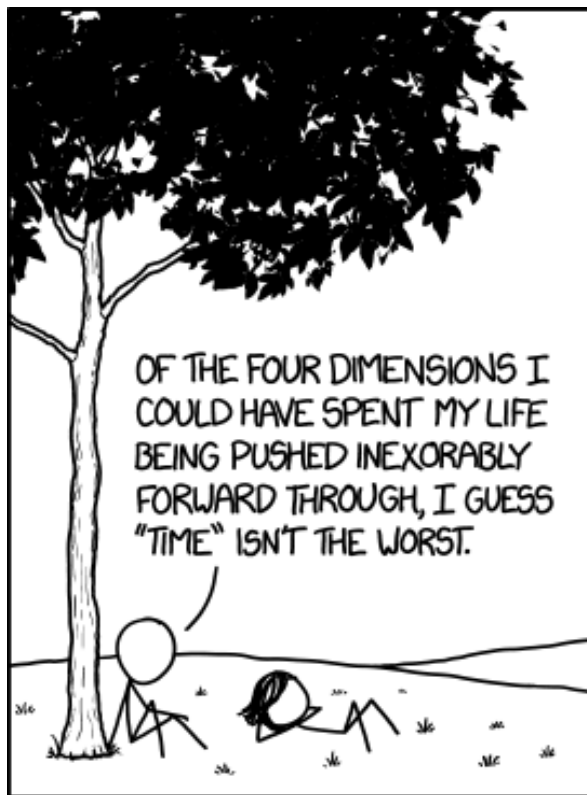


Scioly Summer Study Session 2015

It's About Time

Created by jkang



School Name: _____
Team Number: _____
Student Names: _____

Instructions:

1. Read all these instructions carefully before starting.
2. Do not open this test until instructed to.
3. Be sure to write legibly.
4. Fill out your school name and number on every page.
5. Only the answers in the answer boxes will be scored.
6. The testing period is over at 20 minutes past the start time.
7. Each question is worth 2 points. An answer either is fully correct and gets all points or is wrong and gets no points.
8. Where relevant, answers must include appropriate units. The default unit for time is seconds.
9. Significant figures must be used, whenever applicable.
10. Assume the value of g on Earth is 9.81 m/s^2 , where relevant.
11. The score from the tie-breaker at the end will be used only in case of a tie.
12. Feel free to PM me on scioly.org with any questions or comments about the test.

School Name: _____
Team Number: _____

- 2.84 s
- 82.2 s
- 10.6 s
- 1 s
- 57 174
- First Sunday after the full moon on
or after the vernal equinox
- Clock of the
Long Now
- 2:07 PM
- $4.57 \cdot 10^{-25}$ s
- Annular solar eclipse
- Escapement
- $5.39 \cdot 10^{-44}$ s
- 0.105 rad/s
- John Harrison

1. An ideal pendulum arm with a mass of 3.00 kg and length of 2.00 m. What will the period of the device be?
2. An astronaut is flying at exactly 0.8c travels a fixed distance. After this, an observer on Earth records 137 seconds. What time does the astronaut record?
3. How long will Q#1's pendulum take to hit the ground, if it is thrown from height 443 m with velocity 137 m/s at a 13.0° angle to the horizontal on an exoplanet? ($g = 13.7 \text{ m/s}^2$)
4. How many seconds are there in 9,192,631,770 transitions between two hyperfine states of the cesium-133 atom?
5. This test was written on June 1, 2015 at 00:00 UTC. What is the modified Julian date for this day?
6. How is the date of Easter determined?
7. What famous clock is also known as the "10,000-year clock"?
8. If it's 1:37 PM in Uzbekistan, and I take a 1 hour flight from there to Afghanistan, when I land, what time is it in Juliet time?
9. How long does it take light to travel 137 attometers?
10. What is the term for the passing of the Moon through the solar disk, where a ring of sunlight is still visible?
11. What is responsible for the tick-tock sound of a mechanical clock?
12. At which point in time, in seconds, after the Big Bang, do we have information about the universe?
13. What is the angular velocity, in rad/s, of the second hand on an analog clock (Answer to the nearest thousandth)?
14. Who created the first true marine chronometer?

12:00 PM

15. If it's 7:00 AM June 1st, 2015 in Hawaii, what time is it in Austin, Texas?

$5.99 \cdot 10^{-5}$ s

16. I have a circuit with a 13.0 H inductor and a 7.00 pF capacitor in series. What is the oscillation period of this circuit?

30 701 401 s

17. It's 00:00, June 1, 2015 in Austin, Texas. How many seconds will have passed until this event is first run at nationals on 8:10, May 21, 2016 in Wisconsin?

$4.7304 \cdot 10^{21}$ Svedburg units

18. How many Svedburg units are in an indiction cycle?

International Earth Rotation and Reference Systems Service

19. What does the acronym IERS stand for?

1966

20. What year did the United States permanently implement Daylight Savings Time?

73 050 s

21. A cesium and a hydrogen clock are synchronized, then syntonized to the slower rate. After 24 hours, what will be the clocks' time difference in seconds?

25

22. How many leap years are there between 1899 and 2001 (inclusive)?

December 22, 2015
04:48 UTC

23. What is the UTC date and time of the winter solstice this year (2015)?

June 2, 2015

24. Assuming this test was written on June 1, 2015, when will the next full moon occur (give the date)?

6

25. How many time zones does Canada have?

Tiebreaker Question

I am writing this test on June 1, 2015 in Austin, Texas. Give the names of as many U.S. states as possible that will have the UTC offset (and only that offset) I am currently under six months from the given date.

Scoring is 1 point for each correct state.

Answer- Connecticut, Delaware, Georgia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Vermont, Virginia, West Virginia

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