Question block created by wizard

This exam contains 52 questions.

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

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

$$M = F \cdot d$$

$$M_+ = M_-$$

$$F = \sigma \cdot A$$

$$F = m \cdot A$$

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

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

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

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

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

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

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

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

$$W = Q - \Delta U$$

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

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

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

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

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

$$f_k = \mu_k \cdot F_N$$

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

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

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

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

$$v_f = v_0 + \Delta v$$

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

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

$$s = v \cdot t$$

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

$$v = a \cdot t$$

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

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

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

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

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

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

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

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

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

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

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

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

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

1. The particles of an atom can have an electrical charge.

Which particle has a positive charge?

a. Electron.
b. Neutron.
c. Proton.

2. Which particles determine the volume of an atom?

a. Electrons in their shells.
b. Protons in the nucleus.
c. Neutrons in the nucleus.

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

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

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

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

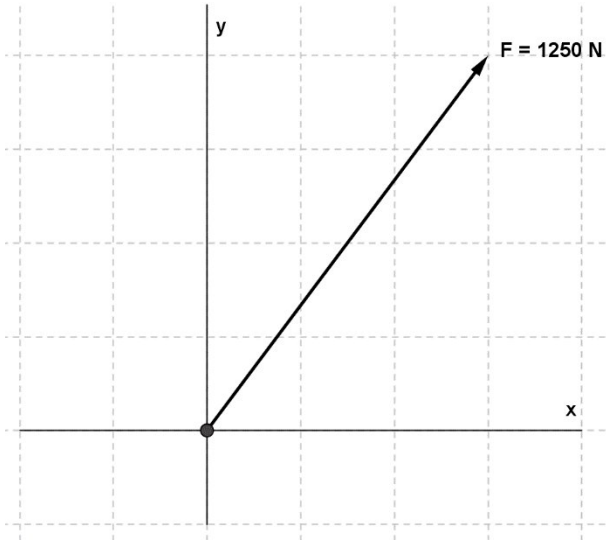
5. Which of the following expressions is a property of a solid.

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

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

a. Subliming.
b. Melting.
c. Cooking.

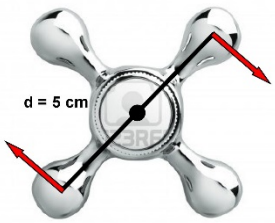
7. Calculate the force that causes a vertical displacement.



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



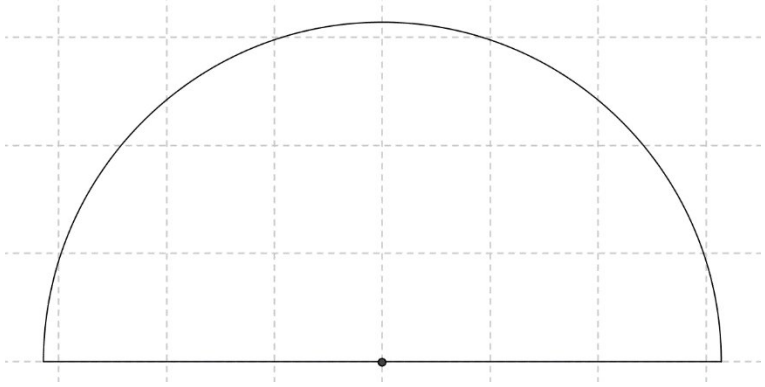
a. 5 Nm
b. 1,25 Nm
c. 2,5 Nm

9. In any rigid extended body is a unique point at which the total gravitational force acts.

Give another name for this total gravitational force.

a. Gravity (m/s²).
b. Weight (N).
c. Mass (kg).

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



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

11. What kind of external forces cause stress?

a. Body forces.
b. Surface forces.
c. Both, surface- and body forces.

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

Determine the number of neutrons in this atom.

a. 43
b. 15
c. 2,07

13. It's important to know some units of pressure.

1 bar = ... N/m^2

a. $1 \cdot 10^5$
b. 1
c. $1 \cdot 10^3$

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

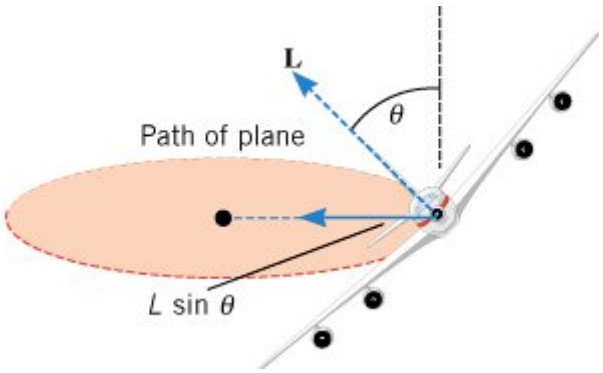
15. What kind of quantity is acceleration?

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

16. During a free fall, the air resistance is....

a. negligible and the acceleration is constant.
b. negligible and the acceleration is not constant.
c. not negligible and the acceleration is not constant.

17. Why does a pilot bank or tilt a plane at an angle to make a turn?



a. To create the centripetal force.
b. To create the centripetal acceleration.
c. To create the centrifugal force.

18. In which part of the perpendicular movement equals the speed of the pendulum 0 (zero) m/s?

a. In the extreme positions.
b. In the equilibrium position.
c. Halfway the extreme and the equilibrium position.

19. If the angular speed of a harmonic motion decreases, what will happen to with the period of this harmonic motion?

a. Angular speed and period are not related.
b. The period will increase.
c. The period will decrease.

20. "It is a measure of the force amplification achieved by using a tool, mechanical device or machine system".

This is the description of....

a. law of gear trains.
b. law of the lever.
c. mechanical advantage.

21. 592 mg = ... dg

a. 0,592
b. 5,92
c. 0,0592

22. Which definition is the definition of mass?

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

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

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

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 N
b. < - 300N
c. > - 300 N

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

An object under influence of a force....

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

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

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

27. If work is done on an object, the object will move.

Is it possible for a moving object to do work?

a. If it is allowed to push or pull another object.
b. Only if it is allowed to push another object.
c. Only if it is allowed to pull another object.

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 internal forces of a system is zero.
c. the vector sum of the external forces acting on a system is zero.

29. The impulse-momentum theorem states that....

a. the work done by a net-force is not equal to the change in the object's kinetic energy.
b. the work done by a net-force is equal to the change in the object's kinetic energy.
c. the impulse produced by a net-force is equal to the change in the object's momentum.

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. In which situation: 1, 2 or 3 is the normal force the biggest? (The mass of the blocks is equal in each situation.)

a. In situation 3.
b. They are equal in each situation.
c. In situation 1 and 2.

32. What concept do we use to compare densities?

a. Mass density.
b. Density.
c. Specific gravity.

33. When I have 2,5 dm^3 steel with a density of 7,8 kg/dm^3.

Calculate its mass.

a. 0,32 kg
b. 19,5 kg
c. 3,12 kg

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 dm^2.

a. 40 kg/dm^3
b. 4 kg/dm^3
c. 1 kg/dm^3

35. When using Bernoulli's equation:

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

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

The pressure...

a. decreases.
b. increases.

c. stays the same.

36. The thermocouple makes use of two junctions.

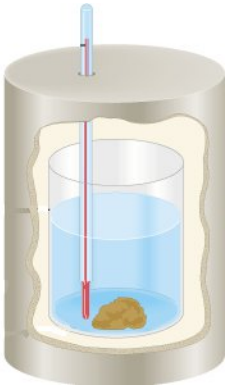
What are the names of these junctions?

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

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

a. 16000 J
b. 36000 J
c. 4,44 J

38. What is the name of the apparatus shown in the picture?



a. Joulemeter.
b. Calorimetry.
c. Calorimeter.

39. If the coefficient of linear expansion is given.

What is than the coefficient of volumetric expansion?

a. $3\beta = \alpha$
b. $\beta = \alpha/3$
c. $\beta = 3\alpha$

40. Give the second law of thermodynamic.

a. 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.
b. 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.
c. 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.

41. Give Boyle's law.

a. At a constant temperature, the absolute pressure of a fixed mass (fixed number of molecules) of a low-density gas is inversely proportional to its volume.
b. At a constant temperature, the pressure of a fixed mass (fixed number of molecules) of a low-density gas is directly proportional to its volume.
c. At a constant temperature, the absolute pressure of a fixed mass (fixed number of molecules) of a low-density gas is direct proportional to its volume.

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. $1{,}2 \cdot 10^{21}$ m/s
b. $3 \cdot 10^{8}$ m/s
c. $3 \cdot 10^{7}$ 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. 70 ^{o}
b. 90 ^{o}
c. 20 ^{o}

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. - $^{5}/_{6}$ m
c. -1,2 m

46.

When the angle of incidence reaches a certain value, called the critical angle θc, the angle of refraction is.....

a. < 90 ^{o}
b. 90 ^{o}
c. 180 ^{o}

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

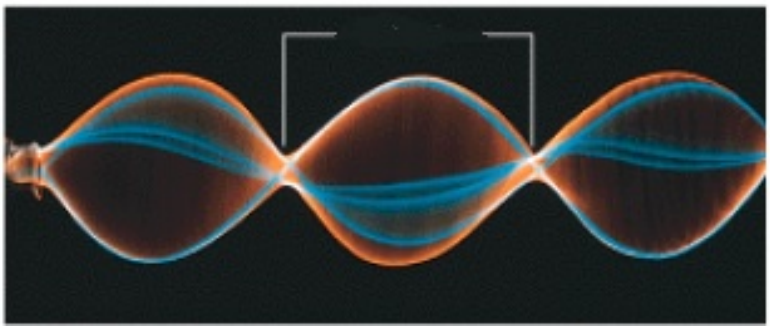
a. at the same time depending on the numerical aperture.
b. at slightly different times.
c. at the same time.

48. The frequency of a wave is 40 Hz.

Calculate the period of this wave.

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

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



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

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

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

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

a. Air density and volume of the air.
b. Temperature and volume of the air.
c. Density and temperature of the air.

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

a. higher
b. constant
c. lower