SUPPLEMENTAL LESSONS

Science Grade 7
3rd Quarter

3rd Quarter Grade 7
Revised Standards on Force, Motion, and Energy

Learning Competency: Differentiate quantities in terms of magnitude and direction

Lesson Focus: Vector Quantities

Introduction

Listing Activity: Give examples of physical quantities in everyday life that involves direction.

Give examples of physical quantities in everyday life that involves magnitude only and without direction.

Ask the students: What do you think your life would be like if direction suddenly didn't exist?

Body/Development of the Lesson

1. Content Frame

Present this group of words in the box:

Mass	Weight	Length	Force	Distance	Displacement
Speed	Velocity	Time	Temperature	Power	
Acceleration	Energy	Work	Thrust	Drag	
Momentum	Volume	Friction			

Let the students group the words into categories they think the words will fit in.

- How did you group the physical quantities?

2. Combination Notes

Choose at least six terms. Look for the meaning of the terms using the Internet or Science books and then illustrate or draw them.

Term and Meaning	Illustration

3. Direct Instruction

   Discuss the difference between scalar and vector quantities or review scalar and vector quantities in physics through the video clip:

   http://kocher.co/lessons/introduction-to-scalars-vectors/

   - How does direction affect some physical quantities?

4. Question and Answer/Processing
   - How are motion and position related?
   - What is a reference frame?
   - What is relative motion?
   - How do distance and displacement differ?

5. Show how to draw directions of vector quantities and how to add/subtract simple vectors by visiting the websites below.
   - Online Activity on Frames of Reference

     http://dev.physicslab.org/Document.aspx?doctype=5&filename=Kinematics_RelativeVelocity.xml
   - Interactive Game: "Go Vector Go"

     http://www.brainpop.com/games/govectorgo/

Conclusion

1. Multiple Intelligence Groupings

   Show the difference between scalar and vector quantities through MI. Some groups may compose a song, create a graphic organizer, draw comic strips, etc.

2. Perform GRASPS Activity.

GRASPS for the Performance Task:

Goal	Increase awareness on the natural disasters using the concepts of one-direction motion and devise an action plan on how to reduce and mitigate disaster risk.
Role	You may choose one of the following roles: • A meteorologist • A weather forecaster • A volunteer from Natural Disaster Risk Reduction and Management Council
Audience	Local community residents

Situation	As part of the local Disaster Preparedness Week, you are tasked to conduct a mini-forum to the local community residents regarding how to reduce and mitigate disaster. The way that people deal with the threat of disasters, including their use of science and technology, is fundamentally dependent on how they view disasters and risk. Likewise, the task of managing disaster risks and disaster events is heavily dependent on scientific knowledge.
Product	Creative slideshow presentation which may consider the following discussion points: • What physics concepts are used in understanding the nature and effect of the calamities/disasters? • How can disaster risks and losses be further reduced through greater use of science and technology concepts? • What is the possible plan of action? Group 1: Typhoon Group 2: Earthquake Group 3: Volcanic Eruption Group 4: Tsunami Group 5: Landslide
Standards	Your product will be assessed based on the following rubric:

Rubric for Disaster Preparedness Plan Product

Category	4	3	2	1
Accuracy of Content/Science Concept	Students show deep understanding of related science concepts. All facts and information presented were accurate, complete, and have no errors.	Students show considerable understanding of related science concepts. Facts and information presented were complete and have one or two errors.	Students show shallow understanding of related science concepts. Facts and information presented were incomplete and have three or four errors.	Students show limited understanding of related science concepts. Facts and information presented were incomplete and have five or more errors.

Campaign/ Product	Students create an original, accurate, and interesting product that adequately addresses the issue. Students are very persuasive and informative on disaster risk reduction.	Students create an accurate product that adequately addresses the issue. Students medium is informational, but not persuasive on disaster risk reduction.	Students create an accurate product but it does not adequately address the issue.	The product is not accurate.
Research Data	Students include four or more high-quality examples or pieces of data to support their campaign.	Students include at least three high-quality examples or pieces of data to support their campaign.	Students include at least two high-quality examples or pieces of data to support their campaign.	Students include fewer than two high-quality examples or pieces of data to support their campaign.
Plan of Action/ Solutions	Students identify more than four reasonable, insightful possible solutions/ strategies.	Students identify at least four reasonable, insightful possible solutions/ strategies.	Students identify at least three reasonable, insightful possible solutions/ strategies.	Students identify fewer than three reasonable, insightful possible solutions/ strategies.
Graphics/ Pictures	Graphics go well with the text and there is a good mix of text and graphics. Graphics are relevant to topic and create emotion or action in audience.	Graphics go well with the text, but there are so many that they distract from the text. Number of graphics detract from persuasiveness.	Graphics go well with the text, but there are too few and the brochure seems "text-heavy."	Graphics do not go with the accompanying text or appear to be randomly chosen or irrelevant to topic.

Modified from: http://www.belleville.k12.wi.us/bhs/history/Webquest/PACRubric.htm

3rd Quarter Grade 7
Revised Standards on Force, Motion, and Energy

Learning Competency: Relate the characteristics of waves

Lesson Focus: Characteristics of Waves

Introduction

Pre-lab Discussion

1. Review the characteristics of waves.
2. Discuss the objectives of the laboratory activity:
   - Relate the characteristics of waves by measuring water waves that have various frequencies and amplitudes.
3. Remind dos and don'ts for online activity/computer-generated activity.

Body

Experiment Proper

Procedure:

1. Visit the website http://glencoe.mcgrawhill.com/sites/0078779626/student_view0/unit3/chapter10/virtual_lab.html.
2. Select a speed and a size for the plunger.
3. Click the Start Plunger button to start plunger-generating waves.
4. Click the Step button repeatedly to stop the wave and see each step of its motion. Click the Play button to return to normal motion.
5. Using the grid, measure the wave's amplitude and wavelength. Using the timer, measure the frequency of the wave. Click the magnifying glass to see a detailed view of the wave.
6. Repeat steps 2 through 4 for various combinations of speed and size. Record your findings in the table.

Data Gathering

Record the data from the virtual experiment in the table below:

	Plunger Speed	Plunger Size	Amplitude	Wavelength	Frequency	Illustration/ Sketch of the Waveforms
Wave 1						

Wave 2						
Wave 3						
Wave 4						
Wave 5						

Conclusion

Answer the following questions:

1. Describe the movement of waveforms produced by varying plunger speed and size.

   Wave 1 – _____

   Wave 2 – _____

   Wave 3 – _____

   Wave 4 – _____

   Wave 5 – _____

2. How does the size of the ball on the plunger affect the amplitude of the wave?
3. What effect, if any, does increasing the speed of the plunger have on the frequency of the waves?
4. What effect, if any, does increasing the speed of the plunger have on the wavelength of the waves?
5. What is the relationship between the frequency and wavelength of the wave?
6. What effect, if any, does frequency have on the amplitude of a wave?
7. What relationship exists between the amplitude of a wave and the amount of disturbance in the wave ?
8. Write a conclusion for this experiment based on the given objective.

Note: Alternative wave simulator for this virtual lab:

- http://www.classzone.com/books/ml_science_share/vis_sim/wslm05_pg18_graph/wslm05_pg18_graph.html
- http://www.bbc.co.uk/schools/gcsebitesize/science/aqa/waves/generalwavesrev1.shtml
- http://w3.shorecrest.org/~Lisa_Peck/Physics/syllabus/soundlight/ch25waves/ch25_applets_videos/long_transv.mov
- http://w3.shorecrest.org/~Lisa_Peck/Physics/syllabus/soundlight/ch25waves/ch25_applets_videos/long_transverse.swf
- http://www.animatedscience.co.uk/blog/wp-content/uploads/focus_waves/tl-wave.html

3rd Quarter Grade 7
Revised Standards on Force, Motion, and Energy

Learning Competency: Describe the characteristics of sound using the concepts of wavelength, velocity, and amplitude

Lesson Focus: Characteristics of Sound

Introduction

Group Game: What Sounds Can You Make?

- Each group will use any two materials to produce sounds under time pressure.
- Ask the students: Which object(s) made the sound?
  What actions caused the sound?
- Have them describe the sound.

Body/Development of the Lesson

1. Draw and label.

   Ask the students to draw the diagram of a sound wave and label its frequency, wavelength, and amplitude.

2. Discussion

   Explain the characteristics of sound. The frequency of a wave is heard as pitch. The volume of a sound is heard as the amplitude of the sound wave. Wavelength is inversely proportional to frequency – as wavelength gets bigger, the lower the frequency. An interactive with definitions can be found here: http://www.acoustics.salford.ac.uk/schools/teacher/lesson1/lesson1interactive.html.

3. Slinky Demonstration on How Sound Wave Travels

   Have the students "play" with a slinky to demonstrate the way compressional waves travel. They should also demonstrate wavelength, amplitude, and frequency.

4. Power Sound Music Editor

   Let the students try to remix slow and fast music with Power Sound music editor application in the computer for 5–10 minutes and tell them to observe the wavelength, amplitude, and frequency. Power Sound is a downloadable music editor where songs can be remixed by just trimming, copying, pasting, and splitting sound waves. It can be use even without an Internet connection:

   http://www.free-sound-editor.com/download.html.

5. Table Completion

As the music plays, the students will observe how the waves look like.

	Wavelength	Frequency	Period	Amplitude	Wave Speed
Slow Music					
Fast Music					
Soft Music					
Loud Music					

6. Group Experimental Activity on Pitch

Make predictions about what will happen to the pitch of the sound as the straw length is shortened.

Hand out a straw to each student. The students should flatten out one end of the straw and cut out an upside down "V," like the ends of a blue ribbon. Each student should blow the straw and comment on the pitch of the sound. The straw is much like the reed of a musical instrument.

Each student should cut a portion of the straw from the end in which they blow.

- How does the length of the column/straw affect the pitch?

7. Interactive Online Activity on Changing Guitar Sounds
   - Visit http://www.sciencekids.co.nz/gamesactivities/changingsounds.html
   - Vary the length of the guitar cord and take note of the change in pitch.
8. Creating Your Own Musical Instrument
   - The students will design a musical instrument from everyday objects that can be played in different pitches. Discuss what feature of the instrument may be manipulated to change pitch: length, mass, liquid volume.
   - The students will draw their design for a musical instrument. Each student should include a plan for the instrument and a materials list. They may compare and discuss their designs with other students.
   - The students may explore Inventing Homemade Instruments with Math and Measurement: http://www.philtulga.com/HomemadeMusic.html.
   - Suggested items: cans, cups, tubes, paper, plastic, metal, rubber bands, tape, combs, balloons, hangers, yarn, string, floss, bottles, dowel rods, rulers, boxes, straws, etc.

Conclusion

"Sound of Music" Mini-Concert

The students will present to the class their own musical instrument and the group will play the instrument. They will also explain the science behind their created instrument.

3rd Quarter Grade 7
Revised Standards on Force, Motion, and Energy

Learning Competency: Infer that light travels in a straight line

Lesson Focus: Characteristics of Light

Introduction

Give One – Get One/Stand Up, Hand Up, Pair Up:

1. The students will fold a piece of paper in half lengthwise. At the top of left column, students will write "Give One." At the top of the right column, the students will write, "Get One."
2. Tell the students to list some sources of light that they know under their "Give One" column." The students will list as many things as they know.
3. Tell the students to "Stand Up, Hand Up, Pair Up." The students will find a partner. Partner A will give an answer to Partner B. If Partner B has that answer on his/her paper, he/she will check it off. If it is a new answer, he/she will write it in the "Get One" column.
4. Both partners will share and say thank you/good bye, Hand Up – Pair Up, and find a new partner.
5. The students will continue until you say to stop.

Doodle and Describe:

1. The students will choose at least three sources of light and draw how light travels from that source. Then the students will write a short description about the drawing.

Doodle	Describe

2. Ask the students: "What is common about the drawing and description?"

Body

Light Demonstration A

1. Ask the students to make a prediction if they can see a light beam as it travels.
2. Make the room as dark as possible.
3. Shine a flashlight or projector across the room. Be careful that there are no objects between the light source (flashlight or projector) and the wall.
4. Ask the students what light they see. They will see the light coming from the source and the light reflected off the wall. But can they see light actually travelling from the source to the wall?
5. Now take two chalky blackboard erasers and hit them together in the path of the light. The effect only lasts for a few moments so you need to keep the dust flying.
6. Ask the students: "Can you see the light traveling to the wall? Describe the path."

   Explain the function of the chalk dust.

   Source: Physics for Fun by Science Discovery Program, University of Colorado

Light Demonstration B

1. For each index card, use a ruler to draw lines, connecting opposite corners of the card.
2. At the intersection of the two lines, use a hole puncher to punch a hole in the center of the index cards.
3. For each card, use a small piece of modeling clay and place the card into the clay to create a "stand" for the card. Place the cards so that they stand vertically and at an equal distance from each other.
4. Place the flashlight at one end of the row of index cards and turn off the light in the room.
5. Arrange the index cards so that light can be seen through all the holes.
6. Observe and record your observations.
   - How can light be seen through all the index cards?
   - What does the experiment prove about the path light travels?
   - What would happen if the holes were smaller?
   - What would happen if the middle index card was moved unaligned with the other two index cards?

   Source: http://www.ducksters.com/science/experiment_light_travel.php

Video Clip Viewing

1. Show the following video clips to illustrate further that light travels in a straight line:
   - Light travels in a straight line? (Let's find out)

     http://www.youtube.com/watch?v=WrQsq8s8XzU

An experiment using a tank of water with added milk powder to act as a diffuser to find out how light travels. Demonstrations include a krypton torch (yellow light), an LED torch (white light), and a laser light.

- To show that light travels in a straight line

  http://www.youtube.com/watch?v=Hh4lregaYes

  Three pre-drilled metal rectangles and a laser were used to show that light travels in straight lines.

Conclusion

Synthesis

1. Journal Writing

   The students will write their answer to the following questions individually:

   a. How does their light travel?

   b. Why does light travel in a straight line?

   c. Cite any instrument or machine using light and describe its use applying the concept that light travels in straight line.

2. Perform GRASPS activity.

GRASPS for the Performance/Product Task:

Goal	To address some of the most common lighting problems in various situations or activities
Role	You are the consultant of the Center for Occupational Health and Safety who conducts lighting survey to identify problems and eventually recommend proper lighting solution needed for various situations or activities.
Audience	Depending on the assigned situation/activity: Group 1: Student reading using the study table Group 2: Student working on a computer Group 3: Office workplace where visual tasks are only occasionally performed Group 4: Seminar orientation using LCD projector Group 5: Kitchen working area
Situation	As the consultant of the Center for Occupational Health and Safety, you are tasked to conduct lighting survey to detect and solve some of the most common lighting problem since poor lighting can affect the quality of work and can be a safety and a health hazard, too.
Product	Creative slideshow presentation
Standards	Your product will be assessed based on the following rubric.

A helpful website that contains detailed information about lighting survey checklist and recommended light levels:

http://www.ccohs.ca/oshanswers/ergonomics/lighting_survey.html

Rubric for the Product

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Accuracy of Content/ Science Concept	Students show deep understanding of related science concept. All facts and information presented were accurate, complete, and have no error.	Students show considerable understanding of related science concept. Facts and information presented were complete and have one or two errors.	Students show shallow understanding of related science concept. Facts and information presented were incomplete and have three or four errors.	Students show limited understanding of related science concept. Facts and information presented were incomplete and have five or more errors.
Product	Students create an original, accurate, and interesting product that adequately addresses the issue. Students are very persuasive and informative on lighting solutions.	Students create an accurate product that adequately addresses the issue. Students medium is informational, but not persuasive on lighting solutions.	Students create an accurate product but it does not adequately address the issue.	The product is not accurate.
Lighting Checklist/ Problem	Students correctly identify at least three lighting problems.	Students correctly identify at least two lighting problems.	Students correctly identify at least one lighting problems.	Students incorrectly identify lighting problems.

Lighting Solutions	Students correctly identify at least three reasonable, insightful possible solutions/ strategies.	Students correctly identify at least two reasonable, insightful possible solutions/ strategies.	Students correctly identify at least one reasonable, insightful possible solutions/ strategies.	Students incorrectly identify lighting solution.
Graphics/ Pictures	Graphics go well with the text and there is a good mix of text and graphics. Graphics are relevant to topic and create emotion or action in audience.	Graphics go well with the text, but there are so many that they distract from the text. Number of graphics detract from persuasiveness.	Graphics go well with the text, but there are too few and the brochure seems "text-heavy."	Graphics do not go with the accompanying text or appear to be randomly chosen or irrelevant to topic.