0 1 The following bit pattern represents a binary number.

00000110

0 1 . 1 What is the result of applying a left binary shift of 2 to this bit pattern? Express your answer as a bit pattern.

[1 mark]

0 1 . 2 The arithmetic effect of applying a left binary shift of 1 to a binary number is to multiply that number by 2.

State the arithmetic effect of applying a left binary shift of 3 to a binary number.

[1 mark]

0 1 . 3 What will be the arithmetic effect of left binary shifting a binary number by 4 and then right binary shifting the result by 5?

[1 mark]

Turn over for the next question

0 2 The algorithms shown in **Figure 4** and **Figure 5** both have the same purpose.

The operator `LEFTSHIFT` performs a binary shift to the left by the number indicated.

For example, `6 LEFTSHIFT 1` will left shift the number `6` by one place, which has the effect of multiplying the number `6` by two giving a result of 12

Figure 4

```
result ← number LEFTSHIFT 2
result ← result - number
```

Figure 5

```
result ← 0
FOR x ← 1 TO 3
   result ← result + number
ENDFOR
```

0 2 . 1 Complete the trace table for the algorithm shown in **Figure 4** when the initial value of `number` is 4

You may not need to use all rows of the trace table.

[2 marks]

result

0 3 Add together the following three binary numbers and give your answer in binary:

```
  01110101
  00100100
+ 00010001
----------
```

[2 marks]

0 4 . 1 Add together the following three binary numbers and give your answer in binary.

```
  0 1 0 1 0 1 0 1
  0 1 1 0 1 1 0 0
+ 0 0 0 1 1 0 0 1
-----------------
```

[2 marks]

0 4 . 2 State the result, in binary, of performing a binary shift two places to the left on the binary value `00111001`

[1 mark]

Turn over for the next question

0 5 . 1 Add together the following three binary numbers and give your answer in binary.

[2 marks]

$$\begin{array}{r} 0\ 0\ 1\ 1\ 0\ 1\ 1\ 0 \\ 1\ 0\ 0\ 1\ 0\ 0\ 1\ 0 \\ +\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 1 \\ \hline \\ \hline \end{array}$$

0 5 . 2 Apply a binary shift three places to the right on the bit pattern `10101000`

Give the result using 8 bits.

[1 mark]

The arithmetic effect of applying a left binary shift of two to a binary number is to multiply that number by four.

0 5 . 3 State the arithmetic effect of applying a left binary shift of four to a binary number.

[1 mark]

0 5 . 4 State the arithmetic effect of applying a left binary shift of three followed by a right binary shift of five to a binary number.

[1 mark]

Turn over for the next question

0 6 Add together the following three binary numbers and give your answer in binary.

[2 marks]

```
  0 1 0 1 1 0 0 0
  0 0 0 1 1 0 0 1
+ 0 1 0 0 1 0 1 1
-----------------

-----------------
```

0 7 Describe the binary shift that would be used to divide a binary number by four.

[1 mark]

0 8 . 4 Explain how a binary number can be multiplied by 8 by shifting bits.

[2 marks]

0 9 Add together the following three binary numbers and give your answer in binary.

[2 marks]

```
  0 0 0 0 1 0 1 0
  1 0 0 1 1 0 1 0
+ 0 0 1 1 0 0 0 1
-----------------

-----------------
```

1 0 . 1 **Figure 1** shows a bit pattern.

Figure 1

00110011

State the result of applying a left binary shift of **two** to the bit pattern shown in **Figure 1**.

[1 mark]

1 0 . 2 The decimal equivalent of the bit pattern shown in **Figure 1** is 51

State the result of applying a left binary shift of **one** to the bit pattern shown in **Figure 1**.

Give your answer in **decimal**.

[1 mark]

1 0 . 3 Which statement best describes where a single binary shift can be used?

Shade **one** lozenge.

[1 mark]

A Multiply or divide numbers by any even number. ⬭

B Multiply or divide numbers by any number. ⬭

C Multiply or divide numbers by any odd number. ⬭

D Multiply or divide numbers by powers of two. ⬭