Strengthening ICT in Schools and
SCHOOLNET PROJECT
in ASEAN Setting

Directory of ICT Resources for Teaching and Learning of Science, Mathematics and Language

United Nations Educational,
Scientific, and Cultural Organization
UNESCO Bangkok

JFIT
Japanese Funds-in-Trust

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This CD-ROM is a useful source for all science, mathematics and language teachers. It contains lesson plans and multimedia activities designed for students in secondary school.

If you want to see how computers can be used to improve teaching and learning, take a few minutes and try this CD-ROM.

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Introduction

This directory describes the content on the UNESCO SchoolNet CD, which is a set of ICT-based resources for teaching and learning of science, mathematics and language for secondary-level students. This CD was created as part of **the Strengthening ICT in Schools and SchoolNet Project in ASEAN Setting, UNESCO SchoolNet**. The project is supported by the **Japanese Funds-in Trust and the ASEAN Foundation**.

The UNESCO SchoolNet project aims to strengthen ICT integration in schools in a systematic way. One of the project objectives is to provide readily available and quality ICT-based resources (materials & lesson plans) for teaching and learning. The content of the CD is based on science, mathematics and language curricula of the participating countries: Cambodia, Indonesia, Laos PDR, Malaysia, Myanmar, Philippines, Thailand and Viet Nam.

These resources were complied by Buenafe Abdon, John Henly and Marilyn Jeffrey, and were put together in the CD by Dr. Philip Wong and his team. The CD was created under the guidance and coordination of Cedric Wachholz and Tinsiri Siribodhi from the UNESCO ICT in Education Unit.

Before you begin...set your computer to access the CD content

Before you begin using the CD, you need to install several plug-ins (available on the CD) in order to view the learning objects found on the CD. When you open the CD, click on the plug-in icons to install or go to:

Adobe Reader www.adobe.com/products/acrobat/readstep2.html

Macromedia Flash Player www.macromedia.com/downloads/

Macromedia Shockwave player www.macromedia.com/downloads/

Macromedia Authorware player www.macromedia.com/downloads/

Java plug-in technology http://java.sun.com/products/plugin/

Apple Quick-time www.apple.com/quicktime/download/win.html

ENGLISH						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
1.	Grammar	Recount Genre and Factual Recount	To understand the structure of the Recount Genre, identify elements in the genre and write a factual recount.	Yes	Yes	1
2.	Grammar	Applets for Creating Quizzes	Facility for teachers of EFL to give their students interactive language exercises on the Internet. Students can use the short demos there or the teacher can make their own very easily – these can then be used offline. It is very easy to make your own interactive web pages online.	Yes	Yes	1
3.	Grammar	Grammar Rock	A collection of songs about grammar. The full text of songs is given and also a recording.	Yes	Yes	1
4.	Grammar	Simple Past and Past Continuous	To choose between past continuous and simple past tense and to form past continuous tense correctly.	Yes	Yes	1
5.	Grammar	Tools For Cloze Passage	Tool for making cloze exercises. When making the exercise the teacher chooses which letters of the alphabet should be missing. Using the exercises gets students to focus on text, examining its structure and analysing its features. The tool is available for offline use.	Yes	Yes	1
6.	Grammar	Parts of Speech	Self paced lesson on parts of speech.	Yes	Yes	3
7.	Grammar	Grammar Practices and Quizzes	121 online quizzes on grammar and spelling.	Yes	Yes	2
8.	Grammar	Passive and Active	Word file where students sort sentences into active and passive tense. Further activities could be added e.g. students write their own examples.	Yes	Yes	2

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9.	Grammar	Parts of Speech	Self paced lesson on parts of speech.	Yes	Yes	3
10.	Grammar	Starpunc - Punctuation	Eight cloze exercises which focus on punctuation. The exercises are designed for primary school but for students whose first language is English, they may therefore be suitable for older EFL students. There are tools for teachers to make their own exercises. The tools can be used offline.	Yes	Yes	3
11.	Grammar	Present Continuous	A PowerPoint presentation to be used for whole-class teaching of the present continuous. Teacher's notes are provided in a Word file.	Yes	Yes	3
12.	Grammar	Prefixes	Resources include web pages, a lesson plan and a student worksheet. Students read and listen to two news stories on the Internet, the teacher explains prefixes used in the stories and students complete the worksheet which includes researching the meaning of some new prefixes.	Yes	Yes	3
13.	Grammar	Barrier Games	Two PowerPoint presentations used for whole-class teaching. The presentations include barrier game where one student has to describe an image on the screen while another (who cannot see it) draws it. One presentation includes descriptive writing as well as speaking and listening.	Yes	Yes	3
14.	Grammar	Active and Passive Tenses	Word file where students sort sentences into active and passive tense. Further activities could be added e.g. students write their own examples.	Yes	Yes	3
15.	Grammar	Interactive Quizzes	121 online quizzes on grammar and spelling.	Yes	Yes	3
16.	Reading	Welcome To London	Reading and listening exercises.	Yes	Yes	1

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17.	Reading	Language, Jobs, Culture	Students listen to a reading about call centres. This is followed by eight different exercises. The language is difficult and designed for adults.	Yes	Yes	2
18.	Reading	Listening Skills	Self paced lesson on listening comprehension.	Yes	Yes	2
19.	Reading	Pronunciation	Pronunciation and listening skills. As well as giving a phoneme chart for the 44 English sounds, there are recordings of pronunciation of different vowels.	Yes	Yes	2
20.	Reading	Reading Skills	Mini stories with cloze exercises.	Yes	Yes	2
21.	Reading	Sounds English	A series of activities focusing on correct pronunciation and listening skills. Shows students how to correctly form different sounds in English. Students can see the correct shape of the mouth and position of the tongue as well as hear the sound. Students can listen to words and identify them.	Yes	Yes	2
22.	Reading	Words in the News	Huge range of world news stories. Each story is given as text and sound file. Difficult words or phrases are explained.	Yes	Yes	1
24.	Spelling	Look, cover, write, check	Interactive Excel workbook. This is a tool used to help students practise spelling. The teacher enters a list of words for students to use and then saves the file as a template. It uses the 'look, cover, write, check' technique.	Yes	Yes	3

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25.	Tool	Quizmaker	Make your own quizzes. Missing words can be chosen from a drop-down menu or typed in. Quizzes must be created online but once made, they can be saved as html files and used offline.	Yes	Yes	1
26.	Tool	Hot Potatoes	Tool for making cloze exercises, matching exercises, multiple choice, short answer questions, jumbled sentences and crosswords.	Yes	Yes	3
27.	Vocabulary	Vocabulary Development	Students use higher order thinking skills to develop vocabulary. Although the lesson plan does not suggest it, this activity could be done using a word processor or using mind mapping software to produce work for display.	Yes	Yes	2
28.	Vocabulary	Clockwords	Interactive web pages (uses Flash). Clock Words is a word creation activity. Nine letters are added to the screen by clicking on the consonant or vowel buttons. The idea is to create the longest possible word in the time allowed.	Yes	Yes	3
29.	Writing	Creative Writing	To stimulate pupil's interest in reading for better writing. By the end of the lesson, pupils should be able to write up a creative ending base on the story they choose as a group with not less than 120 words.	No	No	1
30.	Writing	How Do I Get There	To write instructions to tell people what to do and use imperatives while writing instructions.	No	No	1
31.	Writing	Writing- Lion and Mouse	A lesson plan in which text from the Lion and the Mouse story needs to be re-ordered in a word processor. The activity could be extended by introducing spelling and punctuation mistakes for the students to correct.	Yes	Yes	1
32.	Writing	The Disaster Areas	To understand the effects of natural disasters on human and their environment. The lesson teaches about how to protect yourself against natural disasters and to be familiar with the various types of natural disasters.	No	Yes	1

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33.	Writing	Written Work on Shrek	A lesson plan in which students watch the movie 'Shrek' and complete activities on the worksheet provided.	Yes	Yes	1
34.	Writing	Communication and Culture-Flat Stanley	A lesson plan which has a series of activities using the 'Flat Stanley' web site. The Flat Stanley web site aims to develop children's research and communication skills by having them describe their daily lives.	Yes	Yes	2
35.	Writing	Sentence Generator	Interactive web pages where students choose the correct part of speech – noun, adverb, article, etc to make a sentence. There are several different sentences taken from well known children's books.	Yes	Yes	2
36.	Writing	Weekly News Online	The text and voice recording of three news items are given each week. The text is read slowly. A pre-listening vocabulary is provided.	Yes	Yes	2
37.	Writing	Word Spin-Sentence Construction	Interactive web pages (uses Flash). Wordspin helps students experiment with word relationships and sentence structure. It provides an exciting and dynamic way to explore language at work and discover grammatical rules. It's ideal to use with a whiteboard, as the students can immediately see the word classes in action and comment on the language produced.	Yes	Yes	2
38.	Writing	Writing a Newspaper Report	A lesson plan which takes a process approach to developing writing skills. Students are guided through the processes of collecting information and deciding how they will structure it within the text before they begin to write. They are then guided through the process of drafting, editing and redrafting the text to produce a final copy.	Yes	Yes	2
39.	Writing	One Day In The Life	Students can submit a description of one typical day in their life. Different countries are listed as topics. Teachers must first register with iEARN in order to view existing students' accounts and to submit their own students work.	Yes	Yes	3

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No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
40.	Writing	World of English Teachers' Applets	Facility for teachers of EFL to give their students interactive language exercises on the Internet. Students can use the short demos there or the teacher can make their own very easily – these can then be used offline. It is very easy to make your own interactive web pages online.	Yes	Yes	3
41.	Writing	Travel Brochure	Students make a travel brochure about a particular destination. To save time and to make it easier, students could use a template prepared by the teacher. Students could present the information using presentation software instead of making a leaflet.	Yes	Yes	3
42.	Writing	Lights, Camera, Action	Lights, Camera, Action.	Yes	Yes	3
43.	Writing	Exploring Biography	A WebQuest lesson serves as an introduction to the biography genre. Students look at examples of biography and they are then guided through the processes of planning, researching and writing a biography.	Yes	Yes	3
44.	Writing	Essay Helper	A series of interactive web pages designed to help students analyse a question and plan an essay.	Yes	Yes	3
45.	Writing	ePALS	This web site provides a safe way for teachers to find pen pal for their students in another country and writing for a real audience will motivate the students and improve their reading and writing skills.	Yes	Yes	3
46.	Writing	Create a Story	A lesson plan in which a chain of six students writes a story. Each student has a fixed time to write the beginning of a story which is continued by a the next student and so on. The sixth student completes the story and checks spelling and grammar before printing.	Yes	Yes	3
47.	Writing	Chain Stories	A lesson plan in which students work in groups of three to write a story. Each student writes the beginning of a story which is continued by a second student. A third student completes the story.	Yes	Yes	3

MATHEMATICS						
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1.	Algebra	Integral Machine	This file allows the student to change the width dx of rectangles under the curve. The student can see sums of rectangles under a curve, rectangles over a curve, rectangles reaching to f(xmidpoint), and to see rectangles of measurements dx*dy.	Yes	Yes	1
2.	Algebra	Derivative Machine	This machine allows the student to see how the secant line defined by (x, f(x)) and (x+h, f(x+h)) approaches the slope of the line tangent to a function at (x, f(x)). The user can switch between algebra (delta) notation and precalculus (f(x)) notation.	Yes	No	1
3.	Algebra	The Mean Value Theorem	Modeled on the derivative machine, this machine shows how, on the interval (a, b), there is a point c such that the slope of f(c) is equal to the slope of the secant line from (a, f(a)) and (b, f(b)).	No	No	1
4.	Algebra	Taylor Series Expansions	This machine shows how successive polynomial expansions approach the functions from which they are derived. The student can show up to ten expansions at the same time, either in a table or as a graph.	No	No	1
5.	Algebra	Slide Rule	This circular slide rule shows spiraling logarithms, and can be used to do multiplication and find roots.	No	No	1
6.	Algebra	Compound Interest Calculator	Calculation and graphic model of compound interest on a loan. Students can choose the amount of principal, the rate, the pay period, and the duration of a loan, and see how the structure of a loan changes with different parameters.	No	No	1
7.	Algebra	Linear Programming -- A 3D Model	A model of everyday linear programming problems, which explains why maxima and minima are at the corner points of the area satisfying the constraints. The constraints and z-function are manipulable, to fit many types of problems.	No	No	1

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8.	Algebra	First and Second Derivative of a Function	To understand the structure of the Recount Genre, identify elements in the genre and write a factual recount.	Yes	No	1
9.	Algebra	Binomial Coefficients and Pascal's Triangle	The program will identify the value of the binomial coefficient of a Pascal Triangle when you enter the values for the level (n) and the term (k).	No	No	2
10.	Algebra	Venn Diagrams	Help students learn about classifying numbers into various categories through answering questions about Venn Diagrams.	Yes	No	3
11.	Algebra	Pattern Generator	Determine and then continue the pattern generated.	Yes	No	3
12.	Algebra	Venn Diagram Shape Sorter	Sort coloured shapes into a Venn Diagram	Yes	No	3
13.	Algebra	Sequencer	Sort coloured shapes into a Venn Diagram.	Yes	No	3
14.	Algebra	Factorize 2	Learn about factoring numbers.	Yes	No	8
15.	Algebra	Factorize	Learn about factoring numbers.	Yes	No	8
16.	Algebra	Explore Quadratics	An interactive applet for exploring and learning the concept of quadratics.	No	No	9

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17.	Algebra	Slope as Rate of Change	This resource started with some background information about the topic then provided a program that will help you visualize how changing the values for the slope, m, and the y-intercept, b, will affect the graph of the equation y = mx + b.	Yes	Yes	10
18.	Algebra	Simultaneous Equations Using Elimination	With this lesson, the student will be able to solve a system of two equations when there are two unknowns. The Elimination method is an effective method for solving a system of two unknowns. This lesson provides students with immediate feedback using a computer program or online applet.	Yes	Yes	10
19.	Algebra	Function Machine	This animation helps students to understand the function concept through the "machine" metaphor. The domain elements (input) are dragged into the machine, which then goes through some (unseen) process and spits out the range element corresponding to the input. The results are then displayed in tabular form.	Yes	Yes	10
20.	Algebra	Quadratic Functions	This resource contains concise information about quadratic functions and its graph. An interactive program that students can manipulate to visualize the different shapes and size of the graph as it relates to its formula. At the end, an application is provided to apply the concept.	Yes	Yes	10
21.	Algebra	The Difference of 2 Squares	A visual representation of the equation A 2 – B 2 = (A+B)(A-B). And then the geometric simulation is presented to allow the student to manipulate the geometric variables to see this result examined through many situations.	Yes	Yes	10
22.	Algebra	Building Connections among Classes of Polynomial Functions	This lesson focuses on having students make connections among different classes of polynomial functions by exploring the graphs of the functions. The questions in the activity sheets allow students to make connections between the x-intercepts of the graph of a polynomial and the polynomial's factors.	Yes	Yes	11

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No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
23.	Algebra	Linear Function and Graph	To understand the structure of the Recount Genre, identify elements in the genre and write a factual recount.	Yes	Yes	11
24.	Algebra	Exploring Linear Data	In this grade 7 to 12 lesson, students model linear data in a variety of settings that range from car repair costs to sports to medicine. Students can work alone or in small groups to construct scatter plots, interpret data points and trends, and investigate the notion of line of best fit.	Yes	Yes	11
25.	Algebra	Virtual Manipulative: Scatterplot	Students will make conjectures about possible relationships between two characteristics of a sample on the basis of scatter plots of the data and approximate lines of fit. Also, Students will formulate questions, design studies, and collect data about two different characteristics within one population.	Yes	Yes	12
26.	Algebra	Virtual Manipulative: Stick or Switch	This probability game is played by selecting a door and clicking on it. You are then given the option to stick with your original selection or switch to the other door. This interactive game is a fun way to explain the probability of winning with each strategy.	Yes	Yes	12
27.	Algebra	The Factor Game	The Factor Game is a fun interactive game that exercises your factoring ability. You can test your skills against a human or the computer.	Yes	Yes	12
28.	Geometry	Simple Geometric Transformations	Simple Geometric Transformations: Line Reflection, Point Reflection, Translation and Rotation.	Yes	No	2
29.	Geometry	Sum of Angles in a Triangle	Get the sum of angles of a triangle by moving the vertices of the given triangle with pressed mouse button.	Yes	No	2

MATHEMATICS						
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30.	Geometry	Special Lines and Circles in a Triangle	To understand the structure of the Recount Genre, identify elements in the genre and write a factual recount.	Yes	No	2
31.	Geometry	Circumcircle of a Triangle	The three perpendicular bisectors of a triangle meet at one point. This point has equal distances to all three vertices of the triangle.	No	No	2
32.	Geometry	Incircle of a Triangle	The three angle bisectors of a triangle meet at one point. This point has equal distances to all three sides of the triangle.	No	No	2
33.	Geometry	Circumference and Area of the Circle	Explore the area and circumference of a circle by using multi-point polygons as an approximation.	No	No	2
34.	Geometry	Center of Mass in a Triangle	Vertices of the triangle can be moved and the corresponding centre of triangle will move along.	No	No	2
35.	Geometry	Cyclic Quadrilateral	A quadrilateral is cyclic if it can be inscribed in a circle. Opposite angles in a cyclic quadrilateral add up to 180°	No	No	2
36.	Geometry	Angles at the Circle	This lesson allows students to see the relationships between angle at the centre, angle at circumference and exterior angles	Yes	No	2
37.	Geometry	Pythagorean Theorem (1)	To prove the Pythagorean Theorem through the manipulation of squares	No	No	2
38.	Geometry	Pythagorean Theorem (2)	Another method of showing this theorem for a right angled triangle.	No	No	2

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No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
39.	Geometry	Area Explorer	Helps students learn to estimate and calculate the areas of computer generated shapes using a grid.	Yes	No	4
40.	Geometry	Perimeter Explorer	Helps students learn to estimate and calculate the perimeters of computer generated shapes using a grid.	Yes	No	4
41.	Geometry	Shape Explorer	Helps students learn to estimate and calculate both the perimeters and areas of computer generated shapes using a grid.	Yes	No	4
42.	Geometry	Angles	Gives students practice using and solidifying their understanding of angle terminology	Yes	No	4
43.	Geometry	Triangle Explorer	Helps students learn to use a grid to calculate the area of randomly computer generated triangles.	Yes	No	4
44.	Geometry	Area of Rectangle	Helps students learn to calculate the area of a rectangle.	Yes	No	4
45.	Geometry	Floor Tiles	Students learn about tessellation on quadrilateral figures by dynamically changing the shape of the quadrilateral through dragging corners.	No	No	4
46.	Geometry	Tessellate!	Students deform a triangle, rectangle or hexagon to form a polygon that tiles the plane. Corners of the polygons may be dragged, and corresponding edges of the polygons may be dragged. Parameters: Colors, starting polygon.	Yes	No	4

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47.	Geometry	Surface Area & Volume	Helps students calculate the volume of differently shaped three dimensional prisms using a grid.	Yes	No	4
48.	Geometry	Simple Plot	Introduces students to the Cartesian coordinate system by having them plot ordered pairs of numbers, either as a scatter plot or with the dots connected. This tool may also be used to allow students to correct multiplication drill work sheets.	No	No	5
49.	Geometry	Ordered Simple Plot	Another version of "Simple Plot" which allows the user to plot and connect ordered pairs in the order that they are entered. This enables pictures to be drawn by connecting the pairs rather than having the computer connect them from left to right.	No	No	5
50.	Geometry	Graphit	Introduces students to the Cartesian coordinate system by having them plot ordered pairs of numbers and/or functions similarly to a graphing calculator. This tool may also be used to allow students to correct multiplication drill work sheets.	No	No	5
51.	Geometry	Simple Coordinates Game	Introduces students to the Cartesian coordinate system by having them calculate and enter the coordinates of a randomly placed house. This particular applet only deals with the first quadrant.	Yes	No	5
52.	Geometry	General Coordinates Game	Introduces students to the Cartesian coordinate system by having them calculate and enter the coordinates of a randomly placed house. This applet is a more complicated version of the Simple Coordinates Game and uses all four quadrants	Yes	No	5
53.	Geometry	Simple Maze Game	Allows students to have fun while mastering their understanding of how the Cartesian coordinate system works by maneuvering a robot through a mine field. This applet only utilizes the first quadrant.	Yes	No	5
54.	Geometry	Maze Game	Allows students to have fun while mastering their understanding of how the Cartesian coordinate system works by maneuvering a robot through a mine field. This applet only utilizes all four quadrants.	Yes	No	5

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55.	Geometry	Slope Slider	Helps students manipulate the linear function F(x)=mx+b and explore the relationship between slope and intercept in the Cartesian coordinate system.	Yes	Yes	5
56.	Geometry	Function Flyer	This version of Slope Slider allows the student to enter in the function of his or her choice. This will encourage the user to explore the effects on the graph of manipulating the constants and coefficients. This applet can also be used as tool to correct graphing work sheets.	No	No	5
57.	Geometry	Graph Sketcher	This applet allows the student to enter in the function of his or her choice as well as modify the graph scale size. This will encourage the user to explore the effects on the graph of manipulating the constants and coefficients. This applet can also be used as tool to correct graphing work sheets.	No	No	5
58.	Geometry	Boxplot 1	Represents and organizes data students have collected using a box plot. This tool allows students to view their data in individual sets as well as compiling all their data into one large set.	No	No	6
59.	Geometry	Boxplot 2	Represents and organizes data students have collected using a box plot. This tool allows students to view their data in individual sets as well as compiling all their data into one large set.	No	No	6
60.	Geometry	Rectangle: Area, Perimeter, Length, and Width	This java applet examines the relation between length and width when the area, perimeter, or both are held constant. This can be used for problem solving activities or during instruction.	Yes	Yes	10
61.	Geometry	Perimeter and Area of Polygons	These lessons are in-depth learning modules that provide detailed examples, diagrams, summaries and exercises about topics such as perimeter, area, trapezoids, etc. Each volume consists of a related group of lessons, practice exercises, challenge exercises, and a solutions page.	Yes	Yes	10

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No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
62.	Geometry	Interactive Geometry Dictionary—Lines	Lines and points are the two most fundamental structures of geometry. This resource contains vision representation to explore the definitions of the lines and some of their properties.	Yes	Yes	10
63.	Geometry	A Geometric Investigation of (A + B) 2	This resource provides a visual representation and a way to explore a geometric explanation of why (A + B) 2 = A 2 + 2AB + B 2.	Yes	Yes	10
64.	Geometry	Exploring Angle Sums Using Half Turns	In this investigation, you can interactively construct a figure that illustrates the sum of the angles in a triangle, quadrilateral or a pentagon.	Yes	Yes	11
65.	Geometry	Exploring Parabolas (JavaSketchpad	The activity offers an opportunity to explore the properties of parabolas through a geometric perspective within your browser window.	Yes	Yes	11
66.	Geometry	Types of Angles	Presents visually the types of angles. An applet is provided to check understanding of the definition. Students will decide if it is an acute or obtuse angle and click on the corresponding button.	Yes	Yes	11
67.	Geometry	Transformations	This resource provides interactive representation of the following concepts: translations, reflections and rotations.	Yes	Yes	11
68.	Geometry	Dynamic Algebra Exploration - Shadows and Similar Triangles	This resource can be used in investigating similar triangles that are formed when objects block sunlight and shadows are formed. As an exercise, students will be required to do an investigation using the Java applet.	Yes	Yes	12
69.	Geometry	Three Types of Angles	This resource presents three types of angles—right, acute, and obtuse. This will help you write definitions and begin to visually recognize the three types of angles.	Yes	Yes	13

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70.	Geometry	Cob-Web Plot	This is one of several manipulatives that illustrate "sensitive dependence on initial conditions," one of the defining characteristics of chaos and fractals. What this manipulative shows is how small a change can make the sequence of functional-values behave completely differently, approaching 0 in one instance, approaching 1 in another, jumping almost back and forth among two or three values, or jumping chaotically all over the unit interval.	Yes	Yes	13
71.	Geometry	Cutting Corners Tool	Provides an excellent opportunity for students to talk about the names and attributes of shapes they do not regularly meet	Yes	Yes	13
72.	Geometry	"New" Ways of Working with Triangles	This resource allows an exploration into new ways of working with triangles that can be afforded through technology.	Yes	Yes	13
73.	Geometry	Proof Without Words - Pythagorean Theorem	This program shows a dynamic, geometric "proof without words" of the Pythagorean Theorem. The teacher can then ask the students to explain the proof after watching the visual representation.	Yes	Yes	13
74.	Geometry	Quadrilateral Activity	This activity is designed to develop group interaction and cooperation while working with constructing a large parallelogram, square, rectangle, rhombus and trapezoid using rope held by the participants.	Yes	Yes	13
75.	Geometry	Studying Polyhedra	This resource provides an interactive window that can be used to explore different shapes and dimensions of a polygon. Links to several resources are also available as well as instructions on how to use the program effectively in the explorations.	Yes	Yes	13

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76.	Numbers	Continued Fraction Machine	This tool shows rational numbers as areas made up of squares, and a corresponding continued fraction. Each step in the division is equivalent to an iteration of Euclid's algorithm.	No	No	1
77.	Numbers	Kids and Cookies	This game introduces concepts of rational number and division through the simulation of sharing cookies with friends. The online version has no sound; downloadable versions have additional (and optional) voiceover and music.	Yes	No	3
78.	Numbers	Eggs	This tool is a fun way to investigate the discrete model of rational numbers using eggs and egg cartons. The cartons can be partitioned in a variety of ways to represent fractions and their equivalents.	No	No	3
79.	Numbers	Fraction Rods	This tool was designed for students to learn fraction concepts.	No	No	3
76.	Numbers	Continued Fraction Machine	This tool shows rational numbers as areas made up of squares, and a corresponding continued fraction. Each step in the division is equivalent to an iteration of Euclid's algorithm.	No	No	1
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78.	Numbers	Eggs	This tool is a fun way to investigate the discrete model of rational numbers using eggs and egg cartons. The cartons can be partitioned in a variety of ways to represent fractions and their equivalents.	No	No	3
79.	Numbers	Fraction Rods	This tool was designed for students to learn fraction concepts.	No	No	3
80.	Numbers	Integer Cars	This tool was designed for school students to learn integer concepts.	Yes	No	3
81.	Numbers	Fraction Converter	Helps students to convert fractions to decimals and decimals to fractions.	Yes	No	3
82.	Numbers	Fraction Sorter	Students represent fractions by coloring in the appropriate portions of either a circle or a square, then order those fractions from least to greatest.	Yes	No	3
83.	Numbers	Fraction Four	Allows students to play a generalized version of connect four, in which each player is allowed to place a piece on the board after correctly solving a problem. Students must be able to multiply, divide, compare, and convert: fractions, decimals and percents.	Yes	No	3

MATHEMATICS						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
84.	Numbers	Number Cruncher	Similar to the original "Function Machine" but lists input and output in a table and will not let the user attempt to guess the rule without at least having two data points.	No	No	5
85.	Numbers	Whole Number Cruncher	Similar to "Number Cruncher" but only generates multiplication and addition functions to avoid outputting any negative numbers.	No	No	5
86.	Numbers	Coloring Multiples in Pascal's Triangle	Practices students' multiplication skills while working on their pattern recognition skills.	Yes	No	7
87.	Numbers	Clock Arithmetic	Allows students to work with modular arithmetic and work with their ability to express time on both a 12 and a 24 hour clock system.	Yes	No	7
88.	Numbers	Caesar Cipher II	Have students use their reasoning skills combined with their arithmetic skills to encode and decode messages.	Yes	No	7
89.	Numbers	Cantor's Comb	Work with student's prediction skills as well as work with the concept of infinity.	No	No	7
90.	Numbers	Comparison Estimator	Similar to Estimator but compares two sets of objects.	Yes	No	7
91.	Numbers	Estimator Four	A game like Fraction Four but asks the players to estimate the answer within a given time span. Parameters: time limit, error tolerance, difficulty level	Yes	No	7

MATHEMATICS						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
92.	Numbers	Unit of Conversion	Learn to convert between decimeters, millimeters and centimeters. For every correct answer, one person gets to ride on the ferris wheel.	No	NO	7
93.	Numbers	Coloring Remainders in Pascal's Triangle	Practices students' division skills while working with pattern recognition	Yes	NO	7
94.	Numbers	Caesar Cipher	Helps students develop their reasoning skills while using simple arithmetic skills to encode and decode messages.	Yes	NO	7
95.	Numbers	The Tortoise and Hare Race	Works with students' prediction skills as well as work with the concept of infinity.	No	NO	7
96.	Numbers	Estimator	Practices estimation skills by determining the number of objects, length, or area. Parameters: error tolerance.	Yes	NO	7
97.	Numbers	Bounded Fraction Pointer	Similar to "Fraction Pointer" but the user gives the values for the fractional points on the number line rather than having the computer randomly generate them.	No	NO	8
98.	Numbers	Fraction Finder	Similar to "Fraction Pointer" but there is no arrow to help the user determine the value of a fraction between the two endpoints.	Yes	NO	8
99.	Numbers	Equivalent Fractions Finder	Visually represents equivalent fractions by dividing squares or circles and shading portions equivalent to a given fraction. Also shows the fractional value on a number line after you check to see if your fraction is correct.	No	NO	8

MATHEMATICS						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
100.	Numbers	Table of Prime Numbers	Gives you a table of prime numbers from 1 to 1 000 000 000 000	No	No	8
101.	Numbers	Arithmetic Four	A game like Fraction Four but instead of fraction questions the player must answer arithmetic questions (addition, subtraction, multiplication, division) to earn a piece to place on the board. Parameters: time limit, difficulty level, types of questions	Yes	No	8
102.	Numbers	More or Less Estimator	Similar to Estimator activity but states a quantity and asks the user to estimate whether the set of objects is more or less than the number given.	Yes	No	8
103.	Numbers	Fraction Pointer	Graphically determine the value of two given fractions represented as points on a number line then graphically find a fraction whose value is in between the value of the two given fractions and determine its value.	No	No	8
104.	Numbers	Bounded Fraction Finder	The same as "Bounded Fraction Pointer" but there is no arrow to help the user determine the value of a fraction between the two endpoints.	Yes	No	8
105.	Numbers	Equivalent Fractions Pointer	Visually represents equivalent fractions by dividing squares or circles and shading portions equivalent to a given fraction. Also shows the fractional value on a number line as you color in the fraction.	No	No	8
106.	Numbers	Who Wants Pizza? A Fun Way to Learn About Fractions	This resource uses pizza as an example in teaching fractions. Several interactive activities are provided for students to check understanding of the concept	Yes	Yes	10
107.	Probability	Fire!!	Allow students to experiment with theoretical and experimental probability. Fire can also be used to develop students awareness of different possible outcomes for multiple step problems as students run a simulation of how a fire will spread through a stand of trees.	Yes	Yes	3

MATHEMATICS						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
108.	Probability	Racing Game with Two Dice	Strengthens students' concept of probability and the effects different variables have on the out come of race results. This applet allows the students to be challenged with more complex math concepts than the Racing Game with One Die applet because it adds another die into the game and allows the race to have multiple contestants.	Yes	No	6
109.	Probability	Monty Hall Game	Students choose one of three doors to experimentally determine the odds of winning the grand prize behind one of the doors, as in the TV program "Let's Make a Deal."	Yes	No	6
110.	Probability	Crazy Choices Game	Allows students to explore theoretical and experimental probability in groups of three playing games of chance using dice, cards, spinners or coin tosses.	No	No	6
111.	Probability	Spinner	Allows students to explore theoretical and experimental probability.	Yes	No	6
112.	Probability	Adjustable Spinner	Allows students to explore theoretical and experimental probability.	No	No	6
113.	Probability	Understanding Experimental Probability	Experiment with experimental probability using a fixed size section spinner, a variable section spinner, two regular 6-sided number cubes or design your own number cubes.	No	No	9
114.	Probability	Racing Game with One Dice	Introduces students to probability by having them work in pairs and experiment with the applets parameters allowing them to "see" the effects of each variable on race results.	Yes	No	9
115.	Probability	Directable Fire!!	Allows students to experiment with theoretical and experimental probability. Fire can also be used to develop students awareness of different possible outcomes for multiple step problems as students run a simulation of how a fire will spread through a stand of trees.	Yes	No	9

MATHEMATICS						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
116.	Probability	Explore Probability	An interactive applet using coins to allow students to explore and learn the concept of probability.	No	No	9
117.	Probability	Marbles	Allows students to explore theoretical, experimental, and learn about sampling with and without replacement by modeling drawing marbles from a bag.	No	No	9
118.	Probability	Dice Table	Allows students to practice their fraction to decimal and decimal to percent conversion skills while experimenting with the outcome distribution for a roll of two dice by playing a dice throwing game.	No	No	9
119.	Probability	Explorations with Chance	This lesson plan gives the student additional experience with the concept of probability. These activities explore the idea of fair and unfair games.	Yes	Yes	11
120.	Probability	Let's Make a Deal Math: The Study of Probability	The purpose of this activity is to introduce some interesting problems and learn about probable outcomes. At the conclusion of this activity, you will be able to explain why some choices are better than others.	Yes	Yes	12
121.	Statistics	Calculating Margin of Error for a Population Sample	This machine shows the margin of error for a population sample, given a certain level of confidence, sample size, and proportion of yes/no answers. The sample size can be set to values between 25 and 2000, the proportion value to values between .01 and .99, and the confidence level at 95 or 99 percent.	No	No	1
122.	Statistics	Sampling Distribution of the Mean	This machine shows the consistency of sampling means in variously shaped populations. A student can change sample sizes, view raw data, choose samples singly or by the thousands, and observe changes as the sample.	NO	No	1
123.	Statistics	Bar Graphs and Column Graphs	Enter the height of three people and generate bar or column graphs to represent the different heights.	No	No	4

MATHEMATICS						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
124.	Statistics	Histogram	Have students view their own data, ranging from shoe sizes to the cost of candy bars, using a histogram. A histogram is a bar graph that looks at frequency.	Yes	No	6
125.	Statistics	Pie Chart	Have students manipulate a pie chart to represent their data. Also can be used to familiarize students with percents and their relationship to a whole, while practicing their graph-reading ability.	Yes	No	6
126.	Statistics	Stem and Leaf Plotter	Helps students organize and graph data they have collected into Stem and Leaf-plots. This applet can also be used help students practice calculating mean median and mode.	No	No	6
127.	Statistics	Bar Graph	Enter data to create a bar graph, then manipulate the graph's maximum and minimum values.	Yes	No	6
128.	Statistics	Bar Graph Sorter	Sort coloured shapes into a bar graph.	Yes	No	6
129.	Statistics	Poisson and Normal Approximations to Binomial Distribution	Investigate the conditions under which Binomial Distribution can be approximated using Poisson or Normal Distribution and apply the appropriate approximation (Poisson or Normal Approximation) to Binomial Distribution for the given conditions.	No	No	8
130.	Statistics	Measures	Have students enter data and view the mean, median, variance and standard deviation of the data set. Parameters: number of observations, range for observations, which statistics to view, identifiers for the data.	No	No	9
131.	Statistics	Plop It!	Allows students to graph their information using a simple bar graph and investigate mean, median, and mode.	No	No	9

MATHEMATICS						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
132.	Statistics	Introduction to Statistics	The set of interactive lessons on measures of central tendency provide detailed examples, diagrams, summaries and exercises. Each lesson consists of a related group of lessons, practice exercises, challenge exercises, and a solutions page.	Yes	Yes	11
133.	Statistics	Rice Virtual Lab in Statistics	This resource contains an online statistics book with links to other statistics resources on the web plus java applets that demonstrate various statistical concepts. Also available are examples of real data with analyses and interpretation and some basic statistical tools.	Yes	Yes	11
134.	Statistics	Linear Regression (and Best Fit)	This is a lesson which will allow students to explore notions of relationships between two variables. There are many problems and activities included in this lesson to aid learning and classroom discussion.	Yes	Yes	11
135.	Statistics	Leonardo da Vinci Activity	This activity can be used for testing students' knowledge of algebra, measurement, problem solving, reasoning and proof. Students will be required to collect data; input data into spreadsheets and make conclusions.	Yes	Yes	11
136.	Statistics	Generating and Analyzing Data	This activity allows students to look for functions within a given set of data. After analyzing the data, the student should be able to determine a type of function that represents the data.	Yes	Yes	12
137.	Statistics	A Data Collection and Analysis Class Experiment	This activity requires student to collect data in the classroom and organize the collected information in a spreadsheet. With the inputted data, students analyze the information using a given set of questions then prepare a graph.	Yes	Yes	13
138.	Time	Clock Wise	Practice reading a clock.	Yes	No	4
139.	Time	Elapsed Time	Practice finding elapsed time given a starting time and an ending time.	Yes	No	4

MATHEMATICS						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
140.	Trigonometry	Circle Graph	Enter data categories and the value of each category to create a circle graph. Similar to "Pie Chart" but the user can define the data set.	No	No	9
141.	Trigonometry	Explore Transformation	An interactive applet for exploring and learning the concept of transformation, namely translation, rotation and enlargement.	Yes	No	9
142.	Trigonometry	Velocity	An interactive applet for exploring and learning the concept of velocity by controlling the speed of a car. Be careful not to crash the car!	Yes	NO	9
143.	Trigonometry	Explore Trigonometry	An interactive applet for exploring and learning the concept of trigonometry.	No	No	9
144.	Trigonometry	Equations of the Straight Line	In this applet, lines may be dragged as a whole or with one of the two defining points. When a line is dragged or clicked upon, one of its equations is displayed just beneath the graph.	Yes	Yes	10
145.	Trigonometry	Graph of y=a sin b(x-c)	This resource provides a visual representation of the graph and let students observe the changes to the graph when the values of a, b and c are changed.	Yes	Yes	12
146.	Trigonometry	Graph of y = sin x + cos x	This resource provides a visual representation of the graph y = sin x + cos x. The goal of the applet is to understand the following equation: sin x + cos x = 2 sin (x + 45 0).	Yes	Yes	12

MATHEMATICS						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
147.	Trigonometry	Signs of the Trigonometric Functions	This resource provides some information about how the trigonometric ratios are defined and uses a diagram to remember what ratios are positive in each quadrant. To illustrate this concept in an interactive way, a flash animation is provided to let students practice the concept repeatedly.	Yes	Yes	12
148.	Trigonometry	A Formula for Slope	This teaching unit can be used in exploring the concept of slope and develop a formula for the slope of the line passing through two points. Using the Java applet, the students are guided in their explorations using a set of questions.	Yes	Yes	12
149.	Trigonometry	Parabola by Definition	This activity explores the geometric definition of a parabola and sees how the focus and direction affect the parabola's shape. You'll also see how parabolas can model different real world situations, including water fountains and projectiles.	Yes	Yes	12
150.	Vector	Vector Equation	Allows students to plot two points in a line and to view it in a 3-D space.	No	No	1
151.	Vector	Components of a Vector	A 3-D representation of a vector. Allows students to change vector position by entering 3 values.	No	No	8
152.	Vector	Vector Investigation Tool - Dual Vector	Using one, two or three vectors, students can explore vectors in different contexts. This dual vector situation uses a plane.	Yes	Yes	10

EARTH SCIENCE						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
1.	Astronomy	Comets	Learn about comets.	Yes	Yes	1
2.	Astronomy	Exploring Circumpolar Stars Using Starry Night Pro	Students construct a meaningful and accurate understanding of the apparent movement of stars.	Yes	Yes	1
3.	Astronomy	Our Solar System	To learn about the solar system.	Yes	Yes	2
4.	Geomorphology	Earthquakes	Learn the characteristics of earthquakes and learn what a seismologist does.	Yes	Yes	1
5.	Geomorphology	Where in the World Are All the Earthquakes?	Students should have the understanding that earthquakes occur in particular areas around the globe and that scientists use earthquake data as one way to identify plate boundaries.	Yes	Yes	1
6.	Geomorphology	Types of Volcanoes	Learn how to identify the differences between three types of volcanoes.	Yes	Yes	2
7.	Geomorphology	Waterbasins and Watersheds	Learn about watersheds, their function, their importance and the consequences of human impact.	Yes	Yes	2
8.	Minerals	Mineral Identification Lab	Learning to identify minerals based on mineral characteristics.	Yes	Yes	2
9.	Weather	The Impact of El Nino, Pt. 1	This inquiry activity challenges students to use their analytical skills and creativity to make sense of the weather patterns they identify through the data.	Yes	Yes	1

EARTH SCIENCE						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
10.	Weather	The Impact of El Nino, Pt. 2	Students use their analytical skills and creativity to make sense of the weather.	Yes	Yes	1
11.	Weather	Global Warming	This lesson has student working in groups, however students could also work alone at computers. Teachers must supply students with data.	Yes	Yes	1
12.	Weather	Collecting Weather Data	Learn to collect weather data.	Yes	Yes	1
13.	Weather	Emergencies	Learn about a variety of emergencies that happen in different places in the world, learn about response, case studies and what one can do to help.	Yes	Yes	1
14.	Weather	Global Warming, an inquiry based WebQuest	Learn about global warming through exploring with internet resources.	Yes	Yes	2
15.	Weather	Smokestack Plumes (Pollution)	Participants will build a spreadsheet model of the dispersion of toxic pollutants emitted from a smokestack. The spreadsheet models the lateral and vertical dispersion of the emitted pollutants as a function of various parameters, including wind velocity, actual and effective stack height, and atmospheric stability.	Yes	Yes	2
16.	Weather	Exploring Weather Patterns Around the World	Students observe patterns in the world's climate and try to identify the primary factors involved in these patterns.	Yes	Yes	2
17.	Weather	Weather, Geography and the Internet	Learn about weather and geography and how they are related to each other.	Yes	Yes	2
18.	Weather	World Population	Learn about population statistics associated with twocountries.	Yes	Yes	2

BIOLOGY						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
1.	Anatomy	Circulatory System	Students will learn parts, function and importance of circulatory system.	Yes	Yes	1
2.	Anatomy	Human Nervous System	Students will gain an understanding of the human nervous system anatomy and function.	Yes	Yes	2
3.	Anatomy	Virtual Frog Dissection	This interactive exploration will increase the knowledge of the students on the internal structures of the frog.	Yes	Yes	2
4.	Biochemistry	BioTech, Inc	Students will produce a business plan, a presentation, a resume and a report while researching and examining genetic concepts.	Yes	Yes	1
5.	Biochemistry	Bioterrorism	Students will be able to learn about infectious agents.	Yes	Yes	1
6.	Biostatistics	Current Issues In Global Population	Students will learn about population, demographics and related global issues.	Yes	Yes	1
7.	Cell	Cell Division: Meiosis	Students will learn about the behaviour of chromosomes during meiosis and the associated behaviour of the nuclear envelope and centrioles.	Yes	No	1
8.	Cell	Haemoglobin	Students will be able to analyse and investigate how the pH, temperature, and partial pressures of oxygen and carbon dioxide affect the oxygen dissociation curves in llamas, as well as the adaptations in the haemoglobin of llamas to high altitude conditions.	Yes	No	2
9.	Cell	Acids and Bases In The Body	Students will learn the role of acids and bases in the body, especially the blood buffer system.	Yes	Yes	1

BIOLOGY						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
10.	Genetics	Genetics	Students will be able to predict the results of simple crosses with expected ratios of 3:1 and 1:1, using the terms homozygous, heterozygous, F1 generation, F2 generation, explain codominance by reference to the inheritance of the ABO blood group phenotypes (A, B, AB, O, gene alleles IA, IB and IO) and describe the determination of sex in Man (XX and XY chromosomes).	Yes	No	1
11.	Genetics	Genetics - Rabbit	Students will be able to explain the concept of monohybrid inheritance, predict the characteristics of offspring that result from simple monohybrid crosses of various dominant and recessive traits and compare the expression of incomplete dominance and co-dominance.	Yes	No	1
12.	Genetics	Fundamentals of Genetics	Students will learn to define, calculate and explain Mendalian genetics.	Yes	Yes	2
13.	Genetics	Genes At Work	Students will learn about dominant traits, genes, and DNA determine.	Yes	Yes	2
14.	Genetics	Genetic Engineering	Students will discover ethical issues surrounding the practice of genetic engineering in reproductive medicine; and understand key terms and concepts related to the science of genetic engineering.	Yes	Yes	2
15.	Genetics	Genetic Variation	Students will learn that genetic variation is the basis of evolution through natural selection.	Yes	Yes	2
16.	Genetics	Genetics	Students will write a paper on a genetics topic (Word), use an Excel spreadsheet to demonstrate genetic principles (Excel), and finally give a presentation using PowerPoint.	Yes	Yes	2
17.	Genetics	Mendel Seminar	Students will learn about evolution and Mendelian genetics.	Yes	Yes	2

CHEMISTRY						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
1.	Inorganic	Virtual Chemistry Lab	This is a highly interactive application of a Chemistry lab. To launch the virtual lab, click on the Activity link and double-click on the VirtualLab.exe file to launch the application.	No	No	1
2.	Inorganic	Shampoo	Students will learn to define acids (Shampoo) and alkalis (conditioner), explain the process of neutralisation between acids and alkali and calculate the amount of acid/base required for neutralisation.	Yes	No	1
3.	Inorganic	Acid Bases and Indicators	Students will be able to suggest a suitable method for the identification of pH on different substances.	Yes	No	1
4.	Inorganic	Cleaning of Chemical Spill	Students are placed in a scenario where they have to handle a chemical spill. They have to identify the types of chemicals present by using various types of identification analysis methods.	Yes	No	1
5.	Inorganic	Fuel Cell	Students will learn to desribe what is a Galvanic cell and a fuel cell and how they both work.	Yes	No	2
6.	Inorganic	Qualitative Analysis	Students will be able to develop analytical and logical thinking.	Yes	No	2
7.	Inorganic	Carbon - Structure Matters	Learn about the characteristics and structure of matter.	Yes	Yes	2
8.	Inorganic	It's ELEMENTary	This lesson has students create a periodic table of elements using Excel, then create graphs to see relationships among and between element classifications.	Yes	Yes	2

CHEMISTRY						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
9.	Inorganic	Teaching the Periodic Table with Database Software	To learn the Periodic Table.	Yes	Yes	2
10.	Inorganic	Videos	Watch how sodium, potassium and lithium react in contact with water.	Yes	No	2
11.	Organic	Teaching Science Using the Newspaper	20 ideas for teaching science using the newspaper.	Yes	Yes	2
12.	Physical	Electrolysis	Students will learn about the electrolysis of Molten ionic compounds and Aqueous ionic compounds.	Yes	No	1
13.	Physical	The Mole	Students will be able to identify the mole as the unit for counting atoms, molecules and ions. State that the molar mass of a substance is the mass of one mole of the substance, the relationship between the numerical values of molar mass and relative atomic/molecular/formula mass of elements / compounds.	Yes	No	1
14.	Physical	Size of Particles	At the end of the lesson, students will be able to describe the effects of size of particles on the rate of reaction and to give reasons why it is so.	Yes	NO	1
15.	Physical	Chromatography	Students will learn to apply chromatography to separate and identify mixtures and to interpret paper chromatograms by comparing with that of the known compound, and by comparing Rf values.	Yes	No	1
16.	Physical	Concept Mapping and the Classification of Matter	Students explore their understandings of particular concepts which provides them with a roadmap for the construction of new knowledge.	Yes	Yes	1

CHEMISTRY						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
17.	Physical	Periodic Table Trends: Melting Point and Boiling Point	Learn the relationship between an element's position in the periodic table, and its respective melting and boiling points.	Yes	Yes	1
18.	Physical	Covalent Bond	To introduce students to the concept of covalent bonding through the use of an interesting and engaging analogy.	Yes	No	1
19.	Physical	Discovery Of Electrons	An introduction to electrons, what makes an atom, and an experiment on cathode ray tubes.	Yes	No	2
20.	Physical	Equilibrium	Students should be able to qualitatively deduce the effects of changes in temperature on a given system.	Yes	No	2
21.	Physical	Particle Size	Students will be able to describe the effect of particle size on the speed of reaction and explain this effect in terms of collisions between reacting particles.	Yes	No	2
22.	Physical	Speed Of Reaction	Students will learn to identify the factors affecting rate of reaction and explain how the factors affect rate of reaction.	Yes	No	2
23.	Physical	Evidence for Atoms	Learn the basic principals of atom theory.	Yes	Yes	2

PHYSICS						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
1.	Electricity	Explore Current Flow	This interactive applet shows the flow of current based on the amount of voltage and resistance set by the student.	Yes	No	2
2.	Electricity	Fluid Analogy of Current, Voltage and Resistance	Using a tap controllable by the student, this applet shows the varying flow based on the power of the pump.	No	No	3
3.	Electricity	Direct Current Electrical Motor	This Java applet shows a direct current electrical motor which is reduced to the most important parts for clarity. Instead of an armature with many windings and iron nucleus there is only a single rectangular conductor loop; the axis the loop rotates on is omitted.	Yes	No	3
4.	Electricity	Generator	This Java applet simulates a generator which is reduced to the most important parts for clarity. Instead of an armature with many windings and iron nucleus, there is only a single rectangular conductor loop; the axis the loop rotates on is omitted.	No	No	3
5.	Electricity	Ohm's Law	This applet shows a simple circuit containing one resistor. In addition, there is a voltmeter (parallel to the resistor) and an ammeter (in series with the resistor).	Yes	No	3
6.	Electricity	Combinations of Resistors	A simulation that allows students to change voltage and resistance. Students can also charge the arrangements into a parallel or a serial format. Values will be calculated.	Yes	No	3
7.	Electricity	Simple AC Circuits	This simulation deals with an electromagnetic oscillating circuit, consisting of a capacitor (center) and an inductor.	Yes	No	3
8.	Electricity	Electromagnetic Oscillating Circuit	This animation shows an electromagnetic wave, namely a plane polarized wave, which propagates in positive x direction. The vectors of the electric field (red) are parallel to the y axis.	No	No	3

PHYSICS						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
9.	Electricity	Electromagnetic Wave	This animation shows an electromagnetic wave, namely a plane polarized wave, which propagates in positive x direction. The vectors of the electric field (red) are parallel to the y axis, the vectors of the magnetic field (blue) are parallel to the z axis.	Yes	No	3
10.	Electricity	Digital Multimeter	An interactive applet that teaches how to use a multimeter and the properties of a digital multimeter.	No	No	3
11.	Electricity	Resistor Colour Code Calculator	A calculator that allows students to select the colour of the bands of a resistor which will in turn compute the resistance value.	No	No	5
12.	Electricity	Comparing a DC Circuit to the Flow of Water	A simple DC circuit has a DC voltage source lighting a light bulb. Also shown is a hydraulic system in which water drives a turbine. The two systems are shown to be similar.	Yes	No	6
13.	Electricity	Electric Field of an Oscillating Charge	An electric charge is executing simple harmonic motion, and the animation shows the electric field lines around it.	No	No	6
14.	Electricity	The Time Base Control 1	Shows the effect of changing the time base control on the display of an oscilloscope. There is no input voltage.	No	No	7
15.	Electricity	The Time Base Control 2	Shows the effect of changing the time base control on the display when there is an input voltage varying in time.	No	No	7
16.	Electricity	The Time Base Control 3	Shows the effect of changing the time base control on the display when there is an input voltage varying in time when the frequency of the voltage is high.	No	No	7

PHYSICS						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
17.	Electricity	The Voltage Control	Shows the effect of changing the voltage control on the display.	No	No	7
18.	Electricity	The Trigger	Shows the effect of changing the trigger level on the display.	No	No	7
19.	Electricity	Current Electricity - AC/DC	Learn about energy and transfer.	Yes	Yes	9
20.	Heat	Evaporation	Students will investigate how temperature, surface area and wind affect the rate of evaporation.	Yes	No	2
21.	Light	How Light Travels	This applet illustrates how light would travel from a torchlight through a paper hole (adjustable size) and the shadow of a ball on a wall.	Yes	No	3
22.	Light	Refraction of Light	The applet will show the reflected and the refracted ray and calculate the corresponding angles	Yes	No	4
23.	Light	Reflection and Refraction of Light Waves	This applet is a sort of tutorial which explains the reflection and the refraction of waves by the principle of Huygens.	No	No	4
24.	Light	Refracting Astronomical Telescope	This Java applet simulates a simple refracting astronomical (inverting) telescope, consisting of two lenses which are called the objective and the eyepiece (ocular).	No	No	4

PHYSICS						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
25.	Light	Interference of Light at a Double Slit	A simulation which allows students to change the wavelength, the space between two slits, and the angle. Values will be calculated and visually represented.	Yes	No	4
26.	Light	Diffraction of Light by a Single Slit	Same as the above simulation but this time, there is only one slit. Wave patterns will he shown.	Yes	No	4
27.	Light	Photoelectric Effect	This Java applet simulates an experiment for the determination of the Planck constant and the work function.	No	No	4
28.	Light	Exploring the Length of a Shadow	This applet calculates the length of a shadow after the student sets the height of a stick and the time of day.	No	No	5
29.	Light	Rotating a Mirror and the Reflected Ray	Illustrating that when a mirror is rotated by an angle, the reflected ray is rotated by twice that angle.	No	No	7
30.	Light	Object-Image Relationships	Ray tracing for a thin lens showing the formation of a real image of an object.	No	No	7
31.	Light	Using an Optical Bench	A simulation of an optical bench with a light source, object, thin lens and an image. The screen that displays the image is moved.	No	No	7
32.	Magnetism	Magnetic Field of a Bar Magnet	The magnetic field of a bar magnet can be investigated with a compass needle.	Yes	No	3

PHYSICS						
No.	**Topic**	**Title**	**Abstract**	**Lesson Plan**	**Internet Required?**	**CD Page**
33.	Magnetism	Magnetic Field of a Straight Current-Carrying Wire	An electric current produces a magnetic field. This applet simulates an experiment concerning the magnetic field of a straight current-carrying wire.	Yes	No	3
34.	Magnetism	Lorentz Force	This Java applet demonstrates the Lorentz force, exerted on a current-carrying conductor swing in the magnetic field of a horseshoe magnet.	Yes	No	3
35.	Matter	Special Processes of an Ideal Gas	A simulation which allows students to investigate the ideal law processes by keeping one of the variables, pressure, volume, or temperature constant.	No	No	4
36.	Matter	Lorenz Attractor	Looking at the Lorenz Attractor in a chaotic regime, allowing the attractor to be rotated.	No	No	5
37.	Mechanics	Motion with Constant Acceleration	This Java applet shows a car moving with constant acceleration. The green control panel contains text fields where you can vary the values of initial position, initial velocity and acceleration.	Yes	No	1
38.	Mechanics	Equilibrium of Three Forces	A simple experiment concerning the equilibrium of three forces is simulated here: Weights are suspended from three tied cords. Two of the cords run over frictionless pulleys. The three forces acting on the knot (coloured arrows) are in equilibrium.	Yes	No	1
39.	Mechanics	Resultant of Forces	This applet deals with forces exerted on a body (assumed as point-sized). You can vary the number of single forces by using the choice box at the ride side. It is possible to change the sizes and directions of these forces (blue arrows) by dragging the arrowheads to the intended positions with pressed mouse button.	Yes	No	1
40.	Mechanics	Resolution of a Force into Components	Allows a force to be split into components and values, and angles of these forces are provided.	No	No	1

PHYSICS						
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41.	Mechanics	Pulley System	You can raise or lower the load with the mouse. If you click on the mouse button, a spring balance will appear showing the tension in the string. You can change the weight of the load and the hanging pulley(s) by using the appropriate boxes. Inputs higher than the spring scale limit (10 N) are automatically changed.	Yes	No	1
42.	Mechanics	Lever Principle	This applet shows a symmetrical lever with some mass pieces each of which has a weight of 1.0 N. The lever arms can be read from the coloured rectangles; one rectangle corresponds to 0.10 m. The lever is in balance when the applet is started.	Yes	No	1
43.	Mechanics	Hydrostatic Pressure in Liquids	In this Java simulation, the hydrostatic pressure of a liquid is measured with an U-tube manometer. On the upper side of the red coloured chamber there is a membrane which is deformed more or less, depending on the pressure.	Yes	No	1
44.	Mechanics	Inclined Plane	This Java applet demonstrates a motion on an inclined plane with constant velocity and the corresponding forces.	No	No	1
45.	Mechanics	Newton's Second Law Experiment	This Java applet simulates an air track glider setup, as it is used for experiments on constant acceleration motion. A gravitational acceleration of 9.81 m/s2 was presupposed. The mass of the wagon, the value of the hanging mass and the coefficient of friction (within certain limits) can be changed.	Yes	No	1
46.	Mechanics	Projectile Motion	This Java applet shows the motion of a projectile.	Yes	No	1
47.	Mechanics	Elastic and Inelastic Collision	This Java applet deals with the extreme cases of a collision process illustrated by two wagons.	Yes	No	1
48.	Mechanics	Newton's Cradle	This applet simulates a well known experiment which demonstrates the conservation of momentum and energy.	No	No	1

PHYSICS						
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49.	Mechanics	Simple Pendulum	This Java applet demonstrates the variation of elongation, velocity, tangential acceleration, force and energy during the oscillation of a pendulum (assumed with no friction).	Yes	No	2
50.	Mechanics	Levers	Students will apply their process skills to investigate how the distance between the effort and the fulcrum affects the amount of effort needed to balance a load in a lever.	Yes	No	2
51.	Mechanics	Exploring a Pendulum	A pendulum simulation where students can select it's diameter and material weight to see the difference in swing speeds.	No	No	4
52.	Mechanics	Three-body Gravitational Interaction	Two fixed suns and one planet. Initial conditions are controllable, and up to 4 different independent planets may be displayed.	No	No	5
53.	Mechanics	Constant Acceleration	One dimensional kinematics of a body undergoing constant acceleration. Includes visually integrating the acceleration and velocity graphs, and visually differentiating the position and velocity graphs.	Yes	No	5
54.	Mechanics	Motion Animation	A car with a non-zero initial speed has a constant acceleration whose value can be controlled by the user.	No	No	5
55.	Mechanics	Dropping Two Balls Near the Earth's Surface	Two balls falling near the Earth's surface under the influence of gravity. The initial horizontal speed of one of the balls may be varied.	No	No	5
56.	Mechanics	Galilean Relativity	Illustrating Galilean relativity using his example of dropping a ball from the top of the mast of a sailboat.	No	No	5

PHYSICS						
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57.	Mechanics	Projectile Motion	Firing a projectile when air resistance is negligible. The initial height and angle may be adjusted.	Yes	No	5
58.	Mechanics	Racing Balls	Two balls roll down two different low-friction tracks near the Earth's surface. The user is invited to predict which ball will reach the end of the track first. This problem is difficult for many beginning Physics students.	No	No	5
59.	Mechanics	Racing Skiers	The "Racing Balls" animation which is accessed via the above line sometimes triggers cognitive dissonance and rejection in beginning students. For some of these, changing the balls to skiers helps to clarify the situation, and that is what this animation does. The "Racing Balls" lesson should be used with students first.	No	No	5
60.	Mechanics	Air Track Collision	Elastic and inelastic collisions on an air track, with different masses for the target cart.	Yes	No	6
61.	Mechanics	Rolling Disc	A simple animation that traces the motion of a point on a rolling disc.	No	No	6
62.	Mechanics	Simple Harmonic Motion I	Demonstrating that one component of uniform circular motion is simple harmonic motion.	Yes	No	6
63.	Mechanics	Simple Harmonic Motion II	Illustrating and comparing Simple Harmonic Motion for a spring-mass system and for a oscillating hollow cylinder.	Yes	No	6
64.	Mechanics	Damped Simple Harmonic Motion	The damping factor may be controlled with a slider. The maximum available damping factor of 100 corresponds to critical damping.	No	No	6

PHYSICS						
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65.	Mechanics	Coupled Harmonic Oscillators	Two simple pendulums connected by a spring. The mass of one of the pendulums may be varied. Within mathematical rounding errors, the resolution on the screen of one pixel, and a frame rate of 12 frames per second the animation is correct, not an approximation.	No	No	6
66.	Mechanics	Measuring with a Micrometer	A simple animation of using a micrometer to measure the width of a pencil.	Yes	No	6
67.	Mechanics	An Exercise in Reading a Micrometer	Provides controls to position the micrometer, and when a button is clicked displays the reading.	Yes	No	6
68.	Mechanics	A Simple Piston and Boyle's Law	A small animation showing a piston compressing a sample of gas. As the volume of the gas goes down, the density and therefore the pressure goes up.	No	No	6
69.	Mechanics	Derivative of the Sine Function	An animation illustrating that the derivative of a sine function is a cosine.	No	No	6
70.	Mechanics	Adding 2 Vectors	A simple demonstration of adding two vectors graphically. Also demonstrates that vector addition is commutative.	Yes	No	9
71.	Mechanics	Adding 3 Vectors	A simple demonstration of adding three vectors graphically. Also demonstrates that vector addition is associative.	Yes	No	9
72.	Mechanics	Subtracting 2 Vectors	A simple demonstration that subtracting two vectors graphically is the same as adding the first one to the negative of the second one.	Yes	No	9

PHYSICS						
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73.	Mechanics	Component Addition	A simple demonstration that to add two vectors numerically, just add the cartesian components.	Yes	No	9
74.	Mechanics	Unit Vectors	A simple animation of unit vectors and vector addition.	Yes	No	9
75.	Mechanics	Dot Product	A simple demonstration of the relation between the dot product of two vectors and the angle between them.	NO	No	9
76.	Mechanics	Cross Product	Illustrating the direction of the cross product of two vectors with a right-hand "screw" rule.	No	No	9
77.	Mechanics	Exploring Buoyancy and Density with an Online Simulation	Students use virtual tools to determine the mass and volume of different objects.	Yes	Yes	9
78.	Nuclear	Bohr's Theory of the Hydrogen Atom	This applet illustrates a hydrogen atom according to particle or wave model.	No	No	4
79.	Nuclear	Radioactive Decay Series	A chance for students to explore the radioactive decay of various elements	No	No	4
80.	Nuclear	Law of Radioactive Decay	The law of radioactive decay predicts how the number of the not decayed nuclei of a given radioactive substance decreases in the course of time.	No	No	4

PHYSICS						
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81.	Nuclear	Photo Electric Effect	This activity enables students to investigate and discover the relationship between the frequency of light from the light source and the kinetic energy of electrons emitted from the cathode.	No	No	4
82.	Nuclear	Logistic Map	The logistic map, which demonstrates the bifurcations of the population levels preceding the transition to chaos.	No	No	5
83.	Nuclear	Scattering	Simulating nuclear scattering experiments by scattering ball bearings off targets. This is based on an experiment in the First Year Physics Laboratory at the University of Toronto.	No	No	7
84.	Nuclear	Nuclear Decays	The decay of 500 atoms of the fictional element Balonium. Uses a proper Monte Carlo engine to simulate real decays.	No	No	7
85.	Nuclear	Pair Production	A simple illustration of electron-positron production and annihilation.	No	No	7
86.	Nuclear	The Interaction of X-rays With Matter	Illustrating the three principal modes by which X-rays interact with matter.	No	No	7
87.	Nuclear	The Bohr Model	The photon excitation and photon emission of the electron in a hydrogen atom as described by the Bohr model.	No	No	8
88.	Nuclear	Complementarity	Here we visualise a hydrogen atom, which consists of an electron in orbit around a proton. In one view the electron is a particle and in the other view it is a probability distribution. The reality is neither view by itself, but a composite of the two.	No	No	8

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89.	Nuclear	The Double Slit Experiment 1	The famous "Feynman Double Slit Experiment" for electrons. Here we fire one electron at a time from the electron gun, and observe the build-up of electron positions on the screen.	No	No	8
90.	Nuclear	The Double Slit Experiment 2	Here we illustrate Complementarity using the double slit experiment. We view the path of the electron from the gun to the observing screen as a particle and as a wave.	No	No	8
91.	Nuclear	Time Dilation	A demonstration that the phenomenon of time dilation from the special theory of relativity necessarily follows from the idea that the speed of light is the same value for all observers.	No	No	8
92.	Nuclear	Deriving Length Contraction	A tutorial that shows how relativistic length contraction must follow from the existence of time dilation.	No	No	8
93.	Nuclear	Length Contraction is Invisible	This series of animations demonstrates that the relativistic length contraction is invisible.	No	No	8
94.	Nuclear	Deriving the Relativity of Simultaneity	A tutorial that shows how the relative nature of the simultaneity of two events must follow from the existence of length contraction.	No	No	8
95.	Sound	Forced Oscillations (Resonance)	The top of a spring pendulum (red circle) is moved to and fro - for example by hand; this motion is assumed as harmonic, which means that it is possible to describe the motion by a cosine function. The oscillations of the spring pendulum caused in this way are called forced oscillations.	Yes	No	2
96.	Sound	Beats	Allows students to change the frequencies of two waves and gives the resultant wave pattern and plots the graph.	Yes	No	2

PHYSICS						
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97.	Sound	Doppler Effect	A demonstration of Doppler effect – the varying level of the sound of a siren of an ambulance as it reaches an observer.	No	No	2
98.	Sound	Standing Wave	Explanation by Superposition with the Reflected Wave.	No	No	2
99.	Sound	Standing Longitudinal Waves	This Java applet demonstrates the harmonics of the air in a tube as an example of standing longitudinal waves. It illustrates the movement of the molecules in the air during such an oscillation.	No	No	2
100.	Sound	Interference of Two Circular or Spherical Waves	This Java applet shows the interference of two circular spherical waves (e.g. of water or sound waves). The waves spread out from two sources oscillating with the same phase. For the interference of the waves the principle is valid that the elongations are added, considering their signs.	No	No	2
101.	Sound	Twin Paradox	There are many ways of approaching this classic "paradox". Here we discuss it as an example of the relativistic Doppler effect.	No	No	8
102.	Sound	Doppler Effect	Illustrating the classical Doppler effect for sound waves.	No	No	8
103.	Sound	Tuning Fork	A small animation of a vibrating tuning fork producing a sound wave.	No	No	8
104.	Sound	Pressure and Displacement Waves	This animation shows air molecules vibrating, with each molecule "driving" its neighbour to the right. It is used to illustrate that when the displacement wave is at a maximum then the density of the molecules, and thus the pressure wave, is at a minimum and vice versa.	No	No	8

PHYSICS						
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105.	Sound	Temperament	A very brief introduction to the physics and psychophysics of music, with an emphasis on temperament, the relationship between notes.	No	No	9
106.	Sound	Traveling Waves	Illustrating the sign of the time term for traveling waves moving from left to right or right to left.	No	No	9
107.	Sound	Reflections From A Barrier	A wave is reflected from a barrier with a phase reversal. This is the behaviour for transverse waves and the displacement aspect of a longitudinal wave.	No	No	9
108.	Sound	Reflections From Two Barriers	A wave is reflected back and forth between two barriers, setting up a standing wave.	No	No	9
109.	Sound	Standing Waves With A Node On Both Ends	The first three standing waves for nodes at both ends. The frequencies of the waves are proportional to one over the wavelength.	No	No	9
110.	Sound	Standing Waves With A Node On One End	The first three standing waves for a node at one end and an antinode at the other. The frequencies are proportional to one over the wavelength.	No	No	9
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