

Question block created by wizard

This exam contains 52 questions.

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

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

$$M = F \cdot d$$

$$M_+ = M_-$$

$$F = \sigma \cdot A$$

$$F = m \cdot A$$

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

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

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

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

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

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

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

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

$$W = Q - \Delta U$$

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

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

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

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

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

$$f_k = \mu_k \cdot F_N$$

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

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

$$mfr = \rho \cdot A \cdot v$$

$$F = \frac{9}{5} \cdot ^\circ C + 32$$

$$v_f = v_0 + \Delta v$$

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

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

$$s = v \cdot t$$

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

$$v = a \cdot t$$

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

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

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

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

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

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

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

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

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

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

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

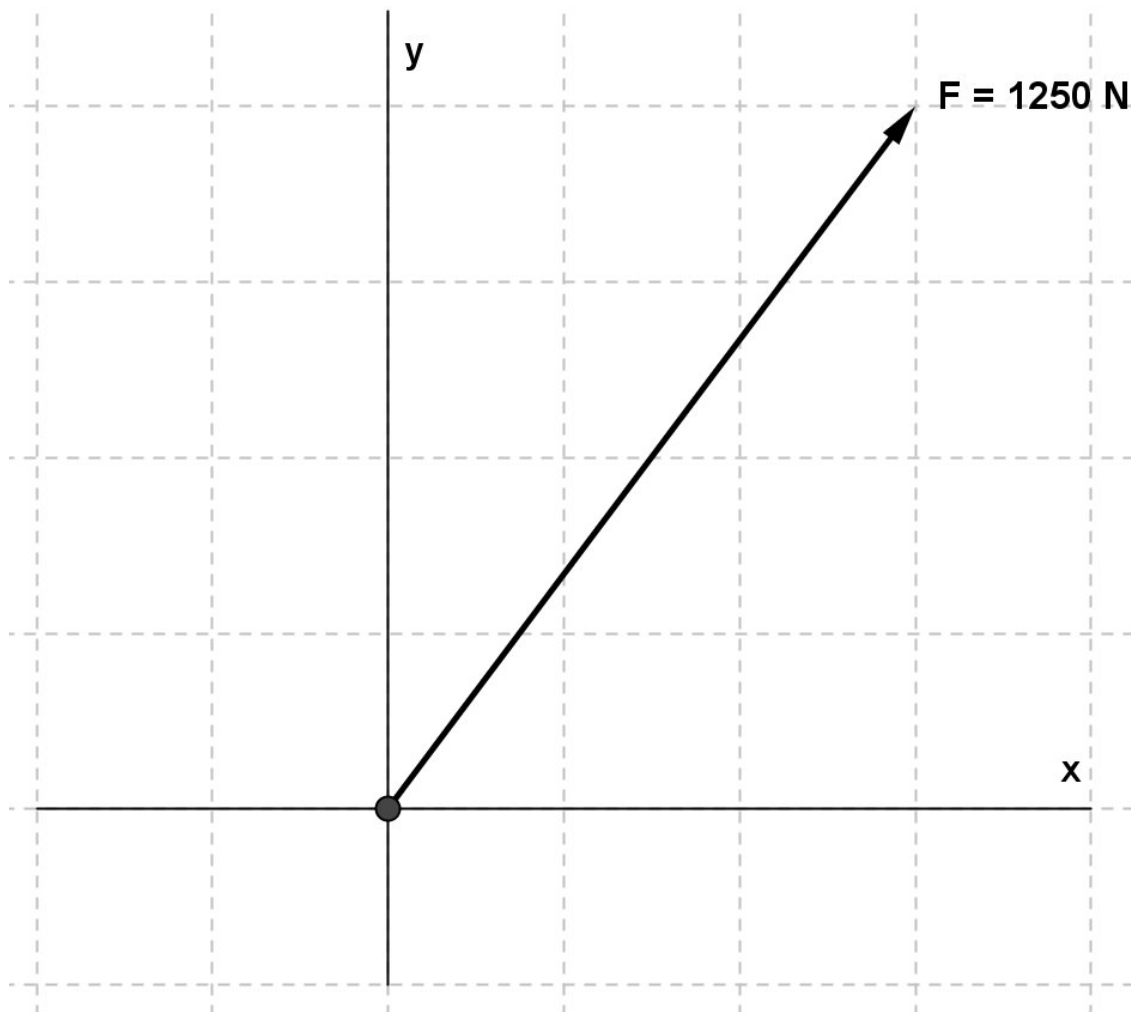
$$I = \frac{P}{A}$$

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

1. The period 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.** An atom consists of 14 protons and its mass number is 29.
Determine the number of neutrons in this atom.
- 2
 - 15
 - 43
- 3.** When you break down a compound, do you get one, two or more kind of atoms?
- One kind of atoms.
 - Two or more kind of atoms.
 - Two kind of atoms.
- 4.** Which of the following expressions is a property of a liquid?
- There are very strong forces of attraction between the particles of a liquid.
 - Liquids have no surface, and no fixed shape or volume.
 - Liquids have much greater density than gases.
- 5.** Which of the following expressions is a property of a solid?
- A solid has no fixed shape.
 - A solid will expand a little on heating.
 - It is not possible to change the volume of a fixed mass of a solid.
- 6.** How do you call the change of matter from liquid to solid?
- Subliming.
 - Freezing.
 - Evaporating.

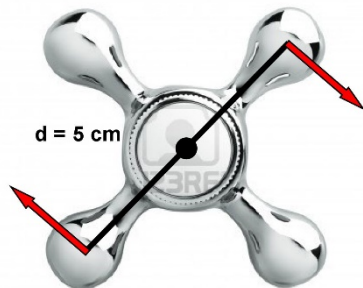
7. Calculate the force that causes a horizontal displacement.



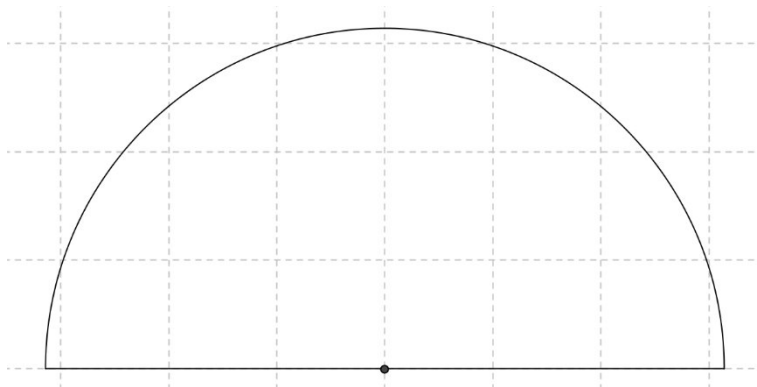
- a. 625 N
- b. 750 N
- c. 1000 N

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. To determine the centre of gravity of a three dimensional body you can use the method of....
- a. measuring and equating moments.
b. equating the CG of several parts of the body.
c. measuring 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. 0,75 m
c. 1,04 m
11. The Young's modulus 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. 15
- b. 43
- c. 2,07

13. If an object is sinking, 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 length of 4500 m. The time from start till end is about 225 s.

Calculate the speed of the airplane.

- a. 50 km/h
- b. 72 km/h
- c. 101 km/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/s²
- b. 450 m/s²
- c. 4,5 m/s²

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

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

17. What does "uniform circular motion" mean?

- a. An accelerating motion in a straight line.

- b. A circular motion with constant speed.
 - c. An accelerating motion in a circle movement.
- 18.** In which part of the perpendicular movement equals the speed of the pendulum 0 (zero) m/s?
- a. In the equilibrium position.
 - b. Halfway the extreme and the equilibrium position.
 - c. In the extreme positions.
- 19.** If the angular speed of a harmonic motion decreases, what will happen to the frequency of this harmonic motion?
- a. The frequency will decrease.
 - b. The frequency will increase.
 - c. Angular speed and frequency are not related.
- 20.** Which combination of gears gives a speed reduction?
- a. A difference in teeth always gives a speed reduction.
 - b. The output gear has less teeth than the input gear.
 - c. The output gear has more teeth than the input gear.
- 21.** 3,8 kg = mg
- a. 38.000
 - b. 3800000
 - c. $3,8 \cdot 10^5$
- 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 directly 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. Defining the units.
 - c. Making the measurements reproducible as possible.

- 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. $< - 300\text{N}$
- b. $> - 300\text{ N}$
- c. $= - 300\text{ N}$

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

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

Calculate the work I have done.

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

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

Is it possible for a moving object to do work?

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

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

- a. the work done by a net-force is equal to the change in the object's kinetic energy.
- b. the work done by a net-force is not 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. Which law applies to a gyroscope?

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

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. 0,94
- b. 1,06
- c. $0,94 \text{ kg/m}^3$

33. The definition of specific gravity is:

- a. Density water (4°C) / density substance
- b. Density substance / density water (4°C)
- c. Density water (4°C) · density substance

34. What is the property of a steady flow?

- a. In steady flow every particle passing through a specific point has the same velocity.
- b. In steady flow the direction of the fluid particles at any point in the fluid changes as time passes.
- c. In steady flow the velocity of the fluid particles at any point is different as time passes.

35. When using Bernoulli's equation:

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

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: $60^{\circ}\text{C} = \dots\dots\dots^{\circ}\text{F}$

- a. 76°F
- b. $65\frac{1}{3}^{\circ}\text{F}$
- c. 140°F

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

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

38. Give the definition of heat conduction.

Conduction is the process...

- a. in which energy is transferred by means of electromagnetic waves.
- b. whereby heat is transferred directly through a material, any bulk motion of the material playing no role in the transfer.
- c. in which heat is carried from place to place by the bulk movement of a fluid or gas.

39. 2000m^3 Water (volume of a swimming pool) is heated from 10°C to 30°C . ($\beta_{\text{water}} = 2,1 \cdot 10^{-4}/^{\circ}\text{C}$)

Calculate the volume expansion of the water at 30°C ?

- a. $6,1\text{ m}^3$
- b. $2008,4\text{ m}^3$
- c. $8,4\text{ m}^3$

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. $0,5$ J/(kgK)
- b. 2 J/(kgK)
- c. 18 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. 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°
- 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. $-\frac{5}{6}$ m
- b. -1,2 m
- c. 1,2 m

- 46.** When the angle of incidence reaches a certain value, called the critical angle θ_c , the angle of refraction is.....

- a. $< 90^\circ$
- 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 slightly different times.
- c. at the same time.

48. The frequency of a wave is 40 Hz.

Calculate the period of this wave.

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

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

Calculate the speed of the wave.

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

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

- a. neutral interference.
- b. constructive 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. $\pi \cdot 10^3$ W/m²
- b. 5 W/m²
- c. $1,25 \cdot 10^{-2}$ W/m²

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

- a. lower
- b. higher
- c. constant