Question block created by wizard

This exam contains 52 questions.

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

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

$M = F \cdot d$

$M_+ = M_-$

$F = \sigma \cdot A$

$F = m \cdot A$

$F_B \cdot b = F_A \cdot a$

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

$F = k \cdot \Delta l$

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

$imp = F \cdot \Delta t$

$p = m \cdot \Delta v$

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

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

$W = Q - \Delta U$

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

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

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

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

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

$f_k = \mu_k \cdot F_N$

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

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

$\mathrm{mfr} = \rho \cdot A \cdot v$

$F = \frac{9}{5}\,^{o}C + 32$

$v_f = v_0 + \Delta v$

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

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

$s = v \cdot t$

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

$v = a \cdot t$

$v_f = v_0 + a \cdot t$

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

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

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

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

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

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

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

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

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

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

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

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

1. What is the name of group 17 of the Periodic Table of Elements?

a. Alkali metals.
b. Halogens.
c. Noble gases.

2. An atom consists of 76 electrons and 115 neutrons.

Determine the atoms mass number.

a. 39
b. 191
c. 151

3. Which of the following expressions is a property of a compound?

a. The properties of a compound are equal to the properties of its elements.
b. A compound consist only of two elements.
c. A compound always contains the same mass ratio of its component atoms.

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

a. Liquids have greater density than solids or gases.
b. A liquids shape is confined to the container it fills.
c. A liquid has a fixed shape.

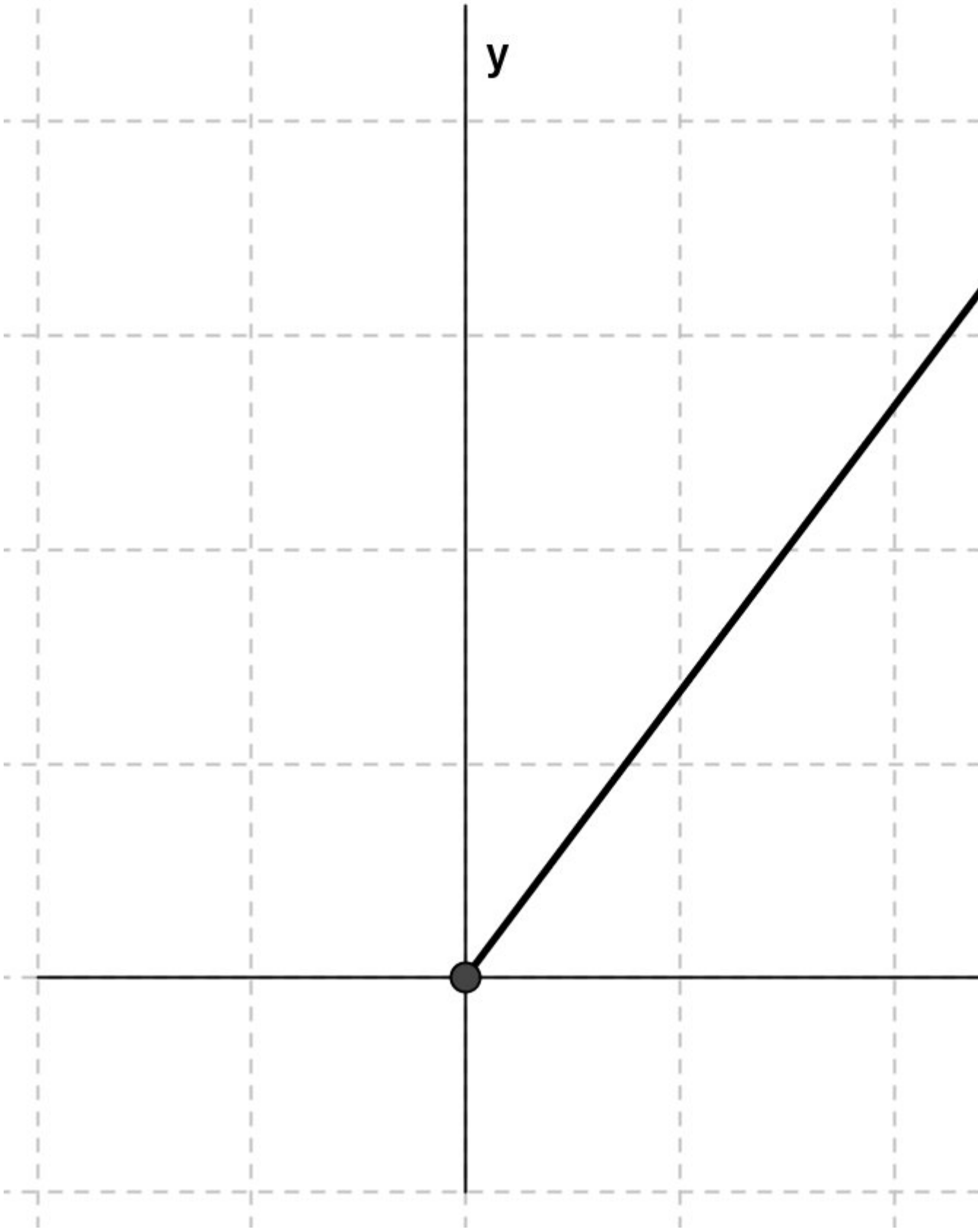
5. Which of the following expressions is a property of a solid.

a. Solids have less density than gases.
b. Solids are extremely difficult to compress.
c. There are almost no forces of attraction between the particles of a solid.

6. How do you call the change of matter from liquid to solid?

a. Evaporating.
b. Freezing.
c. Subliming.

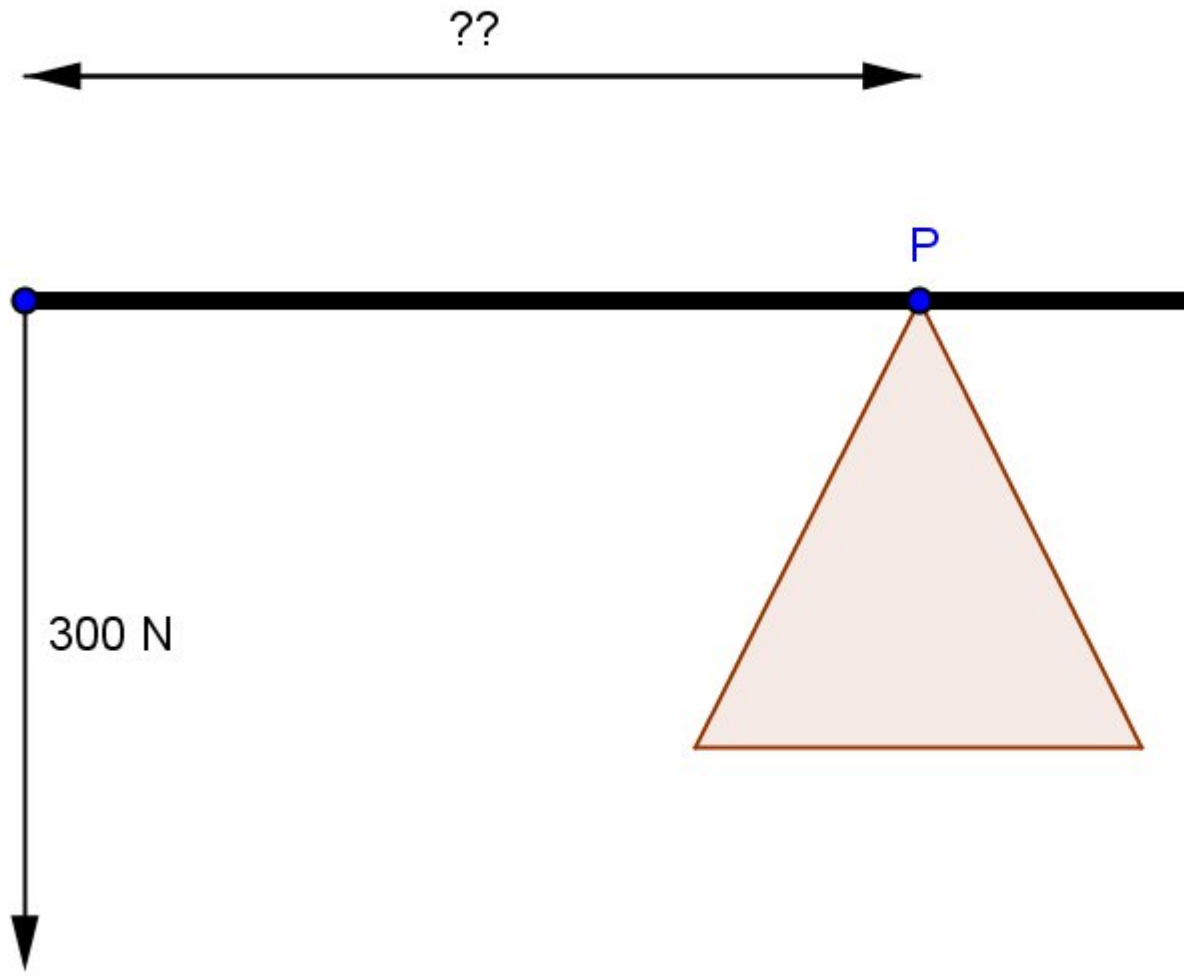
7. Calculate the force that causes a horizontal displacement.



a. 1000 N
b. 750 N
c. 625 N

8. An 8 meter long beam is supported in a movable pivot point. The beam must be balanced. At the left end of the beam works a force of 300 N, at the right end and force of 450 N.

Determine the pivot point measured from the left side of the bar.

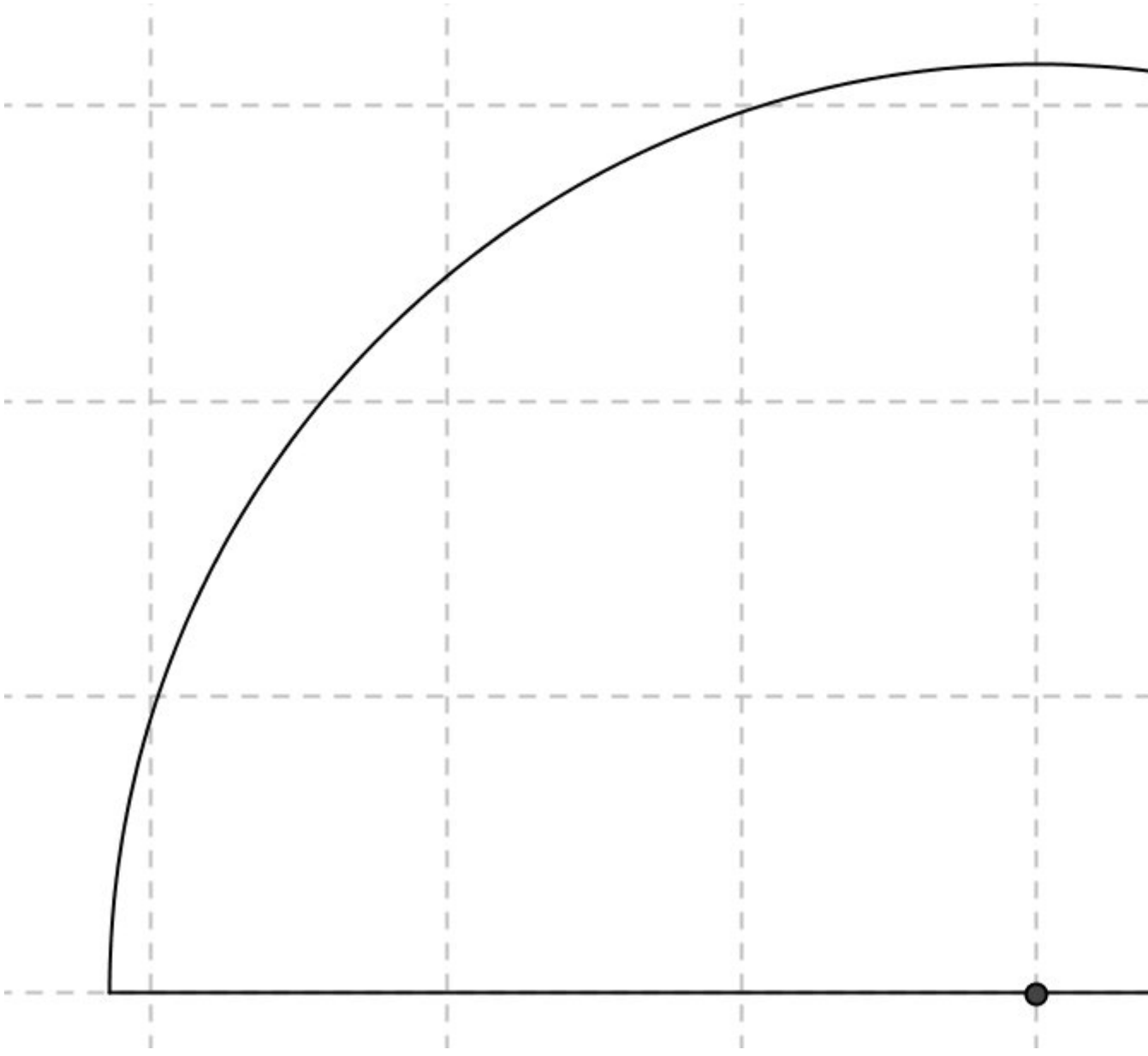


a. 3,2 m
b. 4 m
c. 4,80 m

9. To determine the centre of gravity of a three dimensional body you can use the method of....

a. equating the CG of several parts of the body.
b. measuring the CG of several parts of the body.
c. measuring and equating moments.

10. Calculate the centre of gravity of a semicircle with a radius of π m.



a. 0,75 m
b. 1,04 m
c. 1,33 m

11. Stress measures the average force per unit area of a surface within a deformable body....

a. as a reaction to internal forces.
b. as a reaction to external forces.
c. on which internal forces act.

12. An atom consists of 58 neutrons and its mass number is 103.

Determine the atoms atomic number.

a. 0,22
b. 45
c. 161

13. If an object is floating, the....

a. weight of the object > buoyant force.
b. weight of the object < buoyant force.
c. weight of the object = buoyant force.

14. An airplane is taxiing on the runway with a speed of 72 km/h. The length of the runway is 2400 m.

Calculate how much time is needed to taxi the full length of the runway?

a. 30 s
b. 0,33 h
c. 2 min

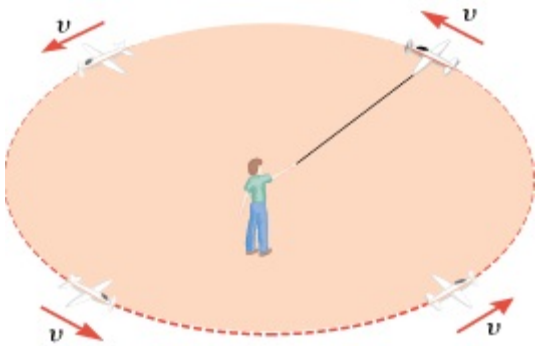
15. What kind of quantity is acceleration?

a. Vector quantity.
b. Scalar quantity.
c. Depending on the speed it can be a scalar or a vector quantity.

16. The acceleration of a free falling body is called the acceleration due to....

a. the velocity of the object.
b. the mass of the object.
c. gravity.

17. Why does the direction of the velocity vector change in each point?



a. Because the speed gets an acceleration, the centrifugal acceleration.
b. Because the speed gets an acceleration, the centripetal acceleration.
c. The speed gets an acceleration, the centripetal deceleration.

18. A pendulum has a period time of 4π s.

Calculate the length of the pendulum.

a. 2,5 m
b. 0,4 m
c. 40 m

19. A spring has a constant of 2,5 N/cm.

Calculate the force to pull out the spring 3,5 cm.

a. 1,4 N
b. 8,75 N
c. 0,7 N

20. Which combination of gears gives a reduction of the output torque?

a. The output gear has more teeth than the input gear.
b. Output gear less teeth than the input gear.
c. The number of teeth of input and output gear are equal.

21. 20 kg = ... g

a. 20000
b. 2000
c. 200

22. Which of the next units are SI units?

a. Meter (m) and kilogram (kg).
b. Second (s) and meter per second (m/s).
c. Meter per second (m/s) and kilogram (kg).

23. What is the first step toward ensuring accuracy and reproducible units in which measurements are made?

a. Making the measurements reproducible as possible.
b. An international agreement.
c. Defining the units.

24. A car is accelerating with 3 m/s^2 and it has a mass of 1200kg.

Calculate the force that the engine must provide minimal.

a. 3600 N
b. $2{,}5 \cdot 10^{-3}$ N
c. 400 N

25. What unit belongs to inertia?

a. m/s
b. kg
c. m/s^2

26. The SI-unit of work (Nm) is referred to as one....

a. Watt.
b. Joule.
c. Ohm.

27. A ball with a mass of 2 kg is falling down from a height of 40m.

Calculate the work that is done on the ball when he is at a height of 20 m. (g= $10m/s^2$).

a. 40 J
b. 400 J
c. 0,5 J

28. The definition of "conservation of linear momentum" states that....

a. it is not necessary that the vector sum of the external forces acting on a system has to be zero.
b. the vector sum of the external forces acting on a system is zero.
c. the vector sum of the internal forces of a system is zero.

29. You hit a ball with a force of 300 N during 3 ms.

Calculate the impulse the ball will get.

a. 100.000 Ns
b. 0,9 Ns
c. $1 \cdot 10^{-5}$ Ns

30. What two kind of gyroscopes do we know?

a. Mechanical and not mechanical.
b. Mechanical and air driven.
c. Mechanical and motor driven.

31. An object is about to slide over a surface.

What can you tell about the f_s^{max} and the f_k?

a. $f_s^{max} = f_k$
b. $f_s^{max} < f_k$
c. $f_s^{max} > f_k$

32. The specific gravity of ethyl alcohol is 0,806.

Determine the density of ethyl alcohol.

a. 0,806
b. 0,806 kg/dm³
c. 1,24

33. The density of hydraulic oil is 8 kg/dm³. The volume of a tank filled with oil is 3,2 m³.

Calculate the mass of this oil.

a. 25,6 kg
b. 25600 kg
c. 2500 kg

34. What answer correponds to a property of a liquid with low viscosity?

a. Within a pipe of uniform cross section, every layer of an ideal fluid moves with different velocity.
b. Within a pipe of uniform cross section, every layer of an ideal fluid moves with the same velocity.
c. Within a pipe every layer of an ideal fluid moves with different velocity.

35. Which is Bernoulli's equation?

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

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

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

36. The thermocouple makes use of two junctions.

What are the names of these junctions?

a. Cold- and Reference-junction.
b. Cold- and Hot-junction.
c. Hot- and Reference-junction.

37. Heat is a kind of energy thus has the unit:

a. W/°C
b. Joule
c. W/s

38. How do we calculate the specific heat capacity (c) with the aid of the equation: $Q = c \times m \times \Delta T$?

a. $c = Q \times m / \Delta T$
b. $c = Q \times m \times \Delta T$
c. $c = Q / (m \times \Delta T)$

39. Give the unit of the coefficient of volumetric expansion.

a. $m^3/°C$
b. $°C^{-1}$
c. $°C/m^3$

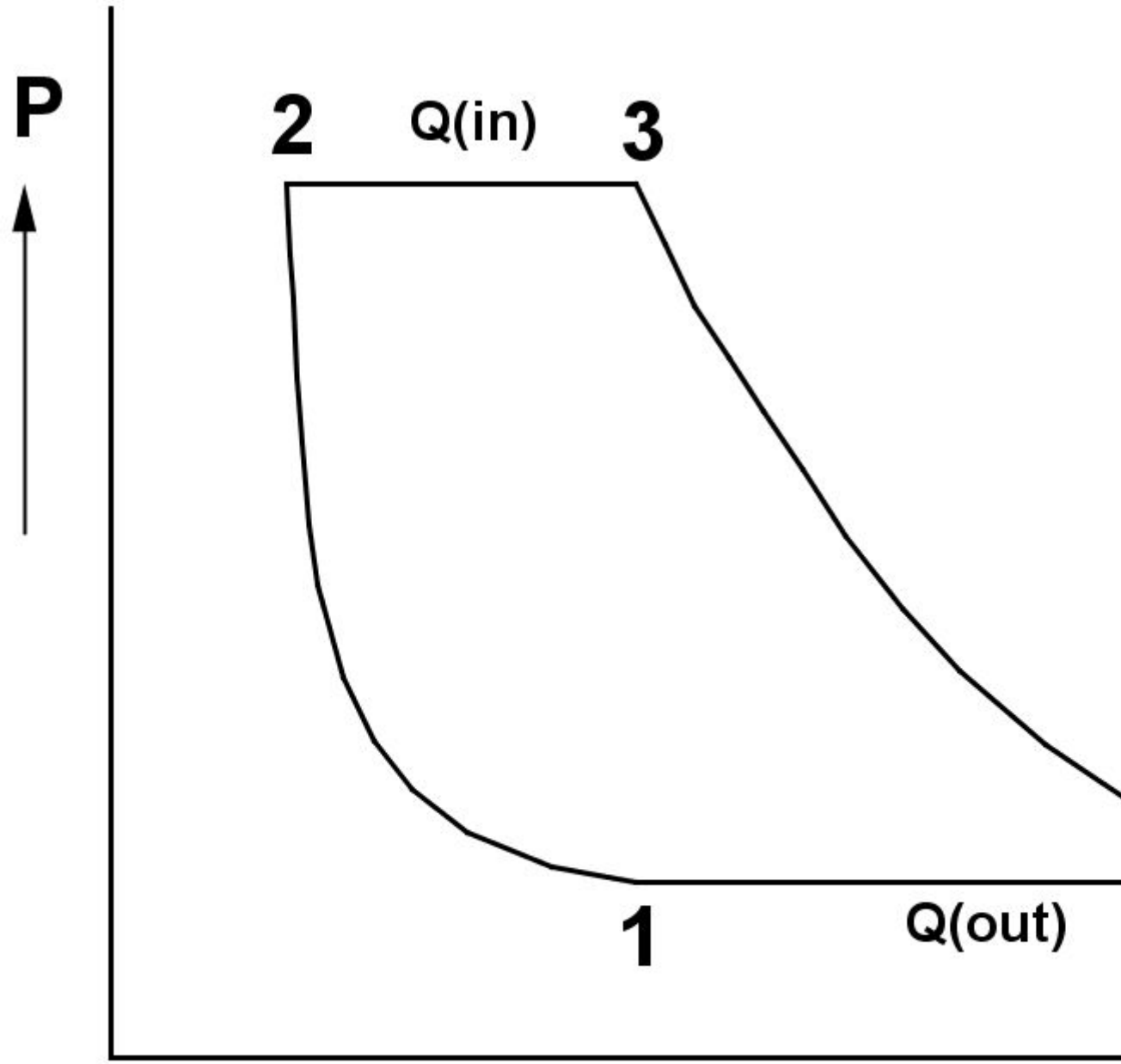
40. Give the second law of thermodynamic.

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 tot 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. Give the ideal gas law.

a. The absolute pressure p of an ideal gas is directly proportional to the Kelvin temperature T and the number of molecules of the gas and is directly proportional to the volume V of the gas.
b. The absolute pressure p of an ideal gas is directly proportional to the Kelvin temperature T and the number of molecules of the gas and is inversely proportional to the volume V of the gas.
c. The absolute pressure p of an ideal gas is inversely proportional to the Kelvin temperature T and the number of molecules of the gas and is directly proportional to the volume V of the gas.

42. The figure represents the process of a gas turbine motor.



What happens during the step 4 to1?

a. The exhaust, removal of heat and the combustion gases under a constant volume.
b. The exhaust, removal of heat and the combustion gases under a constant pressure.
c. The combustion of fuel under constant pressure.

43. The speed of an electromagnetic wave is $2{,}5 \cdot 10^8$ m/s, the frequency of this wave is $5 \cdot 10^6$ Hz.

Calculate the wavelength of this wave.

a. 50 m
b. 2 cm
c. 1,25 Mm

44. The angle of incidence of a light beam on a plane mirror is 50^o with respect to the mirror.

Determine the angle of reflection with respect to the normal.

a. 40 °
b. 90 °
c. 50 °

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

Determine the distance of the image.

a. -6 m
b. $^1/_6$ m
c. 6 m

46. When light passes from a medium of larger refractive index into one of smaller refractive index, the refractive ray bends....

a. towards the normal.
b. along the surface.
c. away from the normal.

47. The number of modes in multimode fibres depends on...

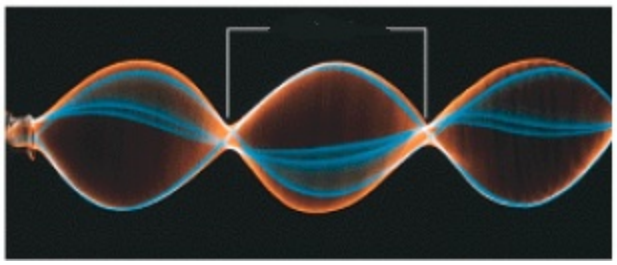
a. only the core size.
b. core size and numerical aperture.
c. only the numerical aperture.

48. The frequency of a wave is 20 Hz.

Calculate the period of this wave.

a. 0,05 s
b. 20 s
c. 0,5 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 in phase, we call this....

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

51. The speed of sound is depending on a number of variables. Which variable?

a. Wave length.
b. Volume.
c. Boltzmann constant.

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

a. higher
b. constant
c. lower