

## The Exercise “Formula”

### Exercise and energy expenditure

With oxygen, our body goes through metabolism to produce energy to provide for daily tasks, physical tasks and exercise. “Metabolic equivalent” (MET) is a standard unit of measure that is defined to quantify our oxygen consumption rate during physical activity. 1 MET equals approximately the oxygen consumption rate per minute for a person sitting at rest, while 2 METs is twofold, and so on. The MET value increases as the activity intensity goes up, signifying a larger amount of energy expenditure. MET values can be categorised into three intensity levels as follows:

Exercise intensity	Metabolic equivalent (MET)
Light	< 3
Moderate	3 – 6
Vigorous	> 6

To estimate the energy expenditure for daily physical activity or exercise, one can use the following formula:

$$\text{Exercise energy expenditure} = \text{MET} \times \text{body weight (kg)} \times \text{time (hour)}$$

Example: energy expenditure of a man at 70 kg performing a 30-minute bout of continuous running (7 METs)

$$\begin{aligned} &= 7 \text{ METs} \times 70 \text{ kg} \times 0.5 \text{ hour} \\ &= 245 \text{ kcal} \end{aligned}$$

### Exercise and nutrition

From the above example, you will find that increasing your energy expenditure through exercise is not efficient enough. The energy cost of a 30-minute bout of running exercise is only equivalent to the calories of a “pineapple bun” (~280 kcal). If the above male aims to lose a pound of body fat (about 3,500 kcal), in theory he needs to run for about 7 hours! For this reason, an effective weight-loss programme must combine a balanced diet and exercise for maximised outcome. Scientists have quantified the MET value of numerous types of daily physical activity and exercise for our use; see Table 1; take a look at it, and work out the energy cost of those that you are interested in.

You may now have a better idea about the relationship between exercise, their intensity levels and energy expenditure. It is also worth noting that the above formula is only a rough way to work out energy expenditure. In reality, energy cost arising from exercise can be influenced by other factors like gender, age, exercise skills and ambient temperature. In next issue, you will find exercise tips for overweight or obese persons. Hope you all have smart workout. Be well!

Daily activity or task	Metabolic equivalent (MET)	30-minute energy expenditure (kcal)
Watching TV while sitting quietly	1.3	46
Using the computer	1.5	53
Riding on a bus / train	1.3	46
Cleaning (washing windows, mopping / vacuuming the floor)	3	105
Moving furniture / heavy objects	6 - 7.5	210 - 245
<b>Exercise</b>		
Walking (3.2 km/hr)	2	70
Brisk walking (6.4 km/hr)	5	175
Climbing up stairs (slow – fast)	4 - 8.8	140 - 308
Jogging (6.4 km/hr)	6	210
Running (12.8 km/hr)	11.8	413
Working out on a stationary bike (moderate)	6.8	238
Swimming (breaststroke)	5.3	186
Badminton	5.5	193
Squash	12	420
Aerobic dance (on a 6-8 inch step board)	7.5	263
Golf	4.8	168
Tai Chi	3	105
Yoga (various styles)	2.5-4	88 - 140

Table 1 MET value of selected types of daily physical activity and exercise.

Source: adapted from <https://sites.google.com/site/compendiumofphysicalactivities/home>