



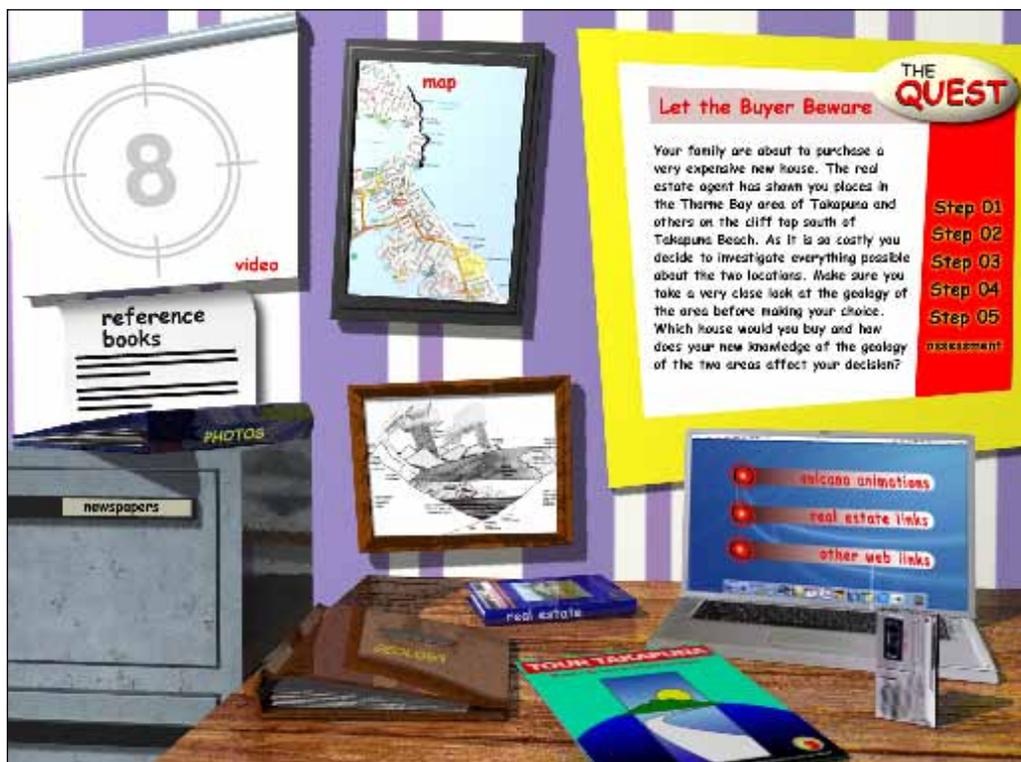
Let the Buyer Beware!

Major Quest

Skilful Compare and Contrast

Scenario

Your family is about to purchase a very expensive new home. The real estate agent has shown you homes in the Thorne Bay area, Takapuna and others on the cliff top south of Takapuna Beach. As it is so costly you decide to investigate everything possible about the two locations. Make sure you take a very close look at the geology of the area before making your choice. Using skilful compare and contrast which house would you buy and how does your new knowledge of the geology of these two areas affect your decision?



Exploratory Environment

INTRODUCTION

The main rock types on the North Shore are sedimentary and volcanic. 'Let the Buyer Beware,' asks our students to research the physical attributes of these rocks and report on how these may affect the choice of a house at Takapuna.

Either location is a wonderful place to live. There is no right answer here, there is only informed decision making. You need to look at the quality of the argument being put forward, the quality of the details that backup the decision, in particular the quality of the geological details.

1 Authenticating the Learning

Initiate a whole class discussion to introduce the scenario and its problem making links to the achievement objective focus and the thinking skill.

Brainstorm and mindmap their present knowledge. What do we already know about the problem? Define the terms 'geology' and 'rock.'

2 Constructing Relevant Questions

As you discuss the scenario begin the question formation and planning the research.

During an interactive discussion between the teacher and class these essential research questions need to be drawn out for investigation. As much as possible these should be co-constructed:

What are the local rock types?

How did these form?

What are their physical properties?

How would they affect the choice of a house's location?

What other things would we need to take into account before making our choice?

What is skilful compare and contrast?

Introduce skilful compare and contrast - co-construct with your class the Thinking Map for skilful compare and contrast.

3 Planning the Research

Discuss with your class and agree on a timetable with checkpoints. Also decide on the concluding performance and look closely at the assessment rubric.

4 Discovering Relevant Information

Begin the 'discovering relevant information' phase by modelling the use of the graphic organisers.

Use the Quest's CD to locate information on the houses, their locations and geological features of each area.

5 Constructing Knowledge

Have your students reflect on the Thinking Steps and their notes including their graphic organisers.

6 New Insights and Understandings

Have your students share their new insights and understandings.

PROBLEM-BASED LEARNING UNIT PLAN - SCIENCE



Title: Let the Buyer Beware

Term: 1

Weeks: 6

Achievement Objective Focus - Develop an understanding that rocks and soil, make up our planet and recognise that these are also Earth's resources that need to be considered when choosing where to live.

Thinking Skill Focus - Skilful Compare and Contrast.

Scenario

Your family is about to purchase a very expensive new home. The real estate agent has shown you homes in the Thorne Bay area, Takapuna and others on the cliff top south of Takapuna Beach. As it is so costly you decide to investigate everything possible about the two locations. Make sure you take a very close look at the geology of the area before making your choice. Using skilful compare and contrast which house would you buy and how does your new knowledge of the geology of these two areas affect your decision?

Learning Experiences	Learning Outcomes Students should be able to:	Organisational Notes
<p>1 Authenticating the Learning Introduce the scenario and its problem-making links to the focus achievement objective & key concepts.</p> <p>Awakening Prior Knowledge What do we already know about this problem?</p> <p><input checked="" type="checkbox"/> Brainstorming <input checked="" type="checkbox"/> Discussion <input checked="" type="checkbox"/> Mindmapping</p> <p>Strengthening Prior Knowledge <input checked="" type="checkbox"/> Front Loading Activities - Choose from 'Geology' folder on desktop Quest CD. The sedimentary rock formation investigation and the mixing up a container of water, sand, dirt and small rocks is essential.</p>	<ul style="list-style-type: none"> • Explain the scenario. • Explain why it is important to solve the problem. • Relate their present understanding of the scenario and its problem. 	<ul style="list-style-type: none"> • Check your data projector. • Book a computer or ipad pod. • Book school's local rock collection. • Read book from resource room called, 'Fountains of Fire.' Book class set. • Familiarise myself with the CD or iPad app 'Let the Buyer Beware!' • Read Teacher's Guide for 'Let the Buyer Beware' and the Field Trip Parents Booklet. • Prepare material for front loading activities, see 'Geology' folder on desktop in 'Let the Buyer Beware!' – sedimentary rock investigation – Coke lava flow – baking soda volcano – dangers our city may face – mixing up water, sand, dirt • Organise geology field trip. Check tide times at http://ofu.co.nz/webgraph/index.php You need a low tide of under 1.0 to get around to Clifton Beach from Takapuna Beach. The field trip can be planned for any time during the Quest. • Print copies of the Field Trip Parents booklet for all parents going on the field trip. • Put up poster on Auckland's Volcanoes to begin wall display and the Pupuke eruption poster.
<p>2 Constructing Relevant Questions Clarifying the problem found in the scenario.</p>	<ul style="list-style-type: none"> • List the key questions they need to answer. • Explain the steps in skilful compare and contrast. 	
<p>3 Planning the Research Developing a plan of action.</p>	<ul style="list-style-type: none"> • Explain the plan of action. 	
<p>4 Discovering Relevant Information Locating and selecting.</p> <p><input type="checkbox"/> teleconference <input type="checkbox"/> fax exchange <input type="checkbox"/> e-mail exchange <input type="checkbox"/> bookmarked www sites <input type="checkbox"/> intranet site <input checked="" type="checkbox"/> school library books <input checked="" type="checkbox"/> National Library books <input type="checkbox"/> magazines <input type="checkbox"/> DVDs, videos <input type="checkbox"/> Internet search <input type="checkbox"/> articles, magazines <input type="checkbox"/> school journals <input type="checkbox"/> visitor <input type="checkbox"/> EOTC experience <input type="checkbox"/> pictures, posters <input type="checkbox"/> interviews, surveys <input type="checkbox"/> found objects <input type="checkbox"/> software, CD ROMs <input type="checkbox"/> thinking tools <input type="checkbox"/> demonstration <input checked="" type="checkbox"/> Quest CD</p> <p><input checked="" type="checkbox"/> Teacher directed activities – graphic organisers</p>	<ul style="list-style-type: none"> • Explain the formation and features of sedimentary rocks. • Explain the formation and features of volcanic rocks. • Identify the sedimentary cliffs of the North Shore. • Identify the volcanoes of the North Shore. • List the criteria their family would use in selecting a new house. 	
<p>5 Constructing the Knowledge Forming and applying.</p> <p><input checked="" type="checkbox"/> Teacher directed activities - graphic organisers</p>	<ul style="list-style-type: none"> • Make a comparison chart for selecting the house that best suits their family and takes the attributes of the local geology into account. 	<p>Assessment Task/s</p> <ul style="list-style-type: none"> • Assess quality of the research using the rubric in the Teacher's Guide.
<p>6 New Insights and Understandings Presenting and evaluating.</p>	<ul style="list-style-type: none"> • Present their solution to scenario • Explain how their solution supports their new insights, understandings and how it relates to the scenario. 	

Unit Evaluation Implications for next unit

**ASSESSMENT TASK – SCIENCE – YEAR 7 AND YEAR 8
PLANET EARTH AND BEYOND
LET THE BUYER BEWARE**



Key Achievement Objective: Develop an understanding that rocks and soil, make up our planet and recognise that these are also Earth’s resources that need to be considered when choosing where to live.

The scenario is: Your family is about to purchase a very expensive new home. The real estate agent has shown you homes in the Thorne Bay area, Takapuna and others on the cliff top south of Takapuna Beach. As it is so costly you decide to investigate everything possible about the two locations. Make sure you take a very close look at the geology of the area before making your choice. Using skilful compare and contrast which house would you buy and how does your new knowledge of the geology of these two areas affect your decision?

ASSESSMENT	BELOW EXPECTATIONS	WITHIN EXPECTATIONS	ABOVE EXPECTATIONS	Effort A B C
Your argument shows:	Recommendation unsupported by relevant details. Only one, if any, relevant reference made to the geology of the North Shore.	Recommendation supported by 3 - 4 relevant details. Relevant references made to both the volcanic and sedimentary formations.	Recommendation supported by 5 or more relevant details. Detailed relevant references made to both the volcanic and sedimentary formations.	
Student Evaluation				
Teacher Evaluation				
Your new insights and understandings show:	You only explained what kind of thinking you did but not how you did it. You explained only how it connected with your thinking, the things you already knew about the special features of rocks and soil and the need to consider these when choosing where to live.	You explained what kind of thinking you did and how you did it. You also explained how it extended your thinking, how your thinking went in new directions around the special features of rocks and soil and the need to consider these when choosing where to live.	You extended this by saying why this way of thinking helped you, including how you would do it next time. You also explained how your thinking was challenged, the questions you still have about the special features of rocks and soil and the need to consider these when choosing where to live.	
Student Evaluation				
Teacher Evaluation				

TEACHER FEEDBACK - MEDALS AND MISSIONS

Discuss with your class why skilful comparing and contrasting is needed.

'Comparing and contrasting is helpful to gain a deeper understanding of the things compared in order to make well-considered decisions or to clear up confusion'

'We compare and contrast for a variety of purposes. Many everyday decisions, like shopping or choosing a route to work, involve comparing and contrasting. A manufacturer might compare and contrast his firm with more successful firms to get ideas about improving productivity.'

'We compare and contrast with varying degrees of thoroughness. Sometimes we attend only to surface characteristics, like how things look, when other factors are more relevant.'

'Our goal in comparing and contrasting is to gain insight and understanding.'

Robert J. Swartz and Sandra Parks

Common Defaults in the way we Compare and Contrast

1. We identify only a few similarities and differences.
2. We identify only superficial similarities and differences.
3. We make rough and imprecise judgments of similarity and difference.
4. We don't draw out the implications of the similarities and differences we have identified.

Develop with your class the thinking steps for skilful comparing and contrasting.

Skilful Compare and Contrast

1. How are they similar?
2. How are they different?
3. What similarities and differences seem significant?
4. What conclusions can you make from the significant similarities and differences?

For more detail see Chapter 4 - Comparing and Contrasting in 'Infusing the Teaching of Critical and Creative Thinking into Content Instruction - A Lesson Design Handbook for the Elementary Grades' Robert J. Swartz and Sandra Parks, The Critical Thinking Co. ISBN 0-89455-481-6. For classes and teachers new to skilful compare and contrast the Lincoln/Douglas activity on page 126 is worth considering.

COMPARE AND CONTRAST

Volcanic Lava Flows

Sedimentary Cliffs

HOW ALIKE?

HOW DIFFERENT?

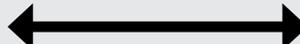
WITH REGARD TO











SIGNIFICANT SIMILARITIES AND DIFFERENCES:

CONCLUSION OR INTERPRETATION:

COMPARE AND CONTRAST

North - House One

South - House Two

HOW ALIKE?

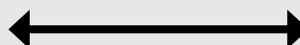
HOW DIFFERENT?

WITH REGARD TO











SIGNIFICANT SIMILARITIES AND DIFFERENCES:

CONCLUSION OR INTERPRETATION:

Integrating Skilful Compare and Contrast into an Argument.

Teachers

Use the template below to help your students decide what to write in their argument. Their argument must be clear to the reader and include researched evidence to back up their position. The template is based on Whiteheads (2003) model in Writing Frameworks: Book B. Revised edition.

Students

Use both your graphic organisers to write your argument. When explaining your choice of house you need to explain why you chose this location and why you did not choose the other location. This is where you show your knowledge of North Shore geology.

Skilful Compare and Contrast

1. How are they similar?
2. How are they different?
3. What similarities and differences seem significant?
4. What conclusions can you make from the significant similarities and differences?

COMPARE AND CONTRAST

Volcanic Lava Flows Sedimentary Cliffs

HOW ALIKE?

House One

HOW DIFFERENT?

WITH REGARD TO

SIGNIFICANT SIMILARITIES AND DIFFERENCES

CONCLUSION OR INTERPRETATION

CONCLUSION OR INTERPRETATION

Before writing have you gone through the 'Skilful Compare and Contrast Thinking Map'?

Title

- Give your argument a title.

Introduction Paragraph

- Describe the context of the argument. This is where you make a link to the scenario.
- Tell your reader why you are making this argument.
- Write a sentence that says what you are arguing for or against. This is where you are stating your position. You could use ideas from the 'Significant Similarities and Differences' to write this.
- Sentence starters could include:
 - 'I would choose to buy the house at...'
 - 'I chose this house because of the following geological reasons...'

Body Paragraphs 1,2, 3, 4 & 5*

- These paragraphs should say why you believe this. You should use the ideas from the 'Compare and Contrast' organisers. Make sure you explain why you think the evidence supports your position.
- Sentence starters could be
 - 'First I believe this because...'
 - 'Evidence I have to support this came from...'
 - 'The second reason is...'
 - 'Another reason I believe that is...'
 - 'The final reason is...'
- Describe the evidence which backs your position up for each reason.

(Extension) Counter Argument Paragraph

- Describe an opposing view and say what is interesting or worth considering about this view. But then say why it is a poor argument and then return to your position. You could use the ideas from the similarities and/or differences you found.
- Sentence starters could be
 - 'Some people might say that...however, the problem with this is...'

Conclusion

- Here you will write a brief summary of your position and the reasons you gave for choosing the house you did.
- Sentence starters could be
 - 'For these reasons I believe that...'

* To achieve an 'Above Expectations' you will be aiming to write 5 'body' paragraphs.

Now add your:

New Insights and Understandings.

- Use the Ladder of Metacognition to comment on your ability to form a well founded judgement.
- What have you learnt about events having causes and effects.

Additional Scaffolding Suggestions

- Use your data projector to introduce the exploratory environment of 'The Office.'
- If the discussion on key concepts using the achievement objective and scenario is difficult, and the brainstorming and mindmapping produced show little geological knowledge, use the investigations in the folder on the office desk called 'Geology' for whole class or small group front loading experiences.

Important

Our experience shows that our students have a much poorer understanding of sedimentary rocks than they do of volcanic ones therefore the sedimentary rock formation investigation is to be completed by every group. Equipment is in the resource room.

Important

You also need to mix up a container of water, sand, dirt and small rocks and observe it settling into layers as few students associate these type of sedimentary rocks with their formation underwater.

- This Quest suits research by collaborative groups of two with access to their own computer or iPad.
- If during a checkpoint the work seems to be lacking geological detail, point them to the newspaper article in the filing cabinet 'Time Nibbles away at Takapuna.' There are ten geology details in this article alone.
- Do not allow any e-mail, fax or phone calls to be made until teacher contact has been made with the expert involved. Set it up for success.
- Remember an expert does not have to be seen in adult terms. It could be another staff member, family friend, parent, grandparent – any knowledgeable adult who has the time to reply.
- If using the Ask-A-Geologist web site remember to check the FAQs first.
- The street addresses and house descriptions are fictitious so the owners can not be approached for additional information.
- See the 'Tour' booklet on the desk of the exploratory environment when planning the field trip (CD ROM or iPad App). Arriving one hour before low tide at the southern (sedimentary) end of Takapuna Beach is **essential**, so plan the visit carefully.
- There is a very real need to visit the sites before the EOTC trip. It would be unwise to rely on the trip notes for your first visit with your students. •
- When organising the geology field trip check tide times at <http://ofu.co.nz/webgraph/index.php>

You need a low tide of under 1.0 to get around to Clifton Beach from Takapuna Beach. The field trip can be taken at any time during the Quest.

- The book 'Under the Mountain' by Maurice Gee is a good one to read to the class during this study.
- As houses in this area are not always available on the Real Estate web sites we have added all that are needed in the 'Real Estate' book on the desk.
- Pupuke erupted around 200,000–250,000 years ago. Thousands of years after the volcano was formed, sea level rose as the world's ice caps melted after the end of the last ice age flooding the valley and forming the Waitemata Harbour. The sea reached its present level about 7500 years ago.
- **Dangerous Demonstration** - Teachers in the past have demonstrated a model volcano by using ammonium dichromate (an orange coloured chemical). A small amount of ammonium dichromate was set alight in the cone of a model volcano producing dramatic fire fountaining, cone formation and an ash cloud. Unfortunately the material produced is carcinogenic and poisonous. Although it is dangerous this demonstration can still be found in children's books on the subject of volcanoes. **Do not use this demonstration** during your work on volcanoes as it will place you and your students in danger.
- Discuss the assessment rubric with the class.

Exploratory Environment

Diagram of Auckland 10 million years ago

Video of sedimentary cliffs

List of reference books from our library

Map of the area

Scenario and problem-based learning stages

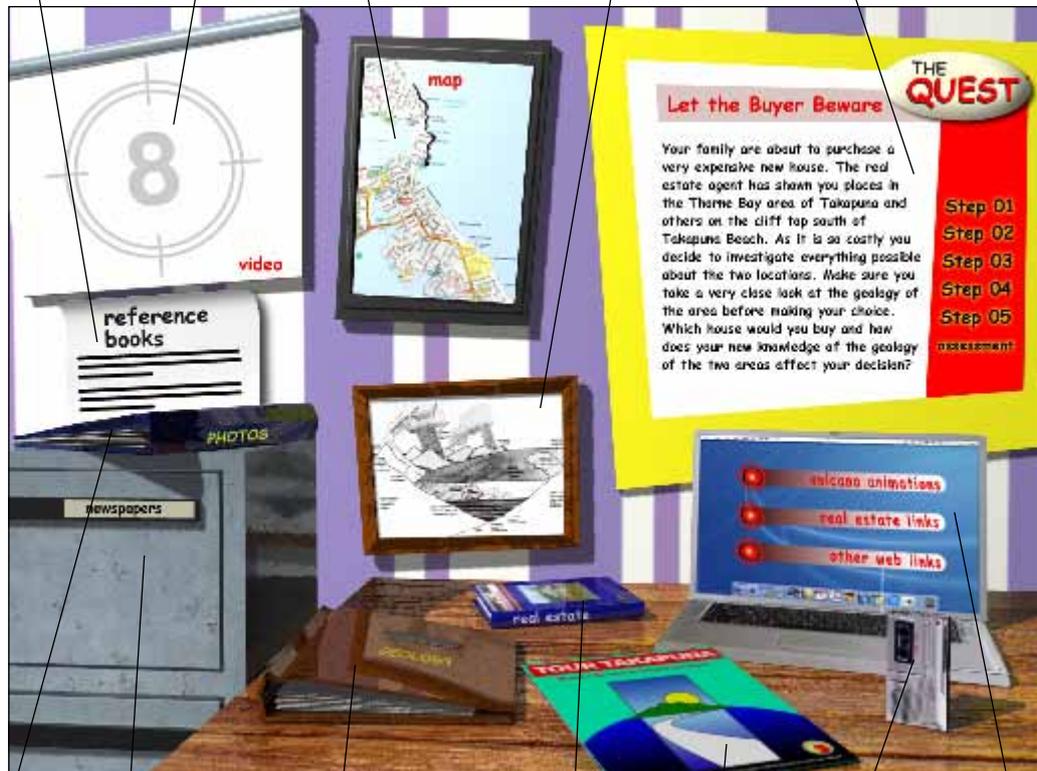


Photo collection

Newspaper articles

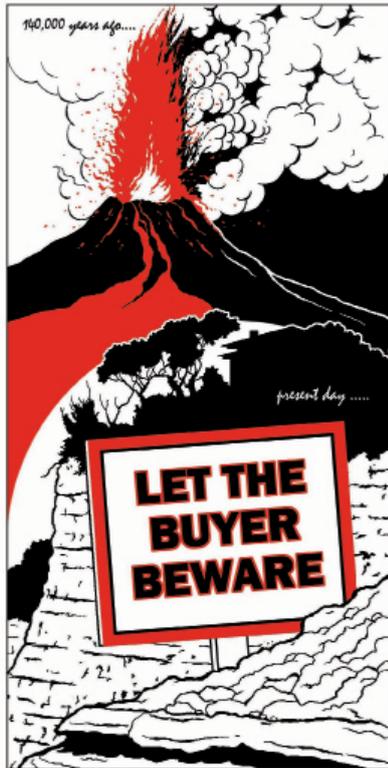
Geology reference material and activities

Houses for sale

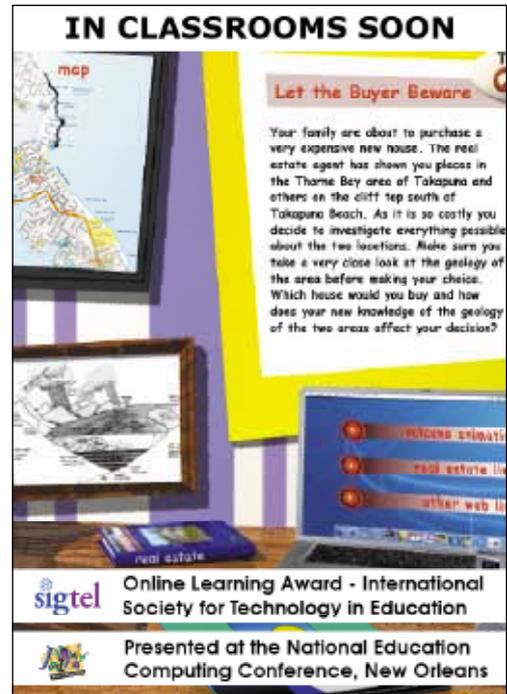
Field trip notes and photographs

Taped interviews

Volcano animations and web links



There is no library display in conjunction with this Quest.



Flag Design

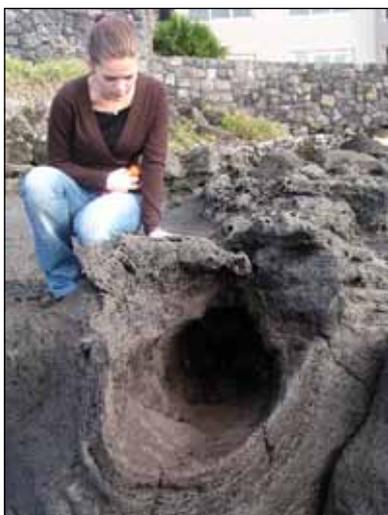


Illustration of the Lake Pupuke eruption drawn specially for our school by Geoffrey Cox author of 'Fountains of Fire.'



Online Learning Award

This Quest received an award, 'Recognizing creative teachers for their pioneering use of telecommunication networks to provide innovative learning opportunities for school-age students,' 2004.



Part of the fossil forest north of Takapuna Beach.



Large house on the sedimentary cliffs south of Takapuna Beach.



This Quest, our first, was presented at the National Education Computing Conference, New Orleans, United States of America 2004.