

Question block created by wizard

This exam contains 52 questions.

$$cg = \frac{h}{3}$$

$$cg = \frac{4r}{3\pi}$$

$$M = F \cdot d$$

$$M_+ = M_-$$

$$F = \sigma \cdot A$$

$$F = m \cdot A$$

$$F_B \cdot b = F_A \cdot a$$

$$MA = \frac{r_B}{r_A}$$

$$F = k \cdot \Delta l$$

$$F \cdot \Delta t = m \cdot \Delta v$$

$$imp = F \cdot \Delta t$$

$$p = m \cdot \Delta v$$

$$F_s = \frac{m \cdot v^2}{r}$$

$$W = m \cdot g \cdot \Delta h$$

$$W = Q - \Delta U$$

$$E_{kin} = \frac{1}{2} \cdot m \cdot v^2$$

$$E_{pot} = m \cdot g \cdot h$$

$$Q = m \cdot c \cdot \Delta T$$

$$\eta = \frac{W}{Q_H} (\times 100\%)$$

$$f_s^{max} = \mu_s \cdot F_N$$

$$f_k = \mu_k \cdot F_N$$

$$\rho = \frac{m}{V}$$

$$sg = \frac{\rho_{substance}}{\rho_{water (277K)}}$$

$$mfr = \rho \cdot A \cdot v$$

$$F = \frac{9}{5} \cdot {}^{\circ}C + 32$$

$$v_f = v_0 + \Delta v$$

$$p = \rho \cdot g \cdot h$$

$$p = p_{atm} + p_{liquid}$$

$$s = v \cdot t$$

$$s_f = v_0 \cdot t + \frac{1}{2} \cdot a \cdot t^2$$

$$v = a \cdot t$$

$$v_f = v_0 + a \cdot t$$

$$v = f \cdot \lambda = \frac{\lambda}{T}$$

$$v = \frac{2 \cdot \pi \cdot r}{T}$$

$$v = \sqrt{a_c \cdot r}$$

$$T = 2\pi \cdot \sqrt{\frac{l}{g}}$$

$$\theta = \omega \cdot t = \frac{2\pi}{T} \cdot t$$

$$\Delta V = \beta \cdot V_0 \cdot \Delta T$$

$$R = \frac{p \cdot V}{T} = \frac{2 \cdot c_p}{5} = \frac{2 \cdot c_V}{3} = R_s \cdot m$$

$$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$$

$$m = \frac{h_i}{h_o}$$

$$T = \frac{1}{f}$$

$$I = \frac{P}{A}$$

$$4,186 \text{ kJ} = 1 \text{ kcal}$$

1. What is the name of group 18 of the Periodic Table of Elements?
 - a. Alkali metals.
 - b. Noble gases.
 - c. Halogens.

- 2.** An atom consists of 58 neutrons and its mass number is 103.

Determine the atoms atomic number.

- a. 161
- b. 22
- c. 45

- 3.** Is it possible to break down a compound in a physical way?

- a. Yes, it is possible.
- b. No, it is not possible.
- c. Yes, both chemically and physically is it possible.

- 4.** Which of the following expressions is a property of a liquid?

- a. Liquids have no surface, and no fixed shape or volume.
- b. There are very strong forces of attraction between the particles of a liquid.
- c. Liquids have much greater density than gases.

- 5.** Which of the following expressions is a property of a gas?

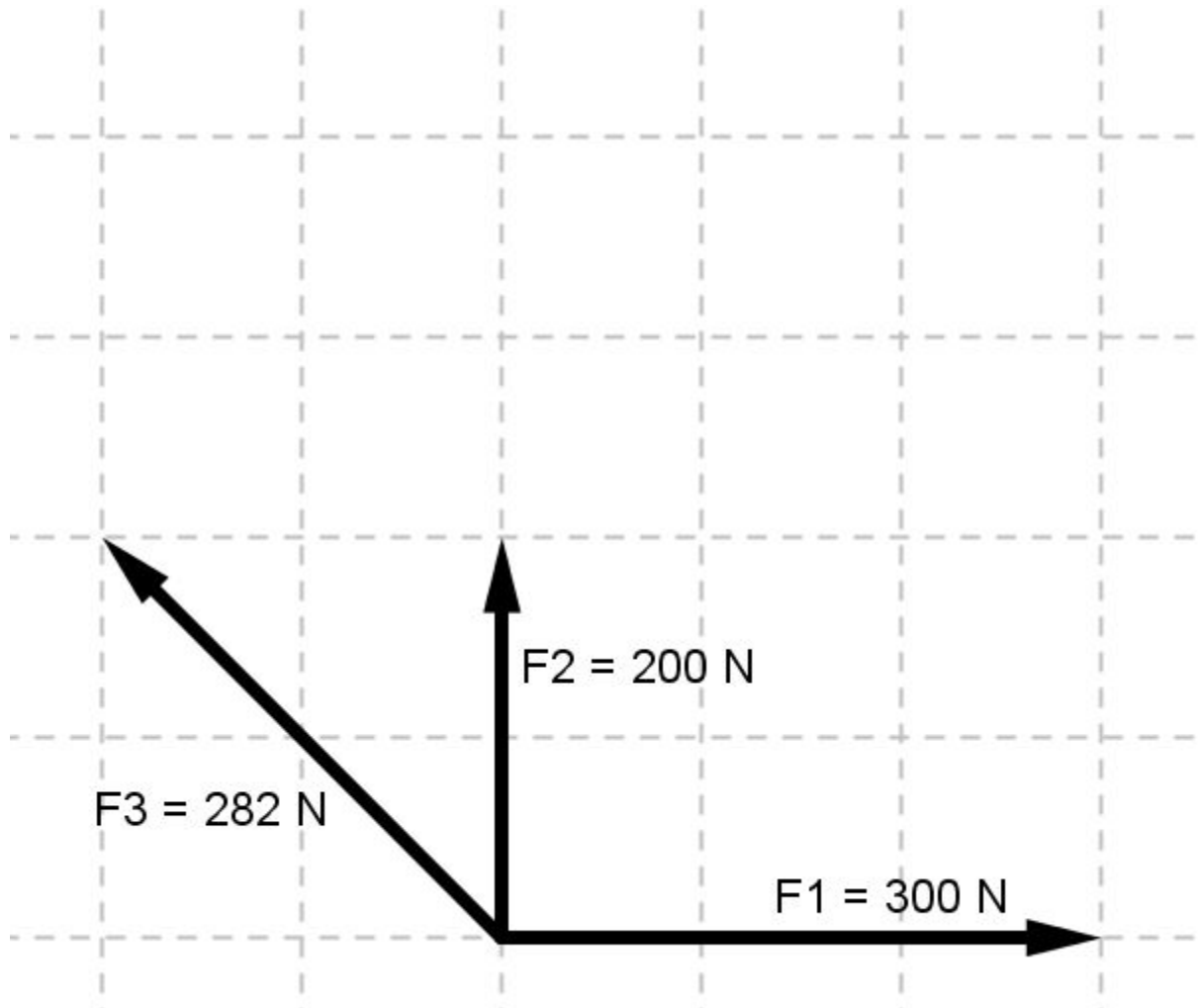
- a. With decrease in temperature, the particles move faster.
- b. The particles are moving very close to each other.
- c. There are almost no forces of attraction between the particles of a gas.

- 6.** If gas is condensing, the new state is liquid or solid, the temperature...

- a. remains the same.
- b. decreases.
- c. increases.

7. Three forces are acting upon an object; $F_1 + F_2 + F_3$. They create a resulting force F_R .

Determine the magnitude of the resultant force F_R .



- a. $100\sqrt{17}\text{ N}$
- b. $100\sqrt{16}\text{ N}$
- c. $100\sqrt{17,6}\text{ N}$

- 8.** On a wheelop cross key two forces are acting. Each force equals 50 N and the diameter of the tap is 5 cm.

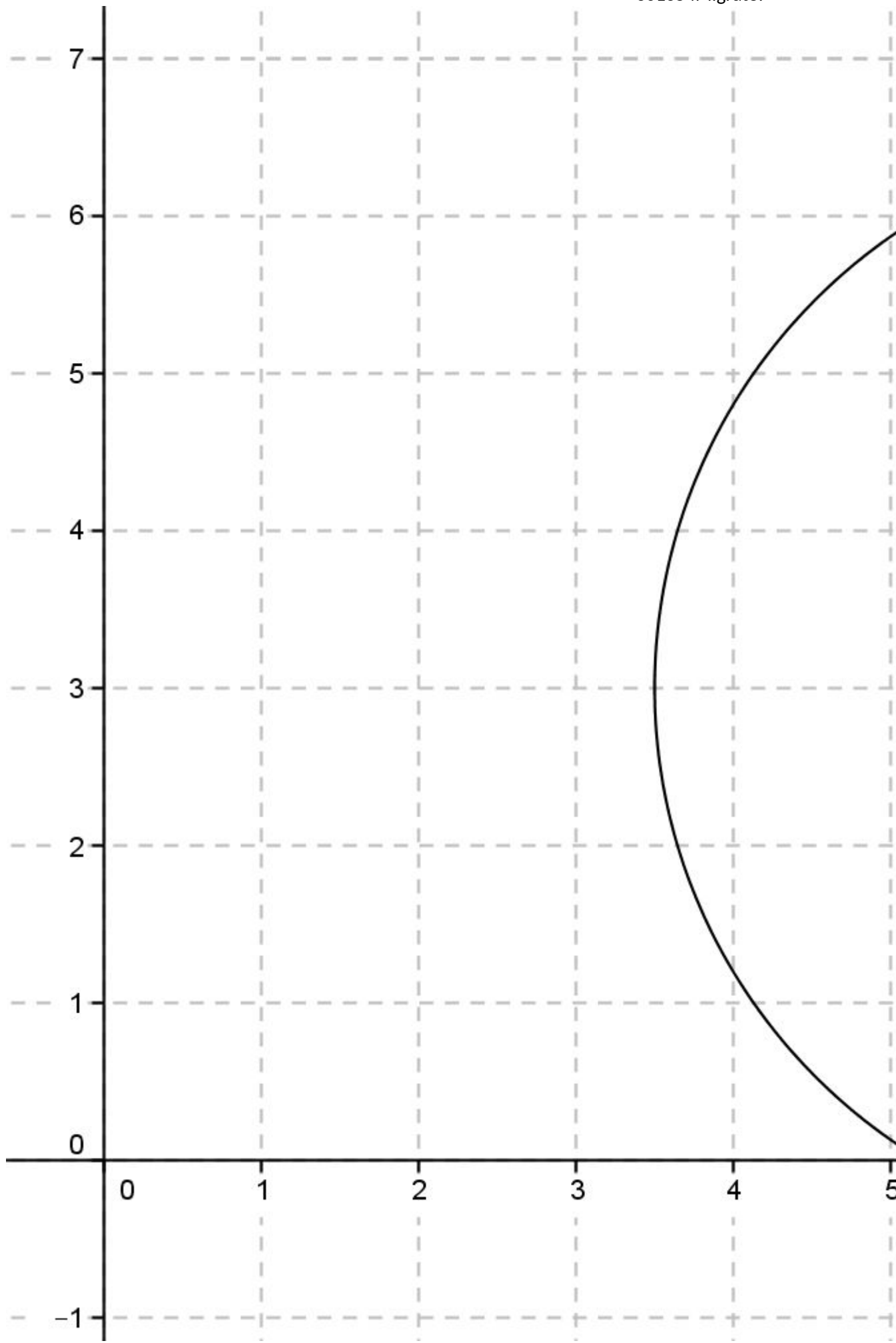
Determine the moment of this couple of forces.



d = 5 cm

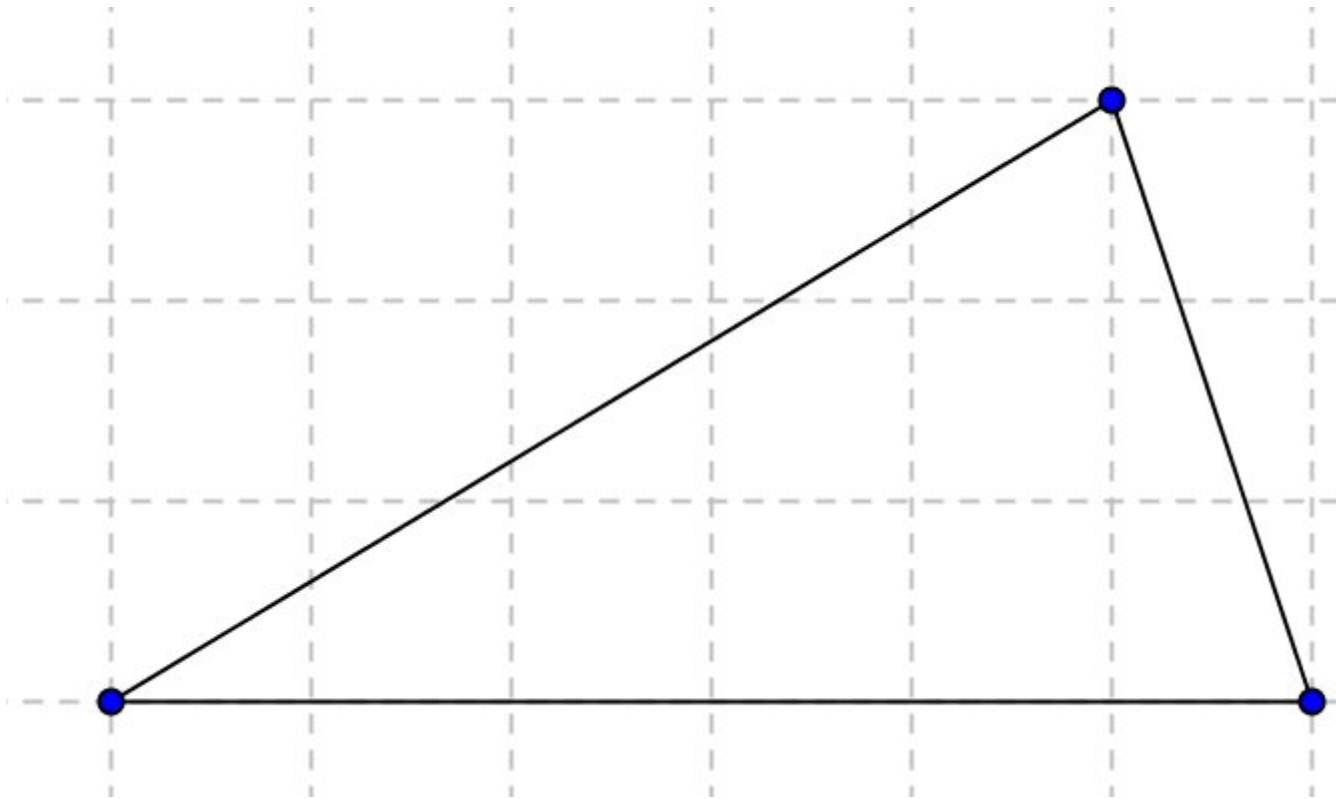
- a. 5 Nm
- b. 2,5 Nm
- c. 1,25 Nm

9. Determine the coordinates of the centre of gravity of the circle in the figure.



- a. (7,3)
- b. (3,7)
- c. 3,5

10. Calculate the height of the centre of gravity of a triangle with a base of 6 m, and a height of 3 m, measured from the base.



- a. 1,0 m
- b. 0,5 m
- c. 2,0 m

11. Stress and strain are.....

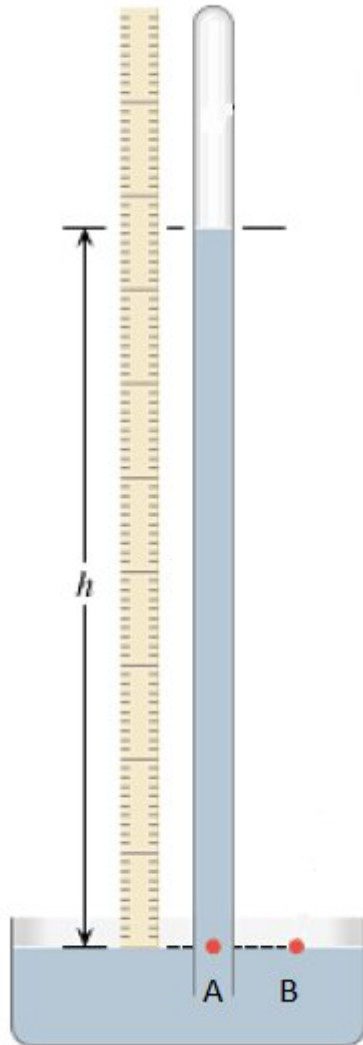
- a. unit less.
- b. proportional.
- c. inversely proportional.

12. An atom consists of 14 protons and its mass number is 29.

Determine the number of neutrons in this atom.

- a. 43
- b. 2,07
- c. 15

13. The pressure in a Mercury barometer in point A....



- a. equals the pressure in point B.
- b. is less than the pressure in point B.
- c. is more than the pressure in point B.

14. An airplane is taxiing on the runway with a speed of 72 km/h. The time from start till end is about 3,75 min.

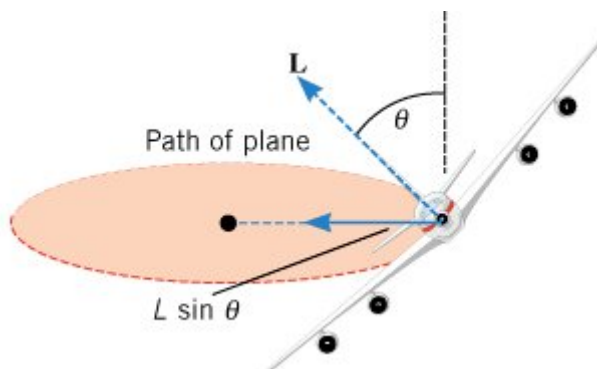
Calculate the length of the runway.

- a. 19200 m
- b. 270 m
- c. 4500 m

- 15.** The measure of how much the velocity changes per unit of elapsed time is called....
- a. acceleration.
 - b. velocity.
 - c. speed.
- 16.** A stone is falling of a tower. The initial speed of the stone is 0 m/s. The final speed of the stone, just before it hits the earth is 20m/s. The time the stone is falling is 2 s.

Calculate the height of the tower.

- a. 80 m
 - b. 20 m
 - c. 400 m
- 17.** Why does a pilot bank or tilt a plane at an angle to make a turn?



- a. To create the centrifugal force.
 - b. To create the centripetal force.
 - c. To create the centripetal acceleration.
- 18.** A pendulum has a period time of $0,4\pi$ s.
- Calculate the length of the pendulum.
- a. 40 m
 - b. 2,5 m
 - c. 0,4 m
- 19.** If the angular speed of a harmonic motion decreases, what will happen to the frequency of this harmonic motion?
- a. Angular speed and frequency are not related.
 - b. The frequency will increase.
 - c. The frequency will decrease.

20. The equation to calculate the MA of a block and tackle is: $MA = v_A/v_B = n$.

What is the meaning of the letter "n"?

- a. The number of rope sections that support the moving block.
- b. The number of rope sections that support the fixed block.
- c. The number of pulleys.

21. 1,5 kg = hg

- a. 15
- b. 0,15
- c. 150

22. Which definition is the definition of mass?

- a. The mass of a substance is inversely proportional to the amount of matter.
- b. The mass of a substance is directly proportional to the amount of matter.
- c. The mass of a substance is proportional to the amount of matter.

23. Where is the mass of an object depending on?

- a. The number of protons and neutrons in the core of the atoms.
- b. Definition of the used units.
- c. A variety of quantities.

24. I beat a hammer with a force of 300 N on a nail. The nail shoots partly in the wood.

What is the magnitude of the reaction force of the nail?

- a. $> - 300 \text{ N}$
- b. $< - 300\text{N}$
- c. $= - 300 \text{ N}$

25. Which statement in the answers is the third law of Newton?

An object under influence of a force....

- a. will stay at rest or in motion along a straight line.
- b. will accelerate.
- c. gives a negative reaction force.

26. If a force of 100 N is acting on an object but the object doesn't move.

How much work is done?

- a. $W = F \times \cos\theta \times s$
- b. 100 Nm
- c. If there is no movement of the object, the work done by the force acting on the object is zero.

27. The potential energy of a stone is 88 J and it has a mass of 2 kg.

Calculate the height of the stone. ($g = 10 \text{ m/s}^2$)

- a. 44 m
- b. 17,6 m
- c. 4,4 m

28. The linear momentum is a...

- a. scalar quantity that points in the same direction as the velocity.
- b. vector quantity that points in the same direction as the velocity.
- c. scalar quantity that points in opposite direction of the velocity.

29. A stone gets an impulse of 4,0 Ns, the duration of the impulse is 20 ms.

Calculate the force on the stone to get this impulse.

- a. 5 mN
- b. 200 N
- c. 80 mN

30. Give 2 applications of a gyroscope.

- a. Compasses and artificial horizon.
- b. Stabilizers and gimbals.
- c. Compasses and gimbals.

31. The static friction force is depending on....

- a. the normal force on an object and the coefficient of static friction.
- b. the weight of an object and the coefficient of static friction.
- c. the speed of an object and the coefficient of static friction.

32. How do you calculate the specific gravity of a substance?

- Calculate the ratio of the substance density relative to the density of a reference substance.
- (Density substance \times density reference substance) $\times 100\%$.
- Density substance \times density reference substance.

33. Is it possible to use the weight in the density equation instead of the mass?

- Yes, you can use the weight without problems.
- Yes, but you have to calculate the mass of the substance first.
- No, it is not possible.

34. Calculate the density of turpentine with a mass flow rate of 60 kg/s and a velocity of 30 dm/s through a pipe with a cross sectional area of 2 dm².

- 4 kg/dm³
- 40 kg/dm³
- 1 kg/dm³

35. When using Bernoulli's equation:

$$p_1 + \frac{1}{2} \cdot \rho \cdot v_1^2 + \rho \cdot g \cdot y_1 = p_2 + \frac{1}{2} \cdot \rho \cdot v_2^2 + \rho \cdot g \cdot y_2$$

What happens to the pressure if the density and the speed of the fluid stays the same?

The pressure...

- stays the same.
- increases.
- decreases.

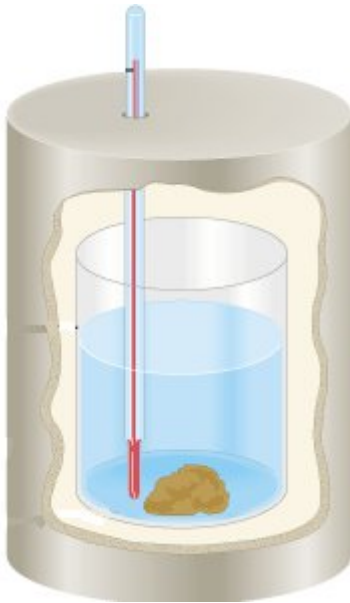
36. Calculate: 450 °C =K.

- 810
- 723,15
- 176,85

37. How much heat is used to warm up $m = 1,5$ kg copper ($c_{\text{copper}} = 400$ J/(kgK)) from 20 °C to 80 °C ($\Delta T = 60$ °C)?

- 4,44 J
- 36000 J
- 16000 J

38. What quantity do we measure with the apparatus in the picture?



- a. Specific heat capacity of an unknown substance.
- b. Heat capacity of an unknown material.
- c. Volume of an unknown material.

39. If water is heated from 0 °C to 4 °C, what will happen with the volume?

- a. The volume doesn't change.
- b. The volume decreases.
- c. The volume increases.

40. Give the first law of thermodynamic.

- a. Heat flows spontaneously from a substance at a higher temperature to a substance at a lower temperature and does not flow spontaneously in the reverse direction.
- b. The internal energy of a system changes from an initial value U_i to a final value of U_f due to heat Q and work W .
- c. Heat flows spontaneously from a substance at a lower temperature to a substance at a higher temperature and does not flow spontaneously in the reverse direction.

41. What equation is used to express the ideal gas law?

- a. $V_i/T_i = V_f/T_f$
- b. $P_i \times V_i = V_f \times P_f$
- c. $R = P \times V/T$

- 42.** The coefficient of performance of a heat pump is 2,5. The heat delivered into a house is 25000J.

How much work has to be done?

- a. 10000 J
- b. 62500 J
- c. 5000 J

- 43.** The frequency of a light wave is $6 \cdot 10^{14}$ Hz. The wavelength of this wave is 500 nm.

Calculate the speed of the light.

- a. $3 \cdot 10^8$ m/s
- b. $3 \cdot 10^7$ m/s
- c. $1,2 \cdot 10^{21}$ m/s

- 44.** The angle of reflection with respect to the normal on a plane mirror is 20 degrees.

Determine the angle of incidence with respect to the mirror.

- a. 20°
- b. 90°
- c. 70°

- 45.** The focal length of a convex mirror is -2 m, an object is at 3 m in front of the mirror.

Determine the distance of the image.

- a. -1,2 m
- b. 1,2 m
- c. $-\frac{5}{6}$ m

- 46.** When the angle of incidence reaches a certain value, called the critical angle θ_c , the angle of refraction is.....

- a. 90°
- b. $< 90^\circ$
- c. 180°

- 47.** Modal dispersion means modes arrive at the fibre end...

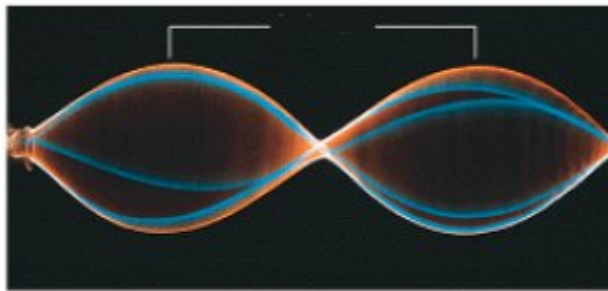
- a. at slightly different times.
- b. at the same time depending on the numerical aperture.
- c. at the same time.

48. The frequency of a wave is 40 Hz.

Calculate the period of this wave.

- a. 0,25 s
- b. 0,025 s
- c. 40 s

49. In a transverse standing wave, how do you call the points depicted by the white lines?



- a. Interference points
- b. Nodes
- c. Antinodes

50. When two waves meet out of phase, we call this....

- a. destructive interference.
- b. neutral interference.
- c. constructive interference.

51. In what kind of material is a specific sound wave the fastest?

- a. In a solid.
- b. In a gas.
- c. In a liquid.

52. When an ambulance with siren leaves you, the frequency of the siren seems to be higher / lower or constant ?

- a. higher
- b. lower
- c. constant