

Ground Hog Day - 02/02/2012



February 2nd is **Groundhog Day** in the United States and Canada. According to folklore, if it is cloudy when a groundhog emerges from its burrow on this day, it will leave the burrow, signifying that winter-like weather will soon end. If it is sunny, the groundhog will supposedly see its shadow and retreat back into its burrow to sleep some more, and the winter weather will continue for six more weeks.¹

First day of winter (Winter Solstice) was December 22, 2011

There are 31 days in December

There are 31 days in January

There are 29 days in this leap year's February

There are 31 days in March

The first day of spring (Spring Equinox) is March 20th

1. How many days are there between the first day of winter and the first day of spring?
2. How many days are there between the first day of winter and Ground hog day, February 2, 2012?
3. How many days are there between Ground hog day and the first day of spring?
4. What position in the calendar do you think Groundhog Day is supposed to represent?

Groundhog Day has its origins in an ancient celebration of a point mid-way between the Winter Solstice and the Spring Equinox. Superstition has it that fair weather implied a stormy and cold second half of winter.

In the U.S. and Canada there are several famous groundhogs that are locally celebrated on February 2nd. The first groundhog, however, was recognized in the 1800's in Punxsutawney, Pennsylvania and he was given the name Punxsutawney Phil. Records have been kept on Punxsutawney Phil's predictions since 1887.

Historical Track Record of Punxsutawney Phil 1887–2011

Courtesy of [Punxsutawney Groundhog Club](#)

| Saw Shadow | No Shadow | No Record |
|-------------|---------------|-----------|
| 99 | 16 | 9 |
| More Winter | End of Winter | --- |

The **frequency** of an event happening is just the number of times that event occurs.

5. What is the frequency in the previous chart of Punxsutawney Phil seeing his shadow?
6. What is the frequency of Phil not seeing his shadow?

The **relative frequency** of an event happening is the frequency of the event divided by the total number of recorded events.

7. What is the relative frequency of Phil seeing his shadow?
8. What is the relative frequency of Phil not seeing his shadow?
9. Do you think that Phil will see his shadow this year?
10. How often should Phil see his shadow ...
 - a. In the next 5 years?
 - b. In the next 10 years?
 - c. Over the next 40 years
11. Is there some other number of years that you think makes sense to calculate based on your relative frequency calculations?

Punxsutawney Phil Vs. the U.S. National Temperature 1988–2011

The table below gives a snapshot by year since 1988 whether Phil saw his shadow or not along with the corresponding monthly national average temperature departures for both February and March.

| Year | Shadow | February Temperature Departure | March Temperature Departure |
|------|--------|--------------------------------|-----------------------------|
| 2011 | No | Slightly Below | Above |
| 2010 | Yes | Below | Above |
| 2009 | Yes | Above | Slightly Above |
| 2008 | Yes | Slightly Above | Slightly Below |
| 2007 | No | Below | Above |
| 2006 | Yes | Above | Above |
| 2005 | Yes | Above | Slightly Above |
| 2004 | Yes | Below | Above |
| 2003 | Yes | Below | Above |
| 2002 | Yes | Above | Below |
| 2001 | Yes | Slightly Above | Tied Average |
| 2000 | Yes | Above | Above |
| 1999 | No | Above | Above |
| 1998 | Yes | Above | Below |
| 1997 | No | Above | Above |
| 1996 | Yes | Above | Below |
| 1995 | No | Above | Above |
| 1994 | Yes | Below | Above |
| 1993 | Yes | Below | Above |
| 1992 | Yes | Above | Above |
| 1991 | Yes | Above | Above |
| 1990 | No | Above | Above |
| 1989 | Yes | Below | Above |
| 1988 | No | Below | Above |

11. Compare Punxsutawney Phil's predictions to that February's temperature from the norm. Out of the 24 years shown, what is the relative frequency of Phil being correct?

12. Now compare his predictions with the average March temperature departures. What is his relative frequency of predicting correctly?

Let's consider how Phil's predictions compare to the predictions of a coin toss. Imagine that we simply flipped a coin to decide whether there will be more winter. If the coin lands heads, we have more winter. If it lands tails, we have the end of winter.

13. How might the coin have done in predicting the weather over last 23 years compared to Phil?

Source: ¹http://en.wikipedia.org/wiki/Groundhog_Day
<http://www.ncdc.noaa.gov/special-reports/groundhog-day.php>
[http://www.ncdc.noaa.gov/temp-and-precip/ranks.php?periods\[\]=1¶meter=tmp&year=2011&month=3&state=110&div=0](http://www.ncdc.noaa.gov/temp-and-precip/ranks.php?periods[]=1¶meter=tmp&year=2011&month=3&state=110&div=0)