SSSS It's About Time Division C

Event By syo_astro Key

* **Each question is worth one point, where each part (ie. a, b, etc or i, ii, etc) is worth an additional point. The test is 71 points.**

***For questions with explanations, use best judgment for whether the answer is correct. The answers given here exemplify effective answers, but there can be others.**

* **Within plus or minus 10% of a given quantitative answer is considered correct. Without units and significant figures, a correct answer is given a ½ point.**

1. Sir Isaac Newton
2. Peter Henlein
3. Warren Marrison
4. Jost Burgi
5. Giovanni de' Dondi
6. 1918
7. They are marine chronometers.
8. An anchor escapement.
9. Either explain how friction (small changes in force like dampening can alter period and accuracy, lack of isochronism) or recoil (damages timekeeping components through backlash) have negative impacts on keeping time.
10. Label the following
    a. pendulum rod
    b. pendulum bob
    c. rate adjustment nut
    d. suspension spring
    e. crutch
    f. fork
    g. escape wheel
    h. anchor
11. It is a harmonic oscillator, which can keep the escapement regulating time at precise intervals.
12. A staking tool

13. 
    a. A spiral pulley used to even out the power of a mainspring in a watch.
14. A timepiece
15. To create a locking action that can count oscillations and dissipate energy from the timekeeping device gradually.
16. Water
17. Sundial
18. Label the following
    a. Nodus
    b. Gnomon
    c. Hour Line
    d. Base
    e. Furniture
19. The piezoelectric effect
20. 0.848 s
21. A skeleton clock
22. An incense clock
23. Master clocks
24. The rotation of the Earth
25. JD 2457158.292
    a. 57157.792
26. 2.81×10^{44} as
27. 5.48×10^{-6} lustrums
28. The time required for light to travel, in a vacuum, 1 Planck length.
29. The mean solar time for the meridian at Greenwich, England.
30. Time dilation
    a. 62.5 years
    b. 37.5 years
31. Null or light-like interval
32. 1.26 s
33. 3.44 s

a. It wouldn't change

34. 3.14 s
35. 2.01 s
36. A Fourier series
37. The x-axis
38. The second law of thermodynamics

Answer:
The correct answer is *c*. Acceleration is defined as the change in velocity over time:

$$a = \frac{\Delta v}{\Delta t} = \frac{v_{final} - v_{initial}}{t_{final} - t_{initial}}$$

Because v here is plotted on the y-axis and t is on the x-axis, $\frac{\Delta v}{\Delta t} = \frac{rise}{run} = m$, the slope of the graph. The slope of a velocity-time graph represents the acceleration of the object, so the greatest acceleration occured where the slope was greatest. Here, that would be at any time between $t = 3$ and $t = 6$ seconds.

39.
40. 1.2 s
41. T0/√(2)
42. 8.18 m/s
43. An analemma
    a. A time delay or running fast (specifically the equation of time being positive or negative).
    b. Elliptical orbits and the inclination of the ecliptic not being taken into consideration when calculating time, resulting in errors.

44. It is NOT because it is divisible by 100 and not divisible by 400 (though, it is divisible by 4).
    a. February 29
    b. Essentially, the global calendar is the Gregorian calendar, which doesn't take into account an accumulated error every year where our calendar is behind the actual time it takes the Earth to go around the Sun. An example problem created from this would be that this would make our seasons and other common holidays shifted back months (so Christmas would literally be in July).
45. Arizona and Hawaii
    a. For AZ: "This is in large part due to energy conservation: Phoenix and Tucson are among the hottest US metropolitan areas during the summer, resulting in more power usage from air conditioning units and evaporative coolers in homes and businesses. An extra hour of sunlight while people are active would cause people to run their cooling systems longer, thereby using more energy."
    For HI: Because of Hawaii's tropical latitude, there is not a large variation in daylight length between winter and summer. Advancing the clock in Hawaii would make sunrise times close to 7:00 a.m. even in June.

b. Since it splits the Earth properly day-wise: 360/15=24 hours (the amount of time in a day). Alternatively, the Earth rotates 15 degrees per hour, so 15 degrees*24 hours=360 degrees, the amount in a circle or what the Earth rotates through in one day.

46. Rolex
47. The automatic or self-winding watch
48. 0.000241 M
    a. 1.26×10^6 s