

Plan a new route for Talgo's Hydrogen Train!

Names:

Year Group:

School:

Spanish Rail Manufacturer, Talgo, established its UK Head Office in Chesterfield in November 2019. Talgo is leading the way in innovative and sustainable technology in rail. In 2020, they announced the development of their very first hydrogen-powered train, which is due to be ready by 2023.

Fun fact:

Hydrogen trains are emission free, meaning they're an environmentally friendly ('green') alternative to existing diesel powered trains. They are also considerably less noisy than their diesel counterparts!

Let's start by learning a little more about sustainability and hydrogen power!
Match the word to the definition. After all, this might come in handy for your challenge!
(If this is printed just draw a line to the match or in acrobat write the appropriate letter in the box)

1. Sustainable

2. Non-renewable

3. Renewable

4. Energy efficient

5. Hydrogen

6. Battery

7. Fuel cell

A. A device where energy is stored

B. Something that performs in the best way possible while using the least amount of energy

C. A resource that cannot be replaced after it has been used

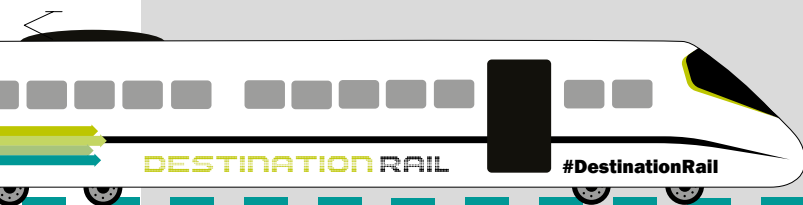
D. A resource that will be replenished

E. A device where energy is generated by a chemical reaction

F. An activity that does not destroy resources

G. An element that when mixed with oxygen produces electricity, heat and water

In acrobat, click the button below to reveal the answers



Plan a new route for Talgo's Hydrogen Train!

You have been tasked with planning the route of a new train line. You have a maximum budget of £100 million. Your train line will bring better transport links to the community and so you will need to consider their needs when planning the route.

Each 1cm of track on the map is equal to 500 meters which costs £1.5 million to build.





Use a piece of string to measure the length of your completed track and work out the price.

To cross a river you will need to build a bridge, bridges cost £2 million

When a train track splits it requires a complex system called points to enable trains to be able to go along both parts of the fork. A set of points will cost £7 million

A station will cost £10 million. Place stations at the grid references 32 72 and 39 67 (learn about grid references on page 3 and refer to map on page 4). You may place more stations if you think it will benefit the local community.

Plot the route between the stations and add up your costs

| | Cost | Amount (cm) | Total |
|--|--------------|-------------|-------|
| Track/500m  | £1.5 million | | |
| Points  | £7 million | | |
| Bridges  | £2 million | | |
| Stations  | £10 million | | |

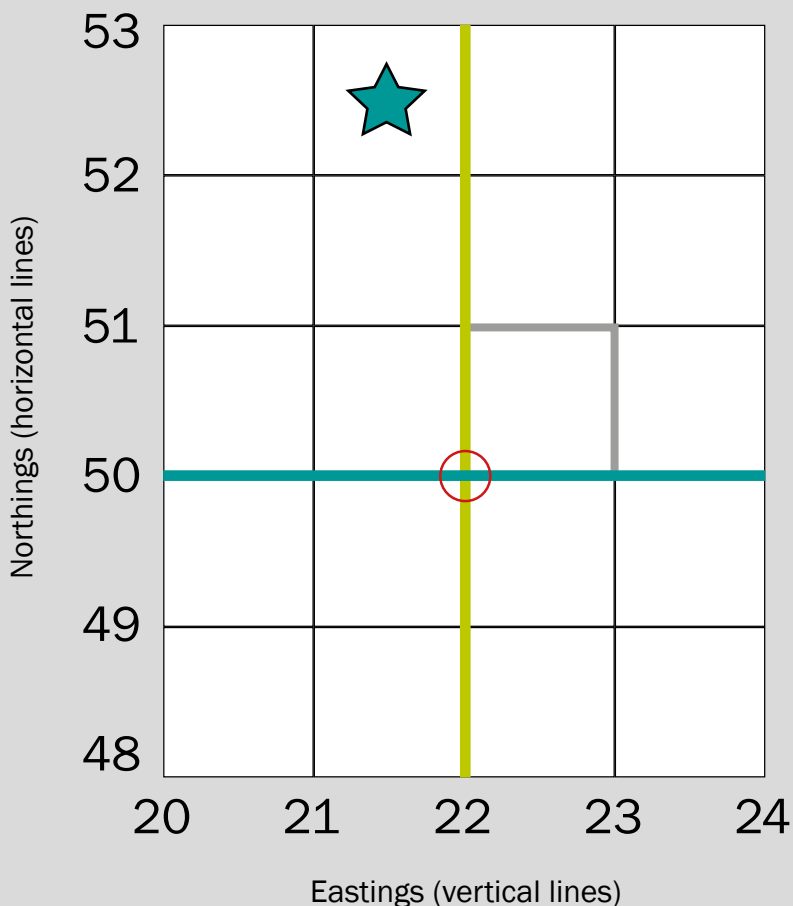
Grid References

Overlaid on every map is a grid. This enables people to communicate accurately about where different points on the map are.

A square on the grid is described by the numbers that show the location of its bottom left-hand corner, this is called a four-figure grid reference.

To read a grid reference:

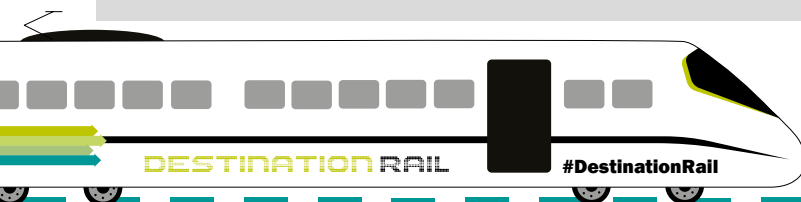
- Start on the left of the map and move along the eastings until you reach the easting of the left edge of the square, take note of its number.
- Then move up the northings from the bottom of the map until you reach the bottom edge of the square and note the number



The grid reference of the highlighted square is

22 50

What is the grid reference of the square with the star?



Use this space to explain why you have chosen to build the train route in this way.

Things to think about:

- How much does it cost?
- Does it improve access to facilities for members of the community?
- What problems did you need to overcome?

Master Engineer Challenge:

What are the 6 figure grid references of your stations?

