Question block created by wizard

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

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

$$M = F \cdot d$$

$$M_+ = M_-$$

$$F = \sigma \cdot A$$

$$F = m \cdot a$$

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

$$F_B \cdot v_B = F_A \cdot v_A$$

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

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

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

$$impuls = F \cdot \Delta t$$

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

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

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

$$W = Q - \Delta U$$

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

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

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

$$\eta = \frac{W}{Q_H} \cdot 100\%$$

$$f_s = \mu_s \cdot F_N$$

$$f_k = \mu_k \cdot F_N$$

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

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

$$m \cdot f \cdot r = \rho \cdot A \cdot v$$

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

$$v_f = v_0 + \Delta v$$

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

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

$$s = v \cdot t$$

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

$$v = a \cdot t$$

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

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

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

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

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

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

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

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

$$coëff.\ of\ performance = \frac{Q_H}{W}$$

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

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

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

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

$$1\ J = 4186\ kcal$$

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

Which particle has a positive charge?

o (a) Neutron.

• (b) Proton.

o (c) Electron.

If choice b is selected set score to 1.

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

Which particle has a negative charge?

• (a) Electron.

o (b) Proton.
o (c) Neutron.

If choice a is selected set score to 1.

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

Which particle has no charge?

o (a) Electron.

• (b) Neutron.

o (c) Proton.

If choice b is selected set score to 1.

4. Do elements, consist of one kind of atoms or one kind of molecules?

o (a) Both atoms and molecules are possible.

• (b) One kind of atoms.

o (c) One kind of molecules.

If choice b is selected set score to 1.

5. In a neutral atom, the mass number equals the number of...

- (a) protons + the number of neutrons.

o (b) electrons + the number of protons.
o (c) neutrons + the number of electrons.

If choice a is selected set score to 1.

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

- (a) Molecule.

o (b) Atom.
o (c) Halogen

If choice a is selected set score to 1.

7. Do "pure substances" consist of one kind of atoms or one kind of molecules?

- (a) Both are possible, one kind of atoms and one kind of molecules.

o (b) One kind of atoms.
o (c) One kind of molecules.

If choice a is selected set score to 1.

8. Which particles determine the volume of an atom?

- (a) Electrons in their shells.

o (b) Protons in the nucleus.
o (c) Neutrons in the nucleus.

If choice a is selected set score to 1.

9. Which particles determine the mass of an atom?

o (a) Electrons and neutrons.
o (b) Protons and electrons.

- (c) Neutrons and protons.

If choice c is selected set score to 1.

10. When you break down a compound, do you get one, two or more kind of atoms?

- o (a) Two kind of atoms.
- o (b) One kind of atoms.
- • (c) Two or more kind of atoms.

If choice c is selected set score to 1.

11. Is it possible to break down a compound in a physical way?

- o (a) Yes, it is possible.
- o (b) Yes, both chemically and physically is it possible.
- • (c) No, it is not possible.

If choice c is selected set score to 1.

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

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

If choice b is selected set score to 1.

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

- • (a) Yes, it is possible.
- o (b) Yes, but chemical and physical is possible.
- o (c) No, it is not possible.

If choice a is selected set score to 1.

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

- • (a) A liquids shape is confined to the container it fills.
- o (b) A liquid has a fixed shape.
- o (c) Liquids have greater density than solids or gases.

If choice a is selected set score to 1.

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

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

If choice b is selected set score to 1.

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

- • (a) Liquids will expand on heating.
- o (b) A liquid is easy to diffuse.
- o (c) The liquid particles are too strongly held together to allow movement, they vibrate about their position.

If choice a is selected set score to 1.

17. Which of the following expressions is a property of a solid?

- o (a) A solid has no fixed shape.
- o (b) It is not possible to change the volume of a fixed mass of a solid.
- • (c) A solid will expand a little on heating.

If choice c is selected set score to 1.

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

- • (a) There are almost no forces of attraction between the particles of a gas.
- o (b) With decrease in temperature, the particles move faster.
- o (c) The particles are moving very close to each other.

If choice a is selected set score to 1.

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

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

If choice a is selected set score to 1.

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

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

If choice c is selected set score to 1.

21. If a solid is subliming, the new state is ...

- o (a) liquid, the temperature decreases.
- o (b) solid, the temperature keeps the same.
- • (c) gas, the temperature increases.

If choice c is selected set score to 1.

22. If a liquid is evaporating, the new state is ...

- o (a) solid, the temperature decreases.
- o (b) liquid, the temperature keeps the same.
- • (c) gas, the temperature increases.

If choice c is selected set score to 1.

23. If gas is condensing, the new state is ...

- o (a) liquid or solid, the temperature increases.
- • (b) liquid or solid, the temperature decreases.
- o (c) liquid or solid, the temperature remains the same.

If choice b is selected set score to 1.

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

- o (a) Cooking.
- • (b) Melting.
- o (c) Subliming.

If choice b is selected set score to 1.

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

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

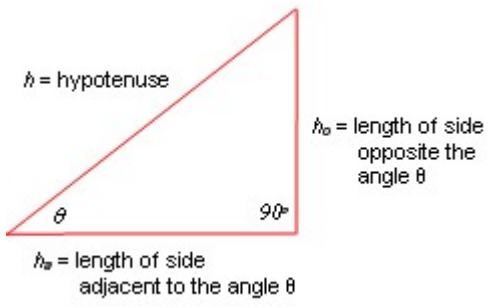
If choice c is selected set score to 1.

26. Which of the following expressions is a trigonometric function?

- • (a) Cosine
- o (b) Hypotenuse
- o (c) Adjacent

If choice a is selected set score to 1.

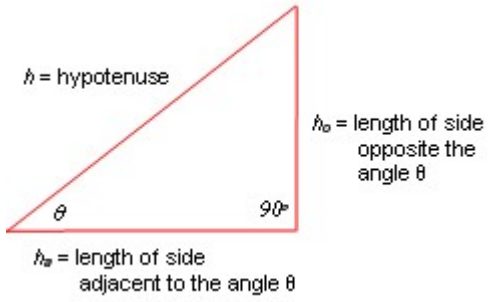
27. Give the definition of sine θ in a right triangle.



- • (a) Opposite : hypotenuse
- o (b) Hypotenuse : opposite
- o (c) Adjacent : hypotenuse.

If choice a is selected set score to 1.

28. Give the definition of tangent *θ* in a right triangle.

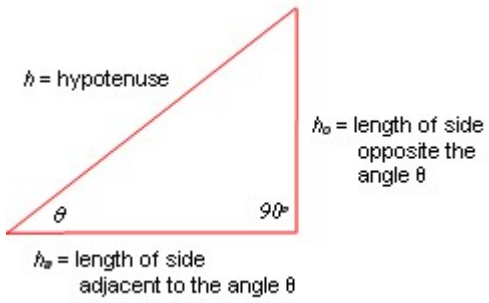


- (a) ho / ha

o (b) ha / h
o (c) h / ho

If choice a is selected set score to 1.

29. Give the definition of cosine *θ* in a right triangle.



o (a) ho / ha
o (b) h / ho

- (c) ha / h

If choice c is selected set score to 1.

30. Forces can be represented by vectors. A vector has three properties.

Name two of the three properties of a vector.

- (a) Directions and magnitude.

o (b) Point of application and curvature.
o (c) Curvature and magnitude.

If choice a is selected set score to 1.

31. Give the definition of a vector quantity.

A vector quantity is a quantity that deals inherently with...

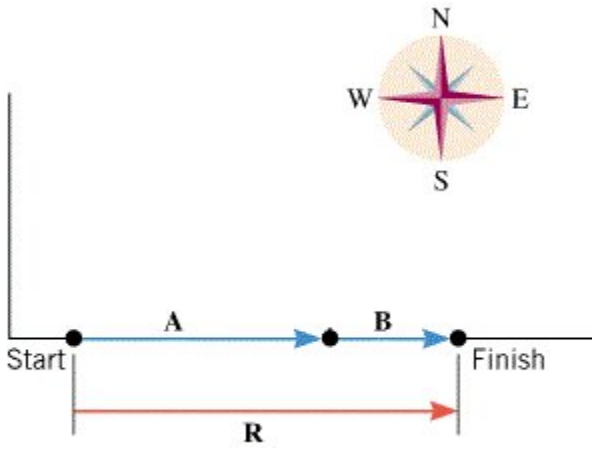
o (a) a direction.
o (b) magnitude.

• (c) both, magnitude and direction.

If choice c is selected set score to 1.

32. There are several ways to calculate two vectors together.

What kind of addition is used in the next figure?



o (a) Pythagoras.

• (b) Tail to head.

o (c) Subtraction.

If choice b is selected set score to 1.

33. When resolving a vector in its two components, in what direction do you have to draw the components?

o (a) In y-direction and parallel to the y-direction.

• (b) In x-direction and perpendicular to the x-direction.

o (c) In x-direction and parallel to the x-direction.

If choice b is selected set score to 1.

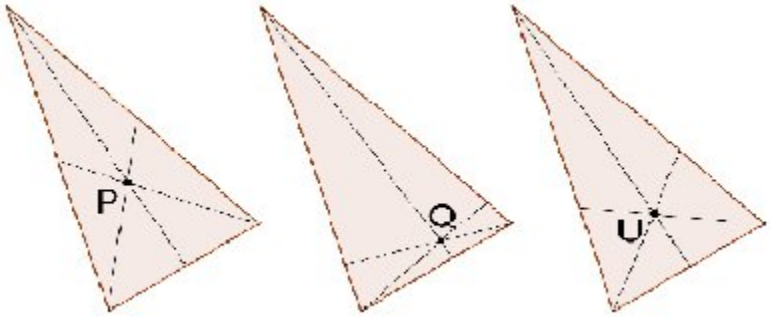
34. The equation to calculate the centre of gravity in a triangle with height h is...

- (a) h/3

o (b) $2\pi h^2$
o (c) 4h/3π

If choice a is selected set score to 1.

35. The figure gives 3 possibilities for the centre of gravity, what point is the real centre of gravity?

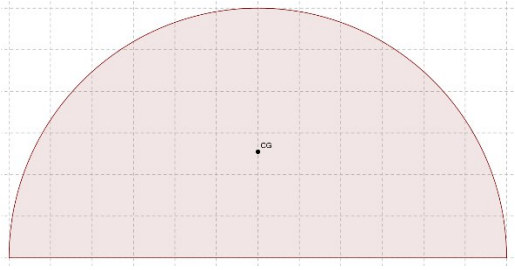


o (a) Q
o (b) U

- (c) P

If choice c is selected set score to 1.

36. Which equation do we use to calculate the centre of gravity in a semicircle?



- (a) CG = (4r) / (3π)

o (b) CG = (3r) / (4π)
o (c) CG = (3π) / (4r)

If choice a is selected set score to 1.

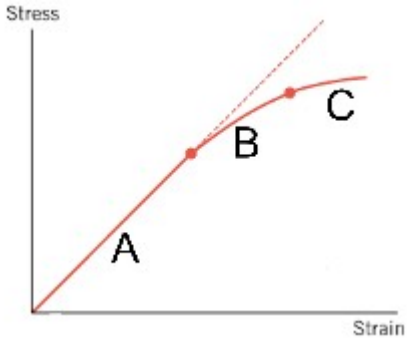
37. Is the mass uniformly distributed throughout an object like a stone?

o (a) Yes.
o (b) Sometimes.

- (c) No.

If choice c is selected set score to 1.

38. In what part of the diagram is stress proportional to strain?

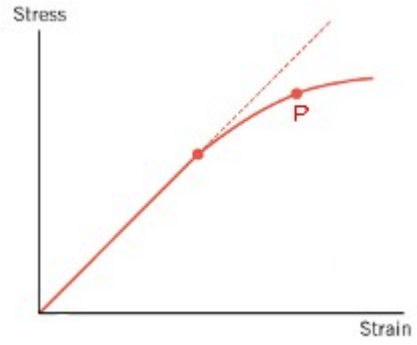


- (a) A.

o (b) B.
o (c) C.

If choice a is selected set score to 1.

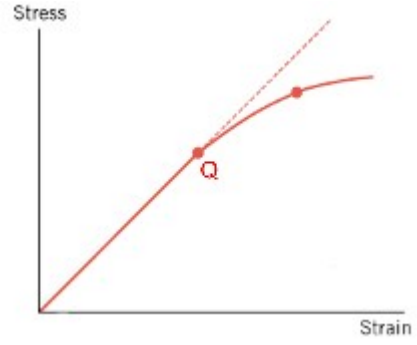
39. What is the name of point P in the diagram?



- o (a) Stress limit.
- o (b) Proportionality limit.
- • (c) Elastic limit.

If choice c is selected set score to 1.

40. What is the name of point Q in the diagram?



- o (a) Stress limit.
- • (b) Proportionality limit.
- o (c) Elastic limit.

If choice b is selected set score to 1.

41. The equation to calculate stress is...

- o (a) σ= m·g
- • (b)
  σ ⁎ F/A

o (c) $\sigma = \Delta L / L_0$

If choice b is selected set score to 1.

42. The unit of stress is...

- (a) N/m^2

o (b) N/m
o (c) N/m^3

If choice a is selected set score to 1.

43. Why is the Young's modulus for solids almost large?

Because you need a...

o (a) small force to compress a solid.

- (b) large force to compress or to stretch a solid.

o (c) large force to stretch a solid.

If choice b is selected set score to 1.

44. How do you call the deformation in the figure?

o (a) Stress.
o (b) Torsion.

- (c) Shear.

If choice c is selected set score to 1.

45. What answer gives the definition of torsion.

In solid mechanics, ...

- o (a) torsion is the twisting of an object due to an applied rotation.
- o (b) torsion is the twisting of an object due to an applied momentum.
- • (c) torsion is the twisting of an object due to an applied torque.

If choice c is selected set score to 1.

46. Torsion is depending of the stiffness of the material.

What equation gives the calculation of rotational stiffness?

- o (a) $T = (JT / r) \cdot \tau$
- • (b) $k = M / \Theta$
- o (c) $k = AY / l$

If choice b is selected set score to 1.

47. In what direction works the Buoyant force?

- o (a) Down.
- • (b) Up.
- o (c) Horizontal.

If choice b is selected set score to 1.

48. Which variable is the buoyant force depending on?

- o (a) Viscosity.
- o (b) The force with which the object touches the liquid surface.
- • (c) The density of the liquid.

If choice c is selected set score to 1.

49. As long as the buoyant force is equal to the weight of an object, the object will...

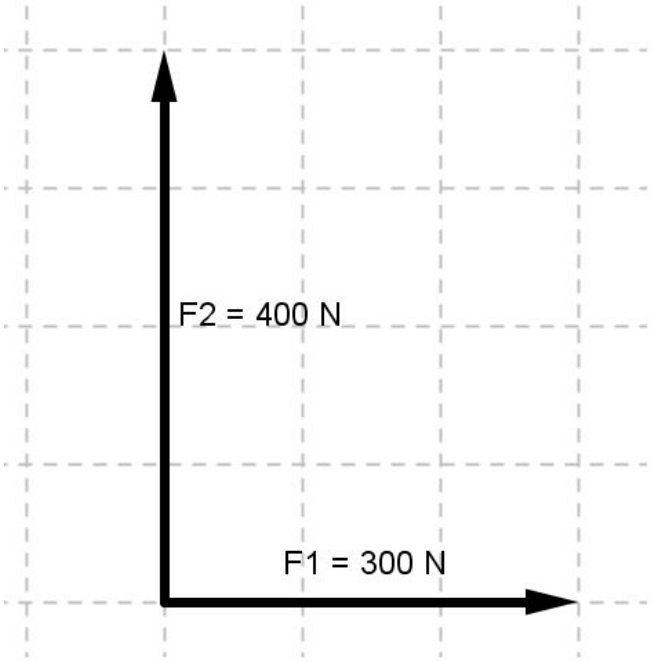
- • (a) float in the liquid.
- o (b) sink or float, because sinking and floating is not depending on the weight.

o (c) sink in the liquid.

If choice a is selected set score to 1.

50. Two forces are acting upon an object; F1 and F2. They create a resulting force Fr.

Determine the magnitude of the resulting force.



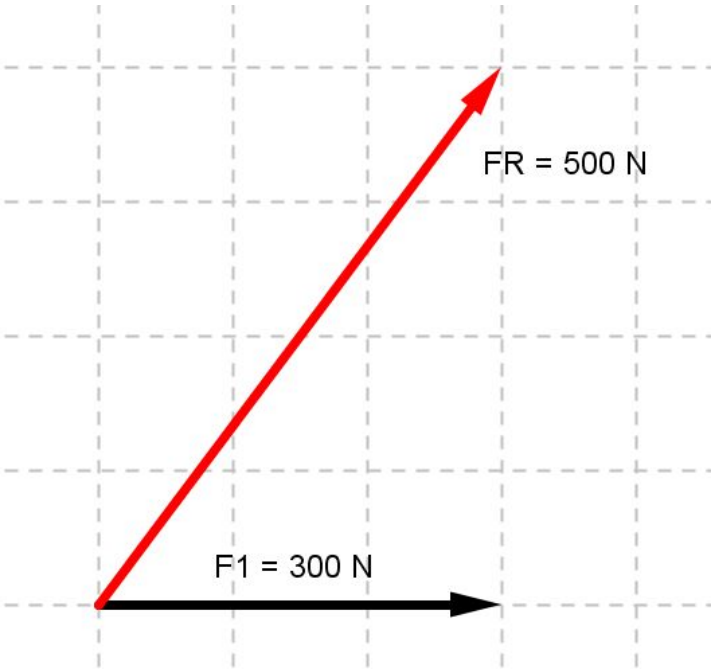
o (a) 265 N
o (b) 100 N

• (c) 500 N

If choice c is selected set score to 1.

51. Two forces are acting upon an object; F1 and F2. They create a resulting force FR.

Determine the magnitude of the unknown force F2.



o (a) 583 N

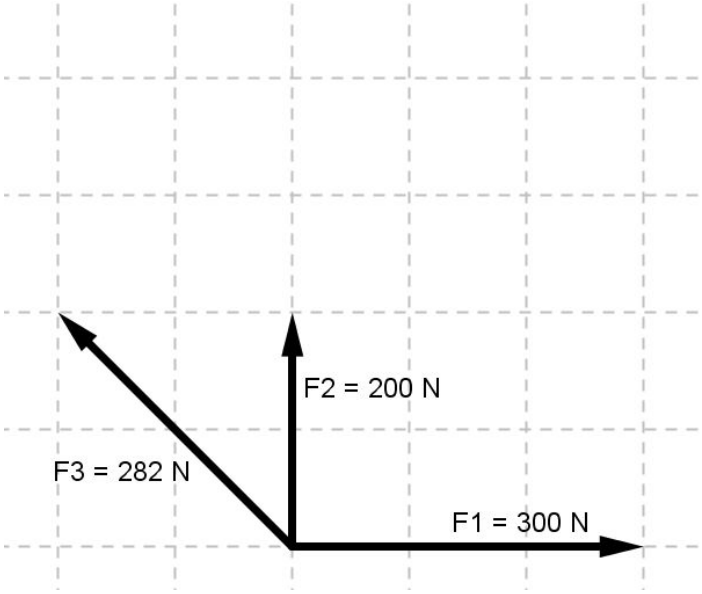
• (b) 400 N

o (c) 200 N

If choice b is selected set score to 1.

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

Determine the magnitude of the resultant force FR.



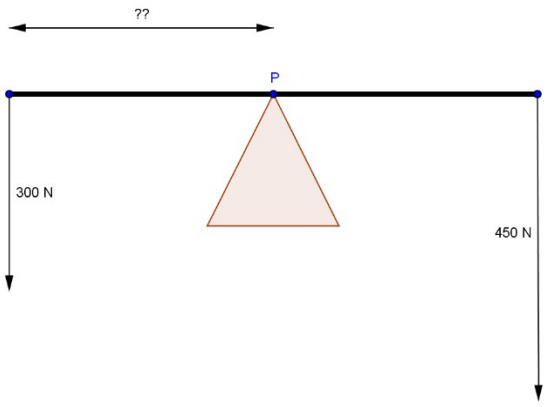
- (a) 410 N

o (b) 400 N
o (c) 420 N

If choice a is selected set score to 1.

53. 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.



o (a) 4 m

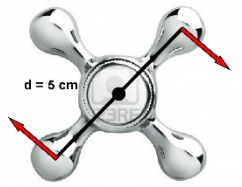
- (b) 4,80 m

o (c) 3,2 m

If choice b is selected set score to 1.

54. On a watertap 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.



o (a) 1,25 Nm

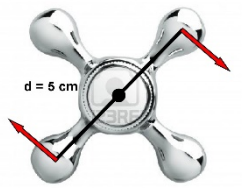
- (b) 2,5 Nm

o (c) 250 Nm

If choice b is selected set score to 1.

55. On a watertap two forces are acting. The moment of this couple of forces equals 3 Nm.

Calculate one of these equal forces.

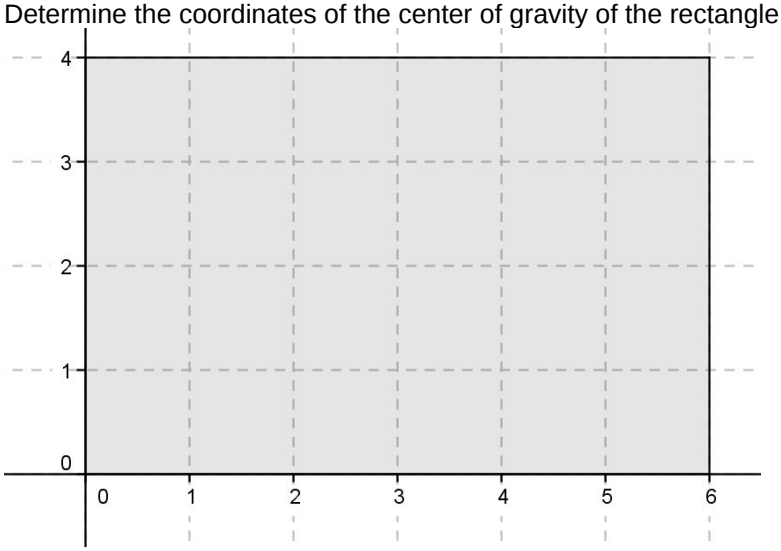


o (a) 3 N
o (b) 30 N

- (c) 60 N

If choice c is selected set score to 1.

56. Determine the coordinates of the center of gravity of the rectangle in the figure.

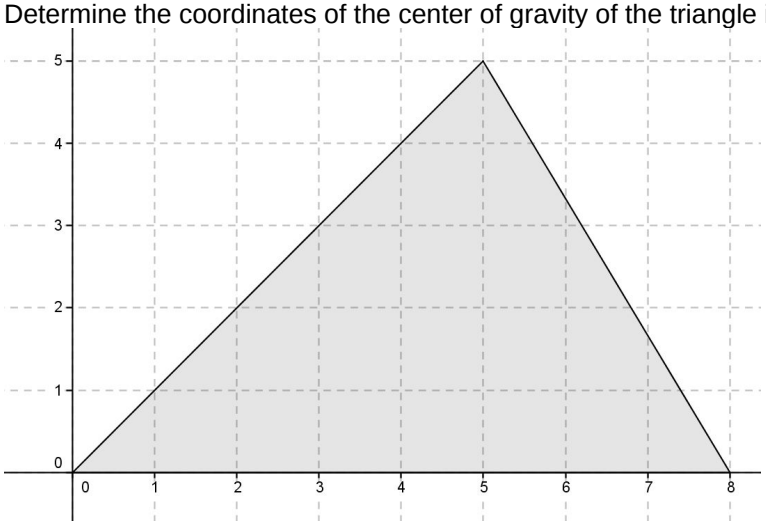


o (a) (4,6)
o (b) (2,3)

- (c) (3,2)

If choice c is selected set score to 1.

57. Determine the coordinates of the center of gravity of the triangle in the figure.



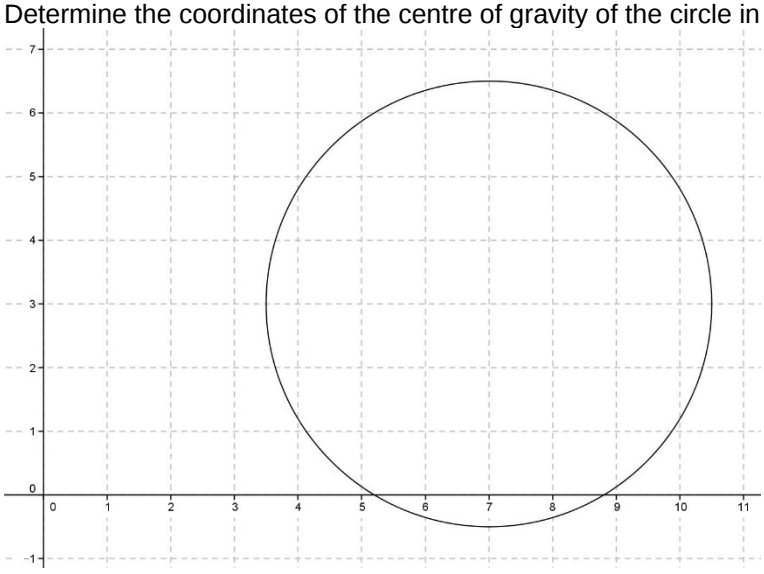
o (a) (3,5)

- (b) (4,3;1,7)

o (c) (5,3)

If choice b is selected set score to 1.

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



- (a) (7,3)

o (b) 3,5
o (c) (3,7)

If choice a is selected set score to 1.

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

Give an other name for this total gravitational force.

o (a) Gravity (m/s^2).

- (b) Weight (N).

o (c) Mass (kg).

If choice b is selected set score to 1.

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

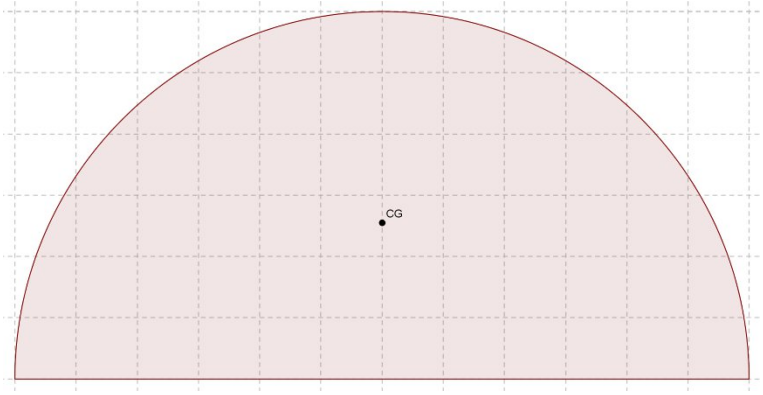
o (a) equating the CG of several parts of the body.

- (b) measuring and equating moments.

o (c) measuring the CG of several parts of the body.

If choice b is selected set score to 1.

61. Which equation do we use to calculate the centre of gravity of a semi circle?

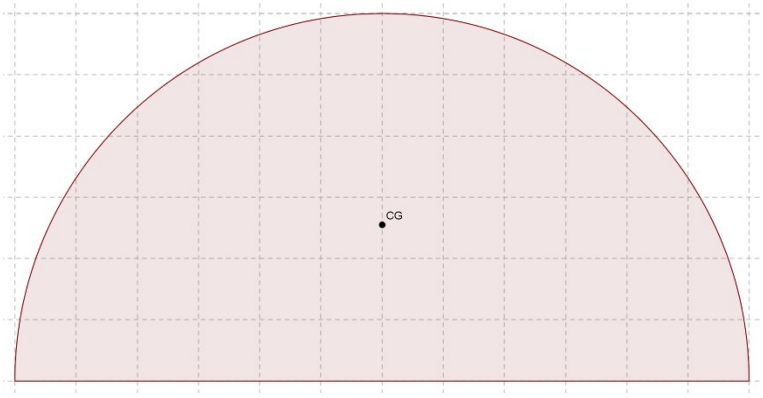


- (a) $(1^1/_3\ r) / \pi$

o (b) h / 3r
o (c) h / 4π

If choice a is selected set score to 1.

62. Calculate the centre of gravity of a semi circle with a radius of π m.



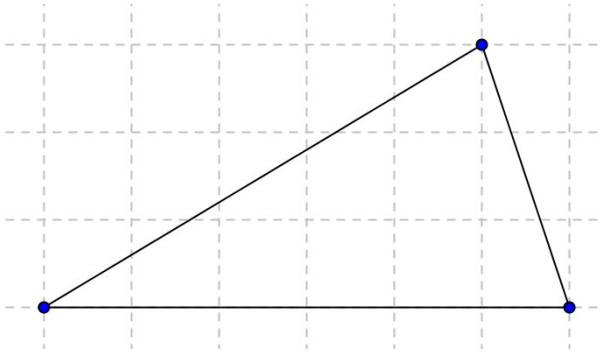
o (a) 0,75 m

- (b) 1,33 m

o (c) 1,04 m

If choice b is selected set score to 1.

63. Calculate the centre of gravity of a triangle with a base of 6 m, and a height of 3 m.



- (a) 1,0 m

o (b) 2,0 m
o (c) 0,5 m

If choice a is selected set score to 1.

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

- (a) The stretching of an object.

o (b) The tear or torsion of an object.
o (c) The tension in an object.

If choice a is selected set score to 1.

65. The stress in a copper wire is 150 N/m^2. The force on the wire is 60 N. Determine the cross-sectional area.

- (a) 0,4 m^2

o (b) 4000 mm^2
o (c) 40 cm^2

If choice a is selected set score to 1.

66. Calculate the stress in an object if a force of 200 N is exerted and the cross section area is 8 cm^2.

- (a) 250 kN/m^2

o (b) 25 N/m^2
o (c) 0,25 N/m^2

If choice a is selected set score to 1.

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

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

If choice c is selected set score to 1.

68. What kind of external forces cause stress?

- o (a) Body forces.
- • (b) Both, surface- and body forces.
- o (c) Surface forces.

If choice b is selected set score to 1.

69. Sress and strain are.....

- • (a) proportional.
- o (b) unit less.
- o (c) inversely proportional.

If choice a is selected set score to 1.

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

Determine the atoms atomic number.

- o (a) 161
- • (b) 45
- o (c) 0,22

If choice b is selected set score to 1.

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

Determine the number of neutrons in this atom.

- (a) 15

o (b) 2,07
o (c) 43

If choice a is selected set score to 1.

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

Determine the atoms mass number.

o (a) 1,51

- (b) 191

o (c) 39

If choice b is selected set score to 1.

73. 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.

o (a) 25 m
o (b) 0,25 m

- (c) 2,5 m

If choice c is selected set score to 1.

74. A cylindrical tank is filled with oil with a density of 800 kg/m^3. The height of the oil in the tank is 1,5m.

Calculate the pressure on the bottom of the tank.

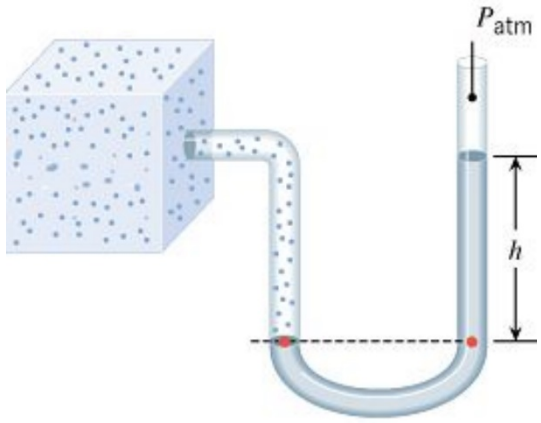
- (a) 12 kN/m^2

o (b) 120.000 Pa
o (c) 1,2 kN/m^2

If choice a is selected set score to 1.

75. A pressure gauge is filled with mecury 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.



- o (a) 1675 kPa
- o (b) 32,5 kPa
- • (c) 1,675 bar

If choice c is selected set score to 1.

76. Average speed and average velocity are two different quantities.

- • (a) Average velocity is a vector quantity.
- o (b) Average speed is a vector quantity.
- o (c) Average speed gives direction and average velocity doesn't.

If choice a is selected set score to 1.

77. What is the equation of acceleration?

- • (a) $a = \Delta v / \Delta t$
- o (b) $a = \Delta v / \Delta x$
- o (c) $a = \Delta x / \Delta t$

If choice a is selected set score to 1.

78. Which equation do you use to calculate the vertical displacement of an object?

- o (a) $v = v_0 + gt$

- (b) $y = v_0t + ½gt^2$

o (c) $x = v_0t + ½at^2$

If choice b is selected set score to 1.

79. Give the right definition of: rotational movement.

o (a) It is not necessary to move along a circle but the speed is contant.

- (b) The speed is uniform and the object needs to move along a circle.

o (c) The speed of an object is not constant and the object moves along a circle.

If choice b is selected set score to 1.

80. The centripetal acceleration can be calculated with equation ...

o (a) $a_c = r/v^2$

- (b) $a_c = v^2/r$

o (c) $a_c = mv^2/r$

If choice b is selected set score to 1.

81. The centripetal force is directed to the center of the circle.

Is the centripetal acceleration also pointed to the center of the circle?

- (a) Yes, both are pointed to the center of the circle.

o (b) No, only the force is directed to the center of the circle.
o (c) No, both are pointing outward the circle.

If choice a is selected set score to 1.

82. The visualization of an pendular movement could be...

- (a) a sinusoidal.

o (b) a straight line.
o (c) a curve.

If choice a is selected set score to 1.

83. The frequency of the pendular motion is depending on...

- (a) the gravitational acceleration and the length of the pendulum.

o (b) the angular speed and the gravitational acceleration.
o (c) the length of the pendulum and the angular speed.

If choice a is selected set score to 1.

84. Which equation do you use to calculate the frequency of a pendulum?

o (a) Equation 3.

$$f = \frac{\sqrt{\frac{L}{g}}}{2\pi}$$

- (b) Equation 1.

$$f = 2\pi\sqrt{\frac{L}{g}}$$

o (c) Equation 2.

$$f = 2\pi\sqrt{\frac{g}{L}}$$

If choice b is selected set score to 1.

85. To get resonance, you have to put....(a)..... to a harmonic motion, to get...(b) .

o (a) (a) a force ; (b) a damping in the harmonic motion.

- (b) (a) energy ; (b) large amplitude motion.

o (c) (a) mass ; (b) a high energetic motion.

If choice b is selected set score to 1.

86. The angular speed is depending on the periodic time and the angular displacement conform equation...

o (a) $x = A \cdot \cos(\omega t)$
o (b)
$\omega = A / (vx)$

- (c)
$\omega = \Delta\Theta/\Delta t$

If choice c is selected set score to 1.

87. "The frequency of an harmonic motion is inversely proportional to the period of time" is given in equation...

- o (a) $f = \Delta\Theta/\Delta T$
- o (b) $f = 1/\Delta\Theta$
- • (c) $f = 1/T$

If choice c is selected set score to 1.

88. Specify the correct description for "mechanical advantage".

Mechanical advantage is a measure of the force...

- o (a) addition achieved by using a tool.
- o (b) division achieved by using a tool.
- • (c) amplification achieved by using a tool.

If choice c is selected set score to 1.

89. What equation of mechanical advantage belongs to gear trains?

- o (a) $MA = F_B / F_A = a / b$
- • (b) $MA = R_B/R_A = N_B/N_A$
- o (c) $MA = R_B/R_A = T_B/T_A$

If choice b is selected set score to 1.

90. What answer belongs to the efficiency of energy conversion?

- o (a)
  $\eta = (L_{out}/L_{in}) \times 100\ \%$
- • (b)
  $\eta = (Q_{out}/Q_{in}) \times 100\%$
- o (c)
  $\eta = (S_{out}/S_{in}) \times 100\%$

If choice b is selected set score to 1.

91. 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.

- o (a) 50 km/h
- o (b) 101 km/h
- • (c) 72 km/h

If choice c is selected set score to 1.

92. An airplane is taxiing on the runway with a speed of 72 km/h. The time from start till end is about 3,75 min.

Calculate the length of the runway.

- o (a) 270 m
- o (b) 19200 m
- • (c) 4500 m

If choice c is selected set score to 1.

93. 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
- o (b) 0,33 h
- o (c) 30 s

If choice a is selected set score to 1.

94. 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.

- o (a) 450 m/s^2
- • (b) 4,5 m/s^2
- o (c) 0,22 m/s^2

If choice b is selected set score to 1.

95. An airplane is accelerating to take-off. Its acceleration is 4,5 $m/s^{2.}$ The final velocity for take-off is 135 m/s.

Calculate the take-off time of the airplane.

o (a) 608 s
o (b) 10 s

- (c) 30 s

If choice c is selected set score to 1.

96. An airplane is accelerating to take-off. Its acceleration is 4,5 m/s^2. The time to get the take-off velocity is 9 s.

Calculate the take-off velocity of the plane.

o (a) 1,96 m/s

- (b) 145,8 km/h

o (c) 35 m/s

If choice b is selected set score to 1.

97. 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 30m/s.

Calculate the time the stone is falling.

o (a) 0,3 s
o (b) 300 s

- (c) 3 s

If choice c is selected set score to 1.

98. A stone is falling of a tower.

Calculate the height of the tower when the time to fall is 4 seconds.

o (a) 400 m
o (b) 20 m

- (c) 80 m

If choice c is selected set score to 1.

99. 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.

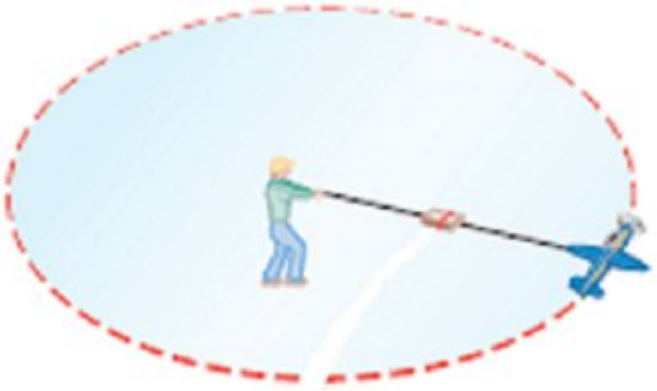
o (a) 400 m
o (b) 80 m

- (c) 20 m

If choice c is selected set score to 1.

100. 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.



o (a) 1,11 km/h

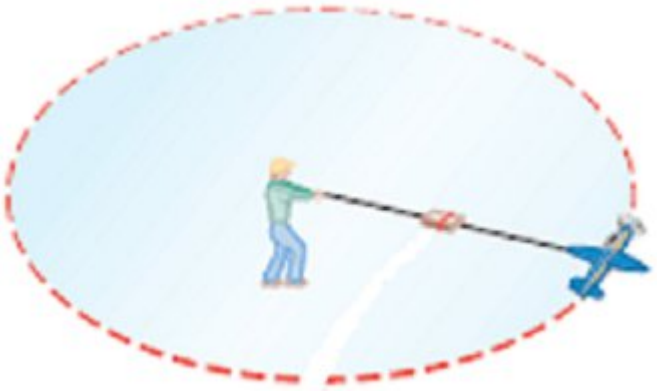
- (b) 4 m/s

o (c) 9,86 m/s

If choice b is selected set score to 1.

101. A model airplane on a guideline. The radius of the circular motion is 10m. The centripetal accelaration of the plane is 12,1 m/s^2.

Calculate the velocity of the plane.



o (a) 1,1 m/s

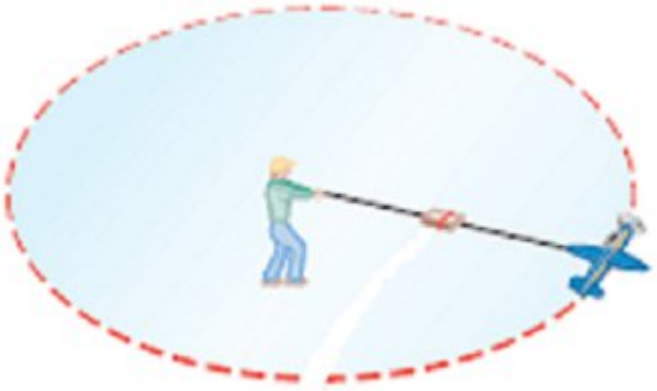
• (b) 11 m/s

o (c) 110 m/s

If choice b is selected set score to 1.

102. A model airplane on a guideline. The radius of the circular motion is 5m. The centripetal force exerted on the plane is 1,5 kN. The velocity of the plane is 50 m/s.

Calculate the mass of the plane.



o (a) 0,3 kg

• (b) 3 kg

o (c) 200 kg

If choice b is selected set score to 1.

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

Calculate the length of the pendulum.

o (a) 0,4 m
o (b) 2,5 m

• (c) 40 m

If choice c is selected set score to 1.

104. A pendulum has a period time of 0,4π s.

Calculate the length of the pendulum.

o (a) 40 m

• (b) 0,4 m

o (c) 2,5 m

If choice b is selected set score to 1.

105. A pendulum has a period time of 0,8π s.

Calculate the length of the pendulum.

o (a) 16 m.
o (b) 16 cm.

• (c) 160 cm.

If choice c is selected set score to 1.

106. A spring has a constant of 2,5 N/cm.

Calculate the force to pull out the spring 3,5 cm.

• (a) 8,75 N

o (b) 0,7 N
o (c) 1,4 N

If choice a is selected set score to 1.

107. The angular speed of an harmonic motion is 2,5π rad/s.

Calculate the angle after 4,5 seconds.

- (a) 1012,50 °

o (b) 11,25 °
o (c) 11,25 rad

If choice a is selected set score to 1.

108. The angular speed of a harmonic motion is 5π rad/s.

Calculate the periodic time of this harmonic motion.

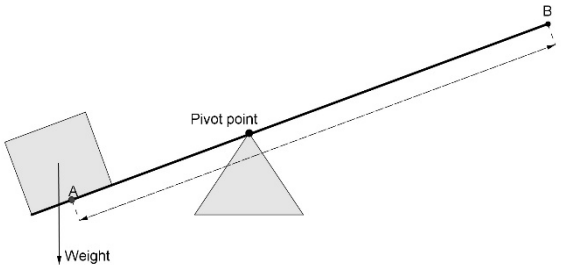
- (a) 0,4 s

o (b) 31,4 s
o (c) 2,5 s

If choice a is selected set score to 1.

109. 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.



o (a) 1600 N

- (b) 0,8 kN

o (c) 600 N

If choice b is selected set score to 1.

110. 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.

- o (a) 0,5
- o (b) 10
- • (c) 0,1

If choice c is selected set score to 1.

111. A block and tackle consists of 8 pulleys. We have to lift a piano with a weight of 6000 N.

Calculate the traction force we have to exert on the rope to lift this piano.

- • (a) 750 N
- o (b) 1500 N
- o (c) 375 N

If choice a is selected set score to 1.

112. Which answer gives the definition of kilogram?

- o (a) One kilogram is the force exerted by the earth on an object.
- • (b) The mass of a standard cylinder of platinum-iridium alloy is defined to be onekilogram .
- o (c) The mass of a substance is based on the mass of one kilogram of atoms from which the substance is made.

If choice b is selected set score to 1.

113. Mass belongs to the units of the "systeme international".

Give another example of a unit of the "systeme international".

- o (a) Velocity.
- • (b) Time.
- o (c) Angle velocity.

If choice b is selected set score to 1.

114. Which unit specifies the mass?

- o (a) N/kg
- • (b) kg
- o (c) N

If choice b is selected set score to 1.

115. The mass of a substance is depending on the mass of the number of ... in an atom.

- o (a) electrons and protons
- • (b) protons and neutrons
- o (c) neutrons and electrons

If choice b is selected set score to 1.

116. Why is the mass of a substance not determined by the mass of the electrons?

- o (a) The mass of an electron is the same as the mass of a proton and a neutron.
- • (b) Electrons are negligible light compared to protons and neutrons.
- o (c) Electrons are much heavier than protons and neutrons.

If choice b is selected set score to 1.

117. If we say: "The mass of these table of wood and iron is 50 kg", do we mean the "mass" or the "specific mass"?

- o (a) The specific mass.
- • (b) The mass.
- o (c) It could be either the mass as the specific mass.

If choice b is selected set score to 1.

118. Give an example of the fact that it is not necessary to touch an object to exercise a force on it.

- o (a) Lift.
- • (b) Gravity.

o (c) Normal force.

If choice b is selected set score to 1.

119. What is the connection between mass and inertia?

- (a) Inertia is a quantitative measure of mass.

o (b) They are inversely proportional.
o (c) Mass is a quantity in kg and inertia not.

If choice a is selected set score to 1.

120. We talk about two kinds of energy, kinetic and potential.

Which one is in some way connected to the gravitation?

o (a) Only kinetic energy.

- (b) Only potential energy.

o (c) Both, kinetic and potential energy.

If choice b is selected set score to 1.

121. Give the equation of work relative to displacement.

- (a) $W = (F \cdot \cos\Theta) \cdot s$

o (b) $W = (F \cdot s)/\cos\Theta$
o (c) $W = (F \cdot \cos\Theta)/s$

If choice a is selected set score to 1.

122. Give the equation for kinetic energy and potential energy.

o (a) $EK = \frac{1}{2}mgh$ and $EP = \frac{1}{2}mv_2$
o (b) $EK = mv^2$ and $EP = mgh$

- (c) $EK = \frac{1}{2}mv^2$ and $EP = mgh$

If choice c is selected set score to 1.

123. The correct formula for the total mechanical energy of an object is...

- (a) $E = mgh + \frac{1}{2}mv^2$

- o (b) E = EP - EK
- o (c) E = EK - EP

If choice a is selected set score to 1.

124. The first law of Newton says the following...

- • (a) An object continues in a state of rest, unless compelled to change that state by a net force.

- o (b) $F_{action} = - F_{reaction}$
- o (c)
  $\sum F = m \cdot a$

If choice a is selected set score to 1.

125. Give the definition of "heat".

Heat is...

- o (a) a change in external energy between two hot objects with the same temperature.
- o (b) the same as temperature change.

- • (c) energy that flows from a higher temperature to a lower temperature object.

If choice c is selected set score to 1.

126. Give the meaning of c in the next equation: $Q = c \cdot m \cdot \Delta T$

c Is the specific heat in...

- o (a) J/K or J/^{o}C

- • (b) J/(kgK) or J/(kg^{o}C)

- o (c) Jkg/K or Jkg/^{o}C

If choice b is selected set score to 1.

127. 20 kg = ... g

- o (a) 200

- • (b) 20000

- o (c) 2000

If choice b is selected set score to 1.

128. 1,5 kg = ... hg

- (a) 15

o (b) 0,15
o (c) 150

If choice a is selected set score to 1.

129. 3,8 kg = ... mg

o (a) $3{,}8 \cdot 10^5$
o (b) 38.000

- (c) 3800000

If choice c is selected set score to 1.

130. 2500 μg = ... mg

- (a) 2,5

o (b) 250
o (c) 25

If choice a is selected set score to 1.

131. 380 μg = ... dg

o (a) 3,8

- (b) 0,00380

o (c) 0,0380

If choice b is selected set score to 1.

132. 12.000 μg = ... kg

o (a) 0,0012

- (b) 0,000012

o (c) 0,12

If choice b is selected set score to 1.

133. 160 mg = ...g

- (a) $160 \cdot 10^{-3}$

o (b) 0,016
o (c) 0,00016

If choice a is selected set score to 1.

134. 592 mg = ... dg

- (a) 5,92

o (b) 0,0592
o (c) 0,592

If choice a is selected set score to 1.

135. 1237 mg = ... g

o (a) 12,37
o (b) 0,1237

- (c) 1,237

If choice c is selected set score to 1.

136. 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.

o (a) 400 N

- (b) 3600 N

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

If choice b is selected set score to 1.

137. I beat a hammer with a force of 300 N on a nail. The nail shoots partly in the wood.

What is the reaction force of the nail?

o (a) > - 300 N

- (b) = - 300 N

o (c) < - 300N

If choice b is selected set score to 1.

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

Calculate the work I have done.

- (a) 240.000 J

o (b) 0,67 J
o (c) 1,5 J

If choice a is selected set score to 1.

139. A car having a mass of 1250 kg is pushed forward with a speed of 4 m/s. It takes energy to do this.

How much kinetic energy will be needed?

o (a) 40 KJ
o (b) 2,5 KJ

- (c) 10 KJ

If choice c is selected set score to 1.

140. 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).

o (a) 40 J

- (b) 400 J

o (c) 0,5 J

If choice b is selected set score to 1.

141. The potential energy of a stone is 88 J and it has a mass of 2 kg.

Calculate the height of the stone. (g = 10 m/s^2)

o (a) 17,6 m

- (b) 4,4 m

o (c) 44 m

If choice b is selected set score to 1.

142. 3 Liters of water with a temperature of 20 ^{o}C is warmed up to a temperature of 30 ^{o}C. (c_{water} = 4200 J/(kgK))

Calculate the heat needed to warm up the water.

o (a) 1,26 kJ
o (b) 140 J

- (c) 126000 J

If choice c is selected set score to 1.

143. The potential energy of a stone of 0,2 kg is 242 J.

Calculate the velocity of the falling stone just before it hits the ground. (g = 10 m/s^2)

- (a) 11 m/s

o (b) 484 m/s
o (c) 121 m/s

If choice a is selected set score to 1.

144. To warm up 3 liters of water from 20 ^{o}C to 100 ^{o}C you need 837200 J of heat.

How much is this in calories?

o (a) 10465 cal
o (b) 0,013 kcal

- (c) 200 kcal

If choice c is selected set score to 1.

145. A water heater has an efficiency of about 95%. To heat 100 liters of water from 35 ^{o}C up to 60 ^{o}C, you need about 9,5 MJ of energy.

How much energy does the heater need?

o (a) 9,975 MJ

- (b) 10 MJ

o (c) 997,5 MJ

If choice b is selected set score to 1.

146. To move a car with a velocity of 2 m/s we need an amount of energy of 2400 J.

Calculate the mass of the car.

- (a) 1200 kg

o (b) 2400 kg
o (c) 600 kg

If choice a is selected set score to 1.

147. To heat an iron rod from 300 K up to 1800 K we need an amount of heat of 1,8 MJ.

Calculate the mass of the iron rod. (c_{iron} = 400 J/(kgK)).

o (a) 4,8 kg

- (b) 3 kg

o (c) 480 kg

If choice b is selected set score to 1.

148. If there are acting several forces on an object and the object is in equilibrium we can say that the momentum is...

o (a) not conservated and the object is in balance.
o (b) conservated and the object is not in balance.

- (c) conservated and the object is in balance.

If choice c is selected set score to 1.

149. If the clockwise moments and the anticlockwise moments are the same in quantity, the object is...

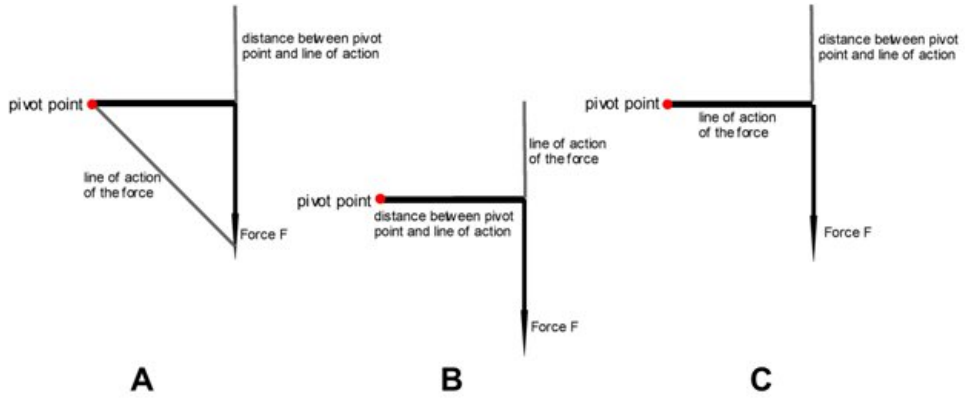
o (a) rotating.

- (b) in balance.

o (c) not in balance.

If choice b is selected set score to 1.

150. In what figure A, B or C are the distance of the force F to the pivot point and the line of action properly drawn?



- o (a) Figure A
- • (b) Figure B
- o (c) Figure C

If choice b is selected set score to 1.

151. The product of the average force and the time interval Δt during which the force acts is the definition of...

- • (a) impulse.
- o (b) the average acceleration
- o (c) linear momentum.

If choice a is selected set score to 1.

152. The definition of impuls is given in equation...

- o (a) $(v_f-v_0)/\Delta t$
- o (b) $m \cdot v$
- • (c) $F \cdot \Delta t$

If choice c is selected set score to 1.

153. The definition of the impuls - momentum theorem is given in equation...

- o (a) $m \cdot v$
- • (b) $F \cdot \Delta t = m(v_f - v_0)$
- o (c) $(v_f - v_0)/\Delta t$

If choice b is selected set score to 1.

154. What can be determined by a gyroscope?

- o (a) Only maintaining orientation.
- o (b) Measure orientation.
- • (c) Measure and maintaining orientation.

If choice c is selected set score to 1.

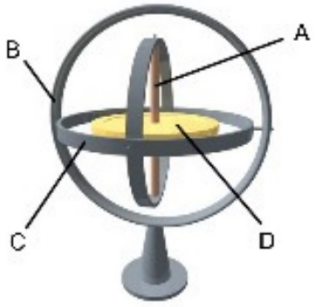
155. Give an example of a free-output-gimbal device.

Attitude reference gyroscopes to measure...

- o (a) the distance.
- • (b) the roll and yaw.
- o (c) the velocity.

If choice b is selected set score to 1.

156. Give the name of part A in the drawing.



- • (a) Spin axis.
- o (b) Gimbal.

o (c) Gyroscope frame.

If choice a is selected set score to 1.

157. Give the definition of the normal force.

The normal force is...

o (a) a force on an object perpendicular to the surface and has a greater magnitude than the weight of the object.

• (b) one component of the force that a surface exerts on an object with witch it is in contact and is perpendicular to the surface.

o (c) a force acting on an object with a magnitude greater than weight of the object.

If choice b is selected set score to 1.

158. Are the friction force and the normal force perpendicular to the surface or parallel to the surface?

o (a) Both are perpendicular.
o (b) The friction force is perpendicular to the surface and the normal force parallel.

• (c) The friction force is parallel to the surface and the normal force perpendicular.

If choice c is selected set score to 1.

159. Which are the correct equations to calculate the kinetic and the static friction force?

• (a) $f_K = \mu_K \cdot F_N \quad f_s = \mu_S \cdot F_N$

o (b) $f_K = \mu_K / F_N \quad f_s = \mu_S \cdot F_N$
o (c) $f_k = \mu_k \cdot F_N \quad f_s = \mu_S / F_N$

If choice a is selected set score to 1.

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

Calculate the velocity of the ball.

o (a) 0,24 m/s
o (b) 0,16 m/s

• (c) 6 m/s

If choice c is selected set score to 1.

161. A ball at rest gets an impuls of 0,9 Ns. The mass of the ball is 90 g.

Calculate the velocity the balls gets.

- o (a) 81 m/s
- o (b) 1 m/s
- • (c) 10 m/s

If choice c is selected set score to 1.

162. A ball at rest gets an impulse of 0,9 Ns. The velocity of the ball is 45m/s.

Calculate the mass of the ball.

- o (a) 50 kg
- o (b) 40,5 kg
- • (c) 20 g

If choice c is selected set score to 1.

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

Calculate the impulse the ball will get.

- • (a) 0,9 Ns
- o (b) $1 \cdot 10^{-5}$ Ns
- o (c) 100.000 Ns

If choice a is selected set score to 1.

164. A stone gets an impulse of 4,0 Ns, the duration of the impulse is 20 ms.

Calculate the force on the stone to get this impulse.

- • (a) 200 N
- o (b) 80 mN
- o (c) 5 mN

If choice a is selected set score to 1.

165. A stone gets an impulse of 4,0 Ns, the force that hits the stone is 200 N.

Calculate the duration of the impulse.

- o (a) 800 ms
- o (b) 50 s

- • (c) 20 ms

If choice c is selected set score to 1.

166. Which law applies to a gyroscope?

- o (a) The law of conservation of momentum.
- o (b) The first law of Newton

- • (c) The law of conservation of angular momentum.

If choice c is selected set score to 1.

167. Which compass is more accurate?

- o (a) They are equal, there is no difference.

- • (b) The gyroscopic.

- o (c) The magnetic

If choice b is selected set score to 1.

168. Why does the rotor of this gyroscope have vanes?

- (a) The rotor is driven by an airflow.

o (b) The rotor is driven by a magnetic field.
o (c) The rotor is driven by means of light.

If choice a is selected set score to 1.

169. The static friction force is depending on?

o (a) The weight of an object and the coefficient of static friction.

- (b) The normal force on an object and the coefficient of static friction.

o (c) The speed of an object and the coefficient of static friction.

If choice b is selected set score to 1.

170. The static friction coefficient between rubber and concrete on a wet day on a horizontal road is 0,8.

Calculate the maximal friction force of a car with a mass of 1200 kg. (g = 10 m/s^2).

- (a) 9600 N

o (b) 960 N
o (c) 15 kN

If choice a is selected set score to 1.

171. The coefficient of kinetic friction between a wooden sled and snow is 0,2.

Calculate the kinetic force between the sled and the snow as the the sled including child has a mass of 45 kg. (g = 10 m/s^2)

o (a) 2250 N
o (b) $2{,}25 \cdot 10^{-4}$ N

• (c) 90 N

If choice c is selected set score to 1.

172. The density of petrol is 0,8 kg/dm^3.

Calculate the specific gravity.

• (a) 0,8

o (b) 0,008
o (c) 800

If choice a is selected set score to 1.

173. The specific gravity of a substance is 1,126.

In this case we are talking about...

o (a) 113 kg/m^3 methane
o (b) 888 kg/m^3 fuel

• (c) 1126 kg/m^3 glycerol

If choice c is selected set score to 1.

174. Determine the specific gravity of blood with a density of 1060 kg/m^3

o (a) 0,94 kg/m^3

• (b) 1,06

o (c) 0,94

If choice b is selected set score to 1.

175. The specific gravity of ethyl alcohol is 0,806.

Determine the density of ethyl alcohol.

o (a) 0,806

• (b) 0,806 kg/dm^3

o (c) 1,24

If choice b is selected set score to 1.

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

Calculate its mass.

• (a) 19,5 kg

o (b) 3,12 kg
o (c) 0,32 kg

If choice a is selected set score to 1.

177. 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.

o (a) 2500 kg

• (b) 25600 kg

o (c) 25,6 kg

If choice b is selected set score to 1.

178. The density of gold is 20 kg/dm^3. The mass of a lump of gold is 50 kg.

Calculate the volume of this lump of gold.

• (a) 2,5 dm^3

o (b) 0,4 dm^3
o (c) 10 dm^3

If choice a is selected set score to 1.

179. The volume of a diamond is 0,2 cm^3, the mass of this diamond is 1 g.

Determine the density of diamond.

o (a) 500 kg/m^3
o (b) 0,2 g/cm^3

• (c) 5 g/cm^3

If choice c is selected set score to 1.

180. Give the equation of mass density.

o (a)
$\rho = m + V$

• (b)
$\rho = m / V$

o (c)
$\rho = m \cdot V$

If choice b is selected set score to 1.

181. The definition of specific gravity is:

o (a) Density water (4^oC) · density substance

• (b) Density substance / density water (4^oC)

o (c) Density water (4^oC) / density substance

If choice b is selected set score to 1.

182. The mass of a sheet of titanium with a density of 4500 kg/m^3 is 15,75 kg.

Calculate the volume titanium.

o (a) 0,035 m^3

• (b) 0,0035 m^3

o (c) 3,5 m^3

If choice b is selected set score to 1.

183. The mass of 0,25 m^3 Mercury is 3400 kg.

Determine the specific gravity of Mercury.

- o (a) 73,5
- • (b) 13,6
- o (c) 8,5 kg/m^3

If choice b is selected set score to 1.

184. Give the equation of continuity.

- o (a)
  $\rho_1 \cdot A_1 \cdot v_1 = (\rho_2 \cdot A_2) / v_2$
- • (b)
  $\rho_1 \cdot A1 \cdot v1 = \rho_2 \cdot A_2 \cdot v_2$
- o (c) $(\rho_1 \cdot A_1) / v_1 = (\rho_2 \cdot A_2) / v_2$

If choice b is selected set score to 1.

185. Why is the stream- velocity of a liquid in a tube dependent of the viscosity of the fluid?

Because a fluid...

- o (a) with a lower viscosity more "on the wall sticks" then a fluid with higher viscosity.
- • (b) with a higher viscosity more "on the wall sticks" then a fluid with lower viscosity
- o (c) with a higher viscosity less "on the wall sticks" then a fluid with lower viscosity.

If choice b is selected set score to 1.

186. Is it possible to compress a liquid easily?

- o (a) Yes, the molecules are very close to each other, so it is easy to compress a liquid.
- o (b) Yes, the molecules are far enough away from each other so there is plenty of room between them to compress.
- • (c) No, because the molecules are very close to each other it is almost not possible to compress them.

If choice c is selected set score to 1.

187. If we look to the total energy of a streaming fluid, it is possible to conclude:

- o (a) E_{tot} = EK - EP = 1/2 mv^2 - mgy
- • (b) E_{tot} = EK + EP = 1/2 mv^2 + mgy
- o (c) E_{tot} = EK·EP = 1/2 mv^2·mgy

If choice b is selected set score to 1.

188. Is the pressure of air underneath a wing of an airplane lower or higher than on the top of the wing to get the lift?

- • (a) Higher, because the velocity of air underneath the wing is slower.
- o (b) Lower, because the velocity of air underneath the wing is slower.
- o (c) Higher, because the velocity of air underneath the wing is faster.

If choice a is selected set score to 1.

189. Give the equation of the "mass flow rate" (in a venturi for example).

- • (a) Mass flow rate = ρ·A·v
- o (b) Mass flow rate = (ρ·v) / A
- o (c) Mass flow rate = (ρ·A) / v

If choice a is selected set score to 1.

190. Calculate the mass flow rate of glycerin with a density of 1,26 kg/dm^3 and velocity of 3 m/s through a pipe with a cross-sectional area of 1 dm^2.

- o (a) 4,2 kg/s
- • (b) 37,8 kg/s
- o (c) 378000 kg/s

If choice b is selected set score to 1.

191. Calculate the density of terpetin 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.

- o (a) 4 kg/dm^3
- • (b) 1 kg/dm^3

o (c) 40 kg/dm^3

If choice b is selected set score to 1.

192. When the massflow rate is 6,6·10^{-6} kg/s. The cross-sectional area of a pipe is 2·10^{-4} dm^2 and the density is 1,1 kg/dm^3.
Calculate the speed through the pipe.

o (a)
14,52 dm/s
o (b)
3·10^{-10} dm/s

• (c)
3·10^{-2} dm/s

If choice c is selected set score to 1.

193. Which is Bernoulli's equation?

• (a) Equation 1.
$$p_1 + \tfrac{1}{2} \cdot \rho \cdot v_1^2 + \rho \cdot g \cdot y_1 = p_2 + \tfrac{1}{2} \cdot \rho \cdot v_2^2 + \rho \cdot g \cdot y_2$$

o (b) Equation 2.
$$\frac{p_1 + \tfrac{1}{2} \cdot \rho \cdot v_1^2}{\rho \cdot g \cdot y_1} = \frac{p_2 + \tfrac{1}{2} \cdot \rho \cdot v_2^2}{\rho \cdot g \cdot y_2}$$

o (c) Equation 3.
$$\frac{p_1 + \rho \cdot g \cdot y_1}{\tfrac{1}{2} \cdot \rho \cdot v_1^2} = \frac{p_2 + \rho \cdot g \cdot y_2}{+\tfrac{1}{2} \cdot \rho \cdot v_2^2}$$

If choice a is selected set score to 1.

194. 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...

o (a) increases.
o (b) decreases.

• (c) stays the same.

If choice c is selected set score to 1.

195. When using Bernoullis 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 speed of the fluid when the pressure increases and the density stays the same?

The speed of the fluid...

o (a) stays the same.

• (b) decreases.

o (c) increases.

If choice b is selected set score to 1.

196. On which principle are the most thermometers based?

o (a) Expanding with decreasing temperature.
o (b) Contraction with increasing temperature.

• (c) Expanding with increasing temperature.

If choice c is selected set score to 1.

197. Calculate: 60°C = ...°F

o (a) $65^1/_3$ °F

• (b) 140 °F

o (c) 76 °F

If choice b is selected set score to 1.

198. Calculate: 450K = ...°C

o (a) 723,15 °C
o (b) 1,65 °C

• (c) 176,85 °C

If choice c is selected set score to 1.

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

- o (a) W/^{o}C
- • (b) Joule
- o (c) W/s

If choice b is selected set score to 1.

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

- o (a) 16000 J
- o (b) 4,44 J
- • (c) 36000 J

If choice c is selected set score to 1.

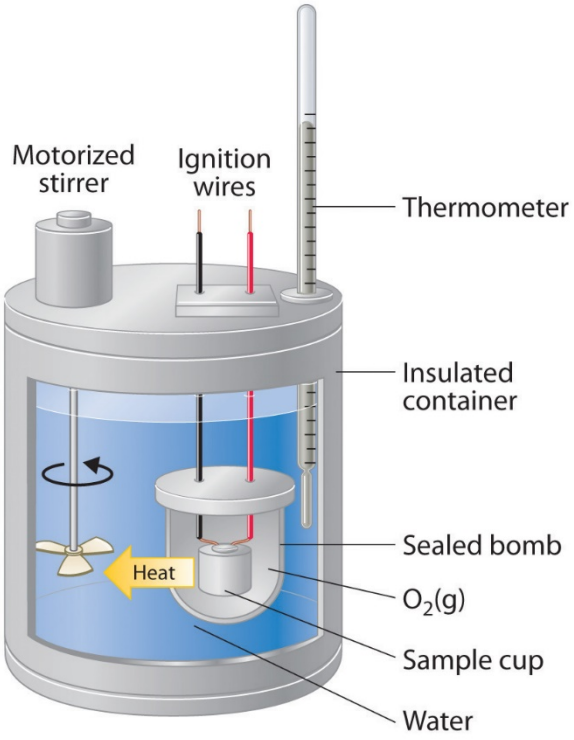
201. A specific quantity of copper is cooled down ΔT=25 K, hereby releases energy Q = 7000 J. (c_{copper} = 400 J/(kgK)).

Calculate the mass of copper.

- • (a) 0,7 kg
- o (b) 112 kg
- o (c) 1,43 kg

If choice a is selected set score to 1.

202. Which of the following descriptions is the correct description of "heat capacity"?



The heat capacity is a variable for a system...

o (a) of substances and has the unit J/(kgK).

• (b) of substances and has the unit J/K.

o (c) of substances and has the unit J/kg.

If choice b is selected set score to 1.

203. What is the equation to calculate the thermal conductivity?

o (a) k= (Q·ΔT) / (l·t·A)

• (b) Q= (k·t·A·ΔT) / l

o (c) k= (Q·l·ΔT) / (t·A)

If choice b is selected set score to 1.

204. Give the definition of heat conduction.

Conduction is the process...

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

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

If choice c is selected set score to 1.

205. When 2000 m^3 water (volume of a swimming pool) is heated from 10°C to 30°C. Calculate the volume of the water at 30°C. (β_{water} = 2,0·10^{-4} /°C)

- • (a) 2008 m^3

- o (b) 2006 m^3
- o (c) 8 m^3

If choice a is selected set score to 1.

206. When 2000 m^3 water (volume of a swimming pool) is heated, the volume of water increases from 2000 m^3 to 2008 m^3. The initial temperature of the water is 5°C.(β_{water}=2,0·10^{-4}/°C).

Calculate the final temperature of the water.

- o (a) 20 °C

- • (b) 25 °C

- o (c) 30 °C

If choice b is selected set score to 1.

207. 2000m^3 Water (volume of a swimming pool) is heated from 10°C to 30°C. (β_{water} = 2,1·10^{-4}/°C)

Calculate the <u>volume expansion</u> of the water at 30°C?

- o (a) 6,1 m^3
- o (b) 2008,4 m^3

- • (c) 8,4 m^3

If choice c is selected set score to 1.

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

Calculate the work done on the gas.

o (a) W= 1000 J
o (b) W= -1000 J

- (c) W= 4000 J

If choice c is selected set score to 1.

209. The work done on a gas of a system is 3000J. The internal energy of the gas decreases with 4000J.

Which conclusion belongs to this process?

- (a) 7000 J of heat is extracted from the gas.

o (b) 1000 J of heat is extracted from the gas.
o (c) 1000 J of heat is gained to the gas.

If choice a is selected set score to 1.

210. The internal energy of a system is increased by 1500J. The amount of supplied heat is 2500J.

Calculate the work done by the gas.

o (a) W= 1000 J

- (b) W= 4000 J

o (c) W= -1000 J

If choice b is selected set score to 1.

211. The pressure of a gas in a container is 546 Pa. The volume of the container is 250L and the temperature of the gas is 0 ^{o}C.

Calculate the gas constant of this gas.

- (a) R = $5 \cdot 10^{-5}$ J/K

o (b) R = 8 J/K
o (c) R = 372645 J/K

If choice a is selected set score to 1.

212. The gas constant of a gas is 4 J/K.

Determine the specific heat capacity with a constant pressure.

o (a) 6 J/K
o (b) 2,5 J/K

• (c) 10 J/K

If choice c is selected set score to 1.

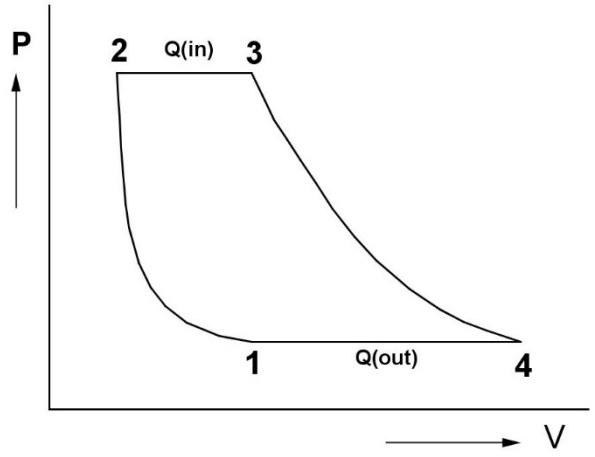
213. Calculate the specific gas constant of 2 kg gas, with a specific heat capacity with constant volume of 6 J/K.

o (a) 18 J/(kgK)
o (b) 0,5 J/(kgK)

• (c) 2 J/(kgK)

If choice c is selected set score to 1.

214. The figure represents the process from a gas turbine motor.



What happens during the step 4-1?

o (a) The combustion of fuel under constant pressure.
o (b) The exhaust, removal of heat and the combustion gases under a constant volume.

• (c) The exhaust, removal of heat and the combustion gases under a constant pressure.

If choice c is selected set score to 1.

215. 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

o (b) 5000 J
o (c) 62500 J

If choice a is selected set score to 1.

216. What equation gives the coefficient of performance for a heat pump?

o (a) coefficient of performance = Q_C / Q_H

- (b) coefficient of performance = Q_C / W

o (c) coefficient of performance = Q_H / W

If choice b is selected set score to 1.

217. 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.

o (a) 2 cm

- (b) 50 m

o (c) 1,25 Mm

If choice b is selected set score to 1.

218. 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.

o (a) $1{,}2 \cdot 10^{21}$ m/s
o (b) $3 \cdot 10^7$ m/s

- (c) $3 \cdot 10^8$ m/s

If choice c is selected set score to 1.

219. The wavelength of a blue light wave is 450 nm.

Calculate the periodic time of the wave.

o (a) 135 s

• (b) $1{,}5 \cdot 10^{-15}$ s

o (c) $6{,}66 \cdot 10^{14}$ s

If choice b is selected set score to 1.

220. The angle of incidence of a light beam on a plane mirror is 50^{o} with respect to the mirror.

Determine the angle of reflection with respect to the normal.

o (a) 50 ^{o}
o (b) 90 ^{o}

• (c) 40 ^{o}

If choice c is selected set score to 1.

221. 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}

o (b) 20 ^{o}
o (c) 90 ^{o}

If choice a is selected set score to 1.

222. The image of an object in a plane mirror is...

• (a) upright, the same size as the object and located as far behind the mirror as the object in front of it.

o (b) upright, smaller than the object and located as far behind the mirror as the object in front of it.
o (c) upside down, the same size as the object and located as far behind the mirror as the object in front of it.

If choice a is selected set score to 1.

223. 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

o (b) $^1/_6$ m
o (c) -6 m

If choice a is selected set score to 1.

224. 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.

o (a) - $^5/_6$ m

- (b) -1,2 m

o (c) 1,2 m

If choice b is selected set score to 1.

225. The image of an object in a mirror is 12,5 cm height. The magnification of the mirror is 2,5.

Calculate the height of the object.

o (a) 0,2 cm

- (b) 5 cm

o (c) 31,25 cm

If choice b is selected set score to 1.

226. 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.

- (b) away from the normal.

o (c) along the surface.

If choice b is selected set score to 1.

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

- o (a) < 90 °
- o (b) 180 °
- • (c) 90 °

If choice c is selected set score to 1.

228. Which equation can be used to calculate the critical angle?

- • (a) $\sin\theta_c = \frac{n_2 \sin 90^\circ}{n_1} \quad (n_1 > n_2)$
- o (b) $\sin\theta_c = \frac{n_1 \sin 90^\circ}{n_2} \quad (n_1 > n_2)$
- o (c) $\sin\theta_c = \frac{n_2 \sin 90^\circ}{n_1} \quad (n_1 < n_2)$

If choice a is selected set score to 1.

229. The number of modes in multimode fibers depends on...

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

If choice c is selected set score to 1.

230. Modal dispersion means modes arrive at the fiber end...

- • (a) at slightly different times.
- o (b) at the same time.
- o (c) at the same time depending on the numerical aperture.

If choice a is selected set score to 1.

231. Give the definition for the "acceptance angle".

The acceptance angle is the maximum angle to the axis of the fibre that light entering the fibre is propagated and depends on fibre ...

o (a) properties and transmission conditions.

• (b) properties and transmission.

o (c) properties.

If choice b is selected set score to 1.

232. The frequency of a wave is 20 Hz.

Calculate the period of this wave.

• (a) 0,05 s

o (b) 0,5 s
o (c) 20 s

If choice a is selected set score to 1.

233. The frequency of a wave is 40 Hz.

Calculate the period of this wave.

o (a) 0,25 s

• (b) 0,025 s

o (c) 40 s

If choice b is selected set score to 1.

234. The frequency of a wave is 80 Hz.

Calculate the period of this wave.

o (a) 80 s
o (b) 0,123 s

• (c) 0,0125 s

If choice c is selected set score to 1.

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

Calculate the speed of the wave.

- (a) 10.000 m/s

o (b) 0,04 m/s
o (c) 25 m/s

If choice a is selected set score to 1.

236. The wave length is 250m, the frequency is 20 Hz.

Calculate the speed of the wave.

o (a) 0,08 m/s
o (b) 12,5 m/s

- (c) 5000 m/s

If choice c is selected set score to 1.

237. The wave length is 300m, the frequency is 40 Hz.

Calculate the speed of the wave.

o (a) 7,5 m/s
o (b) 0,13 m/s

- (c) 12.000 m/s

If choice c is selected set score to 1.

238. 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.

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

o (a) neutral interference.

- (b) destructive interference.

o (c) constructive interference.

If choice b is selected set score to 1.

240. What kind of interference do we use to reduce the loudness of undesirable sounds?

o (a) constructive interference.

• (b) destructive interference.

o (c) neutral interference.

If choice b is selected set score to 1.

241. The sound power of a source is 0,05W. The sound intensity is ..... on a distance of 2 meter from the source, relative to 10 meter?

• (a) higher

o (b) the same
o (c) lower

If choice a is selected set score to 1.

242. The sound power of a source is 0,05 W. The sound intensity is ..... on a distance of 5 meter from the source, relative to 1 meter?

o (a) the same

• (b) lower

o (c) higher

If choice b is selected set score to 1.

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

• (a) $5 \cdot 10^{-2}$ W/m^2

o (b)
$\pi \cdot 10^{3}$ W/m^2
o (c) 5 W/m^2

If choice a is selected set score to 1.

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

o (a) lower
o (b) constant

• (c) higher

If choice c is selected set score to 1.

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

• (a) lower

o (b) higher
o (c) constant

If choice a is selected set score to 1.

246. When an ambulance with siren leaves you, the frequency of the siren ...

o (a) is lower

• (b) is constant

o (c) is higher

If choice b is selected set score to 1.

If assessment score is 0% to 100% Feedback