EPro8 Challenge
Engineer   Problem Solve   Innovate

Storm Proof Dog Kennel

Snuffles is a lovely dog – but he is scared of storms and a hurricane is on the way.

You need to build a storm proof dog kennel that will keep Snuffles dry and safe despite rain, strong wind, flooding and an incoming storm.
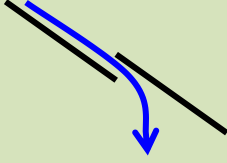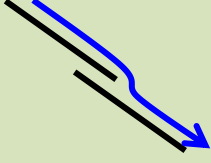
⚡ This challenge contains optional activities using the EPro8 Electronics Starter Kit.

Flood Proof Kennel	
Criteria	The kennel has four legs and a floor approximately 700mm wide and 400mm long.
	Corrugated cardboard is secured to the floor.
	The floor must be at a height where it will remain dry even if the water levels due to the flood rises to 500mm above the ground.
Hint	You can attach the cardboard by using a bolt to push a hole through the card. You can then attach the card to blue joiners on the aluminium frame.
	Think carefully about your dimensions.
	Before you start building take into consideration the criteria for the "Waterproof Kennel". For example, if you use 700mm poles for legs. The extra length of the pole will serve as the wall for the next step.

Waterproof Kennel

Criteria	The kennel has a corrugated cardboard roof. A 500mm tall dog can fit inside the kennel. The roof of the kennel must allow "water" (wing nuts) dropped from above to run off the roof but not touch the floor of the kennel.
Hint	Waterproofing is achieved by overlapping panels so that water will not fall into any gaps. Eaves are the parts of roofs that extend past the side of building to direct water away from the building. Leaks Waterproof

Hurricane Proof Kennel

Criteria	The kennel is rigid. When the floor is pushed sideways it moves by less than 20mm. You can hold the kennel's feet to anchor it to the ground.
Hint	The kennel will require good diagonal bracing on all sides.

Flood Level Warning

Criteria	A lever is lifted up when the water level is close to the floor of the kennel. *Don't actually fill your room up with water – you might get in trouble for this. You will need to use your imagination to test this.*
Hint	A toilet cistern has a ball on the end of an arm. The ball floats on the water. This raises or lowers as the water level changes, turning a valve on and off. Put a balloon at the end of a lever and attach the lever to an axle.

Flood Level Warning Light

Criteria	A lever is lifted up when the water level is close to the floor of the kennel. This pushes a button which turns on a warning light.

Drawbridge

Criteria	A drawbridge leads from the entrance of the dog kennel to the ground. The drawbridge is hinged. It can be raised and lowered by hand.

Crank Handle Drawbridge

Criteria	The drawbridge can be raised and lowered using a crank handle.
Hint	Because the drawbridge is long it has a lot of leverage acting on it. You will not be able to turn this by directly turning the axle it is attached to. Use the reel and a rope (mounted near the top of the dog kennel) to lift the drawbridge.

⚡ Motorised Drawbridge

Criteria	A button is mounted inside the dog kennel. When the button is pushed the drawbridge raises.

Flood Level Alarm

Criteria	Use the online electronics simulator, code **SPDK**. A lever is lifted up when the water level is close to the floor of the kennel. This triggers an alarm that will wake Snuffles.
Hint	A limit switch will not be directly triggered by water. But it can be triggered by the float / lever that you constructed earlier.

Motorised Drawbridge (Simulator)

Criteria	The drawbridge is motorised. Pushbuttons raise and lower the drawbridge.

Automated Drawbridge	
Criteria	If the flood level is high then the drawbridge is automatically closed. When the water level has dropped (ie is it NOT high) then the drawbridge will automatically lower.
Hint	Connect the NOT box to the limit switch to detect when the water level is NOT high.

After you have attempted this challenge watch the tutorial to see our solution at www.EPro8Challenge.co.nz/Tutorial and enter the Challenge Code **SPDK**.