****

1.

```
#include <xc.h>
#include<stdio.h>

//void init_uart(void)
//{
// SPBRG = 0x19; // 9600 baud @ 4 MHz
// TXEN = 1; // enable transmitter
// BRGH = 1; // select high baud rate
// SPEN = 1; // enable serial port
// CREN = 1; // enable continuous operation
//}
void main(void) {

//    init_uart();
   int arr[100]={1,2,3,4,5,6,7,8,9,12};
   int sum=0;
   TRISB=0;
   PORTB=0;
   for(int i=0;i<10;i++){
      sum=sum+arr[i];
      PORTB=sum;
   }
   printf("%d",sum);
   return;
}
```

****

2.

```
#include <xc.h>
```

```
#include<stdio.h>

void putch(unsigned char data) {
   while (!PIR1bits.TXIF)

      continue;
   TXREG = data;
}

void init_uart(void) {
   TXSTAbits.TXEN = 1;
   RCSTAbits.SPEN = 1;
}
void main(void) {

   init_uart();

   int n = 10;
   int array[10];

   for (int i = 0; i < n; i++) {
      array[i]=n-i;
   }

   //bubble sort
   for (int i = 0; i < n - 1; i++) {
      for (int j = 0; j < n - i - 1; j++) {
         if (array[j] > array[j + 1]) {
            int temp = array[j];
            array[j] = array[j + 1];
            array[j + 1] = temp;
```

```
        }
      }
   }
   for (int i = 0; i < n; i++) {
      printf("%d\n", array[i]);
   }
   return;
}
```

****

3.

```
#include<stdio.h>
#include<xc.h>
void putch(char data)
{
 while( ! TXIF)
 continue;
 TXREG = data;
}
void init_uart(void)
{
 SPBRG = 0x19; // 9600 baud @ 4 MHz
 TXEN = 1; // enable transmitter
 BRGH = 1; // select high baud rate
 SPEN = 1; // enable serial port
 CREN = 1; // enable continuous operation
}

void main(void)
{   init_uart();
   int arr[10]={10,9,8,7,6,2,3,1,5,4};
   // selection sort
```

```
   for(int i=0;i<9;i++)
   {
      int small=i;
      for(int j=i+1;j<10;j++)
      {
         if(arr[j]<arr[small])
         {
            small=j;
         }

      }
      // swaping of first element with small element.
      int temp=arr[i];
      arr[i]=arr[small];
      arr[small]=temp;
      printf("%d phase \n",i);
      for(int i=0;i<10;i++){
      printf("%d \n",arr[i]);
   }
   }
   printf("Elements after swapping");
   for(int i=0;i<10;i++){
      //printf("Elements after swapping");
      printf("%d \n",arr[i]);
   }
   return;
}
```

****

4.

```
#include <xc.h>

void main(void){
   int x,choice,num1,num2;
   num1=100;
   num2=20;
   PORTB;
   PORTD;
   int *ptr;
   while(1){
      if(choice==0){
         x=num1*num2;
         PORTB=x/256;
         PORTD=x%256;
      }
      if(choice==1){
         PORTB=num1/num2;
         PORTD=num1%num2;
      }
      ptr=&choice;
   ptr=&x;
   }
   return;

}
```

****

5.

```
#include <xc.h>
```

```
int b = 0x80;
int c = 0x03;
void main(void) {
   TRISB =0;
   TRISC =0;
   TRISD =0;
   PORTB =b;
   PORTC =c;
   PORTD=PORTB+PORTC;
   PORTA=PORTB-PORTC;

   return;
}
```

****

6.

```
#include<xc.h>
#include<stdlib.h>
#include<stdio.h>
#define _XTAL_FREQ 400000


void delaybytimr0(){
   T0CONbits.TMR0ON=1;
   while(INTCONbits.TMR0IF==0);
   T0CONbits.TMR0ON=0;
   INTCONbits.TMR0IF=0;
}
```

```
void main(void){

   TRISB=0;
   LATB=0;
   T0CON=7;
   INTCONbits.TMR0IF=0;
   while(1){

      TMR0=46004;
      delaybytimr0();
      LATB=175;
      TMR0=26474;
      delaybytimr0();
      LATB=80;
   }
   return;
}
```

****

7.

```
#include <pic18f4550.h>
#define RELAY_PIN LATAbits.LATA4
void __interrupt() extint_isr(void)
{
 unsigned int i;
 if(INT1IF)
 {
 INT1IF = 0;
 INT1IE = 0;
 RELAY_PIN = ~RELAY_PIN;
```

```
 for(i=0; i<10000; i++); //small delay for debouncing
 INT1IE = 1;
 }
}
int main()
{
// ADCON1 = 0x0F; //set pins as Digital
 TRISAbits.TRISA4 = 0; //set relay pin RA4 as output
 TRISBbits.TRISB1 = 1; //Interrupt pin as input
 RELAY_PIN = 1;
 INT1IE = 1; //Enable external interrupt INT1
 INT1IF=0;
 //INTEDG1 = 0; //Interrupt on falling edge
 GIE = 1; // Enable global interrupt
 while(1);}
```

****

8.

```
#include <xc.h>
#include <stdio.h>
#include <stdlib.h>
#define _XTAL_FREQ 4000000

void delaybytmr1(){
   T1CONbits.TMR1ON = 1;
   while(PIR1bits.TMR1IF == 0);
   T1CONbits.TMR1ON = 0;
   PIR1bits.TMR1IF = 0;
```

```
}

void main(void) {
   TRISB = 0;
   T1CON = 48;
   PIR1bits.TMR1IF = 0;
   LATB = 0;
   while(1){
      TMR1 = 0;
      delaybytmr1();
      LATB = 170;
      TMR1 = 0;
      delaybytmr1();
      LATB = 85;
   }

   return;
}
```

****

9.

```
#include <pic18f4550.h>
#define RELAY_PIN LATAbits.LATA4
void __interrupt() extint_isr(void)
{
 unsigned int i;
 if(INT0IF)
 {
 INT0IF = 0;
```

```
 INT0IE = 0;
 RELAY_PIN = ~RELAY_PIN;
 for(i=0; i<10000; i++); //small delay for debouncing
 INT0IE = 1;
 }
}
int main()
{
// ADCON1 = 0x0F; //set pins as Digital
 TRISAbits.TRISA4 = 0; //set relay pin RA4 as output
 TRISBbits.TRISB1 = 1; //Interrupt pin as input
 RELAY_PIN = 1;
 INT0IE = 1; //Enable external interrupt INT1
 INT0IF=0;
 //INTEDG1 = 0; //Interrupt on falling edge
 GIE = 1; // Enable global interrupt
 while(1);
}
```

****

10.

```
#include <xc.h>

void main(void) {
    TRISCbits.TRISC2 = 0;
    CCP1CON = 0b00001100;
    T2CON = 0b00000010;
    PR2 = 61;
    CCPR1L = 61;
    while(1){
```

```
        TMR2IF = 0;
        TMR2 = 0;
        TMR2ON = 1;
        while(TMR2IF==0);
    }
    return;
}
```

****

11.

****

12.

```
#include <xc.h>
#define relay LATAbits.LATA4
#define _XTAL_FREQ 4000000
int c = 0;
void __interrupt() isr(){
    if(INT1IF){
        INT1IF = 0;
        if(c==0 && relay==0){
            relay = 1;
        }
        else if(relay==1 && c==0){
            c++;
        }
        else if(relay==1 && c==1){
            c = 0;
            relay = 0;
        }
```

```
    }

}

void main(void) {
    TRISAbits.TRISA4 = 0;
    TRISBbits.RB1 = 1;
    relay = 0;
    INT1IE = 1;
    INTEDG1 = 0;
    GIE = 1;
    INT1IF = 0;
     while(1);
    return;
}
```

****

13.

```
#include <xc.h>
#include<stdio.h>
#include <pic18f4550.h>
#define _XTAL_FREQ 4000000

void putch(unsigned char c){
    while(PIR1bits.TXIF ==0);
    TXREG = c;
}

//void init_uart(void){
```

```
//    TXSTA1bits.TXEN = 1;
//    RCSTA1bits.SPEN = 1;
//}

void main (void){
   //init_uart();
   int a = 0;
   TRISC=0;
   TXSTA=0x20;
   RCSTA=0b10010000;
   SPBRG=6;
   TRISCbits.TRISC7=1;
   while(1){
      printf("\n PICT");
      a = RCREG;
      if(a>=1 && a<=9){
         printf("\nEntered: %d", a);
         break;
      }
   }
   while(1);
   return;
}
```

****

14.

```
#include <xc.h>
#include<stdio.h>
#define _XTAL_FREQ 4000000
```

```
void putch(unsigned char c){
   while(PIR1bits.TXIF==0);
   TXREG = c;
}



void main(void) {
   int a = 0;
   TXSTA = 0x20;
   RCSTA = 0b10010000;
   SPBRG = 6;
   TRISCbits.TRISC7 = 1;
   while(PIR1bits.RCIF==0);
   a = RCREG;
   printf("\nValue of Input k %d",a);
   printf("\nValue 2k %d",a*2);
   printf("\nValue 3k %d",a*3);
   printf("\nValue 4k %d",a*4);
   return;
}
```

****

15.

```
void setup()
{
        pinMode(13, OUTPUT);
        pinMode (12, OUTPUT);
        pinMode (4, INPUT);
        pinMode(3, INPUT);
}
```

```
void loop()
{
        int 10 digitalRead (3);
        int il digitalRead(4) ;

        if ( (10 == HIGH) && (il == HIGH))
        {
        digitalWrite(13, HIGH);
        digitalWrite(12, LOW);
        }
        else if ( (10 == LOW) && (11 = == LOW))
        {
        digitalWrite(13, LOW);
        digitalWrite(12, LOW);
        }
        else
        {
        digitalWrite(12, HIGH);
        digitalWrite(13, LOW);
        }
}
```