

2020 is a Leap year

There are 365 days in a year? Correct?

1. Why do you think there are usually 365 days in a year?

By making our calendar line up with the number of days the Earth takes to orbit the Sun, we ensure that winter is actually in the winter months and summer is in the summer months and so on. But, it really takes the Earth about 365.2425 days or about 365 days 5 hours 49 minutes and 12 seconds¹ to finish its rotation around the Sun.

Well it seems like that is a little less than an extra quarter of a day each year. How do we account for that? Should we add an extra day to insure that our seasons line up? If so, how often?

You probably know that February 29th, is the extra day that is inserted in our Gregorian calendar every four years.

Let's figure how accurate or inaccurate this system is.

2. Calculate how many days will be in a 4-year Earth cycle which includes a leap year.
3. Calculate 4 years of 365.2425 days in a year.
4. How much of a difference is there between your two calculations? Is that close enough to not worry with any further adjustments?
5. After how many years might this slight difference become more significant? Explain why you think this might be so.
6. Just as a comparison, what if we didn't have a leap year and the 4-year cycle of years included only 4×365 days? How far off would this calculation be from 4 years of the more precise days in a year?

To compensate for the error that still exists even after we have instituted a leap year every four years, there are a few more rules.

- The year can be evenly divided by 4;
 - If the year can be evenly divided by 100, it is NOT a leap year, unless;
 - The year is also evenly divisible by 400. Then it is a leap year.
7. Try to create a flow chart to show the steps that you must follow to verify whether a year is a Leap Year or not.

8. To check to see if you have created an accurate flowchart, see if you get the same conclusions from both your flowchart and the written rules that are just below problem number 6.

	Flowchart check	Rules check
a. Was the year 2000 a leap year?		
b. Was the year 1900 a leap year?		
c. Was the year 2004 a leap year?		
d. Will the year 2020 be a leap year?		
e. Will the year 2030 be a leap year?		

7. Write a few sentences that summarize the process that you created in your flow chart.

8. Give some years that will be a leap year and give some years that are not a leap year. Record at least five examples of each in the chart below:

Examples of Leap Years	Years that are not Leap Years

9. In the “not a leap year” category, did you include some years that are a multiple of four, but still not a leap year? If not, include a few now.
10. Let’s pretend that we do not have leap years. After about how many years would summer no longer be from June 20 or 21st to Sept 20 or 21st? After that period of time, which would now be a warmer season (in the Northern Hemisphere), fall or spring? Which would then be a colder season? Show how you know.

¹The exact length of a year is measured in different ways as judged by either its alignment with fixed stars (sidereal year), the sun’s position in our sky (tropical year), or the length of time for the earth to again be closest to the sun (animalistic year). In addition, these measurements vary with the affect of other planet’s gravity, tidal drag, solar wind, and other astronomical factors.

Source:

http://en.wikipedia.org/wiki/Year_-_Variation_in_the_length_of_the_year_and_the_day
<https://www.timeanddate.com/date/leapyear.html>