CENTRIPETAL FORCE FROM GRAVITY

Units 14 & 8

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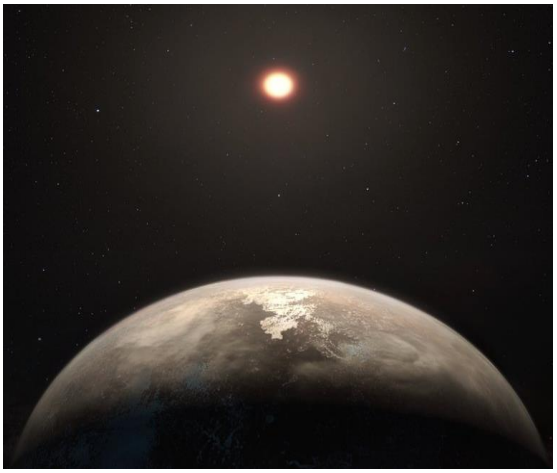
A Nearby Earth-Size Planet May Have Conditions for Life



INTRODUCTION: This close star to our sun(just 11 light yrs. from earth) has a exoplanet (3500 total exoplanets found as of 2017 December) rotating about it (Ross 128). From Wikipedia planet's period **(T) = 9.8596 days**. The **Planet distance from star Ross 128 is article listed below at 4.5 million mi.**

Gravity supplies the centripetal force to keep planet in orbit about star:

G Mm/R² = mv²/R , with: v = Rω = R 2π f = 2π R/T , thus

G M~~m~~/R² = ~~m~~ 4 π² R² /T² R , thus solve for $M = [4\pi^2/G][R^3/T^2]$ Kepler 3rd.

QUESTIONS: (a) Convert period T to seconds?, (b) Convert orbit radius to meters ?, (c) Use Kepler's 3rd. law to find mass of star? Wikipedia & NASA list Ross 128 mass as 0.168 $M_{OUR\ SUN}$. (d) Find NASA/Wikipedia value for mass of Ross 128 star?, (e) How does NASA/Wiki. Value of Ross 128 mass compare with computed value?

HINTS: G = gravitational constant = 6.67 X 10^{-11} N $m^2/kg.^2$, 24 hrs./day, 3600 s./hr., Mass of our sun = 1.989 X 10^{30} kg., 1609.344 m. = 1 mi.,

ANSWERS: (a) 8.57 X 10^5 s., (b) 7.242 X 10^9 m., (c) M = 30.83 X 10^{28} kg.., (d) M = 33.4 X 10^{28} kg., (e) close!, Wikipedia R is a bit larger at 7.375 X 10^9 m., This brings Ms closer

An artist's impression of a newly discovered planet and its red dwarf star, **Ross 128. The planet, 11 light-years away,** is roughly the size of Earth but closer to Ross 128 than our planet, or even Mercury, is to our sun.

There's a new place to look for life in the universe. **Astronomers announced on Wednesday the discovery of an Earth-size planet around a small red star in our corner of the galaxy.** The planet could hold liquid water and conditions favorable for life. The star, Ross 128, is not the closest with a planet similar in size to ours. That would be the sun's next door neighbor, **Proxima Centauri, just 4.2 light-years away.** And there **appears to be just one planet orbiting Ross 128** — not the bounty of seven Earth-size planets that circle Trappist-1, a red dwarf about 40 light-years from here. Ross 128 sits in the constellation of Virgo and appears at the center of this picture. The findings appear in the journal Astronomy and Astrophysics. **The astronomers did not directly see the planet but instead used a telescope in Chile to measure wobbles in the wavelengths of light coming from the star. The wobbles are caused by the gravitational pull of the unseen planet. The magnitude of the wobbles indicates that the planet is at least 1.35 times the mass of Earth but could easily be twice the mass of Earth.** Astronomers' instruments are not yet sensitive enough to spot Earth-size planets in Earthlike orbits around stars similar to our sun. It is easier to detect Earth-size planets around dimmer and cooler stars known as red dwarfs, which are the most common type of star in the Milky Way. Astronomers have in the past couple of decades discovered an abundance of star-hugging planets, far different from anything in our solar system. **(((The Ross 128 planet is only about 4.5 million miles from the star))),** much closer than the 93 million miles between Earth and the sun. But it is close enough to Ross 128 that it absorbs warmth sufficient for liquid water, one of the requisite ingredients for life, to potentially exist on the surface. (If anything, the planet may be too warm, more like the planet Venus.) higher than that of the sun," said Dr. Airapetian. William C. Danchi, also a Goddard astrophysicist and an author of that article, was more positive. **"There is potential for an atmosphere and hence habitability, but it is highly uncertain,"** he said. "This is an important discovery and well worth many follow-up studies." The next generation of large terrestrial telescopes, with mirrors 100 feet or more in diameter, should be able to make out the planet circling Ross 128 and possibly identify specific molecules in its atmosphere. "It would be rather easy to search for oxygen in the atmosphere of such a planet," Dr. Bonfils said.