

## Physics Unboxed (PHY-123)

### HW 4 | Total points: 10

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Scenario: **Malaysia Airlines Flight 370 (MH370/MAS370)** was an international passenger flight operated by Malaysia Airlines that disappeared from radar on 8 March 2014 while flying from Kuala Lumpur International Airport in Malaysia to its planned destination, Beijing Capital International Airport in China. The reason for its disappearance has not been determined[1].

There are numerous theories which attempt to explain this mysterious disappearance. We do not have a definite reason as to why it happened and who is actually responsible for this mystery.

The video shared below gives a very scientific approach and based on technical data available, reconstructs the whole event.

[https://www.youtube.com/watch?v=MhkTo9Rk6\\_4](https://www.youtube.com/watch?v=MhkTo9Rk6_4) Links to an external site.

Watch the video above and share your response to the questions:

[1] [https://en.wikipedia.org/wiki/Malaysia\\_Airlines\\_Flight\\_370](https://en.wikipedia.org/wiki/Malaysia_Airlines_Flight_370)

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#### **Q.1. Mention 3 theories attempting to explain the disappearance of MH370.**

1. An accident– a combination of electrical failure, rapid decompression and pilot incapacitation.
2. A hijacking– a very technically sophisticated hijacking by hijackers that knew the lay of the land and intimate knowledge of how to commandeer and hide a Boeing 777 (more outlandish but possibly by the CIA).
3. A premeditated action by a skilled pilot intent on accomplishing the unthinkable, to make a Boeing 777 disappear.
4. Sucked into a blackhole.

#### **Q.2. In this reconstructed video, a scientific analysis of data is utilized to push forward a theory. Based on the presentation:**

a) At what position/point the plane disappeared? What advantage does it have for the pilot's motive (considering he being the responsible person according to this theory).

- Time/Point of Disappearance: At 1:20:00 AM while between the airspace of Igari and Bitod.
- Advantage to Pilots Motive: Undetectable as it was in limbo between air traffic controllers between a handoff, while no one was rushing to check up on them assuming the plane was in the airspace and thus responsibility of the other, it could go unnoticed at this time.

b) This is a fact that humans cannot survive at high altitude without proper supply of oxygen, that is why the inside of plane uses compressed air to maintain pressure similar to the atmospheric pressure at ground level. Given there was a limited supply of oxygen cutting human life to several minutes depending on the source they used. Is there any scientific evidence to back the statement that "all passengers on board plus the crew members were dead" within hours' time.

- "At 35000 ft. there is only enough air to keep a human meaningfully conscious for 45 seconds"
- The pressurized air in the passenger aircraft keeps us alive across long flights but by opening the underside outflow valves of the plane the condensed air would be vented out into the atmosphere, those without oxygen masks would be dead, and even with the masks they would run out of oxygen within 20 minutes of not being at a breathable altitude.
- Even portable masks and oxygen supply would take 45 minutes but would only be used in an extreme emergency which neither the passengers nor the cabin crew were expecting.

c) What events played a fateful role in keeping this plane unnoticed for most part of their journey over Malaysia and near Penang international Airport.

Skirting of the border between Thai and Malaysian airspace where each military assumes it is being handled by the other and even if they know it is Malaysia Airlines Flight 370 they will assume it is being handled by civilian controllers and the civilian controllers would not care as they have handed the plane over to Ho Chi Minh controllers who were just assuming this was a standard delay and that the contact would be made any time. The airspace controllers were not going fully by the book at this time when they failed to report the missing plane within 5 minutes rather opting to wait 20 minutes before there was any panic, similarly the Malaysian military was careless and missed the plane. Even when flying over Langkawi Airport there was a primary radar station that did not detect the plane as anything suspicious due to having a multitude of planes that flew by commercially.

d) Why did Malaysian Airlines see the plane in Cambodian air space?

The plane was seen in Cambodian airspace as the way its location was mapped in the online flight tracking system was not based on live information but rather based on projections into the future as based on last known position. The plane was last seen in the South China Sea heading Northeast so the location prediction was set to Cambodia.

e) The SATCOM ground handshake from Perth at 59:01 min, 01:03:25 min; gives some crucial information about the plane. What is that information?

As the plane tried to log on to the satellite network it not only showed that the plane was still in the air/intact but also could make this contact every hour which helped give away that with the signals time stamp being attached we could determine how long it took the signal to reach the satellite and in turn build a radius of possible location which when combined with last known position on primary radar even that could be simplified to a specific arc of area.

f) At 01:05:54 min, something happens which gives a hint towards the plane being out of fuel. What was it?

There is confirmation about the plane being in the air/intact at the time of the formation of the 6th arc with the SATCOM handshake, assuming it was flying on autopilot, one of the engines ran out of fuel, shifting the other engine to full power and put the plane in a slight turn towards the right, then so did the other engine. But this kicked the Auxiliary Power Unit (APU) into power that turned on the currently dormant system that made one last handshake much like its last one 6 hours earlier. This formed the final arc, arc 7 that only came as the APU sent a request to connect showing that unlike before where signal came from Perth this connection would have to be initiated by the plane which in the status quo could only be as a result of the APU coming on and the signals also showed that the plane was leaving range of the satellite and at what speed, its presumed decent has begun coming as close to a confirmation that we can have that it was out of fuel and going down.

g) What is your personal take on the information shared? Do you agree or disagree or partially agree and require more information to rule it out as Pilot's plan? Share your thoughts.

Wholeheartedly disagree— I have always been very interested in aviation and even had an entire course project on the prediction of plane crashes. This case has fascinated me for ages and simply “applying Occam's razor” to condemn an otherwise entirely unassuming and devoted pilot to forever go down in infamy is far too reductionist. As a man who often experimented with routes the presence of this route on his simulator is not surprising nor is the decision of the Malaysian government to initially keep this information under wraps as it gives way to baseless theories and accusations like this. Malaysian 370 was a daily passenger flight, it was routine but it was not immune to the issues and risks that all other flights incur from takeoff to landing. At every turn you may feel like all things point to the pilot, but remember this retelling makes huge assumptions about specific actions and that the actions even came from the pilot. Also onboard the plane were 2 passengers who boarded the plane with stolen passports presumed to be “seeking asylum”, who is to say that these actions were not taken by them but rather by the pilot. On the theory of the simulator, something this video conveniently leaves out is that there is nothing to suggest that all the paths joined together into one were even flown as part of one continuous session. Also there is the biggest unanswered question, equivalent in scale to the question about what exactly went down onboard the plane is why would Captain Zahari do this? He did not have any issues at home and was incredibly passionate about aviation with no suspicious ties or behavior.