques to identify clues and put those clues together to find a suspect in a murder case.

Using a map (paper or GPS) to find out (trace) why you are lost or have not arrived at your destination.

3.4. Demonstrate the ability to validate a computer program using test cases.

Focus groups (groups of similar people) brought in by a company to test a new product and see if they like it and will buy the product. If they like it the product goes into production (validated)

Football coach tries a new play and see if his players understand how to execute it.

Teachers giving tests to validate the learning of students...