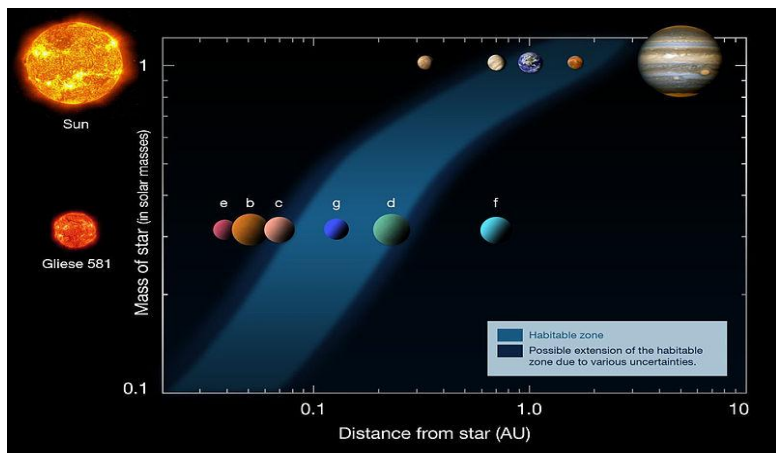


GRAVITY & CENTRIPETAL FORCE

Units 14,8 Dr John P. Cise,

Professor of Physics, Austin Community College, 1212 Rio Grande St., Austin Tx. 78701 jpcise@austincc.edu & NYTimes Dec. 3,2011 by Dennis Overbye
Please send me an e-mail on how you used this application of physics site. Thanks! Dr Cise

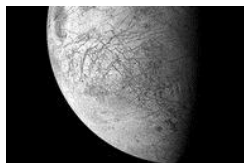


The Gliese 581 system ^[13]				
Companion (in order from star)	Mass	Semimajor axis (AU)	Orbital period (days)	Eccentricity
e	$\geq 1.7 M_{\oplus}$	0.0284533 ± 0.0000023	3.14867 ± 0.00039	0
b	$\geq 15.6 M_{\oplus}$	0.0406163 ± 0.0000013	5.36841 ± 0.00026	0
c	$\geq 5.6 M_{\oplus}$	0.072993 ± 0.000022	12.9191 ± 0.0058	0
g	$\geq 3.1 M_{\oplus}$	0.14601 ± 0.00014	36.562 ± 0.052	0
d	$\geq 5.6 M_{\oplus}$	0.21847 ± 0.00028	66.87 ± 0.13	0
f	$\geq 7.0 M_{\oplus}$	0.758 ± 0.015		

LIFE OUT THERE

Hot on Trail of 'Just Right' Far-Off Planet

Multimedia



Slide Show

Michael Benson's Planetary Landscapes



Slide Show Graphic

Habitable Zones

At least four times in the last few years, astronomers have announced they have found planets orbiting other stars in the sweet spot known as the habitable zone — not too hot, not too cold — where water and thus perhaps life are possible. In short, a so-called Goldilocks planet fit to be inhabited by the biochemical likes of us. None of these claims are without controversy, but astronomers who are making discoveries with NASA's **(((Kepler spacecraft)))** are meeting next week in California to review **the first two years of their quest**, which seems tantalizingly close to hitting pay dirt. **(((“Sooner or later, Kepler will find a lukewarm planet with a size making it probably Earthlike,”)))** said Geoffrey Marcy of the University of California, Berkeley, who spends his time tracking down candidates identified by Kepler. “We’re no more than a year away” from such a discovery, he said. This is how it has gone with the **(((potential Goldilocks planets orbiting Gliese 581)))** a small cool red star about **(((20 light-years from here)))** in the constellation Libra that has been at the center of **(((exoplanet fantasies)))** and speculation for the last few years. Depending on whom you talk to, it has five or six planets, three of which have at one time or another been claimed to be habitable.

INTRODUCTION:

Planet g(see table at left) of Star 581(20 light years from earth) is a likely Habitable Planet. The star 581 has a mass of $M_{581} = 0.3 M_{\text{sun}}$ ($M_{\text{sun}} = 2 \times 10^{30}$ kg). This data can be seen in chart at left from NASA. Also, planet 581g is 0.146 AU from star 581. This data can be seen in second table at left. AU = astronomical unit(distance from earth to sun) = 1.5×10^{11} m .

QUESTION:

With the above data from graphics at leftshow the listed period around star 581 by Planet 581g is ~ 36.6 days?

HINT:

Use Kepler’s third law: $T^2 = (4 \pi^2 / GM_{581})R^3$
This law came from the fact that gravity supplies the centripetal force needed to keep planet 581g in orbit around star 581:

$$Gm_{581g}M_{581}/R^2 = m_{581g}V^2/R$$

Where $V = R 2 \pi / T$

$G = \text{gravitational constant} = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$

You solve for the period in units of seconds.

Then convert to days using : 24 hrs/day, 3600 s/hr

Heads up:

The graphics(planetary landscapes & Habitable zones) at left are awesome!

