

T_{eaching} L_{ondon} C_{omputing}

Programming for GCSE

Topic 6.2: Testing



Aims

- Understand the idea of testing
 - Understand ideas behind the GCSE requirements
 - E.g. OCR Unit 3 Programming Task
-



PRINCIPLES OF TESTING

Test Case

- A use of a program
 - Particular input → **Test Data**
 - Expected results
 - Actual result
 - Important programs are tested using lots of test cases
-

Test Data

- The values used to test a program
 - FROM PROBLEM (not program)
 - Valid
 - Expected to be accepted by the program
 - Extreme
 - Check 'boundaries'
 - Invalid
 - Expected to be rejected
-

Boundary Values

```
if x > 10 and x <= 17 :  
    print("Ans is", x + y)  
else :  
    print("Out of range")
```

- Boundaries are:
 - $x == 10$ – out of range: just too small
 - $x == 11$ – in range: just large enough
 - $x == 17$ – in range: just small enough
 - $x == 18$ – out of range: just too big
-

Test Plan / Evidence

- Shows tests and results

Test	Data	Reason	Expected	Outcome
1	x = 11, y = 10	x in range, y positive	Ans is: 21	Correct
2	x = 11, y = - 5	x in range, y negative	Ans is: 6	Correct
3	x = 17, y = 20	x in range, y positive	Ans is: 37	Correct
4	x = 17, y = -20	x in range, y negative	Ans is: -3	Correct
5	x = 10, y = -1	x out of range	Out of range	Correct
6	x = 18, y = 100	x out of range	Out of range	Correct

GCSE Syllabus – OCR Specification

- Use a suitable test plan and data to test functions of the system
 - AS/A2
 - Similar, but more complex application
-

Teaching Issue

- Are industry processes relevant?
 - Systems very complex
 - Lots of tests
 - ... can be tedious for small scale projects
 - When to write test plan?
 - Link to
 - Bugs in s/w we use; bugs in open source projects
 - Social / ethical
-

Bug List - Example

Issues - chromium - An open-source project to help move the web forward. - Google Project Hosting

code.google.com/p/chromium/issues/list

bug tracker chrome

Most Visited Queen Mary, Uof... Java SE 6 DCS200 Haskell Platform Process Control ... Demon Fair Usage Bookmarks

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 **chromium**
An open-source project to help move the web forward.

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ID ▾	Pri ▾	M ▾	Iteration ▾	ReleaseBlock ▾	Cr ▾	Status ▾	Owner ▾	Summary + Labels ▾
239395	1	28	----	Beta	Internals-Plugins-PDF	Available	----	Unable to paste the selected text from chrome PDF
230722	1	28	----	Beta	Blink-Compositing, Blink-Rendering	Assigned	espr...@chromium.org	myspace.com not painting correctly
230746	1	28	----	Beta	UI, UI-Browser-Autofill	Started	isherman@chromium.org	Alignment issue while displaying Autofill suggestion
239690	1	28	----	Beta	Internals-Views, UI-Input-Text-IME	Started	n...@chromium.org	Native Text Views: TSF stuff seems not working on
239374	2	28	----	Beta	Platform-Extensions, UI	Assigned	kal...@chromium.org	Extension, activeTab permission: access denied wh new tab
243290	2	28	----	Beta	Internals-Media, Internals-Plugins-Flash	Untriaged	----	multiple flash movies on one page not playing
241328	1	29	----	Beta	Blink, Blink-Animation	Untriaged	----	jQuery slideToggle broken on >v26
241459	1	29	----	Beta	----	Untriaged	----	Aw snap / constant crash on new and current tab w links/pages first time
244161	1	29	----	Beta	Internals-Plugins-Flash	Untriaged	----	Unable to see Video until click on it but able to lister



EXAMPLE

OCR Unit 3 Task A Example

Design, code and test a program to calculate the body mass index (BMI) for an adult.

The program should work in metric units (kg and cm) or imperial units (stones and pounds, and feet and inches). The user should be able to choose which units. The system should output the BMI and the appropriate category from:

- Less than 18.5 – Underweight
- Between 18.5 and 25 – Normal
- Between 25 and 30 – Overweight
- Greater than 30 – Obese

The formulae are:

- Metric: $BMI = \text{weight in Kg} / (\text{height in cm})^2$
 - Imperial: $BMI = (\text{weight in pounds} \times 703) / (\text{height in inches})^2$
-



Incorrect!
m not cm

Analysis

- Height ranges
 - 4 ft – 7 ft
 - 122 cm to 213 cm
 - Weight
 - 4st, 0lb to 30st, 0lb
 - 25kg to 190 Kg
-

Test Data (Spreadsheet)

Stone	Pounds	Feet	Inches	Pounds	Inches	BMI	UnderW?	Obese	Normal	OverW	CM	Kg
5	7	6	0	77	72	10.4	Yes	No	No	No	182.9	34.9
6	7	6	1	91	73	12.0	Yes	No	No	No	185.4	41.3
7	7	6	2	105	74	13.5	Yes	No	No	No	188.0	47.6
8	7	5	7.5	119	67.5	18.4	Yes	No	No	No	171.5	54.0
9	7	5	7	133	67	20.8	No	No	Yes	No	170.2	60.3
10	7	5	6	147	66	23.7	No	No	Yes	No	167.6	66.7
11	7	5	5	161	65	26.8	No	No	No	Yes	165.1	73.0
12	7	5	4	175	64	30.0	No	Yes	No	No	162.6	79.4
13	7	5	3	189	63	33.5	No	Yes	No	No	160.0	85.7
14	7	5	2	203	62	37.1	No	Yes	No	No	157.5	92.1
15	7	5	1	217	61	41.0	No	Yes	No	No	154.9	98.4
16	7	6	2	231	74	29.7	No	No	No	Yes	188.0	104.8

8	2.6	5	6.1	114.6	66.1	18.4	Yes	No	No	No	168.0	52.0
8	4.8	5	6.5	116.8	66.5	18.6	No	No	Yes	No	169.0	53.0
8	11.5	5	3.0	123.5	63.0	21.9	No	No	Yes	No	160.0	56.0
9	1.9	5	2.2	127.9	62.2	23.2	No	No	Yes	No	158.0	58.0
9	6.3	5	1.4	132.3	61.4	24.7	No	No	Yes	No	156.0	60.0
9	10.7	5	0.6	136.7	60.6	26.1	No	No	No	Yes	154.0	62.0
10	1.1	4	11.8	141.1	59.8	27.7	No	No	No	Yes	152.0	64.0
10	7.7	4	11.1	147.7	59.1	29.8	No	No	No	Yes	150.0	67.0
10	5.5	4	10.3	145.5	58.3	30.1	No	Yes	No	No	148.0	66.0

Test Plan (Incomplete)

Test	Data	Reason	Expected	Result
1	5ft,7in 8st,6lb	Imperial In range	BMI 18.5 Underweight	
2	5ft, 4in 11st, 7lb	Imperial In range	BMI 30.0 Obese	
3	160cm, 56 Kg	Metric In range	BMI 21.9 Normal	
4	300 cm, 56 Kg	Height too large	N/A	

Summary

- Technique and process
- Expected to be used

