

ASTRONOMY

Why We Have Leap Year

Called that because every fourth year has an extra day which makes the dates after Feb. 29 fall two days later in the week instead of just one.

➤ EVERY fourth year having an extra day is called Leap Year because during the twelve months following Feb. 29 a date "leaps over" or skips a day of the week, causing dates to fall two days later in the week instead of just one. Whenever the number of the year is divisible by four, with the exception of century years not divisible by 400, an extra day at the end of February is introduced.

The ordinary year of 365 days contains 52 weeks and one day. This extra day causes a particular date to fall one day later in the week than during the previous year. But when there is a leap year, which contains 52 weeks and two days, any date in the twelve months after Feb. 29 falls two days later in the week instead of just one. New Year's day, for example, was on Friday in 1943, and on Saturday in 1944, but in 1945 it will skip Sunday and fall on Monday.

Leap Year was introduced because the earth does not turn on its axis an exact number of times during one entire revolution around the sun. In the Julian calendar, inaugurated by Julius Caesar in 45 B. C., the year was assumed to contain $365\frac{1}{4}$ days, or 365 days and 6 hours.

The extra hours cannot be included in the year until they have accumulated to a whole day. By the advice of the astronomer Sosigenes, Caesar decreed that the Roman year should consist normally of 365 days, but that every fourth year should contain 366 days.

The true period of the earth's revolution around the sun is 365 days, 6 hours, 9 minutes, 9.5 seconds. This sidereal year is the time taken by the sun to complete the circuit of the heavens from a given star back to the same star.

The year which is used in everyday life, however, is one which depends on the seasons. Because of a slow wobbling motion of the earth called precession, the equinox moves gradually westward and the tropical year, that is, the interval between two successive arrivals of the sun at the vernal equinox, is about 20 minutes shorter than the sidereal year. Its length is 365 days, 5 hours, 48 minutes, 46 seconds. Thus the average year in the Julian calendar was 11 minutes

and 14 seconds, or 0.0078 day, too long.

This error of 0.0078 day per year adds up to one day in about 128 years, or causes an error of about three days every 385 years.

In the course of a thousand years the Julian calendar loses nearly eight days. Pope Gregory XIII proposed a calendar reform which would make the date of the vernal equinox the same as in the year 325 A.D., at which time the Council of Nicaea decided upon the method of reckoning the date of Easter.

Between 325 and 1582, the date of the vernal equinox had moved, in the Julian calendar, from March 21 to March 11. The Pope directed that ten days be dropped from the calendar so that the vernal equinox would once again fall on March 21. For people living in Catholic countries the day after Oct. 4, 1582, became Oct. 15. Other countries gradually adopted this change.

Since an error of about three days was introduced every 385 years by the Julian calendar, Pope Gregory XIII decreed that the rule of adding an extra day every fourth year should be followed except in the case of those century years whose number is not divisible by 400. Thus the year 2000 remains a leap year, but 2100, 2200, and 2300 will have only 365 days.

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AERONAUTICS

Helicopter Pilots Must Learn to Fly Tail-First

➤ HELICOPTERS are ideal craft for many of the Coast Guard's regular peacetime tasks, declares Lt. Comdr. F. A. Erickson. (*U. S. Coast Guard Magazine*, February) The uncanny ability of these whirling flying-machines to slow down and "stand still" in the air, and to climb and descend at very steep angles to blanket-sized landing spots, enables them to carry out such typical Coast Guard missions as close-up inspection of suspicious-looking boats off shore, putting pilots aboard incoming vessels and removing them from outbound ones, removing crews from stranded or foundering ships and from ice floes and other situations of peril, carrying lines aboard

them from surface rescue vessels, and transferring supplies and personnel to and from lighthouses, light-ships and other isolated navigational aids.

As evidence of the helicopter's extreme maneuverability, Commander Erickson lists the series of "impossible" stunts through which a helicopter pilot student is required to put his machine at 25 hours of flight training. A few of them are:

Take off sideways and climb at a 45-degree angle. Come down the same way, but stop and hover a while before setting the ship down.

Take off backward and fly tail-first. At 25 or 50 feet altitude, while continuing flight in same direction, swing tail around and go on nose-first.

From 200 feet altitude, make 60-degree glide and land on marked area approximately 20 feet on a side.

Fly around the boundary of a square, stopping in the air at each corner, without deviating more than one foot, either vertically or horizontally, from true flight line.

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AGRICULTURE

New Weed Mower Has Cutter Bar Across Front

➤ WHEN mowing-machines were first invented, the cutter bar could not be placed directly either in front of or behind the carriage because the only tractive power available, a team of horses, would have trampled down the grass or other plants to be cut before the knives could get at them. So for nearly a century the cutter bar has stuck out to one side.

With gasoline tractor power available this is no longer a necessity, and two Moline, Ill., inventors, L. A. Paradise and W. J. Coultas, have finally taken advantage of that fact, mounting the cutter bar directly across the forward end of the tractor frame. The tractor thus pushes the mowing-machine ahead of it, as an ordinary lawnmower pushed by a man. The inventors regard their mower as particularly adapted for use in cutting weeds from the sides of highways, its greater compactness rendering it less of a traffic obstruction.

Rights in the patent, No. 2,340,488, are assigned to Deere and Company.

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Porcelain-enameled *carbon steel* is being used in aircraft exhaust systems in place of stainless steel.