

Comets are icy bodies that can be many kilometers across. If they struck earth they would do considerable damage and could even lead to extinctions. One of the biggest problems that astronomers face is that, unlike asteroids, comets come from places in our solar system that are far beyond the orbit of Jupiter. They are usually discovered as very faint fuzzy objects once they reach the orbit of Mars. By that time, there is not much warning should the comet have a path that intersects earth's orbit.

Name	Discovery	Earth Distance	Date
C/2011 UF305	October 2011	375	June 2012
C/2011 L4	June 2011	495	June 2012
C/2011 F1	March 2011	300	August 2012
C/2011 R1	September 2011	330	Sept 2012
C/2010 S1	September 2010	840	Sept 2012
C/2012 J1	May 2012	345	Oct 2012
273P	June 1827	128	Oct 2012
C/2012 J1	May 2012	360	Nov 2012
C/2012 K5	May 2012	50	Dec 2012

The table above gives the month and year when a comet was discovered (column 2), the closest distance that it got to earth in millions of kilometers (column 3) and the month and year when it makes its closest approach to the sun and earth (column 4).

Problem 1 - How many months after the comet was discovered did it make its next closest passage to Earth? Omitting Comet 273P, what is the average number of months between discovery and close passage?

Problem 2 – What percentage of the comets passed further away than 50 million kilometers from Earth?

Problem 3 – During 2012 there were 60 new comets discovered. About how many of these might come within 50 million kilometers of earth during the following year, 2013?

Problem 1 - How many months after the comet was discovered did it make its next closest passage to Earth? Omitting Comet 273P, what is the average number of months between discovery and close passage?

Name	Discovery	Earth Distance	Date	Time
C/2011 UF305	October 2011	375	June 2012	8
C/2011 L4	June 2011	495	June 2012	12
C/2011 F1	March 2011	300	August 2012	17
C/2011 R1	September 2011	330	Sept 2012	12
C/2010 S1	September 2010	840	Sept 2012	24
C/2012 J1	May 2012	345	Oct 2012	6
273P	June 1827	128	Oct 2012	2224
C/2012 J1	May 2012	360	Nov 2012	7
C/2012 K5	May 2012	50	Dec 2012	8

Answer: Omitting 273P , the average is $(8+12+17+12+24+6+7+8)/8 = 12$ months.

Problem 2 – What percentage of the comets passed further away than 50 million kilometers from Earth?

Answer: $100\% \times (8/9) = 89\%$

Problem 3 – During 2012 there were 60 new comets discovered. About how many of these might come within 50 million kilometers of earth during the following year, 2013?

Answer: $60 \times 0.89 = 53$ that pass farther away than 50 million km, and so there are **7 that pass closer than 50 million km.**

Note: What this means is that by the time a comet is discovered, it is only a year from its closest approach to earth, and for a typical year there could be 7 comets that come this close. These are potentially dangerous objects because their sizes are big enough to devastate cities or even entire continents if they were to impact!