Satellite Analyst: The Doppler Effect And Mh 370

Performance Task

Introduction

The search for Malaysian Airlines Flight 370 consumed the world for a number of weeks. The emotional toll and loss for families of the people on board cannot be comprehended by most people. Finding the plane has become an important matter for people and governments around the world. Technology has been helpful and many discussions are continually taking place related to adding more tracking technology for airplanes. The utilization of scientific and mathematical concepts were and are critical to this investigation. The Weather Cable Network in Istanbul is trying to build its reputation for utilizing strong scientific and mathematical foundations for its reporting and forecasting. The majority of viewers speak English as their third or fourth language; therefore, the network must avoid slang in its reporting and presentations.

Big Idea / Essential Questions

Big Idea

- Gravitational force is the dominant force determining motions in the solar system and the Earth.
- Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.
- Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.

Essential Questions

- How does gravity affect the orbit of objects?
- How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems?
- How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving?
- How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?
- How can recognizing repetition or regularity assist in solving problems more efficiently?

G.R.A.S.P.

Goal

As an analyst for the English-language Weather Cable Network based in Istanbul, Turkey, you have been called upon to help the on-screen meteorologists with the tragic events related to Malaysia Airlines Flight 370. You will need to educate them about the Doppler effect and how satellites were used to help find the potential flight path of the airplane at the beginning of the search.

Role

As a Satellite Analyst, you are responsible for the functions of the satellites used by the Weather Cable Network. The network has asked you to help educate the on-air meteorologists regarding the Doppler effect and its use to help potentially track MH 370. The network provides weather coverage to all of Europe, the Middle East, and Asia and has English-language viewers interested in the search. You will also need to develop visuals to help the on-air people explain the process in a way that the viewers can understand,

Audience

The audience for your work will be the on-air meteorologists and the viewers of the Weather Cable Network from Europe, Asia, and the Middle East. For many viewers, English may be their third or fourth language. The materials to be used on television should be clear and focused so viewers understand the discussion.

Situation

The search for Malaysian Airlines Flight 370 consumed the world for a number of months. The emotional toll and loss for families of the people on board cannot be comprehended by most people. Finding the plane has become an important matter for people and governments around the world. Technology has been helpful and many discussions are taking place related to adding more tracking technology for airplanes. The utilization of scientific and mathematical concepts has been critical to this investigation. The Weather Cable Network in Turkey is trying to build its reputation for utilizing a strong scientific and mathematical foundations for its reporting and forecasting. The majority of viewers speak English as their third or fourth language; therefore, the network must avoid slang in its reporting and presentations.

Products

1. Scientific/Graphic Drawing

Using computer software or hand drawing, develop a model that demonstrates the geosynchronous orbit of the satellite used to help track MH 370. The visual will appear as part of a news report and will need to be viewer-friendly while accurately detailing how the Doppler effect was used to make decisions related to the potential flight path of the lost airplane. Use evidence of how energy can be accounted for as either motion of particles or energy stored in fields will be key. This model should have a brief associated narrative explaining critical attributes such as location, distance from the Earth, and the association between the satellite's location and the communication with MH 370.

Scientific/Graphic Drawing - Satellite Analyst: The Doppler Effect and MH370

Achievement Levels	1	2	3	4
Spelling (x1)	Fewer than 80% of the words are spelled correctly in the title, labels, and description.	75% of the words are spelled correctly in the title, labels, and description.	All common words are spelled correctly in the title, labels and description. 1-2 scientific words may be misspelled.	All words are spelled correctly in the title, labels and caption/description.
Labels	Less than 75% of the items that are identified	Most items (75-89%) identified have labels.	Almost all items (90%) identified have labels.	Every item that needs to be identified has a label. Labeling is clear and

Achievement Levels	have labels. Labeling not clear. **1**	Labeling is clear and appropriate. **2**	Labeling is clear and appropriate. **3**	appropriate. **4**
Title (x1)	Title not included and/or does not clearly depict what information is contained on page.	Title included and contained on page.	Clear title, contained on page, and contains detail that sets it apart from other text elements (i.e. larger, stylized, etc.).	Clear and informative title, centered on page, and contains detail that sets it apart from other text elements (i.e. larger, stylized, etc.).
General Formatting (x1)	Lined paper is used and/or computer graphic tool is not used for design. The drawing is too large or too small to be clear. There is a no figure caption.	Unlined paper is used and/or computer graphic tool is used for design. The drawing is too large or too small to be clear. There is a figure caption that describes the drawing.	Unlined paper is used and/or computer graphic tool is used for design. The drawing is large enough to be clear (about 1/2 of a page of typing paper). There is a figure caption that describes the drawing.	Unlined paper is used and/or computer graphic tool is used for design. The drawing is large enough to be clear (about 1/2 of a page of typing paper). There is a figure caption that describes the drawing. The caption includes information about the graphic design, when appropriate.
Drawing - details (x1)	Fewer than 85% of the assigned details are present OR most details are difficult to identify.	Almost all assigned details (at least 85%) have been added. A few details are difficult to identify.	Almost all assigned details (at least 85%) have been added. The details are clear and easy to identify.	All assigned details have been added. The details are clear and easy to identify.
scientific Models (x1)	The product shows minimal evidence of developing or using a model to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields.	The product shows some evidence of developing or using a model to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields.	The product shows adequate evidence of developing or using a model to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields.	The product shows thorough evidence of developing or using a model to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields.

2. Newscast

You have been asked by network executives to create a 2-3 minute presentation that may be used as an on-air presentation for viewers. Minimally, your presentation will be used to educate the meteorologists who will be explaining this process to the viewers. The presentation should synthesize the mathematical modeling with the search for MH 370. The presentation should also explain the gravitational laws associated with orbital motions. It needs to be created in a manner that the viewers can understand, yet is strongly supported by the mathematical models of the Doppler effect and the scientific principles of satellite orbits.

Newscast - Satellite Analyst: The Doppler Effect and MH370

Achievement Levels	1	2	3	4
Newscast Resources (x1)	The resources utilized are not visually interesting and accurate, and do not enhance the newscaster's story.	The resources utilized are minimally visually interesting, accurate, and minimally enhance the newscaster's story.	The resources utilized are somewhat visually interesting, accurate, and somewhat enhance the newscaster's story.	The resources utilized are visually interesting, accurate, and enhance the newscaster's story.
Presentation (x1)	The presenter(s) does not make eye contact with the audience while providing a story that does not keep the audience's attention.	The presenter(s) occasionally makes eye contact with the audience while providing a story that has the audience's attention drifting in and out.	The presenter(s) is fairly consistent in maintaining eye contact with the audience while providing a somewhat relaxed, self confident story that keeps the audience's attention.	The presenter(s) maintains eye contact with the audience while providing a relaxed, self confident story that keeps the audience's attention.
Content (x1)	The newscast is poorly presented with minimal accurate supporting information including facts and presentation aids. The story is not complete.	The newscast is presented in a mostly logical sequence and with minimal accurate supporting information including facts and presentation aids. The story is not complete.	The newscast is presented in a logical sequence and contains some accurate supporting information including facts and presentation aids that provide a story that may be slightly lacking in one or more areas.	The newscast is presented in a logical sequence and contains accurate supporting information including facts and presentation aids that provides the full story.

3. Webpage

The Weather Cable Network's webpage receives more than one million hits a day. The majority of people check the site to learn about the weather in their region. Everyone

who visits the site must first visit the homepage. The network executives have asked you to create a brief visual and associated explanation that explains the different potential orbits for satellites. This will be important as many people do not know about this, nor understand geosynchronous orbits. Your webpage will be put on the homepage and must capture the viewer's attention quickly. Include an explanation of the mathematics in easy to understand terms. Additionally, share how analysts utilized the Doppler effect through the use of a satellite to consider the potential flight path of MH 370.

Webpage - Satellite Analyst: The Doppler Effect and MH370

Achievement Levels	1	2	3	4
Conventions (x1)	The webpage contains a large number of errors of spelling, grammar, punctuation, capitalization, and sentence structure. Some sources are appropriately cited.	The webpage contains a number of errors of spelling, grammar, punctuation, capitalization, and sentence structure. Most sources are appropriately cited.	The webpage contains few errors spelling, grammar, punctuation, capitalization, and sentence structure. All sources are appropriately cited.	The webpage contains no errors of spelling, grammar, punctuation, capitalization, and sentence structure. All sources are appropriately cited.
Content (x1)	The content is fairly aligned with the purpose of the project and the big idea. Most content is accurate and some detail is provided.	The content is fairly aligned with the purpose of the project and the big idea. Most content is accurate and some detail is provided giving some information to the reader.	The content is aligned with the purpose of the project and the big idea. All content is accurate and some detail is provided information for the reader.	The content is strongly aligned with the purpose of the project and the big idea. All content is accurate and detailed providing substantial information for the reader.
Webpage Layout (x1)	The webpage does not fonts and attributes which makes the webpage easier to read. The webpage incorporates some color and background as part of the layout.	The webpage uses fonts and attributes which can be sometimes difficult to read. The webpage incorporates some color and background to make the layout more appealing.	The webpage employs fonts and attributes which makes the webpage easy to read with a complimentary background, color, and layout to provide visual appeal.	The webpage employs a deep knowledge of fonts and attributes making the webpage very reader friendly. The webpage is visually enhanced through the artful use of background, color, and layout.
Creativity (x1)	The webpage is designed based upon existing work and the use of media is minimal. The media has little connection to the content.	The webpage is designed using ideas that involve some examples of media. The media is connected to the content.	The webpage is designed using unique ideas that incorporate examples of media. The media enhances audience engagement and knowledge.	The webpage is designed using unique ideas that incorporate numerous examples of media. The media strongly enhances audience engagement and knowledge.

4. Mathematical Model

Create a mathematical model supported by a visual representation explaining how the Doppler effect was used to help identify the potential flight path of MH 370. This model will help educate the on-air meteorologists and will be used on the air to educate the viewers. Be sure to include the formula used specifying the period and frequency.

Models - Satellite Analyst: The Doppler Effect and MH370

Achievement Levels	1	2	3	4
Model (x1)	The model is a minimally accurate with respect to the plans, diagrams, and/or drawings..	The model is a somewhat accurate reproduction of the plans, diagrams, and/or drawings. It has some detail and some critical components.	The model is a mostly accurate reproduction of the plans, diagrams, and/or drawings. It has attention to detail with some critical aspects in place.	The model is an accurate reproduction of the plans, diagrams, and/or drawings. It has great attention to detail.
Plans (x1)	The diagrams and/or drawing of the model have little connection to scale and dimension. Some parts are labeled correctly.	The diagrams and/or drawing of the model have some sense of scale and dimension. Some parts are labeled correctly.	The diagrams and/or drawing of the model are done with strong consideration for scale and dimensions. Most vital parts of the model are labeled on the representative graphics.	The diagrams and/or drawing of the model are done to scale with the appropriate dimensions. All vital parts of the model are labeled on the representative graphics.
Problem	The model meets few needs and requirements set forth through the	The model meets the many of needs and requirements set forth through the guidelines	The model meets the majority of needs and requirements set forth through the guidelines	The model meets the needs and requirements set forth through the guidelines

Achievement Levels (x1)	1	2	3	4
Solving	guidelines provided. The model accurately represents minimal aspects required.	provided. The model accurately represents some aspects required and solves those problems brought forth.	provided. The model accurately represents most aspects required and solves those problems brought forth.	provided. The model accurately represents all aspects required and solves the problems brought forth.

5. Mathematical Model Narrative

You will need to create a 1-2 page narrative explaining the mathematical modeling used as part of the search for MH370. This information will be critical as most viewers will not have your knowledge and will want to understand why this is a valuable tool in helping to find MH 370. Be sure to include an explanation of the period and frequency, as well as all variables included in the formula.

Mathematical Model Narrative - Satellite Analyst: The Doppler Effect and MH370

Achievement Levels	1	2	3	4
FOCUS (x1)	Minimal evidence of the topic and what should be presented.	No apparent point but evidence of a specific topic and some information related to the topic.	Apparent point made about a single topic with sufficient awareness of topic and what is to be presented.	Sharp, distinct controlling point made about a single topic with evident awareness of the topic and what should be presented.
CONTENT (x2)	Superficial and/or minimal content pertaining to the topic.	Limited content with inadequate explanation that does not deepen the reader's understanding of the topic.	Sufficiently developed content with adequate explanation and development of ideas. Most components of the expected response are present.	Substantial, specific, and/or illustrative content demonstrating strong development of ideas. All expected components are present.
STYLE (x1)	Minimal variety in word choice and minimal control of sentence structures.	Limited word choice and control of sentence structures that inhibit voice and tone.	Generic use of a variety of words and sentence structures that may or may not create writer's voice and tone appropriate to audience.	Precise, illustrative use of a variety of words and sentence structures to create consistent writer's voice and tone appropriate to audience.
ORGANIZATION (x1)	Minimal control of content arrangement.	Confused or inconsistent arrangement of content with or without attempts at transition.	Functional arrangement of content that sustains a logical order with some evidence of transitions.	Strong and sustained arrangement of content with evident and/or subtle transitions.