Why does February have only 28 days?

The months are arranged so that the Solstices fall on June 21st and Dec 21st. However the Equinoxes[1] fall on average on March 20th and Sept 23rd.

This means that there are 187 days between Spring and Autumn Equinoxes but only 178 days between Autumn and Spring *(or 179 on a Leap Year).* So summer is nine days longer[2]!

The reason is that the Earth's orbit is elliptical, not perfectly circular, and, when closer to the Sun, it is moving faster[3]. It is five million kilometres closer on Jan 4th than on July 4th *(3.3% of the 150 million kilometres to the Sun).* This makes the Sun's rays 7% stronger in January which is not so noticeable except in Australia or Brazil *(as most of the southern hemisphere is water).*

So February having less days helps to equalise the dates of the Equinoxes[4].

It is said that the Roman king Numa *(c.700 BCE)* created the twelve month calendar, but as it was based on twelve full moons, it consisted of only 355 days and there was an adjustment period before the new year started on March 1st *(which is why October was the eighth month, etc.).* As the Romans considered even numbers unlucky, months had 29 or 31 days; but one month had to be even to make the total odd, so the month of rituals for the dead *(February – from Febru –'purification ritual', the last month of the year)* was chosen to be unlucky.

This was replaced by the Julian calendar *(Julius Caesar, 46 BCE)* which had twelve solar months with a leap year every four years *(based on a year being 365¼ days)* and New Year was moved to January 1st. But the superstitious Romans still kept February as 28 days.

As the exact number is 365.2422 days, the Gregorian calendar was introduced in 1582 *(by losing 10 days! October 4th was followed by October 15th).* It has no leap year on multiples of 100 *(365.25 – 0.01)* unless it is a multiple of 400 *(365.24 + 0.0025 = 365.2425).* So 2000 was a leap year but 1900 wasn't and 2100 won't be.

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[1] *At the Equinox, the Earth's axis is exactly perpendicular to the Sun; so the Sun is directly over the Equator and sunrise and sunset occur at due east and due west. Also, of course, day and night are of equal length (equi –'equal', nox –'night').*

[2] *Good news for the Northern Hemisphere – longer summer, stronger Sun in winter.*

[3] *Another effect of this change of speed is that noon (sun's highest point in the sky) is only at 12.00 o'clock at the Equinoxes and Solstices and varies by up to 20 minutes at other times. The Babylonians (c.2000 BCE) were aware of this.*

[4] *The equinoxes could fall on the 21st of the month if the summer months were longer and the winter ones shorter, eg. if Sept – Jan had 30 days each and Feb 29 (5 x 30 + 29 = 179) and March – August had 31 (6 x 31 = 186).*