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 period number equals the ...

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

2. Is water, H_20, a molecule, an atom or a halogen?

a. Atom.
b. Molecule.
c. Halogen

3. Is it possible to break down a compound in chemical way?

a. No, it is not possible.
b. Yes, it is possible.
c. Yes, but chemical and physical is possible.

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.

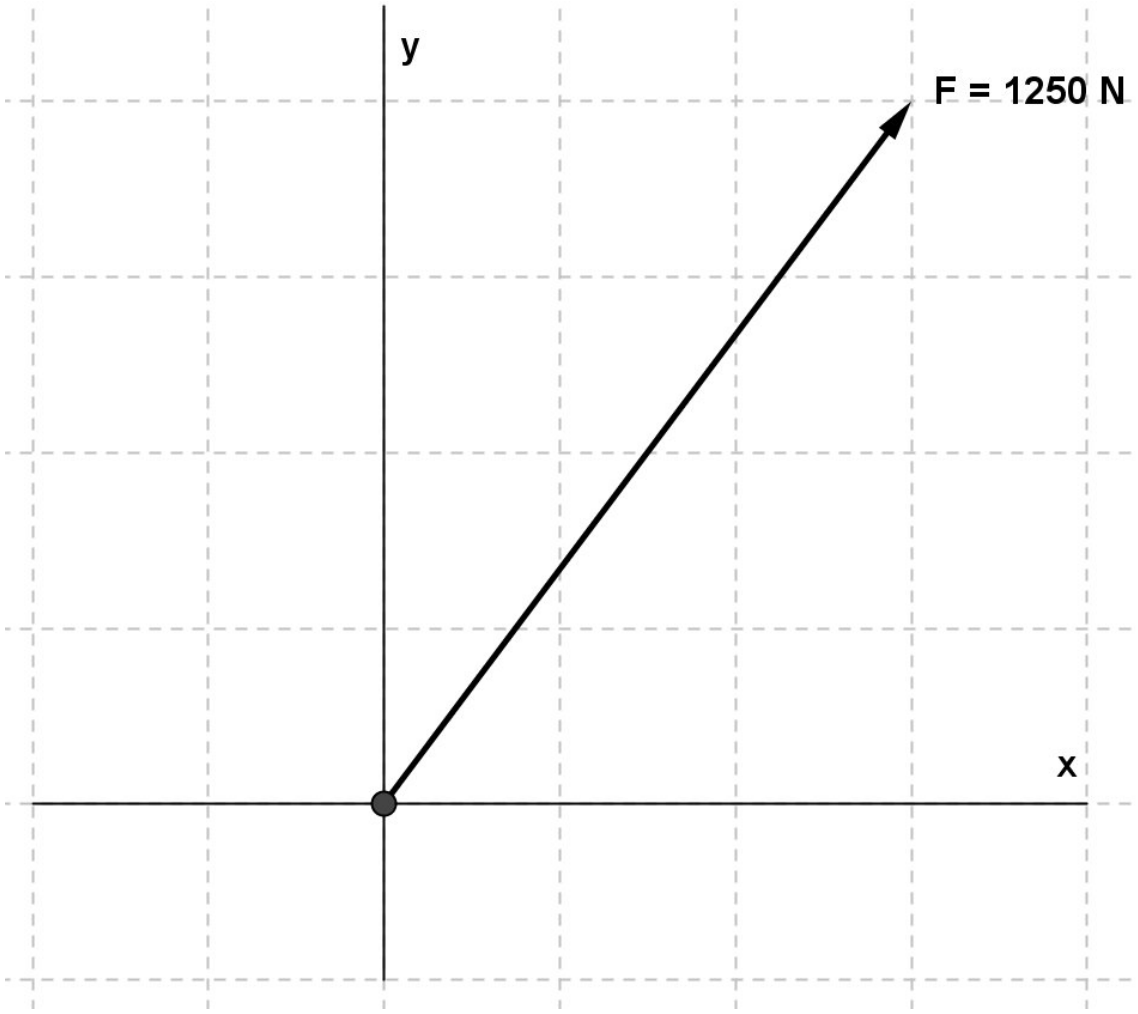
5. Which of the following expressions is a property of a gas?

a. Gases consist of freely moving atoms or molecules, without a definite shape or volume.
b. Gases have a higher viscosity than liquids and solids.
c. Gases consist of moving atoms or molecules, with a definite shape or volume.

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

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

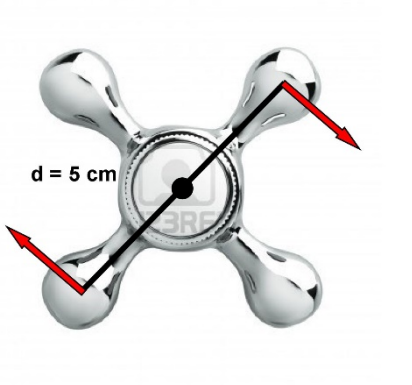
7. Calculate the force that causes a horizontal displacement.



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.

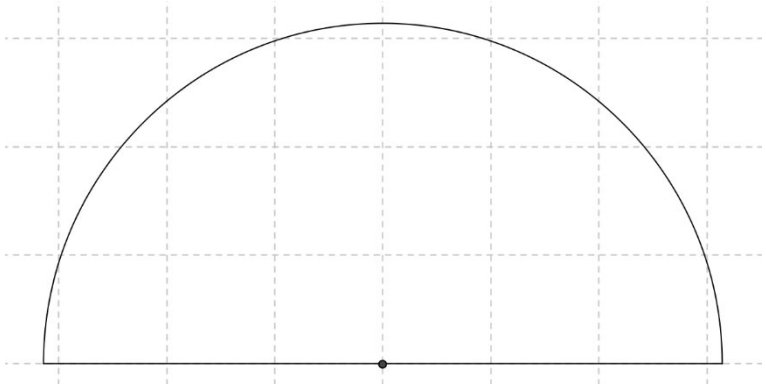


a. 5 Nm
b. 2,5 Nm
c. 1,25 Nm

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

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

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



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

11. The Young's modules is used to calculate?

a. The tension in an object.

b. The stretching of an object.
c. The tear or torsion of an object.

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. A cylindrical tank is partially filled with oil with a density of 800 kg/m^3. The pressure on the bottom of the tank is 20.000 Pa.

Calculate the height of the oil in the tank.

a. 0,25 m
b. 2,5 m
c. 25 m

14. If we say: "A car is travelling with 20 m/s due to east.", do we talk about speed, velocity or acceleration?

a. Acceleration.
b. Velocity.
c. Speed.

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.

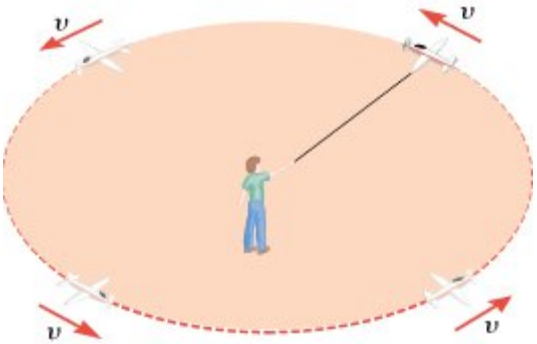
a. 0,22 m/s^2
b. 4,5 m/s^2
c. 450 m/s^2

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

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

17. A model airplane on a guideline. The radius of the circular motion is 3m. The periodic time is 1,5π second.

Calculate the velocity of the model airplane.



a. 1,11 km/h
b. 9,86 m/s
c. 4 m/s

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

Calculate the length of the pendulum.

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

19. What is a "driven motion"?

a. Exerting a "force" on an oscillating object to decrease the oscillation.
b. Exerting a "reactive force" on an oscillating object to maintain the oscillation.
c. Exerting a "force" on an oscillating object, to maintain the oscillation.

20. A gear train consists of two gears, input gear with 200 teeth and the output gear with 20 teeth.

Calculate the velocity ratio of this gear train.

a. 0,5
b. 0,1
c. 10

21. 12.000 μg = ... kg

a. 0,000012
b. 0,0012

c. 0,12

22. Which definition is the definition of mass?

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

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

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

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. "Inertia is the natural tendency of an object to remain at rest or in motion at a constant speed along a straight line."

This is the....

a. second law of Newton.
b. third law of Newton.
c. first law of Newton.

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

Calculate the work I have done.

a. 1,5 J
b. 0,67 J
c. 240.000 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. 0,16 m/s
b. 0,24 m/s
c. 6 m/s

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

Calculate the impulse the ball will get.

a. 0,9 Ns
b. $1 \cdot 10^{-5}$ Ns
c. 100.000 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. 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. Determine the specific gravity of blood with a density of 1060 kg/m^3

a. 1,06
b. 0,94 kg/m^3
c. 0,94

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

Calculate its mass.

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

34. What is a streamline in a fluid or gas flow?

A streamline is a line drawn in the fluid such that a....

a. cosine to the streamline at any point is parallel to the fluid velocity at that point.
b. tangent to the streamline at any point is parallel to the fluid velocity at that point.
c. sine to the streamline at any point is perpendicular to the fluid velocity at that point.

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. stays the same.
c. increases.

36. Calculate: 60°C = ...°F

a. 140 °F
b. $65^1/_3$ °F
c. 76 °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. 4,44 J
b. 16000 J
c. 36000 J

38. Give the definition of heat conduction.

Conduction is the process...

a. in which energy is transferred by means of electromagnetic waves.
b. in which heat is carried from place to place by the bulk movement of a fluid or gas.

c. whereby heat is transferred directly through a material, any bulk motion of the material playing no role in the transfer.

39. 2000m^3 Water (volume of a swimming pool) is heated from 10^{o}C to 30^{o}C. (β_{water} = 2,1·10^{-4}/^{o}C)

Calculate the volume expansion of the water at 30^{o}C?

a. 8,4 m^3
b. 6,1 m^3
c. 2008,4 m^3

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= -1000 J
c. W= 4000 J

41. Calculate the specific gas constant of 2 kg gas, with a specific heat capacity with constant volume of 6 J/K.

a. 18 J/(kgK)
b. 0,5 J/(kgK)
c. 2 J/(kgK)

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 6·10^{14} Hz. The wavelength of this wave is 500 nm.

Calculate the speed of the light.

a. 1,2·10^{21} m/s
b. 3·10^7 m/s
c. 3·10^8 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. 70 °
b. 90 °
c. 20 °

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. $-\frac{5}{6}$ 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 °
b. < 90 °
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. 40 s
b. 0,25 s
c. 0,025 s

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

Calculate the speed of the wave.

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

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

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

51. The power of a sound source is 5π W. Calculate the sound intensity on a distance of 10 m of the source.

a. $1{,}25 \cdot 10^{-2}$ W/m^2
b. 5 W/m^2
c. $\pi \cdot 10^{3}$ W/m^2

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

a. constant
b. higher
c. lower