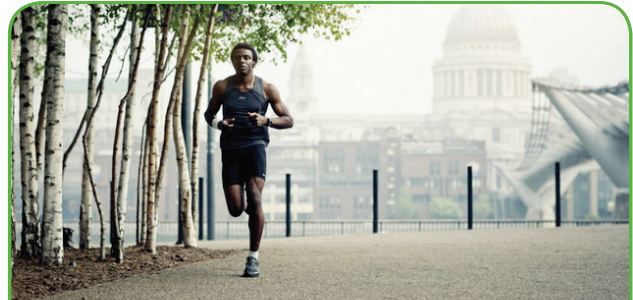


Section 1: Physical Fitness

• How can you tell if you are physically fit?

Physical fitness can be measured in a variety of ways.

- Muscle strength – the force produced by your muscles, for example, the strength of your grip.
- Stamina – how long you can keep going at a particular activity, for example, how long you can run for or how many sit-ups you can do.
- Flexibility – how easily and how far your joints can bend, for example, touching your toes.
- Agility – how easily and how quickly you can turn your body while moving.
- Speed – for example, how fast you can run or swim.
- Cardiovascular efficiency – how well your heart supplies oxygen to your muscles. This affects your stamina.



Factors such as stamina and muscular strength can be used to measure physical fitness

• Suggested Films

- What Is Fitness?
- Fighting Fit

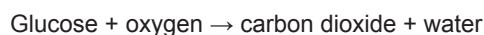
• What happens to the body during exercise?

A process called respiration provides all the energy our bodies use. Respiration is a chemical reaction that happens in every cell in the body and it converts glucose into energy. The more exercise you do, the more energy your body needs, so the more respiration takes place.

There are two types of respiration.

Aerobic respiration

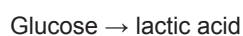
When you initially start exercising there will be enough oxygen available for muscle cells to respire aerobically:



This is a similar equation to that of combustion, except that in combustion the energy produced is released very quickly. During aerobic respiration the energy is released slowly to avoid damaging proteins and other molecules in the cells.

Anaerobic respiration

As the oxygen supply to muscle cells starts to run out, the cells will start to respire anaerobically:



The glucose is not broken down completely and does not produce as much energy, so it is not as efficient as aerobic respiration. Lactic acid is toxic to cells and as it builds up it makes the muscles hurt. If too much lactic acid builds up, all respiration ceases and the muscle cells will be limited in their movement.



Exercise can reduce blood pressure and help maintain healthy bones

• Suggested Film

- What Is Fitness?

Extension Question

Q1. How does exercise affect blood pressure?

As your heart beats it squeezes blood out of its chambers and into the arteries, which stretch. As the heart relaxes, so do the arteries. The stretching and relaxing of the arteries are measured as blood pressure. When you exercise your heart beats harder and faster, increasing your blood pressure. When you stop exercising the pressure drops. If you exercise regularly, your resting blood pressure is likely to be lower than if you did not exercise.

• How can you improve your fitness?



Regular exercise and a balanced diet are key to keeping fit

Improving your fitness levels can help you to lose weight, feel less stressed, and lower your risk of becoming ill. Your fitness can be improved by ensuring you eat a healthy, balanced diet and taking part in regular exercise.

A healthy, balanced diet contains carbohydrates and fats for energy, proteins for growth, vitamins and minerals for preventing disease, fibre for preventing constipation, and water for cell function. You should ensure you eat as much as you need, but avoid consuming excess calories regularly, as this unused energy will be stored as fat in your body. Being either overweight or underweight is bad for your health.

Regular exercise, in this case, is generally defined as any physical activity that leaves you feeling warm and slightly out of breath. Adults should aim to do at least five 30-minute sessions a week, while children should take part in at least 60 minutes of physical activity every day.

• Suggested Films

- What Is Fitness?
- Fighting Fit

Section 2: Metabolism

• Why can some people eat lots of food without gaining weight?

You eat food to provide energy to the cells in your body, and this energy is used by cells to fuel chemical reactions that keep your body alive. These reactions are collectively called your metabolism, and the speed at which they happen is your metabolic rate. Your metabolic rate is influenced by your genes, the amount of exercise you do, the proportion of muscle to fat in your body and your hormones. The amount of food you are able to eat without gaining weight will depend on your metabolic rate. The faster the rate, the more food you can eat without gaining weight.



Individuals have different metabolic rates

• Suggested Films

- What Is a Calorie?
- Why Is Fat So Hard to Shift?

DIAGRAM 01:



Calories Burned During Exercise

BIOLOGY • HEALTHY LIVING • FITNESS

Calories (approximately) Burned in an Hour at a Child's Weight						
Activity	20 kg	30 kg	40 kg	50 kg	60 kg	
Aerobic dancing	152	213	274	335	396	
Backpacking	164	230	295	361	426	
Bicycling (stationary)	164	230	295	361	426	
Bicycling (outdoor)	187	230	337	412	487	
Bowling	70	98	127	155	183	
Dancing	105	148	190	232	274	
Jogging (8kph)	187	262	337	412	437	
Skipping	234	328	442	515	609	
Squash	164	230	295	361	426	
Running (13kph)	316	443	569	696	822	
Skating (ice or roller)	164	230	295	361	426	
Swimming	141	197	253	309	365	
Tennis	164	230	295	361	426	
Volleyball	70	98	127	155	183	
Walking (3kph)	59	82	105	129	152	

• How much energy do you need?

The amount of energy (in calories) you need as part of your diet is determined, in part, by who you are and what you do. Your gender, your weight, your job, where you live and how much exercise you do all affect metabolic rate. The higher your metabolic rate, the more energy-rich foods you need in your diet.

Generally, men have higher energy requirements than women, as they are usually bigger and typically have a higher proportion of muscle, both of which increase metabolic rate. Builders will have a higher metabolic rate than office workers because they are more physically active. Any physical activity, whether because of work or exercise, will increase your metabolism. The temperature of your environment affects your energy needs too. The colder it is the more heat you produce to stay warm. This requires energy, which increases your metabolic rate.



Our diets must contain foods with a certain number of calories to provide enough energy

• Suggested Film - What Is a Calorie?

• How does exercise affect metabolic rate in the long term?



Exercise increases metabolic rate

Exercise increases metabolic rate in two ways. As you exercise you increase the size of your muscles. The more muscle cells you have and the more active they are, the more energy they use up and the higher your metabolic rate. Even after you have finished exercising, your metabolic rate remains high. The longer you exercise for, the longer your metabolic rate is elevated, so the more energy your cells use.

• Suggested Film - Fighting Fit

Section 3: Health Problems

• What is obesity?

Just as weighing too little can be bad for your health, so can being extremely overweight. If your Body Mass Index (BMI) is above 30 it may be an indication that your weight is far too high. To calculate your BMI you divide your weight (kg) by your height (m²).


Obesity usually occurs when an individual takes in more energy through diet than they lose by being active. An energy-rich diet that results in obesity is usually high in sugars and fats and low in fibre and carbohydrates. Sometimes there are other factors that cause excessive weight gain, such as the rare genetic condition Prader-Willi syndrome, which has excessive food consumption as one of its symptoms.

Excess energy from food is stored as fat for times when food is scarce. Fat is also used by the body to protect internal organs. However, if you are obese the amount of fat stored will cause serious health issues.

• Suggested Films

- Obesity
- Insulin and Diabetes

DIAGRAM 02:



BMI Calculator
BIOLOGY • HEALTHY LIVING • FITNESS

Weight	lbs	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215
	Kgs	45.5	47.7	50.0	52.3	54.5	56.8	59.1	61.4	63.6	65.9	68.2	70.5	72.7	75.0	77.3	79.5	81.8	84.1	86.4	88.6	90.9	93.2	95.5	97.7
Height	In/cm	Underweight				Healthy				Overweight				Obese				Extremely Obese							
5'0"	152.4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
5'1"	154.9	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	36	37	38	39	40
5'2"	157.4	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	33	34	35	36	37	38	39	
5'3"	160.0	17	18	19	20	21	22	23	24	24	25	26	27	28	29	30	31	32	32	33	34	35	36	37	38
5'4"	162.5	17	18	18	19	20	21	22	23	24	24	25	26	27	28	29	30	31	31	32	33	34	35	36	37
5'5"	165.1	16	17	18	19	20	20	21	22	23	24	25	25	26	27	28	29	30	30	31	32	33	34	35	35
5'6"	167.6	16	17	17	18	19	20	21	21	22	23	24	25	25	26	27	28	29	29	30	31	32	33	34	34
5'7"	170.1	15	16	17	18	18	19	20	21	22	22	23	24	25	25	26	27	28	29	29	30	31	32	33	33
5'8"	172.7	15	16	16	17	18	19	19	20	21	22	22	23	24	25	25	26	27	28	28	29	30	31	32	32
5'9"	175.2	14	15	16	17	17	18	19	20	20	21	22	22	23	24	25	25	26	27	28	28	29	30	31	31
5'10"	177.8	14	15	15	16	17	18	19	20	20	21	22	23	23	24	25	25	26	27	28	28	29	30	30	30
5'11"	180.3	14	14	15	16	16	17	18	18	19	20	21	21	22	23	23	24	25	25	26	27	28	28	29	30
6'0"	182.8	13	14	14	15	16	17	17	18	19	19	20	21	21	22	23	23	24	25	25	26	27	27	28	29
6'1"	185.4	13	13	14	15	15	16	17	17	18	19	19	20	21	21	22	23	23	24	25	25	26	27	27	28
6'2"	187.9	12	13	14	14	15	16	16	17	18	18	19	19	20	21	21	22	23	23	24	25	25	26	27	27
6'3"	190.5	12	13	13	14	15	15	16	16	17	18	18	19	20	20	21	21	22	23	23	24	25	25	26	26
6'4"	193.0	12	12	13	14	14	15	15	16	17	17	18	18	19	20	20	21	22	22	23	23	24	25	25	26

• What are the health effects of being obese?



A person's BMI can be calculated by comparing their weight to their height

Being obese puts a huge strain on the body. It is extremely uncomfortable to carry around excessive weight and it places a great deal of stress on joints and bones. The condition arthritis, in which damaged joints become inflamed and painful to move, may arise. Blood vessels carrying oxygen to the heart may narrow, increasing blood pressure and the risk of heart attack. There is also an increased risk of type 2 diabetes, in which the body loses control of blood sugar levels. Someone who is obese is more likely to die younger than a slimmer person.

• Suggested Films

- Obesity
- Insulin and Diabetes

• What is the safest way to lose weight?

Some people will try to lose weight quickly by skipping meals, cutting out sugary and fatty foods, or not eating for several days. However, these are not healthy ways to lose weight and, invariably, any weight lost will be quickly gained again, possibly creating a feeling of low self-esteem. Combining a diet high in fruit and vegetables and low in calories, with more physical exercise, is the safest way to lose weight. It will also lead to the weight staying off.

• Suggested Films

- Why Is Fat So Hard to Shift?
- What Do Carb-Free Diets Work?
- Healthy Heart



Increasing your exercise levels can help you keep fat cells at bay

• Quizzes

Obesity

Basic

• How recently has obesity become a global problem?

- A – last 100 years
- B – last year
- C – 300 years ago
- D – last 5 years

• What does BMI stand for?

- A – base mass indicator
- B – body metric ideal
- C – body mass index
- D – bigger mass index

• What would a BMI of 30 or more indicate?

- A – overweight
- B – underweight
- C – obesity
- D – healthy weight

• What kinds of foods are blamed for the rise in obesity?

- A – energy-dense processed foods
- B – fruits
- C – carbohydrates
- D – dairy products

Advanced

• How can you calculate BMI?

- A – weight (in kg) times height (in m)
- B – half height (in m) divided by weight (in kg)
- C – height (in m) divided by weight (in kg) squared
- D – weight (in kg) divided by height (in m) squared

• What is the BMI range for a healthy weight?

- A – under 10
- B – 18.5–24.9
- C – 7.5–17.5
- D – 25 or more

• How many obese adults are there estimated to be worldwide?

- A – 5 million
- B – 50 million
- C – 5 billion
- D – over 500 million

• Why has the body evolved to store fat?

- A – to be stronger for hunting
- B – to be quicker when in danger
- C – to stay alive when food is scarce
- D – to keep the brain healthy

What Is Fitness?

Basic

• What does BMI stand for?

- A – base mass indicator
- B – body metric ideal
- C – body mass index
- D – bigger mass index

• Which of these is not one of the basic indicators of fitness?

- A – BMI
- B – blood pressure
- C – being thin
- D – resting heart rate

• What should you do to get fitter?

- A – only exercise
- B – only eat less
- C – have a balanced diet and exercise regularly
- D – eat more

• Swimming, running and cycling are all examples of which kind of exercise?

- A – aerobic
- B – basic
- C – clinical
- D – developmental

Advanced

• How can you calculate BMI?

- A – weight (in kg) times height (in m)
- B – half height (in m) divided by weight (in kg)
- C – height (in m) divided by weight (in kg) squared
- D – weight (in kg) divided by height (in m) squared

• What is the average resting heart rate for a healthy adult?

- A – 40–60 bpm
- B – 60–100 bpm
- C – 100–120 bpm
- D – 140 bpm

• What is a normal blood pressure?

- A – 120/80
- B – 100/60
- C – 140/40
- D – 80/140

• What are 'feel-good chemicals' called?

- A – dioxins
- B – endorphins
- C – insulins
- D – statins

• Answers

Obesity

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