

1. The longest bus route in Prague is route number 177 at 27.85 km. The scheduled journey time is 75 min. The average speed of the bus is:

- a) 22.3 km/h +
- b) 37.1 km/h -
- c) 20.9 km/h -
- d) 17.5 km/h -

2. The speed of sound in water is approximately

- a) 1 500 m/s +
- b) sound does not propagate in water -
- c) 340 m/s -
- d)  $3 \cdot 10^8$  m/s -

3. The unit of heat is:

- a) joule +
- b) kelvin -
- c) degree Celsius -
- d) mole -

4. The optical power of a lens is -1.5 D. Such a lens is:

- a) a diverging lens with the focal length of 67 cm +
- b) a converging lens with the focal length of 1.5 m -
- c) a converging lens with the focal length of 75 cm -
- d) a diverging lens with the focal length of 15 cm -

5. Half-life of cesium-137 is approximately 30 years. It means that the radioactivity of Chernobyl Cs-137 fallout is now, almost 30 years after Chernobyl disaster:

- a) approximately at 50% of the initial value +
- b) negligibly small, almost none when compared to the initial value -
- c) almost identical to the initial value -
- d) approximately at 30% of the initial value -

6. The temperature of  $137^{\circ}\text{C}$  corresponds to the thermodynamic temperature of

- a) 410 K +
- b) 236 K -
- c) 136 K -
- d) -37 K -

7. The phenomenon of light bending at the boundary between two media is called:

- a) refraction +
- b) reflection -
- c) dispersion -
- d) diffraction -

8. The current through a light bulb is 0.26 A when the light bulb is operated at the voltage of

230V. What is the power of the light bulb?

- a) 60 W +
- b) 100 W -
- c) 50 W -
- d) 75 W -

9. A car is traveling at 70 km/h How much time will it need to travel 12.8 km?

- a) 11 min +
- b) 7 min -
- c) 14 min -
- d) 21 min -

10. A permanent magnet is an object made from a material:

- a) ferromagnetic +
- b) paramagnetic -
- c) diamagnetic -
- d) dielectric -

11. As the frequency of a wave increases, the period of the wave

- a) decreases +
- b) increases -
- c) remains the same -
- d) decreases in case of fluids, but increases in case of solids -

12. What is the refractive index of a diamond if the speed of light in the diamond is  $1.25 \cdot 10^8$  m/s ?

- a) 2.4 +
- b) 1 -
- c) 0.57 -
- d) -1.25 -

13. An object is shot vertically upward with an initial speed of 37 m/s. What is its velocity at the time of 2 s after the shot?

- a) 17 m/s upward +
- b) 0 m/s -
- c) 27 m/s downward -
- d) 37 m/s downward -

14. The elevator transported objects of a total mass of 250 kg to the height of 20 m in 60 s. What amount of work was done by the elevator?

- a) 50 kJ +
- b) 2 000 J -
- c) 25 kJ -
- d) 833 J -

15. The normal atmospheric pressure is approximately

- a) 100 kPa +
- b) 10 Pa -
- c) 1 kPa -
- d) 9.81 kPa -

16. What is the hydrostatic pressure at the bottom of a cylindrical pool completely filled with water, if its diameter is 4 m and it is 1.5 m deep?

- a) 15 kPa +
- b) 400 Pa -
- c) 6 kPa -
- d) 60 kPa -

17. A car accelerates from 80 km/h to 30 km/h in 6 s. What is the average acceleration of its movement?

- a)  $-2.3 \text{ m/s}^2$  +
- b) there is no acceleration -
- c)  $-8.3 \text{ m/s}^2$  -
- d)  $+13.3 \text{ m/s}^2$  -

18. The factor of  $10^{-9}$  can be expressed by the prefix

- a) nano +
- b) mili -
- c) micro -
- d) kilo -

19. An object is moving uniformly in circles with a radius of 5 m and a frequency of 2 Hz. What is its instantaneous velocity?

- a) 63 m/s +
- b) 314 m/s -
- c) 10 m/s -
- d) 25 m/s -

20. The color of light is given by its:

- a) frequency +
- b) polarization -
- c) intensity -
- d) charge -

21. Water flows with a velocity of 20 cm/s in a pipe of diameter 60 cm. What is the velocity in a part of the pipe where the diameter is reduced to 30 cm?

- a) 0.8 m/s +
- b) 0.4 m/s -
- c) 0.1 m/s -
- d) 0.2 m/s -

22. Determine the final temperature when 45 g of water at 20 °C mixes with 22 g of water at 85 °C.

- a) 41°C +
- b) 62°C -
- c) 52°C -
- d) 47°C -

23. Choose the scalar quantity

- a) pressure +
- b) force -
- c) velocity -
- d) acceleration -

24. Two isotopes of the same element differ in the number of:

- a) neutrons +
- b) photons -
- c) electrons -
- d) protons -

25. What is the resistance of a typical 40 W light bulb plugged into a 230 V outlet in your home?

- a) 1.3 k $\Omega$  +
- b) 2.6 k $\Omega$  -
- c) 58  $\Omega$  -
- d) 575  $\Omega$  -

26) For gamma radiation is typical

- a) deep penetration +
- b) positive charge -
- c) wavelength of 550 nm -
- d) negative charge -

27. The resistance of a parallel combination of two resistors, 5 k $\Omega$  and 1 k $\Omega$ , is:

- a) 0.8 k $\Omega$  +
- b) 1.0 k $\Omega$  -
- c) 5 k $\Omega$  -
- d) 6 k $\Omega$  -

28. Pressure of an ideal gas was increased 2-times at an isochoric process. Thus

- a) gas temperature increased 2-times +
- b) gas volume decreased to one half -
- c) gas temperature decreased to one quarter -
- d) gas volume increased 4-times -

29. During a free fall of a body (if the air resistance is negligibly small)

- a) its kinetic energy increases and its potential energy decreases +
- b) its kinetic energy decreases and its potential energy increases. -
- c) its kinetic energy increases and its potential energy does not change. -
- d) neither its kinetic nor potential energy changes. -

30. Which of the following units is a base SI unit?

- a) ampere +
- b) tesla -
- c) ohm -
- d) coulomb -

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