

Tornado information guide



Use this document to support the activity “**Billowing breezes, twisting tornadoes**”, taking inspiration from the stories of Rainbow Grey by Laura Ellen Anderson.

Help familiarise yourself with the science behind a tornado as well as links to footage and a glossary of terms to support you with discussing tornadoes.

What is a tornado?

A tornado is a rapidly rotating column of air that reaches between the base of a storm cloud and the Earth’s surface. They form in very unsettled weather conditions as part of severe thunderstorms. Many conditions need to be present for a tornado to form but when these conditions are met a violently whirling mass of air, known as a vortex, forms beneath the storm cloud.

A funnel cloud develops when winds blowing at different speeds or in different directions meet causing a vortex of rotating air to form, with lower pressure inside than outside. The lower air pressure inside the vortex causes



Tornado

strong inflowing winds to intensify and the spin rate increases as the vortex stretches vertically. If it continues stretching and intensifying for long enough, the vortex touches the ground, at which point it becomes classified as a tornado. The tornado then moves across the surface of the earth causing severe damage or destruction to objects in its path.

A tornado typically has the form of a twisting funnel-shaped cloud between the cloud base and the ground. Sometimes the vortex can appear as a slender rope-like form, particularly when the tornado is weakening; sometimes a tornado can be almost invisible, observable by the debris thrown up from the surface. Tornadoes typically spin anticlockwise in the Northern Hemisphere (cyclonically).

How big are tornadoes?

Tornado size and intensity vary greatly. Typically, a tornado is 20 to 100 metres wide at the earth's surface, lasts for a few minutes and has a track of around a mile (1.6 km). Wind speeds typically range from 75 to 100 mph (120 to 180 km/h). The largest tornadoes are very rare occurrences. They can be over 2 miles (3.2 km) wide, track for over 60 miles (100 km) and have wind speeds in excess of 300 mph (480 km/h).

A large, violent tornado passing through a populated area can lead to total destruction of buildings and property in its path and sometimes loss of life. Such large tornadoes are in the minority. Most tornadoes, although they produce damaging winds, do not lead to the widespread devastation often associated with these weather events in the media. Tornado damage is localised; limited by the track of the tornado.

Where do tornadoes happen?

Tornadoes occur in many places around the world, but North America is the continent where they occur most often. The most violent tornadoes are rarely seen anywhere but the USA, Canada and Bangladesh. 'Tornado Alley', a region of Central USA, is particularly prone to violent tornado outbreaks and is susceptible to large, long-lived tornadoes. In the spring and summer, warm air from the Gulf of Mexico meets cool air from Canada in this region, and this leads to the formation of powerful storms known as supercells that, if the conditions are right, can spawn tornadoes.

Around 30 tornadoes a year are reported in the UK. These are typically small and short-lived but can cause structural damage if they pass over built-up areas.

How are tornadoes formed

Impacts of tornadoes

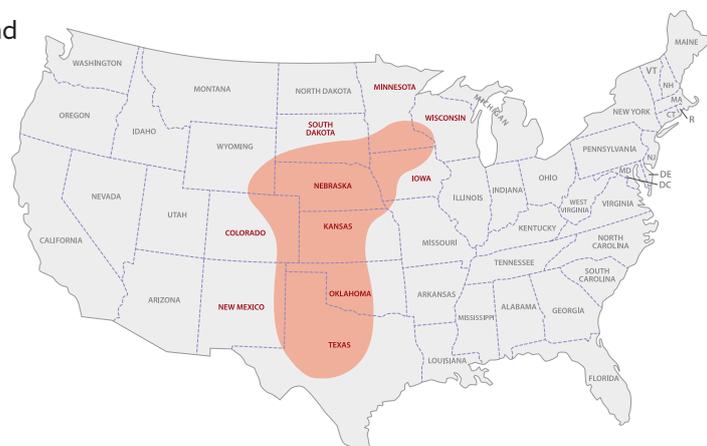
Tornado forecasting is an evolving science, and much effort is put into improving the understanding and forecasting of tornadoes. The largest tornadoes can cause billions of dollars-worth of damage, destroy thousands of homes and lead to loss of life.



Total destruction caused by a T5 tornado.



Map of USA showing tornado alley area.



Some areas prone to tornado outbreaks, such as Central USA, have tornado warning procedures, shelters and educational programmes with the aim of minimising risk to life.

The UK has little need of tornado warnings. However, the Met Office actively works with the National Oceanic and Atmospheric Administration (NOAA) in the USA to advance the science of tornado forecasts and to improve warnings.

Tornado facts

1. TORNADOS IN THE UK

It is claimed that the UK gets more tornadoes per square kilometre than the USA, but not more tornadoes in total. On average, around 30 tornadoes are reported each year in the UK (Kirk, 2007; Mulder and Schltz, 2015, <https://centaur.reading.ac.uk/51053/1/FINALMulderSchultzClimatology.pdf>) although these are generally much weaker than in America.

2. FURTHEST DISTANCE

The greatest recorded distance travelled by a tornado was 219 miles (352 km) from Ellington, Missouri to Princeton, Indiana on 18 March 1925.

3. THE GREATEST NUMBER IN 24 HOURS

The most tornadoes recorded in 24 hours was 175 on the 27-28 April 2011 in the USA.

4. WHERE DO THEY FORM?

Most continents have regions with favourable conditions for tornado formation.

5. THE MOST IN A YEAR

The most tornadoes recorded during a single year was 1,820 in 2004 across the USA.

Tornado explanation videos

If the students are unfamiliar with Tornadoes, please refer to the recommended videos below:

Met Office video explanation of [how a tornado forms](#)

NOAA explanation of [how a tornado forms](#)

Footage of a tornado (attached to activity plan)

Tornado glossary

Atmosphere – the mass of air that surrounds the Earth. It contains nitrogen (78%) oxygen (21%) and traces of other gases. The atmosphere plays an important part in protecting life on Earth.

Meteorologist - A meteorologist uses weather information to understand and predict/forecast weather. They also study how weather conditions affect humans and our planet.

NOAA - The National Oceanic and Atmospheric Administration is a scientific agency within the U.S.A which provides daily weather forecasts, severe storm warnings, climate monitoring for fisheries management, coastal restoration and support for marine commerce.

Vortex - A whirling mass of air in the form of a column or spiral. It need not be oriented vertically but, for example, could be rotating around a horizontal axis.

Supercell – A very powerful thunderstorm which contains a giant rotating column of air that sometimes produce tornadoes.