```c
#include <stdio.h>

#include <math.h>

int a = 0,b = 0, c = 0, a1 = 0, b1 = 0, com[5] = { 1, 0, 0, 0, 0};

int anum[5] = {0}, anumcp[5] = {0}, bnum[5] = {0};

int acomp[5] = {0}, bcomp[5] = {0}, pro[5] = {0}, res[5] = {0};

void binary(){

 a1 = fabs(a);

 b1 = fabs(b);

 int r, r2, i, temp;

 for (i = 0; i < 5; i++){

 r = a1 % 2;

 a1 = a1 / 2;

 r2 = b1 % 2;

 b1 = b1 / 2;

 anum[i] = r;

 anumcp[i] = r;

 bnum[i] = r2;

 if(r2 == 0){

 bcomp[i] = 1;

 }

 if(r == 0){

 acomp[i] =1;

 }

 }

 c = 0;

 for ( i = 0; i < 5; i++){

 res[i] = com[i]+ bcomp[i] + c;

 if(res[i] >= 2){

 c = 1;

 }

 else
```

```
c = 0;

res[i] = res[i] % 2;

}

for (i = 4; i >= 0; i--){

bcomp[i] = res[i];

}

if (a < 0){

c = 0;

for (i = 4; i >= 0; i--){

res[i] = 0;

}

for ( i = 0; i < 5; i++){

res[i] = com[i] + acomp[i] + c;

if (res[i] >= 2){

c = 1;

}

else

c = 0;

res[i] = res[i]%2;

}

for (i = 4; i >= 0; i--){

anum[i] = res[i];

anumcp[i] = res[i];

}

}

if(b < 0){

for (i = 0; i < 5; i++){

temp = bnum[i];

bnum[i] = bcomp[i];

bcomp[i] = temp;

}
```

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  }
 }
void add(int num[]){
 int i;
 c = 0;
 for ( i = 0; i < 5; i++){
 res[i] = pro[i] + num[i] + c;
 if (res[i] >= 2){
 c = 1;
 }
 else{
 c = 0;
 }
 res[i] = res[i]%2;
 }
 for (i = 4; i >= 0; i--){
 pro[i] = res[i];
 printf("%d",pro[i]);
 }
 printf(":");
 for (i = 4; i >= 0; i--){
 printf("%d", anumcp[i]);
 }
 }
void arshift(){
 int temp = pro[4], temp2 = pro[0], i;
 for (i = 1; i < 5 ; i++){
 pro[i-1] = pro[i];
 }
 pro[4] = temp;
 for (i = 1; i < 5 ; i++){
```

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    anumcp[i-1] = anumcp[i];

    }

    anumcp[4] = temp2;

    printf("\nAR-SHIFT: ");

    for (i = 4; i >= 0; i--){

    printf("%d",pro[i]);

    }

    printf(":");

    for(i = 4; i >= 0; i--){

    printf("%d", anumcp[i]);

    }

    }

    int main(){

    int i, q = 0;

    printf("\t\tBOOTH'S MULTIPLICATION ALGORITHM");

    printf("\nEnter two numbers to multiply: ");

    printf("\nBoth must be less than 16");

    do{

    printf("\nEnter A: ");

    scanf("%d",&a);

    printf("Enter B: ");

    scanf("%d", &b);

    }while(a >=16 || b >=16);

    printf("\nExpected product = %d", a * b);

    binary();

    printf("\n\nBinary Equivalents are: ");

    printf("\nA = ");

    for (i = 4; i >= 0; i--){

    printf("%d", anum[i]);

    }

    printf("\nB = ");
```

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for (i = 4; i >= 0; i--){

printf("%d", bnum[i]);

}

printf("\nB'+ 1 = ");

for (i = 4; i >= 0; i--){

printf("%d", bcomp[i]);

}

printf("\n\n");

for (i = 0;i < 5; i++){

if (anum[i] == q){

printf("\n-->");

arshift();

q = anum[i];

}

else if(anum[i] == 1 && q == 0){

printf("\n-->");

printf("\nSUB B: ");

add(bcomp);

arshift();

q = anum[i];

}

else{

printf("\n-->");

printf("\nADD B: ");

add(bnum);

arshift();

q = anum[i];

}

}

printf("\nProduct is = ");

for (i = 4; i >= 0; i--){
```

```c
    printf("%d", pro[i]);

    }

    for (i = 4; i >= 0; i--){

    printf("%d", anumcp[i]);

    }

    }
```