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**Background** SPREADSHEETS TUTORIAL

#### COMMON APPLICATIONS

EXAMPLE: AN INTERACTIVE BASE CONVERTER

Presentation Software Tutorial Introduction Background Text

#### Rationale

It is often useful to be able to demonstrate the mechanisms employed in performing number base conversions. In particular, it is useful to demonstrate base conversion where complex bases are involved. With bases higher than 10, the letters A, B, C, D, E, and F are used to represent digits from 10 to 15.

## Slides Graphics Animations &

#### Tools

The demonstration employs the Microsoft EXCEL application package. EXCEL has features that can be exploited to execute this

25/10/2011 Timings

#### Examples

<u>Mitosis</u> <u>Digestive</u> <u>System</u> <u>Matrices</u> <u>Simple Cell</u> <u>Lightening</u> <u>Conductor</u> <u>Discharging</u> <u>Tube</u> <u>Human Eye</u> <u>Telecollaboration</u>

## <u>Links</u>

# Spreadsheets Tutorial Introduction

Worksheets | D:/cd3wddvd/NoExe/.../meister10.htm Creating Learning Networks for African...

activity. The features employed include using the VLOOKUP feature to pick the values associated with input digits. The function POWER(base, positional exponent) is used to consolidate the position values using the algorithm:

Number = ådigit<sub>j</sub> \* base positional value of digit

#### Methodology

The user is prompted to supply a number to be converted from a given base into base ten. The base of the source number is therefore also input interactively by the user.

The user should enter the number composed of a maximum of four digits one digit per cell in the set of cells in columns EFGH. For each of the digits entered, the application looks up the associated decimal equivalents taking into account that the base could go up

to hexadecimal or base sixteen. Accordingly, the lookup table has a mapping for each of the sixteen possible digits 0, 1, ,9, A, ,F. Table-array

25/10/2011	Creating Learning Networks for African						
Columns & Rows		equivalent					
<u>Charts</u>	0	0					
	1	1					
Examples	2	2					
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Base Converter							
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	В	11					
<u>Links</u>	C	12					
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	E	14					
iutorial	F	15					
Introduction							

The VLOOKUP function accordingly takes the following shape

# 25/10/2011 Periodic Table

# <u>Links</u>

# Word Processing Tutorial

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Examples Address list Time table Newsletter Repeat Patterns Logos Creating Learning Networks for African...

VLOOKUP(value-to-be-matched, table-array-range, column-oftarget-value, k) Where: value-to-be-matches the digit entered by the user and in the formula is represented by the cell address. Table-array-range is the range reference to the lookup table that indicates the decimal equivalent of each digit. Column-of-targetvalue indicates the column within the table-array where the actual values are stored.

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5													-		DIGIT	VALUE	1		4	ME	5	
6	ENTER	A NUMB	ER (	Colu	mns E	FGH)	<b>—</b>	•	в	С	E	3	8		0	0	)		1	Cole	1	
7	ENTE	R THE	BA	SEI	n D7		16	6				T			1	1						
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11	-				- 11	1	10 10								5	5	5					
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15	-							1							9	9	9					
16															A	10						

25/10/2011 Practical Questions

#### HTML Editors Tutorial Basic html

Creating Learning Networks for African... 17 B 11 18 12 19 D 20 21 Ē 14 15 F 22 I + + H Sheet1 / Sheet2 / Sheet3 11 1 👌 🕝 AutoShapes • 🔪 🔪 🖸 🖓 🔛 🕂 🚺 🖉 🔕 • 🏒 • 🗛 • 🧮 ₩ 8 0 0. Draw + Ready NUM BASE CONVERTER -... Reating Learning Net... 1841 A 200 94 80 00 1841 1 Start Microsoft Excel - ...

<u>Netscape</u> Composer

**<u>Click here</u>** to experiment with the application interactively.

# Examples

<u>Teaching</u> <u>Syllabus</u> <u>Teachers' Notes</u> <u>Subject Website</u> <u>Lists</u> <u>Students</u> Website

Art <u>Principles of Art</u> D:/cd3wddvd/NoExe/.../meister10.htm 25/10/2011 Elements of Art **Coloured Pencil** Paintings Pastel Paintings

Book cover Posters

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Home Computer Literacy Common Applications Pedagogy & Internet | Infrastructure Guide Background SPREADSHEETS TUTORIAL COMMON EXERCISES APPLICATIONS Exercise 1: Presentation The table below shows the activity of a certain radioactive Software isotope. Tutorial Introduction Time (hrs) 0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 Background Activity A Text 409 358 316 274 250 226 206 180 163 149 129 counts/min Slides Graphics Animations &

Timings

(a) Plot a graph of Activity against time.

(b) Plot a graph of InA against time (where InA is natural logarithms of A).

## Examples

#### Mitosis

Digostivo

Son Solution Enroadchoot

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## <u>Links</u>

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## Examples

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Exercise 2

Exercise 3

25/10/2011 <u>Retraction of</u> <u>Light</u> <u>Solving</u> <u>Polynomial</u> <u>Equations</u> <u>Workers'</u> <u>Database</u> <u>Base Converter</u>

**Activities** 

<u>Links</u>

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**Tutorial** Introduction

*Example* Periodic Table

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## Examples

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#### Examples

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**Teaching** 

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## SPREADSHEETS TUTORIAL

# **COMMON** EXAMPLE : Investigation of Properties of Light as it moves from

## **APPLICATIONS** glass to air

Presentation Software Tutorial Introduction Background Text Slides Graphics Animations & Timings

Examples Mitosis Digestive

<u>System</u> <u>Matrices</u>

i (deg)	5	10	15	20	25	30	35	40	45	50	55	60	65	70
r (deg)	8.0	14.0	22.0	29.0	36.0	44.0	54.0	64.0	90.0	- 50	- 55	- 60	- 65	- 70

N.B Negative values of (r) indicate that the ray of light is totally internally reflected in glass.

Part 1: Simple Analysis

Plot a graph of angle of refraction (r) against angle of incidence (i) up until the ray reflects.

Note: Negative values of (r) imply that the ray of light is totally internally reflected in glass.

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#### Look at the SpreadSheet (Excel)

# Refraction of Light Solving

Examples

The graph above shows that the angle of refraction (r) increases as the angle of incidence (i) increases.

25/10/2011	Creating Learning Networks for African
<u>Polynomial</u> Equations	Part 2 : Full Analysis
<u>Workers'</u> <u>Database</u>	Plot a graph of sin ( r) against sin ( i) up until the ray reflects.
Base Converter	Proceed as follows:
<u>Activities</u>	(a) Change the angles of incidence(i) and those of refraction (r) from degrees to radians
<u>Links</u>	
Databases	Hint: 1 degree = <u>PI()</u> where PI() is a function to calculate p 180
Tutorial	e.g 20 degrees = <u>PI()</u> x 20 = 0.35
Introduction	180
Example	(b) (i) Name the range containing the angles of incidence(i) the <i>T</i> range.
Periodic Table	Use Insert> Name> Define from the main menu (ii) Name the range containing the angles of refraction (r) the
<u>Links</u>	" <i>ref</i> " range
Word Processina	(c) Calculate the values of the angles of incidence in radians using i * PI()/180 and the angles of refraction

25/10/2011 Tutorial Introduction Text Page Properties Printing Quit

Creating Learning Networks for African... in radians using ref \* PI()/180 (d) Use Insert --> Function ---> Math & Trig ---> SIN to paste the SIN() function and use it to calculate the values of sin (r) and sin (i).

#### Examples

Address list Time table Newsletter **Repeat Patterns** 

Logos

Practical Questions

#### HTML E Tutoria Basic ht

	Statistical Lookup & Reference	ROUND
UTML Editors	Database	SIN
HIML EUILOIS	Text	SINH
Tutorial	Logical	SQRT
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Basic html	SIN(number)	
D:/cd3wddvd/NoExe//mei	ster10.htm	

aste Function		? ×
Function category:	Function <u>n</u> ame:	
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Date & Time	ROUND	
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Statistical	ROUNDUP	
Lookup & Reference	SIGN	
Database	SIN	
Text	SINH	
Logical	SQRT	
Information	SUBTOTAL	•

Netscape Composer

> Examples Teaching Syllabus Teachers' Notes Subject Website Lists

<u>Students</u> <u>Website</u>

Art Principles of Art Elements of Art Coloured Pencil Paintings Pastel Paintings Book cover Posters Creating Learning Networks for African...

Returns the sine of an angle.		
2	OK	Cancel

Note in SIN(number), the number must be the angle in radians.

(e) Block the columm for sin (i) and sin (r) and plot the XY (scatter) chart up to when the ray is totally internally reflected in glass.

• 10 • J	BI	u 🖻 🗐 :		<b>3 % ,</b> t.0 ₊.0	i (‡ (‡	<u>A</u> -
Sin r		2000 - 202 2020 - 202		Chart Wizard - Ste	p 1 of 4 - Chart Type	
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0.26	0.26	0.38	0.37	Pie	1.00	· · · · · · · · · · · · · · · · · · ·
0.35	0.34	0.51	0.48	XY (Scatter)	0.90	1
0.44	0.42	0.63	0.59	Area		1
0.52	0.50	0.77	0.69	C Doughout	0.60	
0.61	0.57	0.94	0.81	Nor Radar	0.40	+
0.70	0.64	1.12	0.90	Surface	0.20	*
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## Creating Learning Networks for African...

0.96	0.82			
1.05	0.87			Scatter with data points connected
1.13	0.91	8		smoothed Lines.

#### (f) Finish off the steps involved in inserting the chart.

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	A	В	С	D	Е	F	G	Н		J	K	L
1	Investigat	e the propert	ies of light	as it m	oves from	glass int	o air					
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9	3	0 44	0.52	0.50	0.77	0.69	0	.80				
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11	4	0 64	0.70	0.64	1.12	0.90	<u> </u>	.60			Sin r	
12	4	5 90	0.79	0.71	1.57	1.00	w			8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8		
13	5	0 -50	0.87	0.77			0	.40				
14	5	5 -55	0.96	0.82								
15	6	0 -60	1.05	0.87			0	.20				
16	6	5 -65	1.13	0.91								

# Scanning an image

Creating Learning Networks for African...

17	0.00
18	0.00 0.20 0.40 0.60 0.80
19	Sin i
20	
21	

Take a look at the SpreadSheet (Excel)

The above graph shows that sin (r) is directly proportional to sin (i).

Sin (r)/Sin (i) = A constant (Snell's law)

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#### **Background**

## SPREADSHEETS TUTORIAL

COMMON APPLICATIONS

EXAMPLE : SOLVING POLYNOMINAL EQUATIONS

Presentation Software Tutorial

Introduction Background Text Slides Graphics Animations & Timings

**Examples** Mitosis

Digestive

System

Example: Solve  $2x^3 + 6x^2 - 9x - 12 = 0$ Solution:

To solve  $2x^3 + 6x^2 - 9x - 12 = 0$ , you have first to draw a graph of y =  $2x^3 + 6x^2 - 9x - 12$ 

PART 1 : Ploting the Graph of  $y = 2x^3 + 6x^2 - 9x - 12$ 

Step 1: Plot a Graph of  $y = 2x^3 + 6x^2 - 9x - 12$ 

(a) Type X in B7 and Y in C7

Block the range B8 through B24 and name this range x. Insert ---> Name ----> Define

25/10/2011 <u>Matrices</u> <u>Simple Cell</u> <u>Lightening</u> <u>Conductor</u> <u>Discharging</u> <u>Tube</u> <u>Human Eye</u> <u>Telecollaboration</u> Creating Learning Networks for African...

(b) In C8, type the formula = 2\*x^3 + 6\*x^2 - 9\*x - 12

(c) Type -5 in B8 Autofill the cells B8 to B24 in steps of 0.5 Block cells B8 to B24

Edit ---> Fill ---> Series

# <u>Links</u>

## Spreadsheets Tutorial

Introduction Worksheets Columns & Rows

<u>Charts</u>

# Examples

Refraction of



25/10/2011 LIGITE Solving Polynomial Equations Workers' Database Base Converter

# **Activities**

# <u>Links</u>

## Databases Tutorial

**Introduction** 

*Example* Periodic Table

## <u>Links</u>

#### Creating Learning Networks for African...

1	B	Pacte	Cheley			
2		Paste Special	Canny			
3		Paste as <u>H</u> yperlink		-		
5		FU E C			Down	Ctrl+D
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7		Delete			Цр	
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11	<u>in</u>	i <u>F</u> ind	Ctrl+F		Justify	
12		Replace	Ctrl+H		Justiny	
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Choose

Series in : Columns Type : Linear Step value : 0.5 Stop value : 3

#### 25/10/2011 Word Processing Tutorial

Introduction Text Page Properties Printing Quit

#### Examples

Address list <u>Time table</u> <u>Newsletter</u> <u>Repeat Patterns</u> <u>Logos</u>

Practical Questions



HTML Editors

25/10/2011 **Tutorial** <u>Basic html</u> <u>Netscape</u> Composer

Examples

Teaching Syllabus

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Art Principles of Art Elements of Art Coloured Pencil Paintings Pastel Paintings Book cover

Click OK

Copy the formula in C8 and paste it in the range C9 to C24.

(d) Choose the the XY (Scatter) graph type shown below.



**Posters** 

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Complete the process of drawing the Chart (graph) he graph is as shown below



#### Link to the Graph.

#### Creating Learning Networks for African... Part 2 : Solving $2x^3 + 6x^2 - 9x - 12 = 0$

We need to find the values of x when y = 0 or the intercepts on the X-axis. The graph of  $y = 2x^2 + 6x^2 - 9x - 12$  shows that there are three values of x:  $x_1$ ,  $x_2$  and  $x_3$ . Two of these values are negative and one positive.

To find the values  $x_1$ ,  $x_2$ ,  $x_3$  use the **Goal Seek** tool under **Tools** on the menu bar.

Goal Seek adjusts the value in a specified cell until a formula that is dependent on that cell reaches a target value

Goal Seek		?×
<u>S</u> et cell:	C15	<u>.</u>
To <u>v</u> alue:	0	
By <u>c</u> hanging cell:	B15	<u>1</u>
	ĸ	Cancel

In this case Goal Seek will adjust the value in cell B15 until until the formula in C15 reaches a target value of 0.

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Note:

The values of Y change from:

-8 (negative) in cell C9 to +7.25 (positive) in cell C10
1 (positive) in cell C15 to -6.25 (negative) in cell C16
-5.25 (negative) in cell C20 to +10 (positive) in cell C21

To obtain the values of x:  $x_1$ ,  $x_2$  and  $x_3$ , use the Goal seek tool and set the values in cells C9 or C10, C15 or C16 and C20 or C21 to a target value of 0.



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#### Use the following values

<u>S</u> et cell	С9	C15	C20	
To <u>v</u> alue	0	0	0	
By <u>c</u> hanging cell	B9	B15	B20	

	A	В	С	D	E	F	G	Н		J	K
4			Plot a graph of $y = 2x^3 + 6x^2 - 9x - 12$								
5			0000								
6		X	Y								
7		-5	-67					Y			
8		-4.5	-32.25								
9	X <sub>1</sub>	-3.77	0.00					80 1			
10		-3.5	7.25						<b>†</b>		
11		-3	15					-60			
12		-2.5	16.75			6.0		40			
13		-2	14					40	•		
14		-1.5	8.25					-20			
15	X <sub>2</sub>	-0.93	0.00				-	20	¥		
16		-0.5	-6.25		_	- 1			-		-Y
17		0	-12		-6	<b>4</b>	-2		2	4	
18		0.5	-14 75					-20			

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#### Link to the Graph

The polynomial  $2x^3 + 6x^2 - 9x - 12 = 0$  has three solutions;  $x_1 = -3.77$ ,  $x_2 = -0.93$ ,  $x_3 = 1.70$ 

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