

big steps forward

// It's really important for new runners to keep their hands loose and relaxed so as to avoid tensing up the shoulders and neck without realizing it. That way they won't waste energy fighting against those tight muscles and will lessen the chances of injury to them.
Efua Baker //

Action, man

Think of the running action as like hopping from foot to foot, and with each hop swinging the raised foot forward to land in front of the other foot. A hop with one leg and the corresponding movement of the other equals a running step; two steps – ie each leg has a hop – amounts to a stride. The sort of running we want to do is, of course, slightly more sophisticated than this, with the aim being to get through a stride as fluently as possible, delivering the maximum amount of forward momentum for the minimum of effort.

Firstly, it's important to note that there is no such thing as the perfect running technique, just like there is no “best” running shoe (see p.42). Because of the differences between runners in terms of size, weight, age, gender, muscle density, strength and so on, everybody's ideal stride will be unique to them. But there are theories and guidelines that can be universally applied, although they will probably need to be customized to fit your individual action.

The stride cycle

To analyse and improve your stride, you need to break it down into its component parts: the support phase, the drive phase and the recovery phase.

The support phase (aka the stance phase)

This is when your foot is actually in contact with the ground. In the best actions, initial contact is made by the middle of the foot, not the heel. The foot should start to strike slightly ahead of your centre of gravity so that when firm contact is made it will be directly underneath it. To cushion the impact of the landing, the knee joint should not straighten completely and the pelvis will dip slightly on the opposite side from that leg. As soon as the foot touches down,

Tip: Rather than stepping further forwards to gain momentum and stride length, concentrate on producing a firmer push back with the foot that is on the ground. That way, you will be much less likely to over-extend your stride.

contact is rolled forwards towards the toes. This action is supported by the iliotibial band in the leg that has landed and the core muscles, which provide some resistance to the body's cushioning of the strike and hold up your trunk as the centre of gravity shifts forward past the standing foot.

The drive phase

As the contact with the ground is rolled forward towards the toes the drive phase begins. The standing leg straightens, pushing backwards and downwards and extending the hamstrings and glutes. Then, as an additional lever, the foot is pushed off as the calf muscles straighten out the ankle. In an ideal stride this will provide force upwards along the straight leg towards the runner's centre of gravity in the hips. This should supply enough vertical force to keep you upright when your centre of gravity is a long way in front of your foot or there is no contact with the ground, but it should take as little energy as possible away from the horizontal force which is what is driving you forwards. How much the ankle should flex as the foot leaves the ground depends on the style of running and how high the foot is going to be lifted: distance runners should stay close to the ground, meaning the ankle will stay almost rigid, while sprinters will virtually point their toes for much greater foot lifts of up to ninety degrees.

Type of running	Where foot should strike
Sprinting	Ball of foot/underside of toes
Short/middle distance	Forefoot/ball of foot
Long distance	Midfoot
Competition-pace long distance	Just in front of midfoot

As you learn how to run efficiently, the chances are you'll have to unlearn how you've been running since you were in nursery school.

Fact: Running differs from fast walking because, to walk, one foot must be on the ground before the other one is raised up from it. When running, both feet are off the ground during every stride.

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Stride cycle 1-2-3

1. Support

Middle of sole of foot in contact with ground, knee and ankle flexed for shock absorption.

2. Drive

Rolling forward on the toes, pushing down and backward into ground to straighten the leg. Elastic recoil bends leg to move foot upwards and forwards.

3. Recovery

Heel moves towards the buttock, hips swing the leg forward and momentum starts to unfold the knee so the leg is almost straight when foot strikes and we're back at the support phase.

Tip: To practise rotating your hips, imagine them as a bucket full to the brim with water. As the angle of your torso changes, you have to keep from spilling the water, thus rotate your hips to make sure they stay level.

The recovery phase

As soon as the foot has left the ground, the leg begins the recovery, or swing, phase. As the foot lifts it will be behind the body, and the leg will raise, bend and kick forwards ready to come down and repeat the cycle. The most efficient runners will make this happen through a combination of muscle force, elastic recoil (see box opposite) and momentum left over from the drive phase. The hip flexors and hamstrings lift the leg, while the quads bend it so the heel heads towards the corresponding buttock, and the momentum carried over from the push from the ground swings the thigh forwards. As long as the quads are nice and loose, as the thigh slows down, the lower leg continues to move, pivoting at the knee joint to all but straighten the leg before the foot is put down.

Like riding a bike...

Good running begins in the trunk and in the hips, and is a smooth circular motion rather than a swinging pendulum – your feet ought to be moving as if you are riding a bicycle rather than taking a speedy stroll. All leg joints – hips, knees and ankles – need to be as loose and as flexible as possible to facilitate what should be that smooth circular motion.

The hinges around which the legs pivot are the hips, with the glutes, hamstrings and quadriceps controlling the action – this is why core strength is vital, because these huge muscles can only function properly if whatever is anchoring them isn't going to be pulled all over the place. After the foot strikes and pushes off, it will be drawn up and backward, to create the back edge of the circle. At first glance, this foot lift seems counter-productive and a waste of energy, but it isn't: by pulling the heel up towards the buttock, the arc that the foot has to travel is much smaller, therefore it can get round it quicker and with less energy expended. Getting it up there

Elastic recoil

Think of a rubber band being stretched to its limit and released. The energy created as it contracts is enough to launch a folded paper pellet all the way across the classroom. As you run, your legs work in exactly the same way, with the muscles within them functioning just like that makeshift catapult: they are stretched all the way then contract during the first phase of the recovery cycle, creating an explosion of energy. This is elastic recoil, and it amounts to free energy inasmuch as it requires no muscle exertion to create it.

To fully utilize this energy within your stride cycle it has to be released at the right time, the moment the sole of the foot lifts off from the ground. This means the leg has to remain almost straight while in contact with the ground; if the knee starts bending while the foot is still planted, the energy will be wasted, as elastic recoil will take place slowly and weakly. This timing is also important to create a forward rather than an upward momentum as the muscles contract to bend the knee, because the movement is carried through to form the top part of the foot's circular motion.

Muscle flexibility and joint suppleness aid elastic recoil enormously and, if fully exploited, can result in a faster turnover and considerable improvement in running economy (see p.112).

doesn't use much power either, as the hamstrings' natural reaction to being straightened during the drive phase is to contract, which bends the knee and pulls the foot up. The hip continues to rotate as the knee pushes forward and drops down to trace the front half of the stride's circle, and when the lower leg kicks out the hip joint on that side will be fully flexed.

Straighten up

The right posture is essential to successful running, helping you maintain energy efficiency and stay injury-free. Good posture will make sure everything is pointing in the right direction along all