

The Mathematical Grammar School Cup

Physics Competition

Solutions:

1. a) D, b) C
2. E
3. A
4. A
5. A
6. D
7. B
8. B
9. Stays constant
10. Increases
11. a) decreases, b) stays constant
12. $A=mg/2$, $B=mg \Rightarrow A < B$
13. $A < B$
14. a) $Q=4\pi\epsilon_0 R^2 E = 5,8691 \cdot 10^5 C$
b) $t=575,51s$
c) $R=U/I=291,6 \Omega$
d) approximately 350000 bolts daily
15. a) $l_{desni}-l_{levi}=32cm-24cm=8cm$
b) they're errct, $h_{left}=1cm$, $h_{right}=2cm$
16. total reflection
17. Balloon will lean towards the direction of car's acceleration
18. Heated balls will thermally expand and then the gravitational potential energy changes slightly: decreases for A, and increases for B and then from the conservation energy law it follows: $t_A > t_B$.