



Open mathematics

Running Trains Safely

Judy Ekins

This is the Severn Valley Railway, which runs alongside a stretch of the Severn River between Kidderminster and Bridgnorth in the West Midlands of England. There are only a few preserved steam railways like this operating in Britain, and all of them are privately run, relying heavily on the help of enthusiasts, who drive the trains, operate the signals and draw up the timetables.

A timetable has to suit passenger demand, but it has another very important function: to ensure safety. This is especially important on single-track sections of line, like those on the Severn Valley Railway. If two trains collide, the consequences can be disastrous.

Michael Buerk (Newsreader)

Five people have died in a train crash in Kent. Two trains collided in thick fog on a single-track line.

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Collisions on a single track are rare but, nevertheless, a very real danger. Even in the '90s, trains have come to grief, despite what are thought to be fail-safe precautions.

News Reporter (Voice-Over)

The two trains collided head-on in thick fog while travelling on the single track line. It's thought both were running late, and there's evidence that one, at least, skidded as it tried to brake before the impact. The collision shattered the front diesel units. The two drivers are understood to be amongst the fatalities.

Judy Ekins

In common with other railway lines, the Severn Valley Railway has to maintain strict safety rules. There are speed limits – here it's ten miles per hour – and signals indicate whether or not it's safe to proceed. There would be no problem in running just one train on one line, but as soon as there are two or more trains running at a time, they have to be able to pass, so you need to make use of locations, such as stations, where the line becomes double track.

Bridgnorth and Kidderminster both lie on the valley of the River Severn, and the two are connected by 24 point five kilometres of railway line. The line starts on one side of the river, before crossing over a bridge to the other side. The line also goes through a tunnel outside Kidderminster. Trains are able to pass one another at a number of intermediate stations along the largely single-track line.

A train not only waits at a station platform to allow passengers to get on and off; it may also have to wait for the line ahead to be clear. This train is having to wait for a train travelling from the other direction to arrive at the station, before it can proceed.

Efficient timetabling should ensure that no train is held up unduly.