

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

- (a) Alkali metals.
- (b) Halogens.
- (c) Noble gases.

If choice b is selected set score to 1.

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

Determine the atoms mass number.

- (a) 39
- (b) 151
- (c) 191

If choice b is selected set score to 1.

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.

If choice c is selected set score to 1.

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.

If choice b is selected set score to 1.

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

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

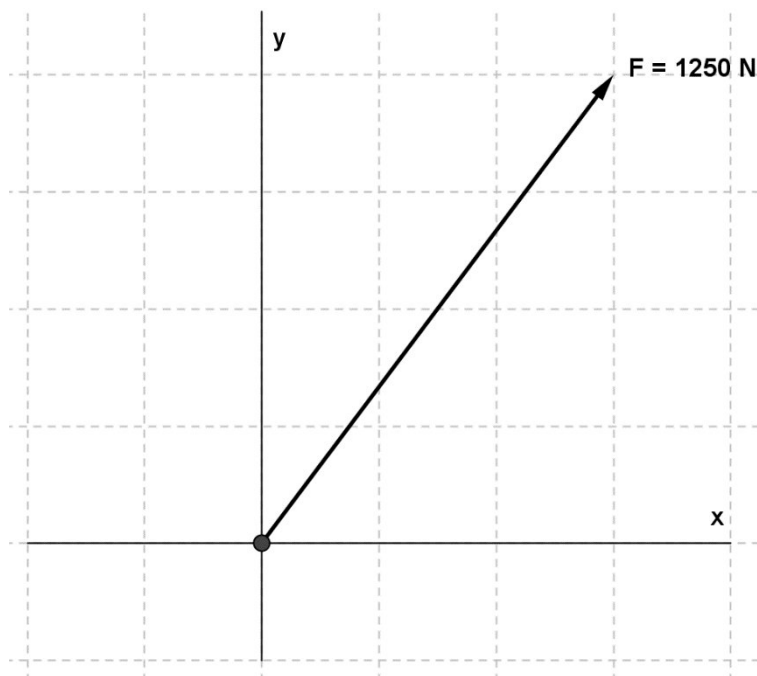
If choice b is selected set score to 1.

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

- (a) Evaporating.
- (b) Freezing.
- (c) Subliming.

If choice b is selected set score to 1.

7. Calculate the force that causes a horizontal displacement.

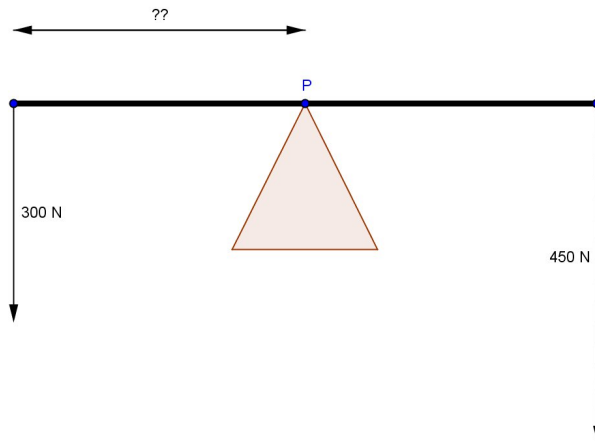


- (a) 750 N
- (b) 1000 N
- (c) 625 N

If choice b is selected set score to 1.

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

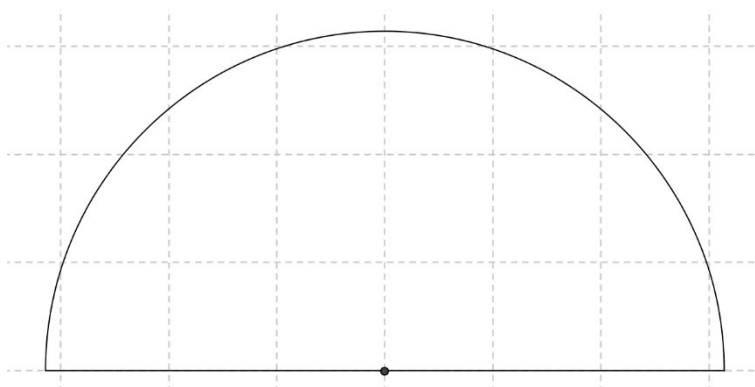
If choice c is selected set score to 1.

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.

If choice c is selected set score to 1.

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

If choice c is selected set score to 1.

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

- o (a) as a reaction to internal forces.
- (b) as a reaction to external forces.
- o (c) on which internal forces act.

If choice b is selected set score to 1.

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

Determine the atoms atomic number.

- o (a) 0,22
- (b) 45
- o (c) 161

If choice b is selected set score to 1.

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

- o (a) weight of the object = buoyant force.
- o (b) weight of the object < buoyant force.
- (c) weight of the object > buoyant force.

If choice c is selected set score to 1.

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?

- o (a) 30 s
- o (b) 0,33 h
- (c) 2 min

If choice c is selected set score to 1.

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.

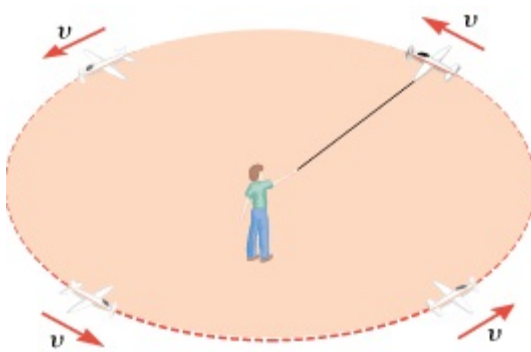
If choice a is selected set score to 1.

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.

If choice c is selected set score to 1.

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.

If choice b is selected set score to 1.

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

If choice c is selected set score to 1.

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) 0,7 N
- o (c) 8,75 N

If choice b is selected set score to 1.

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

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

If choice b is selected set score to 1.

21. 20 kg = g

- (a) 20000
- o (b) 2000
- o (c) 200

If choice a is selected set score to 1.

22. Which of the next units are SI units?

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

If choice a is selected set score to 1.

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

- o (a) Defining the units.
- o (b) An international agreement.
- (c) Making the measurements reproducible as possible.

If choice c is selected set score to 1.

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) 400 N

- (b) $2,5 \cdot 10^{-3}$ N
- (c) 3600 N

If choice a is selected set score to 1.

25. What unit belongs to inertia?

- (a) m/s
- (b) m/s^2
- (c) kg

If choice b is selected set score to 1.

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

- (a) Watt.
- (b) Joule.
- (c) Ohm.

If choice b is selected set score to 1.

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. ($g = 10\text{m/s}^2$).

- (a) 40 J
- (b) 400 J
- (c) 0,5 J

If choice b is selected set score to 1.

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

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

If choice b is selected set score to 1.

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

If choice b is selected set score to 1.

30. What two kind of gyroscopes do we know?

- (a) Mechanical and not mechanical.
- (b) Mechanical and air driven.
- (c) Mechanical and motor driven.

If choice a is selected set score to 1.

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) $f_s^{\max} > f_k$

If choice a is selected set score to 1.

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

If choice b is selected set score to 1.

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) 2500 kg

- o (c) 25600 kg

If choice b is selected set score to 1.

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

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

If choice b is selected set score to 1.

35. Which is Bernoulli's equation?

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

If choice c is selected set score to 1.

36. The thermocouple makes use of two junctions.

What are the names of these junctions?

- o (a) Cold- and Reference-junction.
- o (b) Cold- and Hot-junction.
- (c) Hot- and Reference-junction.

If choice c is selected set score to 1.

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

- o (a) W/°C
- (b) Joule
- o (c) W/s

If choice b is selected set score to 1.

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

- (a) $c = \frac{Q}{m \times \Delta T}$
- (b) $c = Q \times m \times \Delta T$
- (c) $c = \frac{Q \times m}{\Delta T}$

If choice c is selected set score to 1.

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

- (a) $\text{m}^3/\text{°C}$
- (b) °C^{-1}
- (c) $\text{°C}/\text{m}^3$

If choice b is selected set score to 1.

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 to 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.

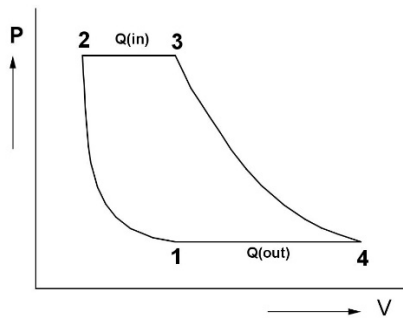
If choice a is selected set score to 1.

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.

If choice b is selected set score to 1.

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



What happens during the step 4 to 1?

- (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.

If choice b is selected set score to 1.

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

If choice a is selected set score to 1.

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

Determine the angle of reflection with respect to the normal.

- (a) 40°
- (b) 90°
- (c) 50°

If choice a is selected set score to 1.

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) $\frac{1}{6}$ m

- (c) -6 m

If choice c is selected set score to 1.

- 46.** When light passes from a medium of larger refractive index into one of smaller refractive index, the refractive ray bends....
- o (a) towards the normal.
 - o (b) along the surface.

- (c) away from the normal.

If choice c is selected set score to 1.

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

- o (a) only the core size.
- (b) core size and numerical aperture.
- o (c) only the numerical aperture.

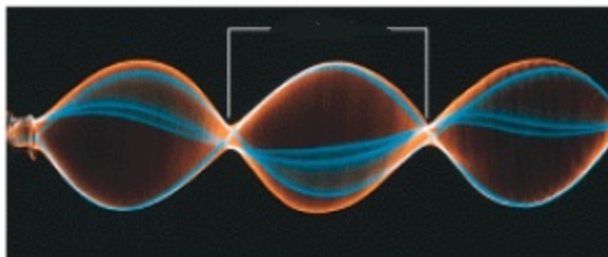
If choice b is selected set score to 1.

- 48.** The frequency of a wave is 20 Hz.
Calculate the period of this wave.

- (a) 0,05 s
- o (b) 20 s
- o (c) 0,5 s

If choice a is selected set score to 1.

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



- o (a) Interference points.
- (b) Nodes.
- o (c) Antinodes.

If choice b is selected set score to 1.

50. When two waves meet in phase, we call this....

- (a) **constructive interference.**
- o (b) neutral interference.
- o (c) destructive interference.

If choice a is selected set score to 1.

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

- o (a) Wave length.
- o (b) Volume.
- (c) **Boltzmann constant.**

If choice c is selected set score to 1.

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

- (a) **higher**
- o (b) constant
- o (c) lower

If choice a is selected set score to 1.

If assessment score is 0% to 100% Feedback