WIND STUDY | Wind Study is intended for grades 5-8 and 8-11
Questions posted on: Monday   Answers posted on: the following Monday
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2021Q27   CHARGE, RATES

QUESTIONS

One Energy uses drones to take photos of wind turbines and to monitor the health of the wind turbine blades. This serious and methodical approach helps ensure that our turbines can operate safely for decades. One Energy's drone has a set of two batteries that provide power during flight, and typically, two team members go out for each blade inspection via drone . One is the drone pilot; the other swaps the batteries after each landing and helps the drone pilot keep an eye out for other flying objects.

It is important to know how long the drone can be piloted before having to land for a battery swap, to ensure the drone can land safely. One consideration is the wind conditions, which can affect the draw of the battery. For a better understanding of battery capacity, know that it is measured in milliamp-hours (mAH). Draw is the rate at which the mAH are being consumed by the functions of the drone. The drone used by One Energy draws power from both batteries at the same time. You'll use the following information for these problems:

Battery Capacity: 4280mAH per battery

Draw: 611 mAH per min per battery
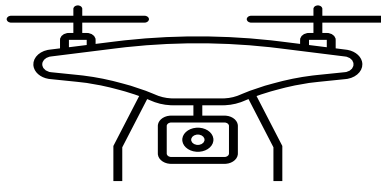
Level 1: The better the pilot can plan the drone flight, the smoother the flight will go. If the drone pilot plans to begin landing the drone at 25% battery, approximately how many minutes can the pilot fly the drone for blade inspections before they must land?

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Level 2: The wind speed on any given day can affect a pilot's decisions on drone flight. For instance, when wind speeds are high, it is better not to fly the drone. Waiting for low wind speeds allows for a smoother and safer drone flight. Wind speed also affects how long a battery charge will last. So, the more wind during flight, the faster the pilot will want to land. Using the above information as a baseline at 2 mph, what is the draw a single battery will have at a wind speed of 4 mph if the draw increases by 305.5 mAH per mph per battery?

This picture was taken by a drone! Our pilot was able to capture this unique perspective on construction by having the drone up in the air to snap a pic.