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Science Oxford Challenge

Ball Run

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Ball Run

Build a ball run that takes 2 seconds, 8 seconds or 20 seconds

Your ball run will be completely unique! You can use any surface, any building materials and any type of ball to create your own ball run. We've put together some tips and things to think about below, as well as some ideas to get you started if you're feeling stuck. Don't forget that we love to see your photos and videos of your creations.

Age group: EYFS, KS1, KS2, adult

What you will need: a surface to build on with props at one end, materials to build with and a way of securing them, a ball, a timing method

Skills: creativity, resilience, spatial awareness, gross and fine motor skills, designing to a specification, testing, evaluation, improving a design, patience, verbal and social skills, engineering skills, teamwork, using equipment, timing, observation, developing an understanding of gravity

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Building Your Ball Run

To build your ball run, you need six things:

1. A surface to build on which can form a slope

You can build your ball run on any surface, inside or outside, and your ball run can be as big or as small as you would like. A flat surface is usually easiest to build onto and makes your ball run more repeatable (you're more likely to get the same result every time) but you can choose any surface.
Some possibilities are a large, hardback book, a table, a piece of cardboard, a storage box lid or base, a piece of wood, a garden lounger or a Lego base. You could even combine different surfaces together to create a super ball run!

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2. Something to prop one end of your surface on to make it into a slope

Gravity pulls everything on our planet towards the ground and this includes the ball you use for your ball run. If your surface is flat, gravity pulls the ball directly downwards and the ball doesn't move. To make a successful ball run, you need a slope that gravity can pull the ball down. Think about how steep or shallow you would like your slope to be and what difference this could make to how your ball run works. You'll need to choose a prop that is appropriate for your surface. If you're using a book, you could prop up one end on small tins or a stack of other books. If you're using a table, you'll need something strong to prop one end up, like boxes or bricks.
If you're using a piece of cardboard, you could bend one end into a stand and tape this to a table or the floor.

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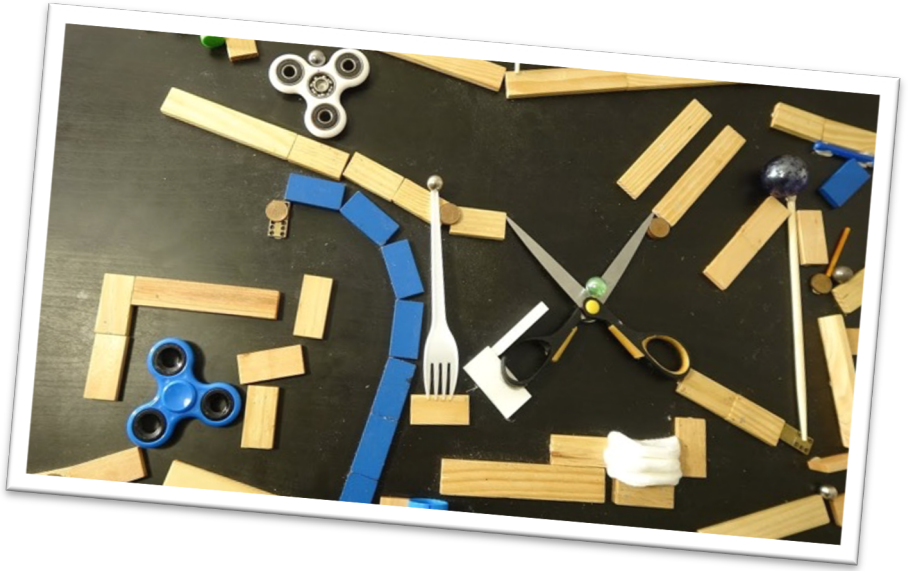
3. **Materials to stop the ball going straight down the slope**



To make your ball run successful, you want the ball to take as long as possible to get from the top to the bottom of your surface. If you let it go at the top of your surface and it rolls directly to the bottom, it won't take long at all! You need to slow it down by making it move across your surface instead of just down it.

You could test this for yourself by asking someone to time how long it takes you to walk straight across a room and then how long it takes you to walk across the same room in a zig zag. You can use any materials that you have at home to make your ball move across the board. You could try craft items, kitchen equipment or cutlery, stationery, toys, lolly pop sticks, twigs or natural materials or anything else you have.

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4. **Something to stick those materials in place**

As your materials are on a slope, even if they stay in place when you put them there, they're likely to move once you test with your ball. Since you'll be continually testing and improving your ball run, try to choose something that is easy to move. Blue tack is great or you could try pins, tape or magnets, depending on your age and the surface you've chosen.

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5. **A ball to travel along your ball run**

Again, you need to think about the surface you've chosen here – if your surface is small, you'll need a smaller ball like a marble, squash ball or a ping pong ball. If your surface is larger, you could try a larger ball like a tennis ball, a play ball or even a football.

To experiment further, you could try your ball run with different types of balls and see which works best or you could try using something that doesn't roll as easily (like a pom pom or cotton wool ball) and see if your ball run is more or less effective.

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6. **A way of timing how long your ball takes to travel your ball run**

You could use anything with a timer function for this – a clock, a stopwatch or a mobile phone. For younger children, you could just count steadily. Measuring and choosing what equipment to use for measuring are important scientific skills, so it's worth spending some time thinking about what will work best for you.

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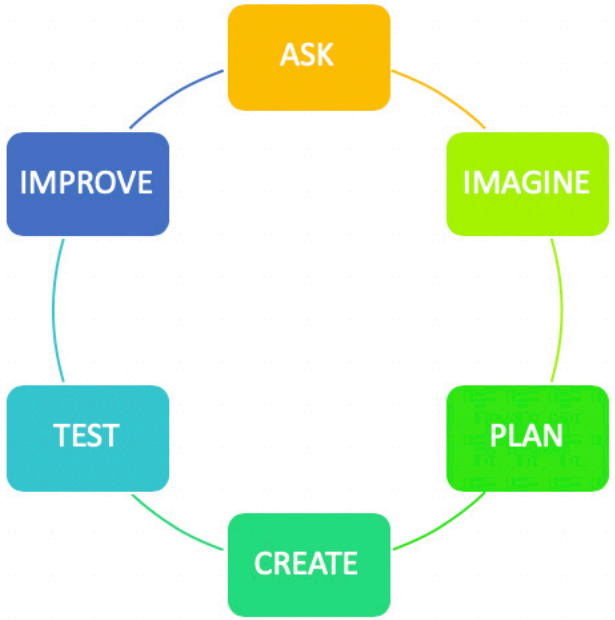
The Engineering Design Process

If you had a go at the Tower Challenge last week, you'll already be familiar with the engineering design process; the way that engineers come up with successful solutions to problems.



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Ask: what is the problem? How have other people solved the problem? What criteria do I have to stick to? Why isn't what I tried first working? Think about the challenge you have been set (build a ball run) and the criteria you have to stick to (your ball must take as long as possible to get to the end, without stopping).

Imagine: what are all the different ways I could solve the problem? This is your brainstorming section and a great time to talk to other people about what they think and their ideas. The best balls runs we've seen come from people working together to create something amazing.

Plan: what steps do I need to take? You could draw a diagram and gather your materials at this point.

Create: start building! Don't be afraid to change your plan as you go along – engineers are constantly thinking about and improving their designs. Tweaks and small changes can make a big difference.

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Test: let your ball go at the top of your ball run and time how long it takes to get to the bottom. Did your ball run work how you had planned? Did every section do what you wanted it to do? Did your ball get stuck or come off the edges of your surface? Did it take as long to get to the bottom as you were aiming for? Did the ball do the same thing every time you tested?

Improve: did everything work how you wanted it to? Is there anything you could improve? Can you build a ball run that takes even longer? Is there anything you want to change?

This step takes you back to the start of the process again – you're asking what you can do better, imagining a solution, planning, creating and testing your solution and then thinking again about improvements. Sometimes you might want to start over completely – this happens to engineers in real life too! It just means that you've learnt from what you've tried and you want to try something different.

You can keep the engineering design process going until you're completely happy with your creation.

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We hope you enjoyed our Lockdown Ball Run Science Oxford Challenge and we look forward to seeing your version!

Don't forget to download and print out our Challenge poster or make your own.

There's a prize of a family ticket for our Science Oxford Centre for the best entry - good luck!

Thanks to Bridget for making and testing her ball run for our video, which takes exactly 8 seconds!!

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Share your challenge with us…

Show us what you came up with on Twitter, Facebook or Instagram and tag:

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or email competition@scienceoxford.com

For more ideas visit www.scienceoxford.com/resources

Check out our other Science Oxford Challenges this spring and summer!

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