Név: ..... osztály:.....

ÉRETTSÉGI VIZSGA • 2008. november 3.

FIZIKA
ANGOL NYELVEN

KÖZÉPSZINTŰ
ÍRÁSBELI VIZSGA

2008. november 3. 14:00

Az írásbeli vizsga időtartama: 120 perc

Pótlapok száma	
Tisztázati	
Piszkozati	

OKTATÁSI ÉS KULTURÁLIS MINISZTÉRIUM

Instructions to candidates:

Time allowed for this question paper is 120 minutes.
Read the instructions of this question paper carefully, and make sure that you do not run out of time.
You may solve the problems in any order.
Materials allowed: calculator, data tables.
If there is not enough space provided for the solution of a problem you may continue on the sheets attached at the end of the paper. On the sheets attached please indicate the number of the problem.

Indicate here which of the problems 3/A and 3/B you have chosen: (That is which one you want to be assessed.)

3/ ☐

PART ONE

Exactly one of the answers to each of the questions below is correct. Write the appropriate letter in the white square on the right. (If necessary check your answer by calculation.)

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1. It is well known that by means of a converging lens the rays of the Sun can be collected to light fire. Which one of the following devices can be used to light fire?

A) Convex mirror.
B) Concave mirror.
C) Plane mirror.

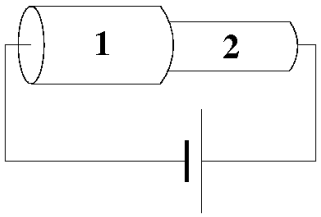
2 points	

2. If you kick a medicine ball, your foot hurts. What happens if you kick the same ball on the Moon with the same force?

A) It will hurt less because the weight of the ball is smaller on the Moon.
B) The pain will be the same, since the mass of the ball is the same on the Moon and on the Earth.
C) It will hurt more because it is more difficult to accelerate the ball on the Moon than on the Earth.

2 points	

3. The wire, whose resistance is not negligible, and which is shown in the figure, consists of two parts which have equal lengths but different widths. In which part will the current be greater if voltage is applied between the ends of the wire?



A) In part number 1.
B) In part number 2.
C) The currents are the same in both parts.

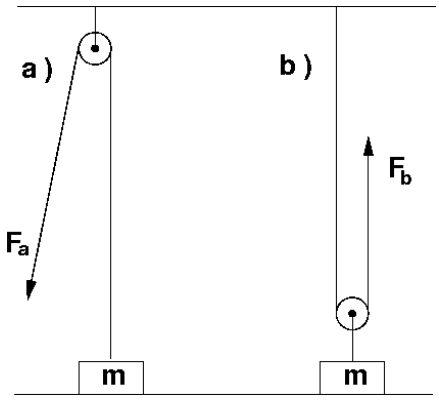
2 points	

4. A sample of gas is heated in a closed container, at constant volume from a temperature of 100 °C to a temperature of 200 °C. To what value will the pressure of the gas increase?

A) It increases to twice of the original value.
B) It increases to more than twice of the original value.
C) It increases to less than twice of the original value.

2 points	

5. The body of mass *m* shown in the figure can be raised to a height of *h* in two different ways, by means of a fixed pulley and by means of a movable pulley. In which case will the performed work be smaller? (The masses of the pulleys and the ropes are negligible.)



A) In case a.) the work is smaller because it is always easier to pull the rope downward.
B) In case b.), because in case of the movable pulley the rope is pulled by a smaller force.
C) The same work is done in both cases.

2 points	

6. Which statement is true?

A) The Moon does not keep the same face towards the Earth at all times.
B) The Moon is rotating about its own axis, but it keeps the same face towards the Earth at all times.
C) The Moon does not rotate about its own axis, this is why it always keeps the same face towards the Earth.

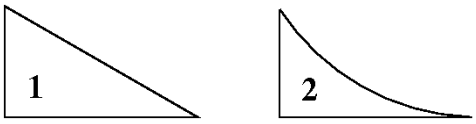
2 points	

7. Is it true for any type of gas that its specific heat capacity at constant pressure is always greater than its specific heat capacity at constant volume?

A) No, it is only true for diatomic gases.
B) Yes, without any exception it is always greater.
C) No, in case of noble gases the two values are equal.

2 points	

8. An object is released from rest at the top of two different ramps. The ramps have the same heights, and friction is negligible. At which ramp will the speed of the object at the bottom of the ramp be greater?



A) The speed of the object will be greater at the bottom of ramp number 1.
B) The speed of the object will be greater at the bottom of ramp number 2.
C) The speeds of the objects will be the same at the bottom of the two ramps.

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2 points	

9. Which speed is the greatest among the speeds listed below??

A) 36 km/h
B) 1.1 m/s
C) 6000 cm/minute

2 points	

10. What are the isotopes?

A) Atoms from which the electrons are ripped off.
B) Atoms which have the same atomic number but different atomic mass numbers.
C) Radioactive materials.

2 points	

11. The equivalent resistance of two resistors connected in parallel is 12 ohms. What might be the resistances of the two resistors?

A) 2 and 10 ohm.
B) 4 and 20 ohm.
C) 20 and 30 ohm.

2 points	

12. Can you heat something with ice?

A) No, because ice is always colder than water.
B) Yes, anything can be heated, which is colder than ice, which is investigated.
C) Yes, but only those liquids which have smaller melting point than water.

2 points	

13. Two incandescent lamps, whose power ratings are 4 W and 5 W, are connected in series to a voltage supply. Choose the statement which is surely true.

A) The two lamps dissipate the same power.
B) The currents that flow through the two lamps are the same.
C) The voltages across the two lamps are the same.

2 points	

14. A book is lying on the tabletop. Which forces are exerted on it?

A) The normal force exerted by the table and the gravitational force.
B) The gravitational force and its reaction force.
C) The normal force exerted by the table and its reaction force.

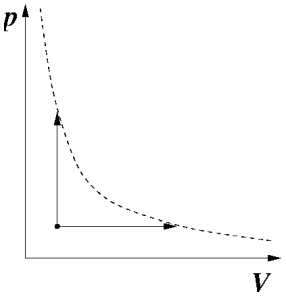
2 points	

15. Which radioactive decays involve change in the atomic number of the nuclei?

A) α- and β-decay
B) γ- and β-decay
C) α- and γ-decay

2 points	

16. The two arrows in the figure shows two processes of a sample of ideal gas. The dashed line is a hyperbola. Which statement is not true?



A) The temperature of the gas changes by the same amount in each process.
B) The absorbed heat is the same in each process.
C) The change in the internal energy is the same in each process.

2 points	

17. A charged particle is shot into uniform electric field perpendicularly to the electric field E. Which statement is true?

A) Both the magnitude and the direction of the velocity of the particle change.
B) The speed of the particle remains the same, but the direction of its motion changes.
C) Neither the direction nor the magnitude of the velocity of the particle change.

2 points	

18. The energy of the photons of red light, which is incident on the cathode of a photocell, is greater then the work function. How will the speed of the ejected electrons change if the cathode is lighted by blue light of the same intensity?

A) The speed decreases.
B) The speed does not change.
C) The speed increases.

2 points	

19. The number of the atoms of a radioactive element is decreased to one fourth of the original value in ten years. What is the half-life of the element?

A) 2.5 years.
B) 5 years.
C) 20 years.

2 points	

20. Two satellites of different mass orbit around the Earth along circular paths of the same radii. Which one has greater period?

A) The one which has smaller mass, because its linear momentum is smaller.
B) They have the same periods, because they have the same accelerations.
C) The one which has greater mass, because the attractive force exerted on it by the Earth is greater.

2 points	

PART TWO

Solve the following problems. Justify your answers by means of explanations, diagrams or calculations, depending the nature of the problem. Make sure that the meaning of all notations used is clear.

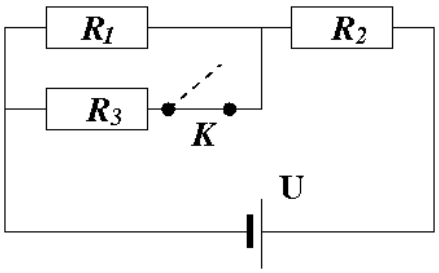
1. **Q = 5 kJ thermal energy is added to an aluminium rod of length l = 30 cm and of cross-section A = 0.5 cm^2. What will the final temperature of the rod be if initially its temperature was T = 18 °C? By what amount does the internal energy of the rod change during the heating?**
   The specific heat capacity of aluminium is c=900J/kg·°C, and the density of aluminium is 2700 kg/m^3.

Total
12 points

2. There is a switch in the circuit shown in the figure. The resistances of the resistors are $R_1 = R_2 = R_3 = 10\,\Omega$ and the voltage across the battery is $U = 5\,\mathrm{V}$. What is the power at each resistor if switch K is

a) **closed?**

b) **open?**



a)	b)	Total
11 points	7 points	18 points

Solve only one of the problems 3/A and 3/B. On the cover sheet indicate which one you have chosen.

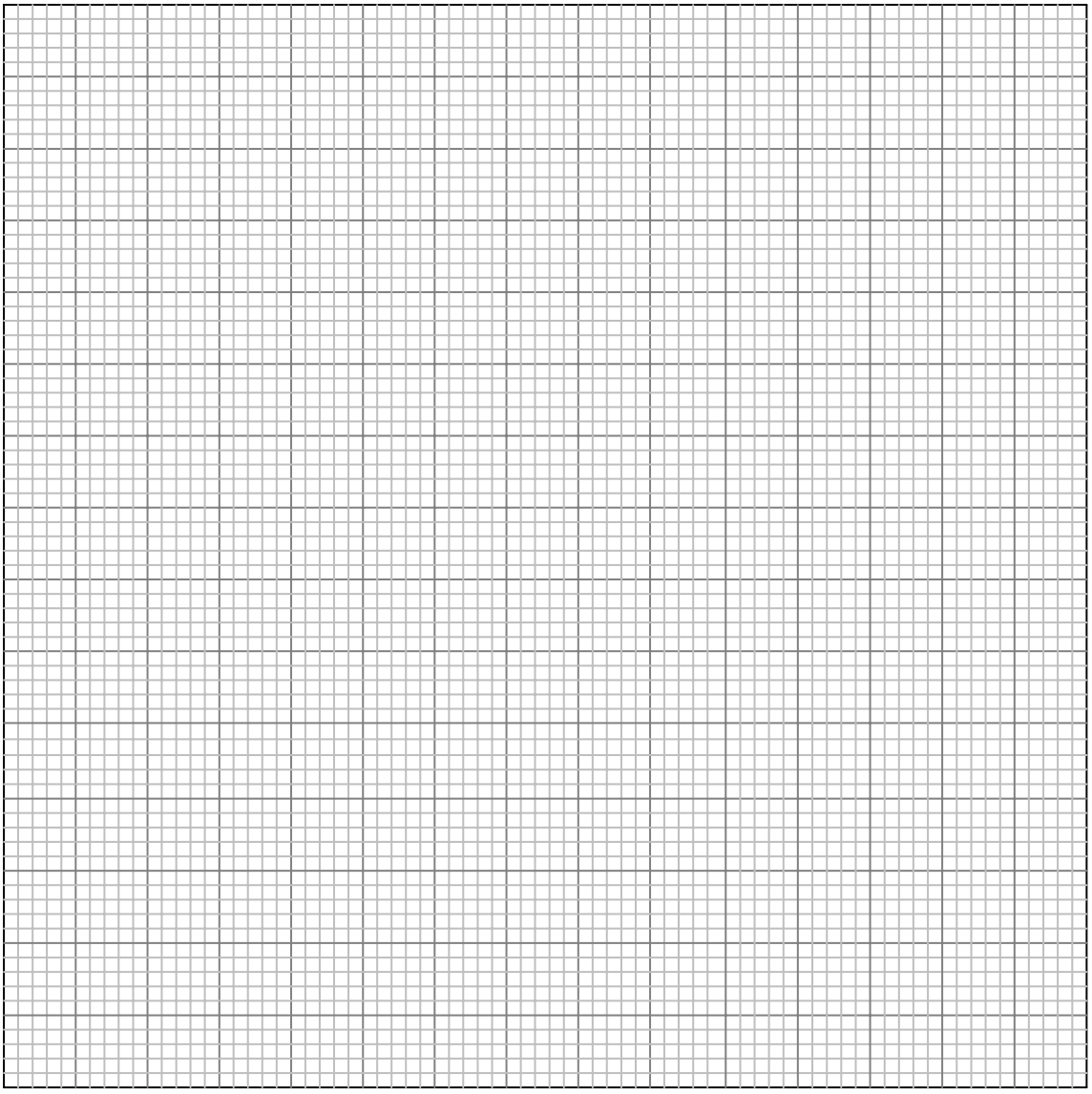
3/A A small amount of water in a flask is boiled by means of a gas heater. After some minutes of boiling the flask is taken away from the heater. The boiling stops. Then the flask is sealed by a rubber bung, and with the help of a sponge, cold water is used to cool down the part of the bottle which is above the water. The water begins to boil again. At this time it is very difficult to pull out the rubber bung. Why does the water begin to boil again? Why is it difficult to pull out the bung?

Total
20 points

3/B The data below shows the length of a spring as a function of the pulling force exerted on the spring:

Force (N)	2	4	6	8	10	12	14	16	18	20
Length of spring (cm)	10	11.1	12	12.9	14.1	15	15.8	16.4	16.6	16.7

a) **Plot the data in a suitable graph.**
b) **What can be deduced from the graph about the spring?**
c) **Determine the spring constant when the length of the spring is between 10 cm and 15 cm, and find the length of the unstretched spring.**
d) **How much work is done by the force exerted on the spring while the spring is extended from the length of 10 cm to 12 cm?**



a)	b)	c)	d)	Total
3 points	4 points	8 points	5 points	20 points

To be filled by the examiner:

	maximum score	score attained
I. Multiple Choice Questions	40	
II. Extended Response Problems	50	
TOTAL	**90**	

examiner

Date: ……

	elért pontszám / score attained	programba beírt pontszám / score input for the program
I. Feleletválasztós kérdéssor / I. Multiple Choice Questions		
II. Összetett feladatok / II. Extended Response Problems		

javító tanár / examiner

jegyző / registrar

Dátum / Date: …… Dátum / Date: ……