

				Key terms		Location of tropical storms	
				Tropical storm	An area of low pressure with spiraling winds moving about a central calm eye. Strong winds and heavy rain.	Where are tropical storms found?	Mainly between 5-15 degrees N/S of the equator. Up to 30 degrees though.
Tropical Storms		Jet stream	Fast flowing current of air that circulates the earth at a height of 10km.	Oceans must be warm 27 degrees C or more.	They have different names for when they occur in different parts of the world. Hurricanes – Atlantic, Cyclones – Indian Ocean, Typhoons – off the coast of China/Japan		
		latitude	A line drawn west to east on a map showing where places lie between the equator and poles.				
How do tropical storms form?	The sun heats the oceans which in turn heats the air above them. This warm air rises and colder air rushes in to replace the warm rising air. This process continues and the spin created by the Coriolis causes incoming winds to spin. As air rises it cools and condenses creating large towering cumulonimbus clouds. Latent heat is released powering the storm. The winds begin to spiral and a low pressure zone is created in the centre where air descends. When wind speeds reach 119km/h the low pressure zone becomes an official tropical storm.	arid	A climate where there is not enough rainfall to support vegetation growth. Less than 250mm of rain annually.	Global Atmospheric Circulation system			
What are the key features of a tropical storm?	Tropical storm – low pressure zone Eye – central low pressure zone – calm conditions Eye wall – strongest winds and torrential rainfall Rain bands – bands of rain, closer to the centre the stronger the winds and rain. Pressure gets lower towards the centre.	typhoon	Another name for a hurricane that develops in the Pacific west.				
How will climate change affect tropical storms?				cyclone	Another name for a hurricane that develops in the Indian Ocean	Describe characteristics of the Hadley Cell	Centre cell – air rises at the equator Air sinks around 30 degrees north and south – this is a high pressure zone. This is where most of the world's deserts are found. Conditions are dry and hot.
Intensity	More severe category 4/5 storms may increase by 2-11% by 2100 as sea temperatures increase.			Coriolis effect	The deflection of wind caused by the Earth's rotation. To the right in the northern hemisphere causing winds to spiral anti-clockwise.		Surface winds travel back towards the equator.
Frequency	Overall will be expected to stay the same. May be more frequent higher intensity.			Storm surge	A large wave created by a storm. Often causes most damage. More than strong winds.	Describe characteristics of the Ferrel Cell	This cell is between 30-60 degrees north and south in between the Hadley and polar.
Distribution	Not expected to change. Tropical storms may develop outside the current range of 5-30 degrees.			Surface winds travel from 30 degrees N/S to 60 degrees N/S at this point the air rises again creating a second low pressure zone. This boundary at the latitude of 60 degrees is known as the sub-polar low.			
Effects of Typhoon Haiyan, 2013		Responses to Typhoon Haiyan		How can you reduce the effects of a tropical storm?			
Primary effects	6300 people killed – most drowned in the storm surge. 600,000 displaced across the Philippines 40,000 homes damaged in or flattened 90% of Tacloban city destroyed Tacloban airport damaged 30,000 fishing boats destroyed Damaged power lines Destroyed crops Widespread flooding	Immediate		Monitoring and Prediction	Satellites can be used to monitor cloud formations. Rainclouds that develop around 16km in altitude are linked to increased intensity. There are now satellites that can monitor global precipitation to identify these. Aircraft and drones can also now be used to measure conditions. In the US NASA use drones to monitor conditions. Super computers developed by NOAA now can provide 5 day warnings. A tracking system has also been developed to forecast the path.		
		International governments and NGOs provided food, water and shelter. US assisted with search and rescue and aid to remote places. 1200 evacuation centres set up. UK sent shelter boxes French and Belgian set up field hospitals Philippines Red Cross provided food and water			Protection	Buildings can be reinforced and weaknesses improved. Install hurricane straps between roof and walls Install storm shutters on windows Install emergency generators Tie down / remove wind borne objects e.g. garden furniture Reinforce garage doors Remove trees near buildings	
Secondary effects	14 million affected in total, many homeless 6 million lost source of income Landslides and blocked roads caused by floods Power cut off in some areas for months Ferry services and airports disrupted for weeks – slowing aid Shortages of food/water and shelter Destroyed shops/schools/hospitals affected livelihoods Many jobs lost Looting and violence broke out in Tacloban	Long term		Planning	America has a National Hurricane Preparedness Week each year in May to ensure that people are well prepared. Advice includes how to prepare disaster kits, having fuel in vehicles, knowing official evacuation centres, storing loose objects and planning with family what to do.		
		UN and other HICs donate financial aid to support supplies and medical equipment. Rebuilding of roads, bridges and airport facilities Cash for work programmes Rice farming and fishing quickly re-established Aid agencies e.g. Oxfam support replacement of fishing boats Thousands of homes built away from coast More cyclone shelters built.			USA have a designated team of FEMA to help provide prior warnings and manage the disaster after.		
How are storms measured?							
Saffir-Simpson scale from 1-5. 5 being the worse. Wind speeds more than 252km/h							
In order to reach scale 1 – wind speeds must be 119km/h.							
Which direction do storms travel?							
All storms travel from east to west in the direction of surface winds in the Hadley cell, created by Coriolis effect.							

<b>Weather Hazards</b>			Key terms		Location of tropical storms	
			Tropical storm		Where are tropical storms found?	
Tropical Storms			Jet stream			
			latitude			
How do tropical storms form?			arid			
What are the key features of a tropical storm?			typhoon			
How will climate change affect tropical storms?			cyclone			
			Coriolis effect			
Intensity			Storm surge			
Frequency						
Distribution						
Effects of Typhoon Haiyan, 2013			Responses to Typhoon Haiyan		Global Atmospheric Circulation system	
					Describe characteristics of the Hadley Cell	
How can you reduce the effects of a tropical storm?			Monitoring and Prediction		Describe characteristics of the Ferrel Cell	
					Describe characteristics of the Polar Cell	
Primary effects			Protection		How are storms measured?	
Secondary effects			Planning		Which direction do storms travel?	