

1. What Does This Program Do?

After the following program is run, what is the final value of J?

```
10 A = 4096
20 B = 1
30 J = 1
40 IF A=B THEN 90
50 A = A/4
60 B = 4*B
70 J = J+1
80 GOTO 40
90 END
```

2. What Does This Program Do?

If variables a, b, and c all start out with a value of 2, which, if any, of them have a value of 2 after the program finishes?

```
if (a+b)>c then a=b+c else a=c-b
if a>(b+c) then b=a-c else b=a+c
if a+b>b-c then c=a+b else a=b-c
if a+b>c then a=b+c else c=b-a
```

3. BASIC Expressions

What is the value of the following BASIC expression given that a=2, b=6, and c=-1.

$$a + b * (c + a) - b \uparrow 2 / (a + c)$$

4. BASIC Expressions

Translate the following algebraic expression into BASIC, using a minimum number of parentheses.

$$\frac{A + B}{2A} + \frac{3(A + 4)}{B^2}$$

5. BASIC Expressions

Write a BASIC statement that is an *exact* translation of the following:

The value x equals the sum of a and b divided by twice the difference of c and d

1. The following table shows how the value of A is quartered while the value of B is quadrupled until their values are equal. Variable J is incremented each time that the values of A and B are changed.

A	B	J
4096	1	1
1024	4	2
256	16	3
64	64	4

4

2. The following table shows the values of the variables after each if statement is executed:

if?	a	b	c
true	4	2	2
false	4	6	2
true	4	6	10
false	4	6	2

c

3. Here is the evaluation of the expression:

$$\begin{aligned}
 a + b * (c + a) - b \uparrow 2 / (a + c) &= 2 + 6 / (-1 + 2) - 6 \uparrow 2 (2 + -1) \\
 &= 2 + 6 / 1 - 36 / 1 \\
 &= 8 - 36 \\
 &= -28
 \end{aligned}$$

-28

4. The trickiest part of this problem is probably the $2 * A$ denominator. It *must* be put in parentheses. Without those parentheses, the expression would be

$$\frac{A + B}{2} \cdot A$$

$(A+B) / (2 * A) + 3 * (A+4) / B \uparrow 2$

5. The statement shown on the right is the only correct translation. Note that the parentheses are needed around the term $2 * (c-d)$ because division and multiplication have equal precedence, and bind from left-to-right. Without the parentheses, the value of x would be “the average of a and b times the difference of c and d .”

$x = (a+b) / (2 * (c-d))$