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Year 11 Interleaved Homework 4

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1. Shift the following binary number left 5 spaces.

1 0 0 0 1 0 0 1
0 0 1 0 0 0 0 0 ✓

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2. What is the arithmetic effect of the above shift?

Times by 32 ✓

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3. A binary number is shifted 4 spaces left and then 2 spaces right. What is the arithmetic effect of this shift?

Times by 4 ✓

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4. Define the term "Decomposition".

Breaking down a problem ✓ into smaller sub problems to make them to make them easier to solve (only needed if 2 mark q)

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5. Convert the following hexadecimal values to denary. Show all your working.

a. 4C – 4*16 = 64 C=12 64+12=76

b. B5 – B = 11 11*16=176 176+5=181

c. FA – F = 15 15*16=240 A=10 240+10 = 250 ✓

d. 63 = 6*16 = 96 96+3 = 99

6. Convert the following hexadecimal values to binary. Show all your working.

a. 4C – 4 = 0100 C = 12 12 = 1100   01001100

b. B5 – B = 11 11 = 1011 5 = 0101   10110101

c. FA – F = 15 15 = 1111 A = 10 10 – 1010   11111010

d. 63 – 6 = 0110 3 = 0011   01100011 ✓

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7. Define the term "Abstraction".

Removal of unnecessary steps ✓

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8. RLE is a lossless compression algorithm.

a. Decompress:

41, 30, 71, 90
1111000111111000000000 ✓

b. Compress:

1110000011001111000
31, 50, 21, 20, 41, 30 ✓

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9. Using 0 for Black and 1 for White. Decompress the RLE into the blank bitmap below.

RLE:

31, 20, 51, 10, 21, 10, 51, 20, 61, 20, 31, 10, 21, 20, 21, 30, 11, 20, 11, 20, 11, 60, 31, 40, 21

1	1	1	0	0	1	1	1
1	1	0	1	1	0	1	1
1	1	1	0	0	1	1	1
1	1	1	0	0	1	1	1
0	1	1	0	0	1	1	0
0	0	1	0	0	1	0	0
1	0	0	0	0	0	0	1
1	1	0	0	0	0	1	

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10. Review the Python code below

```python
1. def Multiply(m, n):
2.     i = 1
3.     while n <= m:
4.         n = n * i
5.         i = i + 1
6.     print(n)
7.
```

a. Complete the trace table where m = 3 and n = 1.

M	N	I	Output
3	1	1	
3	1	2	
3	2	3	
3	6	4	6

b. What programming constructs are present in this algorithm?

- Sequence ☑
- Selection
- Iteration ☑

c. What is the purpose of the program?
Multiply n by consecutive integers starting from 1 until n exceeds m.

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11. Write a Python program that tracks a participant's progress in a cooking challenge based on the number of recipes they have tried.
Your program should:

- Ask the user to input the number of recipes a participant has tried (they should enter a number between 1 and 40 inclusive; if the number falls outside this range, prompt them to re-enter a valid number).
- If a participant has tried more than 35 recipes, output "You have completed the Cooking Challenge!"
- If a participant has tried more than 20 recipes, output "You are well on your way to completing the Cooking Challenge!"

```python
recipes = int(input())
while recipes < 1 or recipes > 40:
    recipes = int(input())

if recipes > 35:
    print("You have completed the Cooking Challenge")
elif recipes > 20:
    print("You are well on your way to completing the Cooking
Challenge!")
```