

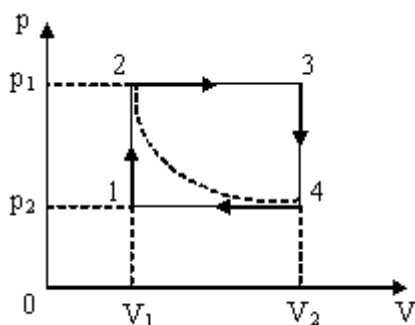
1. A squared timber of 5 kg mass, tied by non-elastic and weightless thread, which is thrown over the disc, to another squared timber of 2 kg mass is placed on an inclined plane forming a 36° angle. Find the acceleration and the direction of the movement of the squared timbers and the force of the tension of the thread. The coefficient of the friction between the first squared timber and the inclined plane is 0.1. Do not pay attention to the mass of the disc and to the friction of the thread to it.

10 points

2. A vessel which volume is 300 cm^3 is separated by heat-proof, moving piston. The volume of the gas on one side of the vessel is 100 cm^3 , on the other side of the vessel is 200 cm^3 . At first, the temperature of the gas on both sides of the piston is 300 K, and the pressure is $1.01 \cdot 10^5 \text{ Pa}$. What pressure sets in on both sides of the vessel if the gas in the smaller part of the vessel is chilled up to 273 K, and warmed up in the biggest part up to 373 K?

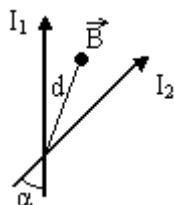
11 points

3. The cycle of the gas of one mole consisting of two isochories and two isobaries is shown in the picture. The temperature in points 1 and 3 is respectively T_1 and T_3 , and points 2 and 4 are the points of one isotherm. Calculate the work the gas does during this cycle.



11 points

4. Two straight continuous currents $I_1 = 1 \text{ A}$ and $I_2 = 2 \text{ A}$ cross in an angle $\alpha = 60^\circ$. The directions of the currents are shown in the picture. Find magnetic induction in the point, which is at the bisector of the angle α at the distance of $d=0,1 \text{ m}$ from the top of the angle. Let's say $\mu = 1$.



9 points

5. The ball, which mass is 20 g, is oscillating at the period of 2 s. At the beginning of the time moment the energy of the ball is 0.01 J and it is 2.5 cm away from the equilibrium position. Write the equation of the harmonics oscillation of the ball and the equation of the return force over time.

9 points