Teachers Teaching with Technology™
Professional Development from Texas Instruments

Chemistry with TI-Nspire™ and TI-Nspire™ Navigator™ – Day 1

Materials for Workshop Participant*

T^3 Professional Development Categories and Learning Objectives

There are three categories of T^3 Professional Development, each with a unique set of learning objectives. This workshop is focused on technology integration, and its objectives are as follows:

Technology Integration

- Emphasis on learning to use TI technology, with broad "how-to" coverage highlighting a wide range of features
- Subject/content-focused training on appropriate usage of TI technology in the classroom
  - I am comfortable with essential technology skills for exploring math and science content.
  - I can design opportunities for students to use technology as a tool to deepen their understanding of mathematics and science.
  - I can locate and download TI activities that align to my standards.
  - I can describe the role technology should play in the successful implementation of my standards, and I can implement a vision of a classroom where students routinely use technology to engage in the practice and content standards.

Workshops focused on instructional practices and content knowledge have the following objectives:

Instructional Practices

- Emphasis on classroom practices with technology as a tool to enhance student learning
- Models CCSS, TEKS, and NGSS tasks using in-depth discussions, reflective practices, and essential technology skills
  - I can demonstrate the importance of teacher actions for students' engagement in the Practices, and I can take actions that will enable students to become mathematical and scientific practitioners.
  - I can describe the role that technology should play in the successful implementation of my standards, and I can implement a vision of a classroom where students routinely use technology to engage in practice and content standards.
  - I can design tasks for students to employ the Practices, using technology as a tool to deepen their understanding of mathematics and science.
  - I can ask questions designed to make student thinking visible – to push them to think about connections, make comparisons, or probe their understanding.

Content Knowledge

- Emphasis on content with technology as support
- Addresses critical, tough-to-teach topics and new content standards for CCSS or TEKS
  - I have a deeper understanding of the mathematics and science in my content area, and I am aware of the shifts in content that affect what I teach.
  - I can design opportunities for students to use technology as a tool to deepen their understanding of mathematics and science.
  - I can locate and download TI activities that align to my standards.
  - I can describe the role technology should play in the successful implementation of my standards, and I can implement a vision of a classroom where students routinely use technology to engage in the practice and content standards.

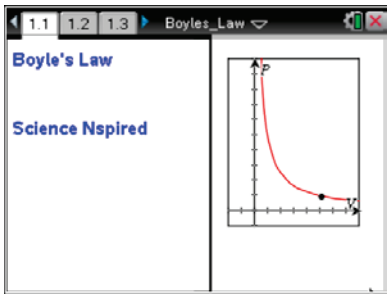
I can…	HH/Nav/DC
Connect a Vernier EasyTemp® USB temperature sensor and navigate the Vernier DataQuest™ app main screen.	DC
Run time-based data collection, change data collection parameters, and collect additional data.	DC
Run multiple trials and store runs.	DC
Use the Curve Fit feature of the Analyze menu to evaluate collected data.	DC
Open a new document, start the DataQuest app, connect a TI-Nspire handheld to a TI-Nspire™ Lab Cradle or Vernier EasyLink™ adapter, plug in a Gas Pressure Sensor, and observe the main screen.	DC
Change the data sampling technique.	DC
Collect data using the Events with Entry feature.	DC
Use the Model tool in the DataQuest app.	DC
Interpolate/extrapolate from a data set.	DC
Login to a TI-Nspire Navigator class.	HH
Open a transferred TI-Nspire document.	HH
Manipulate a slider.	HH
Move from page to page in a TI-Nspire document.	HH
Answer questions within a TI-Nspire document.	HH
Grab and move items on the handheld screen.	HH
Discuss how class answers to questions within a document can be reviewed as a class.	HH/Nav

Boyle's Law
Student Activity

Name _____
Class _____

Open the TI-Nspire document *Boyles_Law.tns.*

In this activity, you will use a Gas Pressure Sensor to measure the pressure of an air sample inside a syringe. Using graphs, you will apply your results to real-world examples.



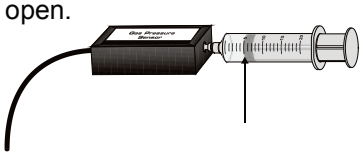
What is the mathematical relation between volume and pressure for a confined gas? To answer this question, you will perform an experiment with air in a syringe connected to a Gas Pressure Sensor. When the volume of the syringe is changed by moving the piston, the change in the pressure will be measured. It is assumed that temperature and moles of gas will be constant throughout the experiment. Pressure and volume data pairs will be collected during this experiment and then analyzed. Using the data and the graph, the type of mathematical relationship between pressure and volume of the confined gas can be determined. Historically, this relationship was first established by Robert Boyle in 1662 and has since been known as Boyle's law.

Move to page 1.6.

Q1. As volume increases, pressure:

A. increases B. decreases C. remains the same

1. With the syringe disconnected from the Gas Pressure Sensor, move the piston of the syringe until the front edge of the inside black ring (indicated by the arrow in the picture to the right) is positioned at the 10.0 mL mark.
2. Turn on your TI-Nspire handheld, and close any documents that are open.
3. Attach the syringe to the probe as shown to the right. (Do not twist too tightly—the syringe just needs to be secure.)



4. Plug the pressure probe into the EasyLink™, and plug the EasyLink into the USB port in the top of the handheld. The DataQuest APP should open automatically.
   - What is the default unit for collection with this sensor?

5. Select **MENU > Experiment > Collection Mode > Events with Entry**.
6. Type in **volume** for Name, press tab, and type **mL** for Units. Press enter.
7. Click the start button to start data collection, or press tab until the start arrow is highlighted, then press enter when ready. It is best for one person to take care of the syringe and for another to operate the handheld.
8. To collect your first data reading, click on the Store Latest Data Set button to save the data. Enter a value of 10, since you set the syringe at 10 mL earlier. Click on OK, or press enter.

9. Depress and hold the plunger to the 9 mL mark. When the pressure value on the left side of the screen has stabilized, click on the Store Latest Data Set button and type in 9, and press enter.
10. Continue this procedure, collecting data at 8, 7, 6, and 5 mL. After you have collected data for 5 mL, click on the Stop button.

- To view your data in graph form click on the Graph View button.

11. Explore the various regression models to determine the best mathematical relationship for your data set.

12. Based on the graph of pressure vs. volume, decide what kind of relationship exists between these two variables—direct or inverse.
    - While on the DataQuest app page, select **MENU > Analyze > CurveFit > Power**.
    - Scroll down to see the curve fit statistics for the equation in the form y = Ax^B , where x is volume, y is Pressure, A is a proportionality constant, and B is the exponent of x (Volume).

Note: The relationship between pressure and volume can be determined from the value and sign of the exponent, B.

- If the mathematical relationship has been correctly determined, the regression line should closely fit the points on the graph (that is, pass through or near all of the plotted points).

Move to page 2.3.

Q2. Which variable is considered to remain constant during a Boyle's Law Experiment?

A. pressure B. volume C. temperature D. all of these

13. To linearize the data and confirm that an inverse relationship exists between pressure and volume, plot a graph of pressure vs. reciprocal of volume (1/Volume) in DataQuest:
    - Select **MENU > Data > New Calculated Column**.
    - Type **InverseV** for Name.
    - Short Name: **1/V**
    - Units: **1/mL**
    - Expression: **1/Volume**
    - Click OK, or press enter.
    - Select **MENU > Graph > Select X-axis > InverseV**.

14. Calculate the regression line y = mx + b where x is 1/volume, y is pressure, m is a proportionality constant, and *b* is the *y*-intercept. On the DataQuest page, select **MENU > Analyze > Curve Fit > Linear**.

Q3. When a quantity of gas is compressed, the pressure of the gas is expected to _____.

A. decrease B. remain the same C. increase D. double

Q4. The expected mathematical relationship between pressure and volume is _____.

A. direct B. inverse C. indirect D. impossible to determine

Move to page 3.2.

Q5. If the volume is doubled from 5 to 10 mL, what does the data show happens to the pressure?

A. increases B. decreases C. doubles D. cut in half

Q6. If the volume is halved from 20 to 10 mL, what does the data show happens to the pressure?

A. increases B. decreases C. doubles D. cut in half

Q7. Based on the data, what would be expected to happen to the pressure if the volume in the syringe were increased from 10 to 40 mL?

A. increase B. decrease C. quadruple D. cut to 1/4th

Q8. From the answers to the above three questions and from the shape of the curve of the plot, of pressure vs. volume, what is the relationship between the pressure and volume of a confined gas?

A. inverse B. direct C. quadratic D. impossible to determine

Q9. What two experimental factors are assumed to be constant during this experiment? (select two)

A. pressure B. volume C. moles of the gas D. temperature

Q10. Using P, V, and k, write an equation representing Boyle's Law.

Q11. Which of the following produced a constant value?

A. pressure x volume B. pressure/volume C. volume/pressure D. none of these

Q12. Summarize what you have learned about the relationship between pressure and volume.

Move to page 4.1.

Extension: Effect of Temperature on Boyle's Law

Follow the instructions on Pages 4.1-4.3 for the simulation, and then answer the following questions from Pages 4.4 and 4.5:

Q13. When the temperature is doubled, how does the pressure change?

A. The pressure doubles. B. The pressure is reduced by ½.
C. The pressure is 4X larger. D. The pressure does not change.

Q14. At a higher temperature, the relationship between pressure and volume is a(an) _____ relationship.

A. direct B. inverse C. quadratic D. impossible to determine

Boyle's Law

SCIENCE NSPIRED

Science Objectives

- Use a Gas Pressure Sensor and a gas syringe to measure the pressure of an air sample at several different volumes.
- Determine the relationship between gas pressure and volume.
- Use the results to predict the pressure at other volumes.

Math Objectives

- Mathematically describe the relationship between gas pressure and volume.
- Evaluate an inverse mathematical relationship.
- Generate and analyze a power regression model.
- Linearize an inverse relation.

Materials Needed

- Vernier® EasyLink™
- Vernier Gas Pressure Sensor
- 20 ml syringe

Vocabulary

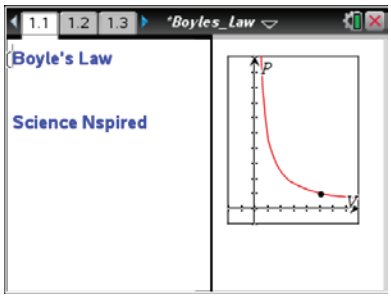
- pressure
- volume
- inverse

About the Lesson

- This activity makes use of the Gas Pressure Sensor in an inquiry activity that enables the student to understand Boyle's Law through experimentation and data collection.
- As a result, students will:
  - Built a mathematical model to show the inverse relationship between gas pressure and gas volume.
  - Analyze that mathematical model, and make predictions from the model through interpolation and extrapolation.
  - Apply Boyle's Law to the real-life situation of human respiration.

TI-Nspire™ Navigator™ System

- Screen Capture to monitor student progress.
- Live Presenter allows students to show their graphs to the class.



TI-Nspire™ Technology Skills:

- Download a TI-Nspire document
- Open a document
- Move between pages
- Entering and graphing data
- Tracing and interpolating

Tech Tip:

Access free tutorials at http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials

Lesson Files:

Student Activity

- Boyles_Law_Student.pdf
- Boyles_Law_Student.doc

TI-Nspire document

- Boyles_Law.tns

Activity Overview

- Please print the student worksheet and make available to students before beginning the lab. Lab background information as well as lab procedures are included only in the student worksheet. Always remember to review any safety precautions thoroughly with your students prior to starting the lab.
- Students may answer the questions posed in the .tns file and submit for grading with TI-Nspire Navigator (optional) or students may answer directly on the student worksheet
- Ensure that students collect data on the 5 known substances and look at the graph before they actual measure the absorbance of the unknown solution. This will allow them to make predictions and to look at the graph of the data first.

Discussion Points and Possible Answers

TI-Nspire Navigator Opportunity

Use the TI-Nspire Navigator System to monitor student progress using screen capture.

Pre-lab Information and Questions.

Have students read the background information on pages 1.2 – 1.5. Then, they should answer the pre-lab question on page 1.6.

Q1. As volume increases, pressure _____.

Answer: decreases

Lab Procedure.

The lab procedure is in the student worksheet and is not duplicated here. Please refer to the student handout.

Boyles Law Lab.tns

Have students move to pages 2.3 – 2.5 and answer the questions in the .tns file or on the worksheet.

Q2. Which variable is considered to remain constant during a Boyle's Law experiment?

Answer: temperature

Q3. When a quantity of gas is compressed, the pressure of the gas is expected to _____.

Answer: increase

Q4. The expected mathematical relationship between pressure and volume is _____.

Answer: inverse

Q5. If the volume is doubled from 5 to 10 mL, what does the data show happens to the pressure?

Answer: cut in half

Q6. If the volume is halved from 20 to 10 mL, what does the data show happens to the pressure?

Answer: cut by one-third

Q7. Based on the data, what would be expected to happen to the pressure if the volume in the syringe were increased from 10 to 40 mL?

Answer: doubles

Q8. From the answers to the above three questions and from the shape of the curve of the plot, of pressure vs. volume, what is the relationship between the pressure and volume of a confined gas?

Answer: inverse

Q9. What two experimental factors are assumed to be constant during this experiment? (select two)

Answer: moles of gas and temperature

Q10. Using P, V, and k, write an equation representing Boyle's Law.

Answer: $P = k/V$

Q11. Which of the following produced a constant value?

Answer: pressure times volume

Q12. Summarize what you have learned about the relationship between pressure and volume.

Answer: Answers will vary. Students should indicate the inverse relationship between pressure and volume

Q13. When the temperature is doubled, how does the pressure change?

Answer: The pressure doubles.

Q14. At a higher temperature, the relationship between pressure and volume is a(an) _____ relationship.

Answer: inverse (same as before)

TI-Nspire Navigator Opportunity: ***Screen Capture***
See Note 1 at the end of this lesson.

Wrap Up

Use Boyle's Law to offer a practical application such as human breathing.

Assessment

Formative assessment will consist of questions embedded in the pre-lab TI-Nspire document. Summative assessment questions are found in the lab and post-lab TI-Nspire document. The questions will be graded when the TI-Nspire documents are retrieved. The Slide Show can be utilized to give students immediate feedback on their assessment.

TI-Nspire Navigator Notes

Note 1 Screen Capture

Screen Capture can be used to monitor students.

Student Login

TI PROFESSIONAL DEVELOPMENT

Objective

- Participants will learn how students log in to a TI-Nspire™ Navigator™ class.

TI-Nspire™ Navigator™ Features

- Logging in to the TI-Nspire™ Navigator™ System from a handheld

TI-Nspire™ Technology Skills:

- Logging in as a student

Tech Tips:

- Make sure the font size on your TI-Nspire handheld is set to Medium.

The TI-Nspire™ Navigator™ System uses both your computer and your students' handhelds. Your computer and your students' handhelds communicate through the TI-Nspire™ Navigator™ access point.

You do not have to log in to communicate with your students' handhelds; you can use the Transfer Tool to send or delete documents and/or operating systems on the students' handhelds. However, if you plan to use Quick Poll, Class Capture, Live Presenter, or place documents in the Portfolio during the TI-Nspire Navigator class session, then you must log in student handhelds to the TI-Nspire™ Navigator™ network.

1. On the teacher computer, within the TI-Nspire™ Navigator™ Teacher Software, press Begin Class.
2. Turn on the handheld that is connected to a wireless network adapter (or locked in the cradle). You will notice the following icons on the handheld in the upper right hand corner.

Icon	Status	Meaning
	Blinking	The handheld is searching for an access point.
	Solid with ✓	The handheld has found an access point.
	Solid with a warning sign	The handheld is not communicating with the wireless network adapter. Detach the handheld from the wireless adapter, wait for the icon to disappear, and then reattach the handheld to the adapter.
	Blinking	The handheld is connected to the network and is ready to log in.
	Solid	The handheld is logged in to the network and is fully charged.

Student Login

TI PROFESSIONAL DEVELOPMENT

3. When the icon appears solid in the upper right-hand corner of the handheld, a “Login to Class” dialog box will appear.

    - If the dialog box does not appear, have students press [on] > **Settings > Login…**.

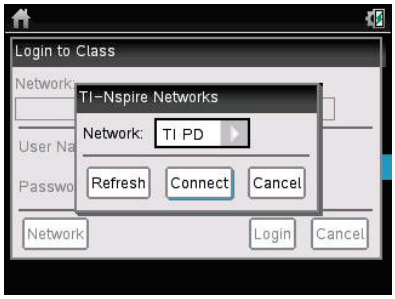
4. When logging in for the first time, a network must be selected. Click the **Network** button, select the appropriate network from the Network drop-down field, and click **Connect**.

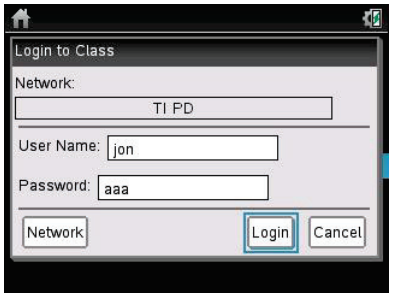
    - A network only needs to be selected once, not every time a handheld is logged in.

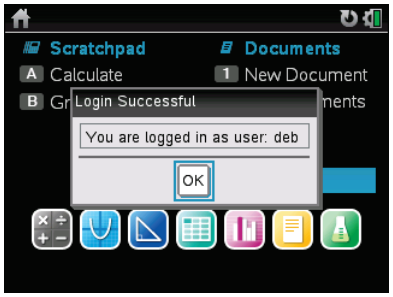
5. Students will first enter their User Name, press [tab], and then enter their Password.

    - Passwords must be at least 3 characters. The teacher might have chosen the student password when setting up the class.

6. Press [enter], and the “Login Successful” dialog box will appear on the handheld.







Waves and Spectrum

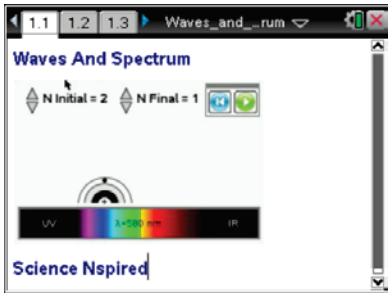
Student Activity

Name _____

Class _____

Open the TI-Nspire document *Waves and Spectrum.tns.*

Why is it that neon lights are so attractive? Neon (Ne) is a single type of atom that gives off an orange light to the naked eye. When Neon's light is passed through a spectrum, though, a number of colors appear. Each element will admit a different set of colors called the emission spectrum.

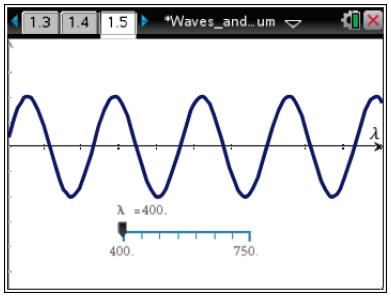


Move to page 1.2.

1. Read the description and instructions on pages 1.2 through 1.4 of the .tns document.

Move to page 1.5.

2. Adjust the slider to change the wavelength of the electromagnetic wave. Observe how this effects the shape and color of the waveform.



Tech Tip: Grab and drag the slider to adjust the wavelength. The slider may lag behind your finger as you drag it.

Move to pages 1.6-1.8. Answer questions 1-3 below and/or in your .tns file.

Q1. Which wavelength of light has the highest frequency?

A. red
B. orange
C. yellow
D. green
E. violet

Q2. Calculate the frequency of light with a wavelength of 400nm.

A. $7.49 \times 10^{5}\ s^{-1}$
B. $7.49\ s^{-1}$
C. $7.49 \times 10^{-4}\ s^{-1}$
D. $7.49 \times 10^{14}\ s^{-1}$

Q3. Calculate the wavelength of light in nm if the frequency is 1.5×10^{18} Hz.

A. 2.0×10^{-10} nm
B. 2.0×10^{-1} nm
C. 2.0 nm
D. 2.0×10^{10} nm

Move to pages 1.9-1.10. Read the information below and/or in your .tns file.

Light is released in small particles called photons. Photons have wavelengths that help determine their colors. Each color, or wavelength, of light also contains a certain amount of energy. The energy can be determined by calculating the frequency of the photon and multiplying that frequency by Planck's constant (h).

Move to pages 1.11-1.14. Answer the questions below and/or in your .tns file.

Q4. Which color of light has the highest energy?

A. red
B. orange
C. yellow
D. green
E. violet

Q5. Calculate the energy for red light with a frequency of 4.15×10^{14} Hz.

A. 1.60×10^{-48} J
B. 2.75×10^{-19} J
C. 4.78×10^{-40} J
D. 1.39×10^{6} J

Q6. How much energy is released from a photon with a wavelength of 555 nm?

A. 3.68×10^{-31} J
B. 3.68×10^{-40} J
C. 3.58×10^{-19} J
D. 3.58×10^{-28} J

Q7. What is the frequency of a photon that releases 4.00×10^{-21} J?

Waves and Spectrum

Student Activity

Name _____

Class _____

Move to page 2.1. Read the information below and/or in your .tns file.

The physicist Niels Bohr predicted that electrons could only exist at certain energy levels. He determined that the energy levels (n) are indicated by whole numbers (1, 2, 3, 4, ...). He also calculated that when electrons move from a higher energy level to a lower energy level, the energy is released in the form of **light**.

Move to pages 2.2-2.4.

3. Read the directions for the simulation on page 2.2. On page 2.3, **N Initial** is the initial energy level where the electron starts, and **N Final** is the energy level where the electron lands.
   - Change **N Initial** to 10 and select the Play button to start the animation.
   - Select the Reset button and repeat for all value of **N Initial** from 9 to 2.
   - Change **N Final** to 2, and run the simulation for all values of **N Initial**.
   - Continue to increase the value of **N Final** and run the simulation to see each of the electron drops. All wavelengths and transitions will appear in the spreadsheet on page 2.4.

Note: Only wavelengths within the range of 200 nm to 950 nm will appear. Visible light wavelengths range from about 400 nm to 700 nm.

Move to page 2.5. Answer question 8 below and/or in the .tns file.

Q8. What electron movements produce visible light?

Move to page 2.6. Read the information below and/or in the .tns file.

- **Lyman series** are the wavelengths of light that are produced when electrons drop to the first energy level.
- **Balmer series** are the wavelengths of light that are produced when electrons drop to the second energy level.
- **Paschen series** are the wavelengths of light are produced when electrons drop to the third energy level.

Move to pages 2.7-2.9. Answer questions 9 and 10 below and/or in the .tns file.

Q9. Calculate the energy for the 4 wavelengths of light generated in the Balmer series.

Q10. Calculate the ΔE for an electron moving from n = 4 to n = 3.

A. 1.06×10^{-19}J

B. -1.06×10^{-19}J

C. 2.42×10^{-19}J

D. 1.36×10^{-19}J

Waves and Spectrum

SCIENCE NSPIRED

Science Objectives

- Students will study the relationship between wavelength, frequency, and color.
- Students will calculate wavelengths and frequencies.
- Students will calculate the energy of electromagnetic radiation using Planck's constant.
- Students will study the energy changes as electrons change energy levels in an atom.
- Students will learn about the Balmer, Paschen, and Lyman series.
- Students will calculate the energy change that an electron undergoes when changing energy levels using the.

Vocabulary

- Balmer series
- electromagnetic radiation
- frequency
- Lyman series
- Paschen series
- photons
- Planck's constant
- Rydberg constant
- speed of light
- visible spectrum
- wavelength

About the Lesson

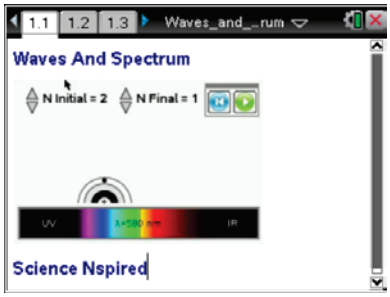
- This lesson involves the relationship between waves and electron energy jumps within the atom. As a result, students will:
  - Study the relationship between wavelength, frequency, and color.
  - Study the energy changes as electrons change energy levels in an atom.

TI-Nspire™ Navigator™

- Send out the *What_Makes_an_Animal.tns* file.
- Monitor student progress using Class Capture.
- Use Live Presenter to spotlight student answers.

Activity Materials

- Compatible TI Technologies: TI-Nspire™ CX Handhelds, TI-Nspire™ Apps for iPad®, TI-Nspire™ Software



Tech Tips:

- This activity includes class captures taken from the TI-Nspire CX handheld. It is also appropriate for use with the TI-Nspire family of products including TI-Nspire software and TI-Nspire App. Slight variations to these directions may be required if using other technologies besides the handheld.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials

Lesson Files:

Student Activity

- Waves_and_Spectrum_Student.doc
- Waves_and_Spectrum_Student.pdf

TI-Nspire document

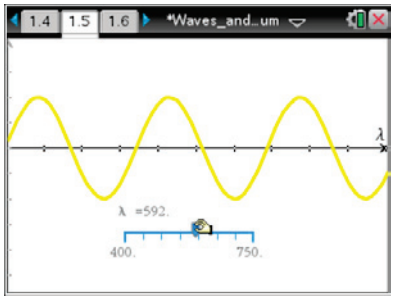
- Waves_and_Spectrum.tns

Discussion Points and Possible Answers

Have students read the background information on pages 1.2-1.4 of the .tns file.

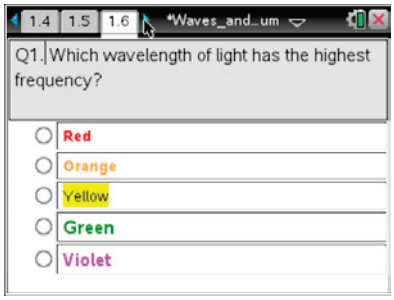
Move to page 1.5.

1. Have students grab and drag the slider to change the wavelength of the electromagnetic wave. As the wavelength changes, the waveform changes color to show the corresponding color of light.



Tech Tip: Students can grab and drag the slider to adjust the wavelength. The slider may lag behind their finger as they drag it.

Move to pages 1.6-1.14. Have students answer questions 1-7 on the .tns file and/or on their student activity sheets.



Q1. Which wavelength of light has the highest frequency?
Answer: violet

Q2. Calculate the frequency of light with a wavelength of 400nm.
Answer: 7.49×10^{14}/s

Q3. Calculate the wavelength of light in nm if the frequency is 1.5×10^{18} Hz.
Answer: 2.0×10^{-1} nm

Q4. Which color of light has the highest energy?
Answer: violet

Q5. Calculate the energy for red light with a frequency of 4.15 x1014 Hz.
Answer: 2.75 x 10-19 J

Q6. How much energy is released from a photon with a wavelength of 555 nm?
Answer: 3.58 x 10-19 J

Q7. What is the frequency of a photon that releases 4.00×10^{-21} J?
Answer: 6.04×10^{12} Hz

Move to pages 2.1-2.4.

2. Have students read the background information on pages 2.1-2.2. On page 2.3, **N Initial** is the initial energy level where the electron starts, and **N Final** is the energy level where the electron lands.
3. Have students set **N Initial** to 10 using the up/down arrows. They can select the Play button to start the animation.
4. Have students select the Reset button to reset the simulation and repeat step 2 for all values of **N Initial** from 9 to 2.
5. Change **N Final** to 2, and repeat steps 3 and 4 for all values of **N Initial**.
6. Continue to increase the value of **N Final** and repeat step 5,to see each of the electron drops. Note: wavelengths within the range of 200 nm to 950 nm will appear. Visible light wavelengths range from about 400 nm to 700 nm. All wavelengths and transitions will appear in the spreadsheet on page 2.4.

Move to pages 2.5-2.9. Answer questions 8-10 on the .tns file and/or below.

Q8. What electron movements produce visible light?

Sample Answers: Suggested responses: 3-2, 4-2, 5-2, 6-2

Q9. Calculate the energy for the 4 wavelengths of light generated in the graph which is known as the Balmer series.

Sample Answers: Suggested responses: 3.03×10^{-19} J, 4.09×10^{-19} J, 4.58×10^{-19} J, 4.84×10^{-19} J

Q10. Calculate the ΔE for an electron moving from the n=4 to n=3.

Answer: 1.06×10^{-19} J

TI-Nspire Navigator Opportunities

Make a student a Live Presenter to illustrate energy changes for the Balmer, Paschen, and Lyman series. Throughout the lab, discuss the activity with students using Slide Show. At the end of the lab, collect the .tns files and save to Portfolio.

Wrap Up

When students are finished with the activity, collect the .tns file using TI-Nspire Navigator. Save grades to Portfolio. Discuss activity questions by opening it in Review Workspace.

Assessment

- Formative assessment will consist of questions embedded in the .tns file. The questions will be graded when the .tns file is collected. The Review Workspace will be utilized to give students immediate feedback on their assessment.
- Summative assessment will consist of questions/problems on the chapter test.