Worksheet: Converting Values

English Name: _____

1. Write the appropriate vocabulary word next to its definition.

a)	to change from one form to another, for example from binary to denary
b)	an operation that inverts (or "flips") the bits of a binary number (0 ↔ 1)
c)	a name for the base-2 number system
d)	a name for the base-16 number system
e)	a set of 8 binary digits
f)	a set of 4 binary digits

2. Given the binary number 1010_0110, make the conversions specified below. It is easy to make small mistakes, so show your work for partial marks.

   a) Convert the value to denary, assuming the byte represents a ***two's complement*** number.

   b) Convert the value to denary, assuming the byte represents a ***sign and magnitude***.

   c) Convert the value to denary, assuming the byte represents an ***unsigned number***.

   d) Convert the value to *hexadecimal.*

3. Again working with the same binary number, 1010_0110, complete the tables below. It is easy to make small mistakes, so show your work for partial marks.

   a) Perform an **arithmetic right shift** by <u>two bit positions</u>, then convert the result to denary, assuming the byte represents a **two's complement** number.

   b) Perform a **logical left shift** by <u>two bit positions</u>, then convert the result to denary, assuming the byte represents an **unsigned number**.

   c) A **logical left shift** by <u>two bit positions</u> should be equivalent to multiplication by four (×4); however the shifted unsigned value calculated in part (3b) is obviously not even close to four times the original unsigned value we calculated in part (2c). What word describes what happened.

   d) First perform a **logical left shift** by <u>two bit positions</u> as in part (b), then **c**onvert the result to *hexadecimal*.

   e) Perform a **logical right shift** by <u>two bit positions</u>, then convert the result to denary, assuming the byte represents an **unsigned number**.

   f) What mathematical operation (operator and operand) is equivalent to a **logical right shift** by <u>two bit positions</u>, assuming the byte represents an **unsigned number**.

operand (binary)	operator	operand (denary)
1110_1001		

   Note: the reason this mathematical expression isn't exactly true is due to the **loss of precision** as bits are shifted out of the number, and lost.