EYFS to KS2 Physics Progression Model (Motion)

This progression map is intended to supplement your scheme or the national curriculum. You can use it to emphasise the key learning you want at each key stage.

	Feeling Motion	Talking Motion	Measuring Motion	Drawing Motion	Thinking Questions
EYFS	Running at different speeds is a great way of experiencing motion. Also use buggies, toy cars, pushchairs etc. If you are on a bus or in a buggy, talk about the motion you can feel - especially speeding up and slowing down. Compare forwards and backwards. Feel the motion in a playground.	Talk about fast and slow and speeding up and slowing down. Include not moving (stationary). Talk about the direction things are moving in.	Compare speeds of different things (hare and tortoise?) Talk about directions: e.g. which direction is the snail going?	As a precursor to abstract representations of motion, use gestures (thinking with your hands). Encourage your pupils to use gestures to represent different speeds (including stationary), speeding-up and slowing down and changing direction.	
KS1	Feel the motion in a playground: • Swings - forwards and backwards -	The hare and the tortoise story is useful for talking about motion. Use comparative	Races are the introduction to measuring speed. Who or what reaches the finishing line first? (note for teachers: when we	You can start to make the gestures more abstract - for example high speed and low speed can be represented by a high	If you run around a track and you are back where you started, have you moved?

	you are speeding up and slowing down. You are fastest at the bottom. You are momentarily motionless at the top. • Roundabouts - these are handy because the speed stays the same but the direction changes. • Slides - these are handy because you accelerate at the top and decelerate at the bottom.	language - *faster than* and *slower than*. Talk about the motion in the playground. • What does it feel like when you are speeding up? • What does it feel like when you are slowing down? • What does it feel like when you are going round the corner?	measure speed, we need to know the distance and the time. Races are a clever way to determine speed without measuring either - you keep the distance the same for everyone and you can see who took less time by the order the racers arrive).	hand and a low hand. Stick people or cars with cartoon speed lines can be used to draw motion. 	In a race, why does everyone need to start at the starting line and finish at the finishing line? (the answer should include ideas about the distance being the same). Is it easier to go around a corner when you are going fast or slow? (it's harder when you are fast).
LKS2	There is no harm in continuing to use playground equipment and also experiences like fairgrounds and amusement parks to develop a physical sense of forces on the body. Make sure you spend time talking about the physical sensations and looking at the motion that caused	**The less time** you take, **the faster** you have travelled. Talk about speeding up and slowing down. Talk about how hard it is to change direction when you are running or cycling quickly. Talk about what it feels like	Keep the distance the same and measure the time for people or toy vehicles to travel the distance. If you can find stopclocks which only show whole seconds, you'll find everything **much** easier.	Arrows are the way that we visualise many useful ideas in physics - motion is one of them.  There is no rule about	The KS1 questions above are equally appropriate for KS2 (and KS3!) If you are in a car or on a bus and you pass the person sitting next to you a pen - how fast is the pen travelling? Can you feel any difference between the pen when you are moving and the pen when

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<td>them - e.g. where did it make your stomach lurch the most? Where did you feel yourself pushed back into your seat? What was happening to the motion at those points?</td>
<td>when you are in a car, or on playground equipment when you change direction or change speed (e.g. a swing, a slide or a roundabout).</td>
<td>Record the times in tables:
<table><tr><th>Person</th><th>Time (seconds)</th></tr><tr><td>Raj</td><td>20</td></tr><tr><td>Sam</td><td>25</td></tr><tr><td>Mary</td><td>15</td></tr></table></td>
<td>where the arrow goes (above, below or to the side) as long as it is clear the object it is referring to.

(note - arrows are useful because you can show the size (speed) and direction).</td>
<td>you have stopped? (If you had a really smooth vehicle, you wouldn't be able to tell you are moving - you could be travelling forwards at a thousand miles per hour or backwards - everything feels normal. But if you change speed or direction, you can feel that).</td>
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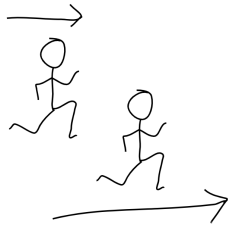
<td>UKS2</td>
<td>Notice what smooth motion feels like - e.g. on a train or car or bus. Can you feel how fast you are travelling? (Answer - no. You can only tell if the motion is changing - speeding up / slowing down or changing direction).</td>
<td>Synonyms for not moving:
Stationary
Motionless
Still
Static (static electricity is charge which doesn't move).</td>
<td>Be more explicit about the distances and the times. Measure time with stopclocks (still stick to whole numbers of seconds) and various metre rules, trundle wheels and tape measures.
<table><tr><th>Person</th><th>Distance (metres)</th><th>Time (seconds)</th></tr><tr><td>Raj</td><td>75</td><td>20</td></tr><tr><td>Sam</td><td>75</td><td>25</td></tr><tr><td>Mary</td><td>75</td><td>15</td></tr></table>Present your times as barcharts:</td>
<td>The length of the arrow represents the speed, so a short arrow shows something moving slowly, and a long arrow shows it travelling quickly.
 
(Arrows are super useful because you can represent speed (length) and the direction easily)</td>
<td>You are on a train travelling smoothly at 100 miles per hour. If you walk towards the rear of the train at 2 miles per hour, how fast are you travelling?

You have a bottle of water on the train's table in front of you. What happens to the water when the train speeds up / slows down, goes round a bend?</td>
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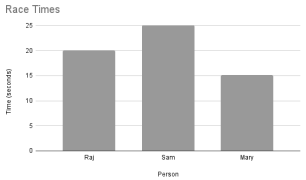
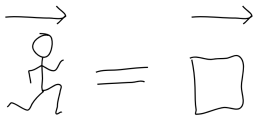
			 **Advanced**: speed is a ratio (distance:time), so if you double the distance a car is travelling you have to double the time. Your pupils will have the maths skills to deal with this. For maximum stretch, you can calculate speed using speed = distance divided by time. This can also be plotted on a bar chart. **Speed has different units -** depending on what you are measuring. Vehicles measure speed in miles per hour or kilometers per hour (still a ratio of distance:time). This is because we tend to drive miles and it takes hours. Physicists use metres per second (m/s) - still a ratio. This is because we are	Your diagrams can become more abstract by replacing drawings with a square or a circle:  (If you get this far, you are **well** on the way to GCSE).	

			measuring smaller distances in less time. **Speedometers:**  Speedometers are used in lots of data dashboards - they are worth teaching explicitly.		

Elaboration

Forces and motion are usually taught together, because there is significant overlap. I would recommend making sure pupils understand each concept separately before exploring the connections - just to reduce the cognitive load. However, once the separate ideas are embedded, make as many links as you can. Elaboration has a powerful learning effect.