

```

!
! This program computes Length of Sunlight During the Day for the First Day of Each Sea
son
!
! Input: None
!
! Output: sun_time_h
!          sun_time_min
!
! Author: Gang Zhang 09/05/2010   Email: zhangg06@hotmail.com
!

```

```

program LAID_ex1_3
INTEGER :: lat, j, k
INTEGER, DIMENSION(1:4) :: sun_time_h, sun_time_min
REAL :: sun_time, h0

```

```

pi = 3.1415937
write(6,*) 'Length of Sunlight During the Day for the First Day of Each Season'
write(6,*) 'Latitude Sunlight time (hours, min)'
write(6,*) '(degrees) March 20 June 21 September 22 December 21'

```

```

do lat=90,-90,-5
  if (lat==90) then
    sun_time_h(1)=0
    sun_time_h(2)=24
    sun_time_h(3)=24
    sun_time_h(4)=0
    do k1=1,4
      sun_time_min(k1)=0
    enddo

```

```

  elseif (lat== -90) then
    sun_time_h(1)=24
    sun_time_h(2)=0
    sun_time_h(3)=0
    sun_time_h(4)=24
    do k1=1,4
      sun_time_min(k1)=0
    enddo

```

```

  else
    phi=lat*pi/180.0 !convert to radians
    do k=1,4
      if (k==1) j=79
      if (k==2) j=172
      if (k==3) j=265
      if (k==4) j=355
      delta=0.4093*sin(2*pi*j/365.0-1.405) !the solar declination in radians
      cos_h0=-tan(phi)*tan(delta)
      if (cos_h0>1.0) cos_h0=1.0
      if (cos_h0<-1.0) cos_h0=-1.0
      h0=acos(cos_h0) !the hour angle at sunrise or sunset. In this Eq, phi can not be 9
0 or -90
      sun_time=24.0*h0/pi
      sun_time_h(k)=floor(sun_time)

```

```

    sun_time_min(k)=nint(60*(sun_time-sun_time_h(k)))
    if (sun_time_min(k)==60) then
        sun_time_h(k)=sun_time_h(k)+1
        sun_time_min(k)=0
    endif
enddo
endif
write(6,300) lat, sun_time_h(1), sun_time_min(1), sun_time_h(2), sun_time_min(2),
sun_time_h(3), sun_time_min(3), sun_time_h(4), sun_time_min(4)
300 FORMAT(1X, I3, 2X, 4(5X, I2, 2X, I2))
enddo
end

```