

				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.				
arid	A climate where there is not enough rainfall to support vegetation growth. Less than 250mm of rain annually.						
typhoon	Another name for a hurricane that develops in the Pacific west.						
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.	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.	Global Atmospheric Circulation system		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.
How will climate change affect tropical storms?				Describe characteristics of the Ferrel Cell	Surface winds travel back towards the equator.		
Intensity	More severe category 4/5 storms may increase by 2-11% by 2100 as sea temperatures increase.	Frequency	Overall will be expected to stay the same. May be more frequent higher intensity.		Storm surge	Coriolis effect	Describe characteristics of the Polar Cell
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 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	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.			
				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 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.	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. 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.							

Weather Hazards			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				
			cyclone				
How will climate change affect tropical storms?			Global Atmospheric Circulation system				
Intensity			Coriolis effect		Describe characteristics of the Hadley Cell		
Frequency			Storm surge		Describe characteristics of the Ferrel Cell		
Distribution					Describe characteristics of the Polar Cell		
Effects of Typhoon Haiyan, 2013			Responses to Typhoon Haiyan		How can you reduce the effects of a tropical storm?		
					Primary effects		Immediate
Secondary effects		Long term	Protection		How are storms measured?		
				Planning		Which direction do storms travel?	