

The 19-Year Cycle (The Metonic Cycle)

The Sun and Moon line up after every 19 years
with a time difference of only $2\frac{1}{4}$ hours

Solar Years

$$\begin{aligned} & 19 \text{ True Solar Years} \\ = & 19 \times 365 \text{ days } 5 \text{ hours } 48 \text{ mins } 46 \text{ secs} \\ = & \quad \quad \quad 6,939 \text{ days } 14 \text{ hours } 26 \text{ mins } 34 \text{ secs} \end{aligned}$$

Luni-Solar Years

$$\begin{aligned} & 19 \text{ Luni-Solar Years} \quad \text{i.e. } 19 \text{ lunar years with } 7 \text{ intercalations} \\ = & 19 \times 12 (= 228) \text{ lunations } + 7 \text{ intercalations} \\ = & 235 \text{ lunations altogether} \\ = & 235 \times 29 \text{ days } 12 \text{ hours } 44 \text{ mins } 2.8 \text{ secs} \\ = & \quad \quad \quad 6,939 \text{ days } 16 \text{ hours } 40 \text{ mins } 58 \text{ secs} \end{aligned}$$

After 1,078 years the difference is only about 2 minutes

The 1960-Year Cycle

The Jubilee Cycle gives 2000-year periods which
equate to 1960 years plus 40 Jubilees

Counted in Civil Lunar Years of 354 days

1960 Lunar Years in terms of the Solar Calendar

$$= 1960 \times 354 \text{ days } \div (\text{length of Solar Year})$$

So in True Solar Years it is

$$\begin{aligned} = & \frac{693,840 \text{ days}}{365 \text{ days } 5 \text{ hours } 48 \text{ mins } 46 \text{ secs}} \\ = & 1899 \text{ Solar Years and } 245 \text{ days} \quad (\text{to nearest day}) \\ \text{or} & \quad \quad \quad 1900 \text{ Solar Years minus } 120 \text{ days} \end{aligned}$$