



Distance Time Graphs

Teacher Notes

This is an actual real-world example of distance-time graphs being used!

Answers are at the end.

Assumed knowledge

- That students will understand how to read and interpret a distance-time graph
- Unit conversion

Your paragraph text

Distance Time Graphs

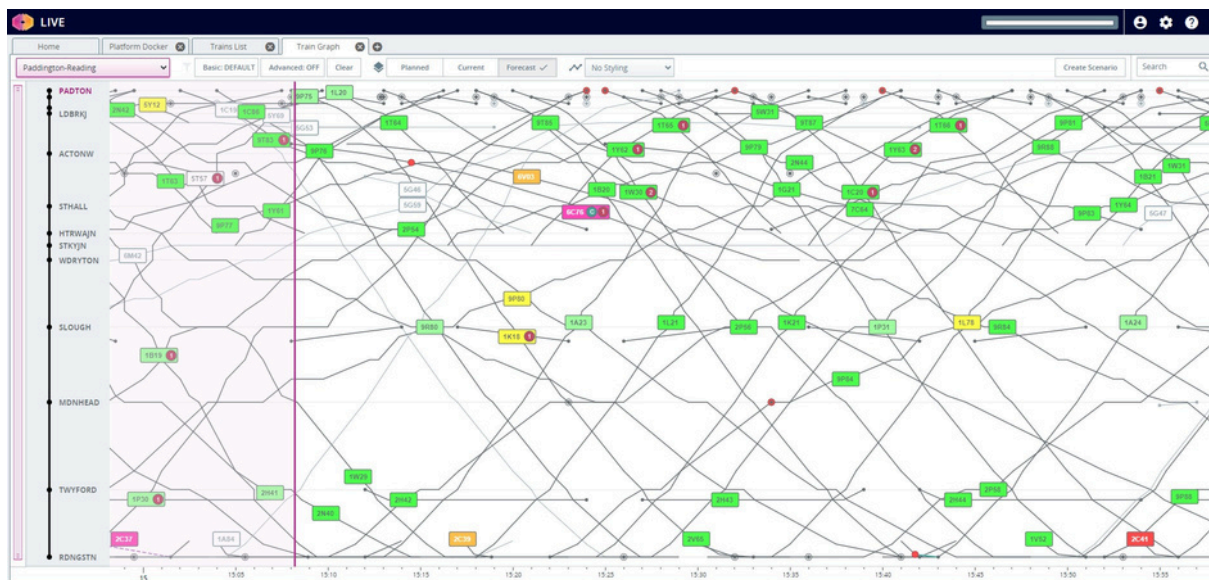
Luminate is a tool developed by Resonate that is used in the rail industry to help those people who make decisions, such as signallers, know where trains are and it predicts where they will be in the future.

Q

Why do you think it is useful to forecast (predict) where a train will be?

One of the features of Luminate is called **Train Graph**.

It looks like this:



It shows a distance-time graph for every train: **distance** is on the y-axis and **time** is on the x-axis.

The coloured boxes show the train's ID (headcode) and its punctuality: those in a green box are running on time, the yellow ones are a little bit late (less than 5 minutes) and the pink one is very late (more than 20 minutes).



The names of the locations might look a bit strange.

PADTON

WDRYTON

SLOUGH

MDNHEAD

TWYFORD

RDNGSTN

GORASTR

DIDCOTP

In the railway we use what are known as **TIPLOCS** (Timing Point Locations) which are a maximum of 7 characters long to describe places.

So, for example:

PADTON is the TIPLOC for Paddington.

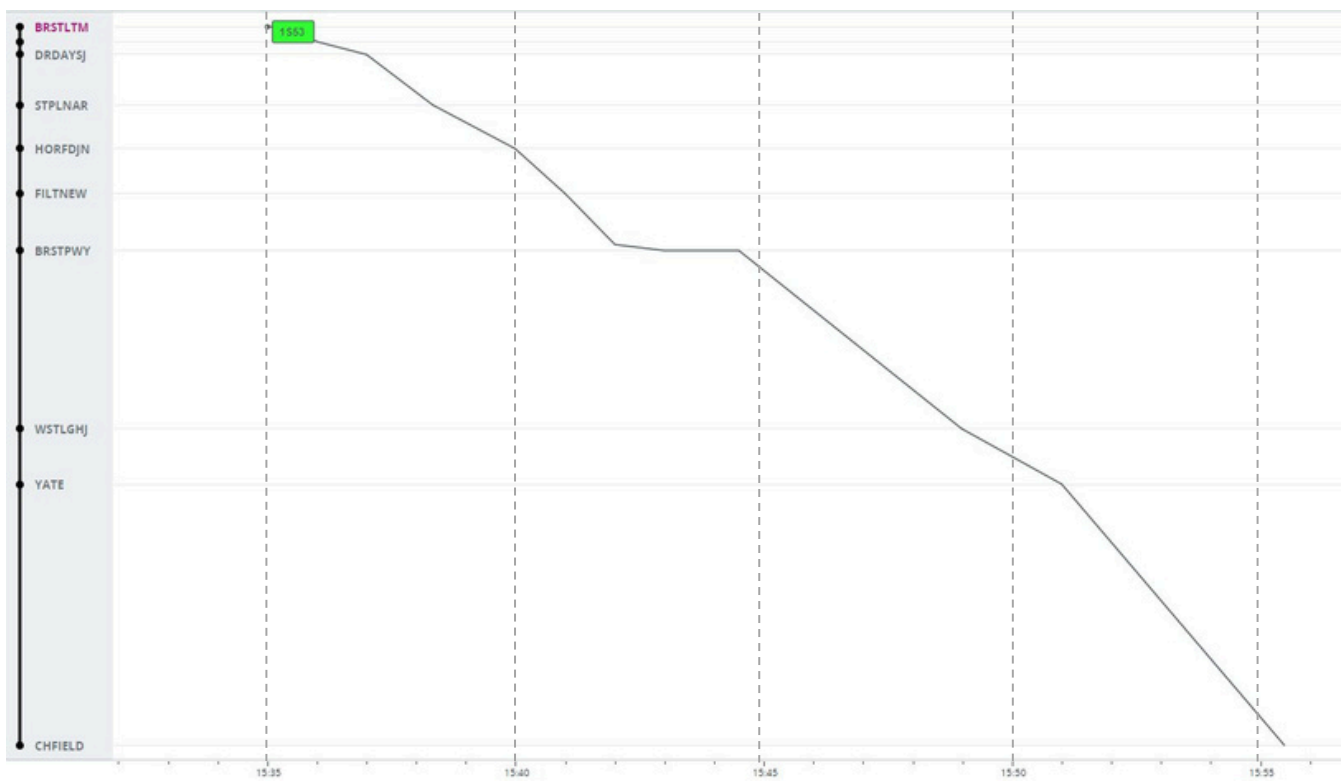
Q

Can you guess where these places are from their TIPLOC name?

1. DRBY
2. BHAMNWS
3. STPX
4. NRCH
5. MNCRPIC



Here is a graph showing part of a train's journey between Bristol Temple Meads and Charfield.

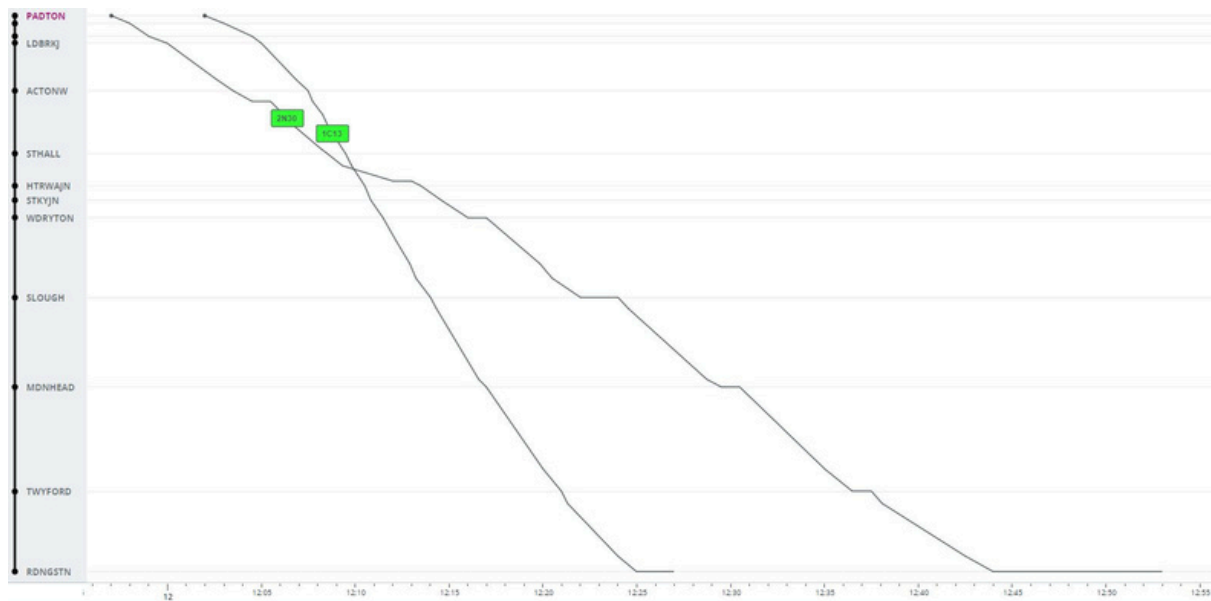


Q

1. What time does the train go through YATE?
2. How long does it stop for at Bristol Parkway (BRSTPWY)?
3. If it leaves Horfield Junction (HORFDJN) at 15:40 and arrives at Filton Abbeywood (FILTNEW) at 15:41, what speed was the train travelling if these locations are 1005m apart?
 - a) Give your answer in meters/minute
 - b) Give your answer in km/hr
4. If $1\text{m} = 1.09361$ yards, how far away are Horfield Junction and Filton Abbeywood in yards? Give your answer to 6 significant figures.
5. If Bristol Parkway (BRSTPWY) and Charfield (CHFIELD) are 13 miles apart, what is the train's average speed in miles per hour for this section of its journey?



This Train Graph shows 2 trains travelling from Paddington to Reading.



Q

Which train do you think is the express (fast) train and which is the slower, stopping service?

How can you tell?

What do you think a freight train would look like?

Sketch it on the graph above.



On the next page you'll find a blank Train Graph for London Liverpool Street to Stratford.

Q

Draw the graph for a train with the following timetable

LOCATION			
	Arrival	Departure	Plt
STFD		16:06:00	11
BOWJ	16:09:00	16:15:00	
BTHNLGR		16:18:00	
LIVST	16:23:00		7

Part of another train's timetable is given below.

LOCATION			
	Arrival	Departure	Plt
LIVST		16:12:00	16
BTHNLGR		16:15:00	
BOWJ		16:17:00	
STFD	16:18:30	16:19:30	8

Q

Draw this train's journey on the same graph.

Q

At about what time will the 2 trains pass each other?





Answers

1. Why is it useful to forecast (predict) where a train will be?

Eg It means we can make decisions in the future
We can see if there will be any problems ahead of time
Something equally sensible

2. Can you guess where these places are from their TIPLOC name?

Derby, Birmingham New Street, St Pancras, Norwich, Manchester Piccadilly

3. What time does the train go through YATE?

15:51

How long does it stop for at Bristol Parkway (BRSTPWY)?

15:43 – 15:44:30 = 1.5 minutes

What speed was the train travelling

Give your answer in meters/minute 1005 m/min

Give your answer in km/hr 60.3 km/hr

How far away are Horfield Junction and Filton Abbeywood in yards?

1099.07805 = 1099.08 yds (6 s.f.)

Average speed

11 minutes and 13 miles: so av speed = $13 / (11/60) = 70.9$ mph (3 sf)

(If student misreads time: 10.5 minutes -> 74.3mph; 11.5 minutes -> 67.8 mph)

4. Which train do you think is the express (fast) train

1C13

and which is the slower, stopping service?

2N30

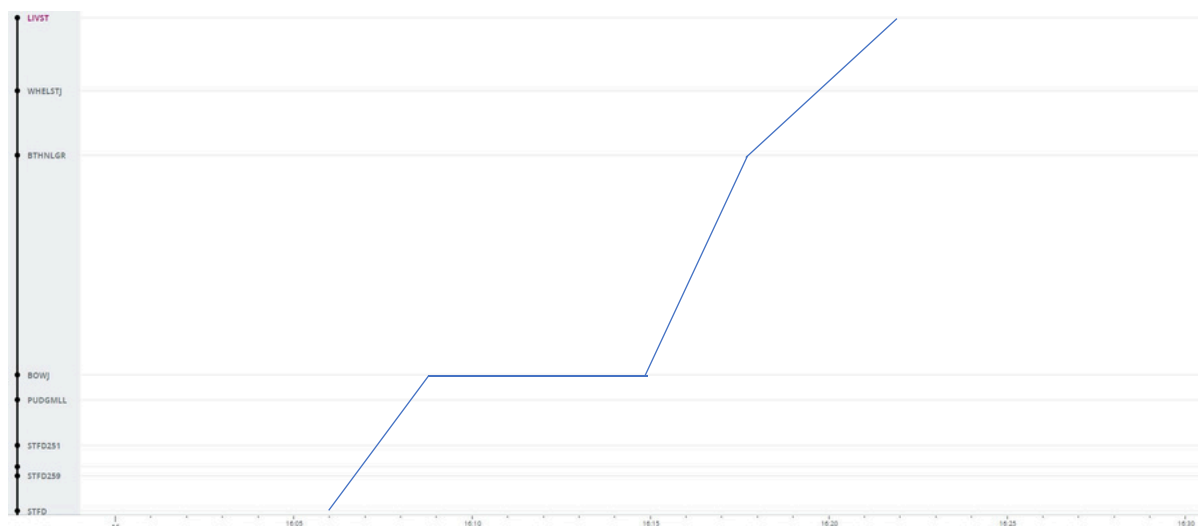
How can you tell?

1C13's line is steeper; 2N30 has more stopping (horizontal) points

What do you think a freight train would look like?

A slower service so a less steep line – no stops

5.





Approx 16:16:30 (16:16 – 16:17 or dependent upon their graph)