MODULE C DATA REPRESENTATION · C6

Logical binary shifts

Original practice questions · 19 marks · ~25 minutes · Cambridge 0478 syllabus 1.1.5

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. No calculator. All binary integers are positive 8-bit integers held in an 8-bit register. The marks for each part are shown in brackets [ ]. The total for this worksheet is **19 marks**.

1

Total: 2 marks

(a) Perform a logical left shift of **three** places on the positive 8-bit binary integer **00010101**. **[1]**

	128	64	32	16	8	4	2	1
Result								

(b) Perform a logical right shift of **two** places on the positive 8-bit binary integer **11001100**. **[1]**

	128	64	32	16	8	4	2	1
Result								

2

Total: 2 marks

(a) Tick (✓) **one** box to show the effect of a logical left shift of **two** places on a positive binary integer (no 1s are lost). **[1]**

Effect	Tick (✓) one
Multiplied by 2	
Multiplied by 4	
Divided by 4	
Multiplied by 8	

(b) Tick (✓) **one** box to show the effect of a logical right shift of **four** places on a positive binary integer (no 1s are lost). **[1]**

Effect	Tick (✓) one
Divided by 4	
Divided by 8	
Divided by 16	
Multiplied by 16	

3 Total: 4 marks

(a) Complete the table by giving the result of each logical shift. **[4]**

8-bit binary integer	Logical shift	8-bit result
00101101	left 1 place	.....
01100000	right 5 places	.....
00001011	left 4 places	.....
10010110	right 1 place	.....

4 Total: 4 marks

A register in a ticket machine's processor holds the positive 8-bit binary integer 11010010.

(a) Give the result of a logical left shift of **one** place on 11010010. **[1]**

Answer (binary): .....

(b) Give your answer to part (a) in denary. **[1]**

Answer (denary): .....

(c) 11010010 is 210 in denary. Explain why the result is **not** 420. **[2]**

5 Total: 3 marks

(a) A logical right shift of **three** places is performed on 00101111. The result is 00000101. State the bits that are lost. **[1]**

(b) 00101111 is 47 in denary, and 47 ÷ 8 = 5.875. Explain why the result of the shift is 5 and not 5.875. **[2]**

6 **Total: 4 marks**

(a) State the value of the bits that are moved in at the opposite end of the register during a logical shift. **[1]**

(b) Describe the logical shift that would divide a positive 8-bit binary integer by 32. **[2]**

(c) State what happens to the bits that are shifted off the end of the register. **[1]**

Total for this worksheet: 19 marks