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. The group number equals the ...

a. the total number of electrons of an atom.
b. number of shells.
c. number of electrons in the outer shell.

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. The properties of a compound are equal to the properties of its 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 much greater density than gases.
b. Liquids have no surface, and no fixed shape or volume.
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.

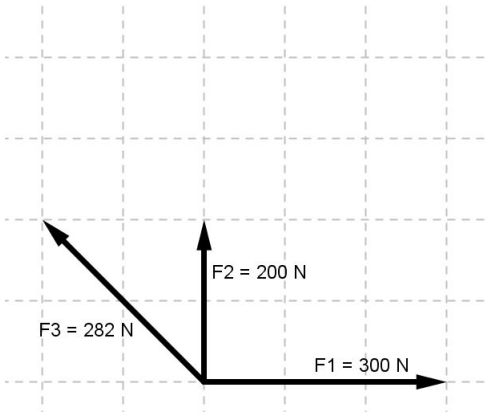
a. Solids have less density than gases.
b. Solids are extremely difficult to compress.
c. There are almost no forces of attraction between the particles of a solid.

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

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

7. Three forces are acting upon an object; F1+ F2+F3. They create a resulting force FR.

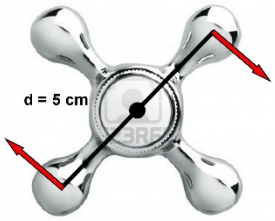
Determine the magnitude of the resultant force FR.



a. 100 √(16) N
b. 100 √(17,6) N
c. 100 √(17) N

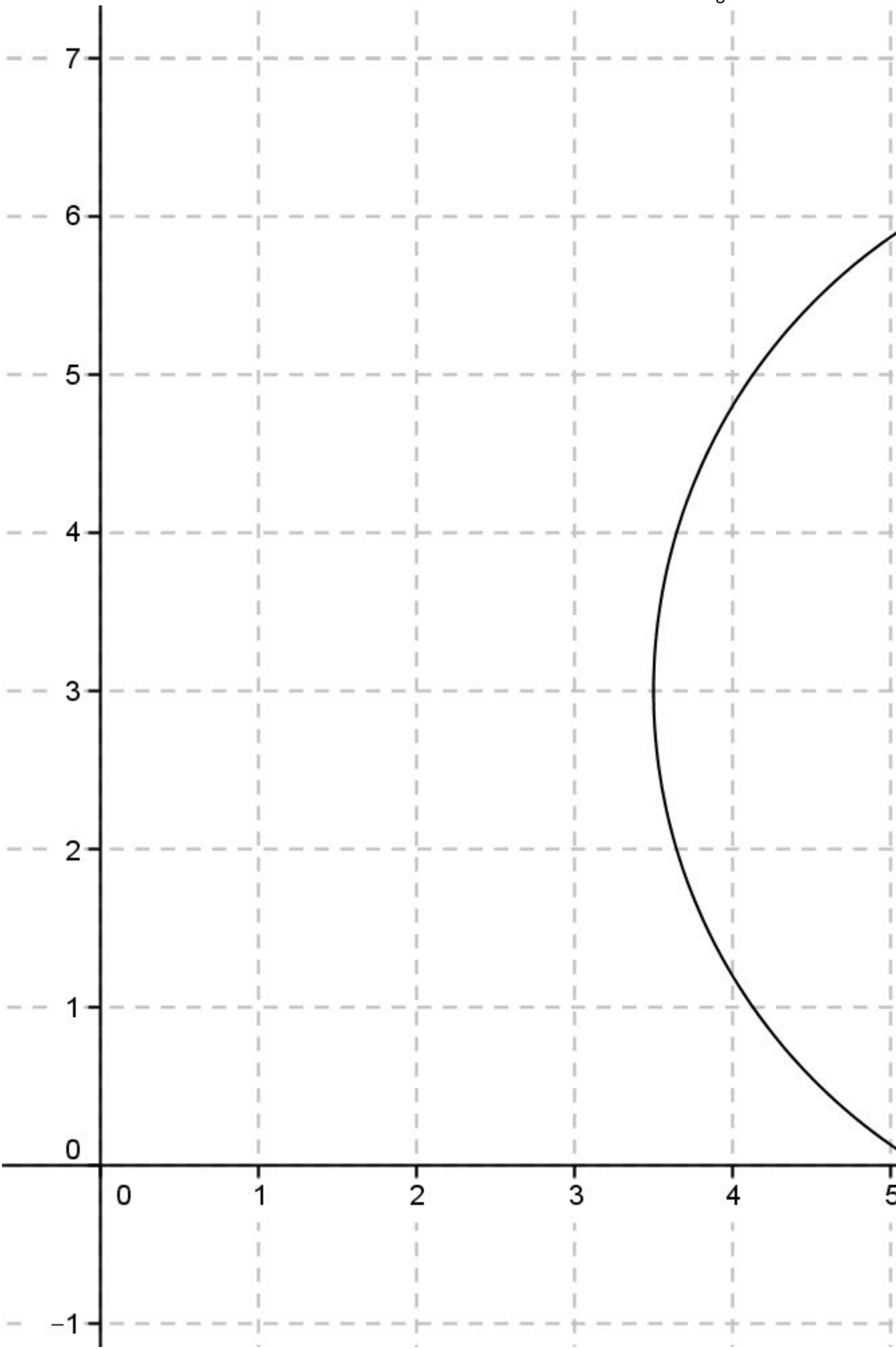
8. On a wheelop cross key two forces are acting. Each force equals 50 N and the diameter of the tap is 5 cm.

Determine the moment of this couple of forces.



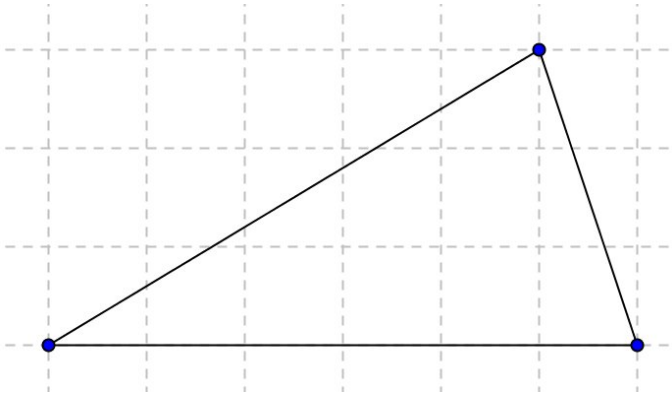
a. 5 Nm
b. 2,5 Nm
c. 1,25 Nm

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


7
6
5
4
3
2
1
0
−1
0
1
2
3
4
5

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

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. 2,0 m
c. 0,5 m

11. What kind of external forces cause stress?

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

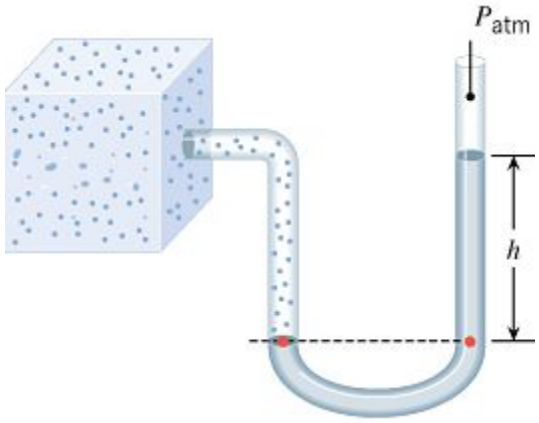
12. An atom consists of 14 protons and its mass number is 29.

Determine the number of neutrons in this atom.

a. 2,07
b. 43
c. 15

13. A pressure gauge is filled with mercury with a density of 12,5 kg/dm^3. The height of the mercury in the right tube is 50 cm related to the height in the left tube. The atmospheric pressure is $1 \cdot 10^5$ Pa.

Calculate the pressure in the container left.



a. 1,675 bar
b. 32,5 kPa
c. 1675 kPa

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. 2 min
c. 0,33 h

15. An airplane is accelerating to take-off. Its initial speed was 0 m/s and the final speed is 45 m/s. The time for this take-off was 10 s.

Calculate the acceleration of the plane.

a. 0,22 m/s^2
b. 4,5 m/s^2
c. 450 m/s^2

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. 400 m
b. 20 m

c. 80 m

17. In what direction does the centrifugal acceleration work?

a. Perpendicular on the centripetal acceleration.
b. Opposite direction of the centripetal acceleration.
c. Opposite direction of the speed of the circular motion.

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

Calculate the length of the pendulum.

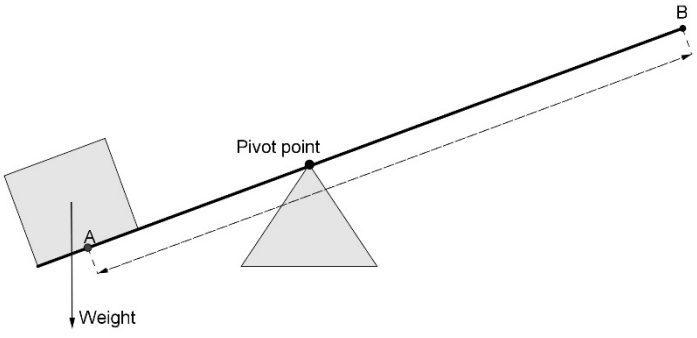
a. 2,5 m
b. 40 m
c. 0,4 m

19. If the angular speed of a harmonic motion increases, what will happen to the frequency of this harmonic motion?

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

20. We are using a lever with a length of 2 m (A,B) and a pivot point at 0,5 m relative to A. We use the lever to lift a crate with a weight of 2,4 kN.

Calculate the force we have to exert to lift the crate.



a. 0,8 kN
b. 1600 N
c. 600 N

21. 592 mg = ... dg

a. 0,0592

b. 0,592
c. 5,92

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. Where is the mass of an object depending on?

a. The number of protons and neutrons in the core of the atoms.
b. A variety of quantities.
c. Definition of the used 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. < - 300N
b. > - 300 N
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. will accelerate.
c. gives a positive reaction force.

26. I push a car over 400 m with a force of 600 N.

Calculate the work I have done.

a. 240.000 J
b. 0,67 J
c. 1,5 J

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. 400 J

b. 0,5 J
c. 40 J

28. A ball has a momentum of 1,2 kg·m/s and a mass of 200 g.

Calculate the velocity of the ball.

a. 6 m/s
b. 0,16 m/s
c. 0,24 m/s

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

Calculate the impulse the ball will get.

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

30. Which law applies to a gyroscope?

a. The first law of Newton
b. The law of conservation of momentum.
c. The law of conservation of angular momentum.

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

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

32. What concept do we use to compare densities?

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

33. The density of hydraulic oil is 8 kg/dm^3. The volume of a tank filled with oil is 3,2 m^3.

Calculate the mass of this oil.

a. 25,6 kg
b. 2500 kg
c. 25600 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. stays the same.
b. increases.
c. decreases.

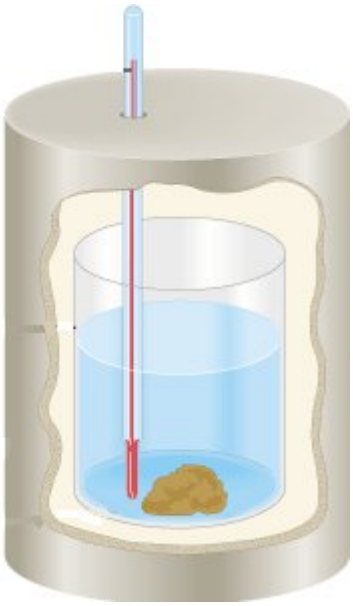
36. Calculate: 60°C = ...°F

a. 76 °F
b. 140 °F
c. $65^1/_3$ °F

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

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



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

39. If the coefficient of linear expansion is given.

What is than the coefficient of volumetric expansion?

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

40. The internal energy of a gas decreases with 1500J, the supplied heat is 2500J.

Calculate the work done on the gas.

a. W= -1000 J
b. W= 4000 J
c. W= 1000 J

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 direct proportional to its volume.

b. 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.
c. 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.

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. 62500 J
b. 10000 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. $3 \cdot 10^{7}$ m/s
b. $1{,}2 \cdot 10^{21}$ m/s
c. $3 \cdot 10^{8}$ 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. 70 °
c. 90 °

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. $-{}^{5}/_{6}$ m
b. 1,2 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 °
b. < 90 °
c. 180 °

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

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

48. The frequency of a wave is 40 Hz.

Calculate the period of this wave.

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

49. The wave length is 500m, the frequency is 20Hz.

Calculate the speed of the wave.

a. 0,04 m/s
b. 10.000 m/s
c. 25 m/s

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

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

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

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