

## Physics - exam questions 2022 - basic level

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For each question, four answers are given, of which only one answer is correct. Please enter the letter corresponding to the correct answer in the table. For the correct answer to each of the questions, 2 points will be awarded.

### Your answer Table .

Nr zadania	1	2	3	4	5	6	7	8	9	10
Poprawna odpowiedź										

Nr zadania	11	12	13	14	15	16	17	18	19	20
Poprawna odpowiedź										

### Questions

1. Bombardment of  ${}_{14}^{28}\text{Si}$  with alpha particles may produce:

- A. hydrogen and  ${}_{16}^{32}\text{S}$
- B. a deuteron and  ${}_{13}^{27}\text{Al}$
- C. a proton and  ${}_{15}^{31}\text{P}$
- D. helium and  ${}_{15}^{31}\text{P}$

2. A radium atom,  ${}_{86}^{226}\text{Ra}$  emits an alpha particle. The number of protons in the resulting atom is:

- A. 84
- B. 85
- C. 86
- D. 88

3. A wire carries a steady current of 2 A. The charge that passes a cross section in 2s is:

- A.  $6.4 \times 10^{-19} \text{ C}$
- B. 1C
- C. 2C
- D. 4C

4. A candle is held 50 cm in front of a plane mirror. The distance between the candle and its image is:

- A. 50 cm
- B. 100 cm
- C. 150 cm
- D. 200 cm

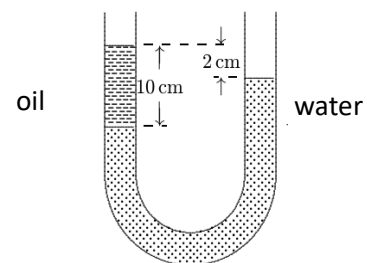
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5. The separation of white light into colors by a prism is associated with:
- A. total internal reflection
  - B. partial reflection from each surface
  - C. variation of index of refraction with wavelength
  - D. an increase in the speed of light in the glass
6. Water waves in the sea are observed to have a wavelength of 300m and a frequency of 0.07 Hz. The speed of these waves is:
- A. 0.00021m/s
  - B. 2,1m/s
  - C. 21m/s
  - D. 210m/s
7. A simple pendulum of length  $L$  and mass  $M$  has frequency  $f$ . To increase its frequency to  $2f$ :
- A. increase its length to  $4L$
  - B. increase its length to  $2L$
  - C. decrease its length to  $L/2$
  - D. decrease its length to  $L/4$
8. The weight suspended from the ideal spring vibrates up and down with period  $T$ . If the amplitude of the oscillation is doubled, the period will be:
- A.  $T$
  - B.  $1.5T$
  - C.  $2T$
  - D.  $T/2$

9. The density of water is  $1.0\text{g/cm}^3$ . The density of the oil in the left column of the U-tube shown below is:

- A.  $0,20\text{ g/cm}^3$
- B.  $0,80\text{ g/cm}^3$
- C.  $1,0\text{g/cm}^3$
- D.  $1,3\text{g/cm}^3$

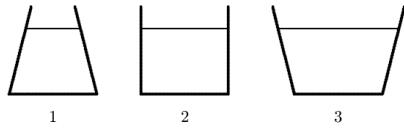


10. A block floats on water partially submerged. 50% of its volume is below the water surface because
- A. its density is less than the density of water
  - B. its density is equal to that of water
  - C. its density is greater than the density of water
  - D. the buoyancy force of water is greater than the weight of the block

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11. The vessels shown below all contain water to the same height. Rank them according to the pressure exerted by the water on the vessel bottoms, least to greatest.



A. 1, 2, 3

B. 3, 2, 1

C. 2, 3, 1

D. all pressures are the same

12. The mass of a hypothetical planet is  $1/100$  that of Earth and its radius is  $1/4$  that of Earth. If a person weighs 600N on Earth, what would he weigh on this planet?

A. 24N

B. 48N

C. 96N

D. 192N

13. An object is thrown straight up from ground level with a speed of 50 m/s. If  $g = 10 \text{ m/s}^2$  its distance above ground level 6.0 seconds later is:

A. 0.00 m

B. 120 m

C. 330 m

D. 480 m

14. If  $g$  is the acceleration due to gravity on the Earth surface, the gain in the potential energy of an object of mass  $m$  raised from Earth surface to a height equal to its radius  $R$  is

A.  $2mgR$

B.  $\sqrt{2}mgR$

C.  $mgR/2$

D.  $mgR$

15. A bullet of mass 20 g flying at 500 m/s hit an obstacle. If the force inhibiting its movement during penetration had a constant value of 50 kN, then it stopped at a depth:

A. 0.5 cm

B. 1 cm

C. 3 cm

D. 5 cm

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16. The frictional force of the notebook against the bench is 2 N. If the student, moving the notebook at a constant speed, did the work 1 J, then moved the notebook to a distance:

- A. 20 cm
- B. 50 cm
- C. 100 cm
- D. 200 cm

17. If the force acting on a body is doubled as also the mass of the body, the acceleration of the body:

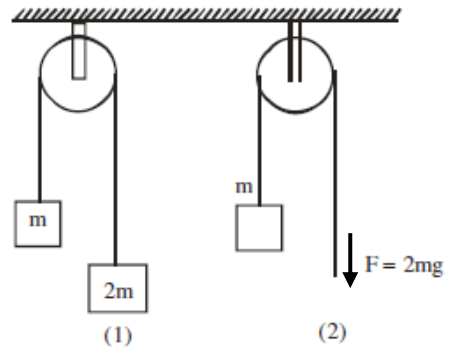
- A. remains unchanged
- B. reduces to half its value
- C. becomes double of its earlier value
- D. becomes four times its earlier value

18. During an isothermal expansion of ideal gas:

- A. volume is directly proportional to pressure
- B. volume is inversely proportional to pressure
- C. the pressure is constant
- D. the volume is constant

19. Two identical frictionless pulleys are arranged separately as shown. Assuming that strings have negligible mass, the acceleration of mass  $m$  in the two cases will be:

- A. the same but different from  $g$
- B. the same and equal to  $g$
- C. more in case (1) than in case (2)
- D. more in case (2) than in case (1)



20. Two automobiles are 150 kilometers apart and traveling toward each other. One automobile is moving at 60km/h and the other is moving at 40km/h . In how many hours will they meet?

- A. 2,5
- B. 2,0
- C. 1,75
- D. 1,5