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| **Extreme weather in the UK** |

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| * **Lesson two** |

This lesson investigates what tornadoes are, how they form and their occurrence in the UK using data from the Tempest database.

**Key Questions**

* What is a tornado?
* How do they form?
* Where and when are they likely to happen?
* What impact can a tornado have?
* Which parts of the UK have experienced a tornado?
* Why are they unusual events in the UK?

**Key ideas**

A tornado is a rapidly rotating column of air stretching between the base of a storm cloud and the Earth's surface. Tornadoes can form if lots of conditions are just right. These conditions can vary slightly but require very unsettled weather conditions.

Tornadoes occur in lots of places around the world, most usually in the continent of North America. Central USA has a region named 'Tornado Alley', because of the frequency and intensity of tornadoes there. In this region, warm air from the Gulf of Mexico in spring and summer meets with cool air from Canada, leading to the build- up of powerful storms which can, if the right conditions are present, produce tornadoes.

The most violent tornadoes are usually found in the USA, Canada and Bangladesh, it is unusual to find them elsewhere. However, they have been known to happen in the UK and the Tempest data base has some documented evidence of where, and of the impacts caused.

(See ‘Tempest tornado form worksheet’ for a simple step by step breakdown of the process.)

**Downloads**

* Tempest lesson two slideshow
* Tempest weather extremes match game
* Tempest weather describe worksheet
* Tempest tornado form worksheet
* Tempest tornado UK factfile worksheet
* Tempest tornado UK account 1811

**Additional resources**

* World maps / atlases
* Internet
* Digital mapping software access

**Web links**

* ‘How do Tornadoes form?’ and ‘Where is Tornado Alley and why does it exist?’

<https://www.metoffice.gov.uk/learning/wind/tornado>

* NASA video clip USA weather system spawning tornadoes <https://www.nasa.gov/content/goddard/nasa-satellite-movie-shows-us-tornado-outbreak-from-space/>
* ArcGIS [www.arcgis.com](http://www.arcgis.com)
* Digimap for Schools [www.digimapforschools.edina.ac.uk](http://www.digimapforschools.edina.ac.uk)

**Learning objective**

To be able to describe and explain what a tornado is, where and when they might occur and what kind of impacts they can cause.

**Starter**

Use the *Tempest weather extremes match game*. Cut up the cards and challenge groups or pairs to match weather event types causes.

Check the answers together and introduce ‘tornadoes’. Use the Slideshow to help pose some starter questions and find out what the class already know about them.

**Main teaching**

*There are two parts to this that can be done together or separately over two lessons.*

1. Explain some of the background to tornadoes and show the short one-and-a-half-minute film ‘Where is Tornado Alley and why does it exist?’ Locate Tornado Alley using maps and / or atlases. There is an image from NASA’s Storm Prediction Centre on the Slideshow.

Show the other short video ‘How do Tornadoes form?’ and discuss what this shows and whether this makes them likely to be found in the UK or not.

NB. *There is an accompanying activity Tempest tornado form worksheet that requires the last video clip to be watched carefully with note-taking in order to complete a drawn sequence of tornado formation. The worksheet also has further information about tornado formation. This activity can be done as part of this lesson or as a follow up lesson. It is useful for the video to be watched more than once to help children make sense of this complex process. It could also form the basis for a piece of homework.*

1. Show the Introduce the Tempest database and recap what it is. Explain that you are going to use it to search for all accounts of tornadoes in the UK that exist on the database over the past few hundred years. Show the search page and ask for suggestions about search terms. Help the class to decide on a suitable approach, for this example, the term ‘tornado’ was chosen from ‘weather events’ and all other fields left blank. Ask the class to guess how many occurrences there will be. You could also use a separate map of the UK and ask the class to guess where, if anywhere in the UK might be identified as a place that experienced a tornado in the past.

This search produces 10 records from 1792 to 1961. The map on the slideshow identifies the markers produced by the search. Ask the class if they are surprised by this.

Show the headlines from one of the events on the 12th May 1811 using the Slideshow and read it together. Discuss the power of the tornado in being able to rip of a church roof and cause such damage. Ask the class if they have ever heard about or experienced damage on a similar scale from a severe weather event.

Explain that the class will use the database to complete their own research about the tornado events shown on the map and introduce the Tempest tornado UK factfile worksheet. This is to help them gather information and use it to create a map and or a report about tornadoes in the UK.

*Or, you could ask the class to browse the tornado events and select one they find especially interesting to record information about.*

**Main activity**

Children work in pairs or small groups to gather data from Tempest about the tornado events. They can either explore this freely or you could allocate counties or regions to different groups.

Using the provided worksheet, challenge children to record information manually from the Tempest data base or copy and paste electronically. Explain that they will use this grid to do some further work about tornadoes.

If you have access to digital map programmes such as Digimap for Schools or ARC GIS then ask the children to select one event and map it using an appropriate map (for example, Digimap for Schools has layers of historical maps), with annotations. Ask children to use their data to answer the following questions:

* Based on the evidence, do you think tornadoes are more likely to happen in the UK at certain times of the year?
* Based on the evidence, what are the most common impacts of tornadoes on people and property in the UK?

**Plenary**

Discuss the answers to questions 1 and 2 and draw out some common understanding, helping children to consolidate what they have learnt.

Ask the class them what advice they would give as to how to stay safe in the event of an approaching tornado.

**Further study**

* Tempest weather describe worksheet
  + This worksheet has the names of weather events but with blank spaces to record simple descriptions. Ask children to do their own research to complete this.
* Tempest tornado form worksheet
  + Watch the Met Office video about the formation of a tornado and use the worksheet with a given list of events as prompts to draw a comic book style sequence showing how this happens.
* Tempest tornado UK account 1811
  + This information sheet has the account of a tornado from 1811 as detailed on the Tempest database. Children could use this to create their own first-hand report, diary or descriptive story set in that time period and illustrate it with an appropriate map.
* The Tempest records for tornado accounts stop at 1961 but have there been any events since? Research newspaper reports to find out. Why haven’t Scotland and Wales got any documented reports on the Tempest website? Ask children to be UK tornado detectives and come up with their own questions and answers.
* Prepare a weather report of a possible tornado creating scenario in the UK using maps and symbols. Video the results.
* Investigate Tornado Alley as one of your regional studies in North America.