

Basal Metabolic Rate (BMR) = Tasa Metabólica Basal (TMB)

The Basal Metabolic Rate is the energy used by endothermic organisms (such as humans) at rest. The daily BMR is the energy that we use every day just to keep us alive. Most of this energy is used to maintain our temperature constant. The rest is used to keep our heart, lungs, brain, etc working.

If we do any other activity (such as sleeping, walking, running...), we will need extra energy.

How to calculate the Basal Metabolic Rate?

We can use the Harris-Benedict equations:

Women: $BMR = 655 + [(9.5 \cdot \text{weight in kg}) + (1.8 \cdot \text{height in cm}) - (4.7 \cdot \text{age in years})]$
 Men: $BMR = 66.5 + [(13.8 \cdot \text{weight in kg}) + (5.0 \cdot \text{height in cm}) - (6.8 \cdot \text{age in years})]$

For example, a 14 years old girl that is 145 cm tall and weighs 42 kg has a BMR equal to:

$$\begin{aligned}
 BMR &= 655.1 + [(9.5 \cdot 42) + (1.8 \cdot 145) - (4.7 \cdot 14)] = \\
 &= 655.1 + [399 + 261 - 65.8] = \\
 &= 1249.3 \quad \text{This means that this girl needs 1249.3 kcal every day just to stay alive.}
 \end{aligned}$$

Now, calculate your own BMR

How much energy do you need?

The BMR just tells you the energy used to stay alive. You must add energy to perform any other activity. The energy used depends on your weight and the time you are doing that activity.

Activity	Energy used: kcal / kg · minute		Activity	Energy used: kcal / kg · minute
Sleeping	0.020		Dancing	0.070
Seating (watching TV...)	0.018		Gardening	0.086
Standing	0.029		Cutting wood	0.110
Eating	0.030		Swimming	0.110
Light housework (cleaning, sweeping...)	0.050		Playing football, basketball...	0.140
Walking	0.040		Working (light)	0.030
Running	0.150		Working (active)	0.050
Driving a car	0.050		Working (hard)	0.100

Working (light): office working, salesperson, teacher...

Working (active): builder, fisher, farmer...

Working (hard): miner, woodcutter, farmer in hard tasks...

Gaining and losing energy on Thanksgiving Day



"Here's to family..."

The family Jones is celebrating Thanksgiving. Will they gain or lose weight today? Use the Harris-Benedict equations and the following data to guess it.

In the first place, you will have to convert American units into European units. Here you have the conversion factors:

$$1 \text{ pound} = 0.454 \text{ kg}$$

$$1 \text{ foot} = 30.48 \text{ cm}$$

Calculate the missing data on this table:

Member of Jones family	Weight (pounds)	Weight (kg)	Height (feet)	Height (cm)	Age	BMR (kcal)
Grandma Jones	143		4.7		68	
Daddy Jones	187		5.9		41	
Mommy Jones	110		5.2		38	
Uncle Jones	242		5.4		49	
Eddie Boy	88		4.4		9	

During Thanksgiving, each member of the family spends time doing several activities. Calculate how much energy they spend doing those activities:

Grandma Jones spends seven hours sleeping, six hours doing some housework, three hours eating, three hours watching TV, two hours seating and talking with the family, two hours walking with Daddy Jones, and one hour dancing. **Total energy:**

Daddy Jones spends eight hours sleeping, one hour running, two hours driving to Grandma's house, three hours eating, two hours cutting wood, two hours playing basketball with Eddie Boy, two hours walking with Grandma Jones, and four hours seating. **Total energy:**

Mommy Jones spends nine hours sleeping, two hours seating in the car, three hours doing some delayed office working, three hours eating, two hours gardening, two hours watching TV, two hours standing and talking with the family and one hour dancing. **Total energy:**

Uncle Jones spends eleven hours sleeping, seven hours seating and watching TV, four hours eating, one hour playing basketball with Daddy Jones and Eddie Boy, and one hour dancing. **Total energy:**

Finally, Eddie Boy spends ten hours sleeping, two hours seating in the car, two hours playing basketball, two hours seating and playing with his Nintendo, two hours cutting wood with his daddy, four hours eating, and two hours walking with a friend. **Total energy:**

Thanksgiving menu

Food	Kcal per serving	Food	Kcal per serving
Milk	100	White bread (100 g)	265
Cereals (30 g)	125	Sweet potato casserole	226
Roasted turkey	663	Apple pie	382
Mashed potatoes	226	Pumpkin pie	287
Homemade gravy	115	Fruit salad	243
Green bean casserole	170	Cranberry sauce	95

Along the day (for breakfast, lunch and dinner), this is what each member of the Jones family has eaten:

Grandma Jones: two servings of milk, two servings of roasted turkey with one serving of gravy, one serving of mashed potatoes, two servings of green bean casserole, 100 g of bread, one serving of sweet potato casserole, one serving of pumpkin pie and one serving of fruit salad.

Daddy Jones: three servings of milk and 60 g of cereals, four servings of roasted turkey with two servings of gravy and two servings of cranberry sauce, three servings of mashed potatoes, 500 g of bread, two servings of sweet potato casserole, two servings of apple pie and two servings of fruit salad.

Mommy Jones: two servings of milk and 30 g of cereals, two servings of roasted turkey and one serving of gravy, one serving of mashed potatoes, two servings of green bean casserole, 200 g of bread, one serving of apple pie and one serving of fruit salad.

Uncle Jones: one serving of milk with 30 g of cereals, five servings of roasted turkey with four servings of gravy, three servings of mashed potatoes, 600 g of bread, two servings of apple pie and one serving of pumpkin pie.

Eddie Boy: two servings of milk and 30 g of cereals, two servings of roasted turkey with double serving of cranberry sauce, one serving of mashed potatoes, one serving of green bean casserole, 200 g of bread, two servings of apple pie and one serving of fruit salad.

Now, calculate the amount of energy (in kcal) that each member obtains with the food they eat, and the amount of energy that they spend (BMR + energy used by doing activities). Will they gain or lose weight?

Member	BMR	Energy used in various activities	Total energy spent (BMR + activities)	Energy obtained with food	Energy balance (obtained energy – spent energy)	Will he/she gain or lose weight
Grandma						
Daddy						
Mommy						
Uncle						
Eddie						