

MATHEMATICS

1. The solution of the equation $\log_3 x < 1$ in the real domain is

- a) $x < 1$ b) $x > 1$ c) $x < 3$ d) $x > 0$ e) $0 < x < 3$

2. If $\sin 2x = \frac{\pi}{2}$, then

- a) $x = 1$ b) $x = \frac{1}{2}$ c) $x = \frac{\sqrt{2}}{2}$ d) $x = 45^\circ$ e) x doesn't exist

3. The solution of the equation $\sin x = 0$ is exactly all $x \in \mathbf{R}$ to which applies (k is an integer)

- a) $x = \frac{\pi}{4} + 2k\pi$ b) $x = \frac{\pi}{4} + k\pi$ c) $x = \frac{\pi}{2} + k\pi$ d) $x = \pi + k\pi$ e) $x = \frac{3\pi}{2} + k\pi$

4. $\binom{10}{8} + \binom{10}{9} =$

- a) $\binom{11}{2}$ b) $\binom{11}{8}$ c) $\binom{20}{17}$ d) $\binom{10}{17}$ e) 110

5. Lines with equations $p: 2x - 5y + 13 = 0$; $q: 2x + 5y + 13 = 0$ share exactly

- a) two points b) one point c) no point d) all points e) impossible to decide

6. If $z = \left(\frac{\sqrt{3}}{2} + \frac{i}{2}\right)^5$ is a complex number, then its absolute value $|z| =$

- a) 1 b) 2 c) 3 d) 4 e) 5

7. If the angle ω is formed by the sides p, q of a triangle, then it is true for the remaining side r that

- a) $r = p + q - 2pq \cos \omega$ b) $r = p + q - 2pq \sin \omega$ c) $r = p + q - 2pq \sin \omega$
 d) $r^2 = p^2 + q^2 - 2pq \cos \omega$ e) $r^2 = p^2 + q^2$

8. A train has travelled 70 km in 2 hours and 15 minutes. How long will it take the train to travel 280 km?

- a) 540 min. b) 4 hrs 5 min. c) 4 hrs 20 min. d) 8 hrs 20 min. e) 5 hrs 10 min.

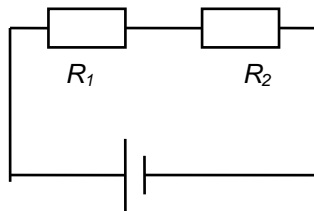
PHYSICS

1. A chandelier has three bulbs with the same resistance. When all three lights are on, the mains supply the current I . If the tungsten wire in one of the bulb is burned, the current supplied from the mains will be

- a) $I/3$ b) $2I/3$ c) I d) $3I/2$

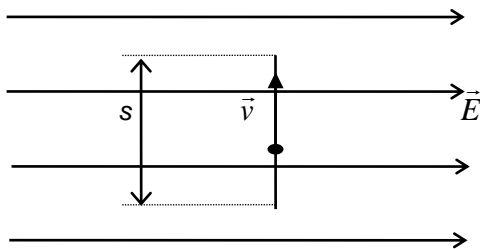
2. The current 6 A passes through the resistance R_1 . We know that $R_2 = 2.R_1$. The power source supplies the current:

- a) 3 A
 b) 6 A
 c) 9 A
 d) 12 A



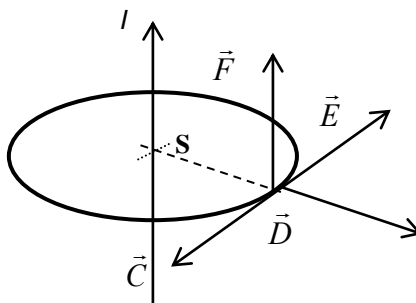
3. In a homogenous electric field with field strength \vec{E} we shall carry a particle having the positive charge Q along the line shown of length s with velocity \vec{v} . The electric force acting on the particle does the work:

- a) $EQvs$
- b) EQs
- c) **0**
- d) $-EQs$



4. Consider a straight conductor passed through by the current I . The induction lines of the magnetic field are circles with the center in point S . Which of the vectors shown in the figure indicates the direction and orientation of the magnetic flux density \vec{B} ?

- a) vector \vec{C}
- b) vector \vec{D}
- c) **vector \vec{E}**
- d) vector \vec{F}



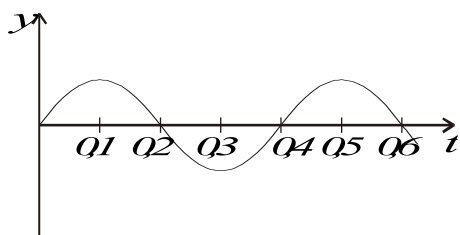
5. A bullet with the mass 10 g travelling at a velocity 120 m/s got stuck in a fixed wooden box. The internal energy of this system (box and bullet) increased by

- a) **72 J**
- b) 144 J
- c) 36 J
- d) 7,2 J

6. Two equally big electric charges act upon each other with the force \vec{F} . If we increase both the magnitude of the charges and their distance to twice the original value, then the electric force \vec{F}_1 acting between the charges will have the magnitude

- a) **$F_1 = F$**
- b) $F_1 = 2.F$
- c) $F_1 = F/2$
- d) $F_1 = F/4$

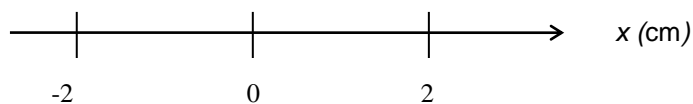
7. In the following plot you see the dependence of the displacement of the body from the equilibrium position against time. The body oscillates with the angular velocity



- a) $0,2\pi \text{ s}^{-1}$
- b) $0,4\pi \text{ s}^{-1}$
- c) $0,8\pi \text{ s}^{-1}$
- d) **$5\pi \text{ s}^{-1}$**

8. A body attached to a spring oscillates with the frequency 5 Hz along the line shown between the points -2 and $+2$. Within one minute the body will cover the distance

- a) 0,4 m
- b) 6 m
- c) 12 m
- d) **24 m**



INFORMATICS

1. LSB is
 - a) a low threshold value
 - b) the most significant bit in a word
 - c) **the least significant bit in a word**
 - d) a high threshold value
2. A packet is
 - a) a bundle of programs delivered with the operating system
 - b) a set of codes used for file encryption
 - c) a set of codes used for file decryption
 - d) **a bundle of data transferred in the computer network**
3. The term multimedia data stands for
 - a) data for holographic presentation
 - b) **data acquired by different devices (video, sound, image)**
 - c) a PowerPoint presentation
 - d) files multiply saved on CD-ROM
4. What range of integers can be expressed by one byte if one of the bits is used to express the sign?
 - a) -255 to 254
 - b) **-128 to 127**
 - c) 0 to 255
 - d) -64 to 63
5. Integers in programs are used mainly for
 - a) reducing the need to round off
 - b) possibility of root extraction
 - c) **quick and memory-efficient calculations**
 - d) high dynamic range
6. What is the purpose of the following algorithm with the result in the C variable? $C=0; I=1; \text{while } I \leq 10 \{ C=C+I; I=I*2 \}$
 - a) to calculate the total of an algebraic line
 - b) to calculate the factorial
 - c) **to calculate the total of a geometrical line**
 - d) to calculate the average
7. Simple Mail Transport Protocol is
 - a) **the basic protocol of electronic mail**
 - b) the protocol of remote access to server
 - c) the protocol of remote access to electronic mail
 - d) the fast file transfer protocol
8. A terminal is
 - a) a device used for working on a switch
 - b) **a device used for working on a remote computer**
 - c) a device used for data back-up
 - d) software for searching files on the Internet
9. Negative binary numbers in a computer can be expressed by
 - a) a so called double-bit
 - b) **a binary complement**
 - c) adding two to a number
 - d) cannot be expressed
10. Which of the following programming structures does not logically agree with the others?
 - a) $m=n>r<x;$
 - b) $m=n!=x;$
 - c) **$m=n*x;$**
 - d) $m=n>=x;$