PHYSICS	16+	45 MIN

CALORIES

I. Fill in the gaps with the proper words, expressions.

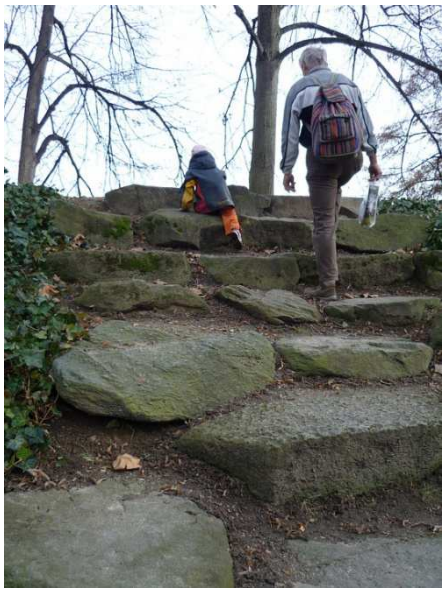
..*(a)*…. is a result of energy imbalance: too many calories are taken in, but ..*(b)*… calories are burned. Several factors - like age, …*(c)*…, and genes influence how many calories (or how much "energy") people burn each day. However, the most variable factor—and the most easily modified—is the amount of …*(d)*… people get each day.

The proper amount of activity can help people stay at a healthy weight or …*(e)*….. It can also lower the risk of …*(f)*…, diabetes, …*(g)*…, high blood pressure, as well as …*(h)*…. Inactive (sedentary) lifestyles do just the opposite.

Despite all the health …*(i)*… of physical activity, people worldwide are doing less of it. It's clear that this …*(j)*… in physical activity is a key contributor to the …*(k)*… epidemic, and in turn, to rising rates of …*(l)*… everywhere.

1	activity	2	body size	3	chronic disease	4	decline
5	global obesity	6	benefits	7	heart disease	8	lose weight
9	obesity	10	reduce stress	11	stroke	12	too few

II. Calculations:



1. To climb mountain is definitely a good exercise, you burn the fat stored in your body. How much fat do you burn if you climb up to the top of an 800 m tall hill? Assume, that about 20 % of the energy is used up to increase the potential energy, and the rest (actually the 80 %) is released as heat. 1 g of fat provides 37,5 kJ energy.

2. A couch potato takes in 10500 kJ energy on average with food every day. His thermal dissipation is 8150 kJ and for his work he needs 1900 kJ energy. Assume that the excess amount of food increases only the mass of fat of his body. Calculate how much a day and a year he gains? (One gram increase of fat tissue needs 37.5 kJ energy.)

3. With the energy released during the biological oxidation of 1 g of carbohydrates, 3.6 kJ work can be done by the human muscles. In the human body 1 g of carbohydrates can produce 0.18 g fat on average. Paul runs regularly, he covers 2.4 km during 11 minutes. For this he needs 780 kJ energy. His body mass has been unchanged for a long time.
   a. What amount of energy per minutes is needed for his running?
   b. How many g of carbohydrates is needed to provide energy for his 11 minutes running during the biological oxidation?
   c. How many g would be the increase of fat of his body if he quitted the regular running?

Solution:

I.

a	b	c	d	e	f	g	h	i	j	k	l
9	12	2	1	8	7	11	10	6	4	5	3

II.

1.

The answer depends on your mass. Let's calculate with '*m*' kg. In this case the work to be done is $m \cdot g \cdot h = 8000\ m$.

1 g fat has an energy content of 37500 J, and 20 % of it is used to do work: 7500 J

x g fat can be used for the required work: 8000*m* J

x = 8000m/7500 = **1,066m g**

(If the mass of the person is 75 kg, the energy needed is 80 g.)

2.

The energy demand of the daily routine is: 8150+1900= 10050 kJ.

It has not been used completely, so incorporated into the fat tissue: 10500-10050= 450 kJ.

1 g increase of fat tissue corresponds to incorporation of 37,5 kJ energy

x g corresponds to 450 kJ energy

x = 450/37,5 = **12 gram a day**

x = 365*12 = **4380 gram a year**

3.

a	781 kJ energy is used x kJ energy	in 11 minutes in 1 minute	x = 781kJ/11 minutes = **71 kJ/minute**
b	use of 1 g carbohydrates use of x g	3,6 kJ 781 kJ	x=781kJ/3,6 kJ/g= **217 g**
c	from 1 g carbohydrates from 217 g	0,18 g fat is produced x g a month	x= **39 g a month** x= 12*39 g= **468 g a year**