



## Balls - Why do some balls go further than others?

Updated v2

### Fact

- The more force you use to throw a ball (the harder you throw it) - the further the ball will go.
- The weight and density of the ball determines how much force you have to use. (Density means how thick something is)
- What the ball is made of can affect how heavy and dense a ball is.
- Smaller, lighter balls need less force to push them through the air than larger, heavier balls.
- You don't need to use much force to throw a light rubber ball but you need to use a lot of force to throw a heavy bowling ball!

### Do you know

- Rubber balls make the best bouncy balls because rubber is flexible.
- Rubber balls are usually full of air so they're light and not very dense.
- Bowling balls are usually full of hard plastics, so they are very dense and heavy.
- Shot put balls aren't very big but they can be very heavy. Some are made of iron, cast iron, solid steel, stainless steel, brass; some are made of sand and others from synthetic (manmade materials) like polyvinyl

### Experiments you can do

Try throwing different types of balls (outside where there is lots of room and you're not going to hit anything!). Which ones are easy to throw? Which ones need more force to throw? Maybe mark up a line so you throw every ball from the same place and get someone to mark where each ball lands so you can really see the distance each ball reaches.

Try dropping different balls from a height and seeing how high they bounce.

What difference is there if you throw with the wind coming from behind you/to the side of you or directly towards you? How does it affect the ball you're throwing?

## Other Investigations

- A. How about when you roll a ball or toy vehicle, does how heavy or dense the ball is make a difference to how far they will roll?  
Try different surfaces (carpet/lino/wooden floors inside and grass/wood/carboard box outside)
- B. Try rolling balls or cars down different slopes – first a gentle slope then a steeper slope.  
Maybe even try rolling the balls/cars up a slope. What difference is there then?  
Do you need to use more or less force to get each ball, then? Which needs more force and why?

Try guessing if things are heavy or light before you pick them up.

- C. Experiment with density at Easter. Bite into one of those solid chocolate, crème filled chocolate or marshmallow filled eggs then bite into a hollow chocolate egg.  
Are the solid, crème filled or marshmallow eggs more dense or less dense than a hollow chocolate egg?

## Jokes

What happened to the broken ball? It got thrown away.