



## Activity Cover Sheet

<i>Title of Activity</i>	"Plastic Organism" Ecosystems
<i>Grade Level</i>	5 <sup>th</sup>
<i>Inquiry Level</i>	4 Guided Inquiry-5 Open Inquiry
<b>One paragraph description</b>	Students will randomly grab two plastic sample "organisms." Using these sample organisms, students will investigate the physical factors with which they interact to compose an ecosystem. Sample organisms will be categorized by the function they serve in their environment. Students will recognize the major source of energy is sunlight and the number of organisms an ecosystem can support depends on resources available.
<i>Teacher's Name</i>	Kaci May
<i>Teacher's School</i>	North Charleston Elementary School
<b>School City, State</b>	North Charleston, SC

**Purpose:**

To have students construct a model of an ecosystem and be able to explain the interactions between organisms and their environment.

**Objectives:**

Students will develop a working knowledge of terrestrial and aquatic ecosystems. They will design a working ecosystem and communicate the needs and roles of organisms within the biome.

**Grade Level:**

5<sup>th</sup>

**Inquiry Level:**

4 Guided Inquiry-5 Open Inquiry

**Prior Knowledge:**

This activity may be used at any point during the study of ecosystems. Teacher may need to review the things necessary for organisms to survive-food, water, and shelter...

**Materials:**

Plastic plants and animals

Bucket with cloth glued around the edges (see Preparation)

Paper

Color pencil/crayons

Internet access

Other resources for research purposes

Data table

Materials necessary to construct model habitats where selected organisms could survive

**Safety:**

Students should be familiar with safe, smart classroom procedures prior to this lab. Students should be reminded of Internet safety. They should follow all classroom rules and procedures.

**Including All Students:**

All students can get involved in this lab. The students can be assigned roles in the lab if needed, but it is best for the teacher to observe and encourage all students to participate. Students with limited mobility may still participate. Students with learning challenges may still be involved and may even far exceed expectations because this lab addresses tactile, visual, and auditory modalities.

**Questions to Ask Along the Way:**

What are the components of a habitat?

What is your hypothesis?

What data supports or does not support your hypothesis?

What are the components of a habitat that the organisms you have chosen require to survive?

Which **abiotic** factors are important for the survival of your organisms?

Which **biotic** factors are important for the survival of your organisms?

Which organisms in different habitats are predators/prey?

How do humans impact the environment/your organism?

How does technology/industrialization effect your organisms' habitat?

What patterns do you find?

What new questions do you have?

What is your evidence?

What does your research lead you to expect?

What are your predictions?

What hypothesis was supported-not supported?

What conclusions can be drawn?

National Science Education Standards Alignment:

**Broad Teaching Strategies**

Active learning/discovery learning  
Cooperative learning/small group instruction  
Critical analysis/critical thinking  
Hands-on learning  
Inquiry-based learning  
Tutorial/self-directed instruction

**Use of Instructional Technology**

Computer assistant learning  
Multi-media/audiovisual instruction  
Other instructional technology

**Additional Teaching Strategies**

Class/group discussion  
Data analysis, collection, interpretation  
Demonstrations  
Learning cycles  
Peer teaching

**Unifying Concepts and Processes**

Systems, order, and organization  
Evidence, models, and explanation  
Evolution and equilibrium  
Form and Function

**Grades 5-8**

**Science as Inquiry**

Abilities necessary to do scientific inquiry  
Understandings about scientific inquiry

**Physical Science**

Transfer of energy

**Life Science**

Structure and function in living systems  
Populations and ecosystems  
Diversity and adaptations of organisms

**Science and Technology**

Abilities of technological design  
Understanding about science and technology

**Science in Personal and Social Perspectives**

Populations, resources, and environments  
Natural hazards  
Risks and benefits  
Science and technology in society

**History and Nature of Science**

Science as a human endeavor  
Nature of science

South Carolina Science Education Standards Alignment:

II. Life Science

B. Populations and Ecosystems

1. A population consists of all individuals of a species that occur together at a given place and time. All populations live together and the physical factors that which they interact compose an ecosystem.
  - b. Investigate and understand how plants and animals in aquatic/terrestrial ecosystems interact with one another and with the nonliving environment.
2. Populations of organism can be categorized by the function they serve in an ecosystem. Plants and some microorganisms are producers—they make their own food. All animals are consumers, which obtain food by eating other organisms. Decomposers, primarily bacteria and fungi, are consumers that use waste materials and dead organisms for food.
  - a. Distinguish among the roles organisms serve in a food web (producers, decomposers, consumers, prey, and predators).
  - b. Describe an organism by its niche in the ecosystem.
3. For ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is used by producers through photosynthesis.
  - a. Recognize that energy passes from organism to organism in food webs.
  - b. Diagram how energy flows through food webs.
4. The number of organisms an ecosystem can support depends on the resources available.
  - a. Identify and investigate the abiotic factors in an ecosystem such as quantity of light, air, and water; range of temperature; salinity, water pressure; and soil composition.
  - b. Identify and investigate the biotic factors in an ecosystem.
  - c. Describe the effect of limiting factors such as food, water, space, and shelter, on a population.
  - d. Evaluate the impact of the environment on populations of organisms.
  - e. Draw conclusion about the influence of human activity on ecosystems.
  - f. Discuss ways to minimize the negative impact of technology/industrialization on ecosystems and to maximize the positive impact.
  - g. Explore and identify career opportunities in natural resource/environmental/ marine science.

Preparation:

Teacher needs to label each organism so that students are familiar with the name of the organism and do not spend too much time trying to identify the species.

Create a way for students to select organisms. Suggestion: Put all organisms (plants and animals) into a five gallon bucket. Hot glue a large cloth around the lip of the bucket and allow the excess cloth to fall into the bucket to cover the organisms students will be selecting. This way they will not see what they are drawing.

Put students in cooperative groups.

Make copies of the Web Site Treasure Hunt and Teacher Resource Hot List for students.

Open each website on all computers the morning of or day before students will access web sites.

This will bring the websites to a local server and therefore access will be faster when students try to access the sites.



#### Procedures:

1. Students will select two plastic organisms from the bucket.
2. Students will research ecosystems/organisms using the Web Site Treasure Hunt found at the end of the lesson plan.
3. Students will create a list of the components of habitats that are necessary for the survival of organisms they selected. Students should also make an inference about where they believe their organisms would be found in nature. They will then determine whether the two organisms would be found in similar biomes.
4. Students will then write hypothesis about what abiotic and biotic factors are necessary for the survival of their organisms. Hypothesis should be stated like *if organism (species students have drawn) is to survive, then it must have the following physical factors in its habitat.*
5. Students should draw a diagram of the environment where their organisms would found in nature. This is important because it forces students to commit to an idea.
6. Students will use the Teacher Resource Hot List to do further research on their organisms/habitats.
7. Students will then write the needs of their organisms and use the following terminology- producers, consumers, decomposers, prey, and predator.
8. Students will then draw a new diagram to show the changes in their conceptions about the habitats where their organisms live in their natural habitats.
9. Students will make presentations to the class. Presentations may last 2-3 minutes maximum and each student in the audience should choose a minimum of 5 presentations during which to take notes using the Presentation Data Sheet. Pass the completed data sheets to the teacher and then to the student presenters for feedback.
10. Students will then collaborate to create a list of organisms they believe would live in the similar habitats/biomes.
11. Student groups will reorganize to accommodate which organism belongs in certain habitats/biomes. Students with organisms that would be found in similar habitats/biomes should be grouped together.
12. New student groups will collaborate to in order to construct a habitat that would support the organisms.

\*Another way to do this would be to bring in the Ecosystems STC kit to construct habitats that support organisms that are naturally found in your state.

#### Extensions/Where To Go From Here:

- Diagram a food web. The Web Site Treasure Hunt has resources available to make food webs online.
- Draw conclusions about the influence of human activity on ecosystems.
- Discuss ways to minimize negative impact of technology/industrialization on ecosystems and to maximize positive impact.

- Describe the effect of limiting factors such as food, water, space, and shelter, on a population.
- Explore and identify career opportunities in natural resource/environmental/ marine science. Use the Internet or invite guest speakers so students may complete Worksheet: Science Role Model Page (attached at end of lesson plan).
- Research and write how organisms were introduced to ecosystem.
- Assign students to represent animals by giving each student a nametag. Throw a rope from each predator to its prey in the ecosystem to model a food chain.

#### Suggestions for Assessment

##### **Authentic & Alternative Assessment**

- Peer Evaluation
- Performance-based assessment
- Self-evaluation (possibly using a rubric)

##### **Tests & Testing (Rubrics may be found at the end of the lesson plan.)**

- Group testing/Cooperative skills
- Objective referenced tests/Internet use, knowledge of ecosystems
- Verbal tests/Group presentations
- Teacher may become familiar with web pages and determine if students used the Internet resources appropriately.

Students may write a lab report as an assessment in addition to creating a model ecosystem. Use <http://school.discovery.com/schrockguide/assess.html> to develop a rubric that meets the needs of you and your students.



### References and Resources:

- “Ecosystems, Biomes, and Habitats”  
(<http://www.fi.edu/tfi/units/life/habitat/habitat.html>)
- “Biomes of the World, Freshwater Ecosystems, and Marine Ecosystems”  
(<http://mbgnet.mobot.org/salt/>)
- “Environmental Biology-Ecosystem”  
(<http://www.marietta.edu/~biol/102/ecosystem.html>)
- “Welfare of Animals” ([http://www.grdodge.org/frontiers\\_pastprojects\\_1998.htm](http://www.grdodge.org/frontiers_pastprojects_1998.htm))
- “Food Chains and Webs” (<http://www.vtaide.com/png/foodchains.htm>)
- “Interesting Facts About Food Chains”  
([http://www.arcytech.org/java/population/facts\\_foodchain.html](http://www.arcytech.org/java/population/facts_foodchain.html))
- “What’s It Like Where You Live?” (<http://mbgnet.mobot.org/sets/temp/index.htm>)
- “What’s It Like Where You Live?”(<http://mbgnet.mobot.org/sets/rforest/index.htm>)
- “What’s It Like Where You Live?”  
(<http://mbgnet.mobot.org/sets/grasslnd/index.htm>)
- “What’s It Like Where You Live?” (<http://mbgnet.mobot.org/sets/temp/index.htm>)
- “What’s It Like Where You Live?”(<http://mbgnet.mobot.org/sets/desert/index.htm>)
- “What’s It Like Where You Live?” (<http://mbgnet.mobot.org/sets/taiga/index.htm>)
- “The Botanist of Tomorrow”  
([http://www.rbg.ca/greenlegacy/pages/botanists\\_future.html](http://www.rbg.ca/greenlegacy/pages/botanists_future.html))
- “Important Botanist of the Past”  
([http://www.rbg.ca/greenlegacy/pages/botanists\\_past.html](http://www.rbg.ca/greenlegacy/pages/botanists_past.html))
- “Ituri Forest: The Ways of Knowing”  
([www.brookfieldzoo.org/pagegen/wok/index\\_f4.html](http://www.brookfieldzoo.org/pagegen/wok/index_f4.html))



Name of Student Scientist \_\_\_\_\_

Directions: This sheet is used for recording notes during student presentations. Write as much information in the appropriate boxes when classmates make their presentations. This sheet will be used to provide feedback for classmates.

Name of Organism: \_\_\_\_\_

<b>Physical Factors Effecting Organism</b>	<b>Is this required for the organism to survive?</b>	<b>Specific Need of the Organism</b>
<u><i>Abiotic Factors:</i></u>		
Quantity of light		
Quantity of air		
Quantity of water		
Range of temperature in air/water		
Salinity of water		
Water pressure		
Shelter		
Soil composition		
Space		
<u><i>Biotic Factors:</i></u>		
Food/prey		
Predator		
Consumers		
Decomposers		
Producers		
Interaction of organisms		
Human impact		
Technology/ industrialization		

## Worksheet: Web Site Treasure Hunt

Your name	Kaci May
Your email address	<a href="mailto:kaci_may@gmail.com">kaci_may@gmail.com</a> or <a href="mailto:kaci_may2000@yahoo.com">kaci_may2000@yahoo.com</a>
What is the question that students are researching on this Treasure Hunt?	Which populations of organisms live together and which physical factors interact to compose an ecosystem?
<b>LIST THE WEB SITES YOU WANT STUDENTS TO EXPLORE BELOW</b>	
<b>Resource #1</b>	
Topic/Title of Resource	Ecosystems, Biomes, and Habitats
Web address	<a href="http://www.fi.edu/tfi/units/life/habitat/habitat.html">http://www.fi.edu/tfi/units/life/habitat/habitat.html</a>
1-2 sentence description of the resource/site	The Franklin Institute Online provides definitions of different types of ecosystems-terrestrial and aquatic. The web page explains the organization of ecosystems and describes various habitats. It also describes how to make a model ecosystem in little time.
<b>Resource #2</b>	
Topic/Title of Resource	Biomes of the World, Freshwater Ecosystems, and Marine Ecosystems
Web address	<a href="http://mbgnet.mobot.org">http://mbgnet.mobot.org</a>
1-2 sentence description of the resource/site	Missouri Botanical Garden offers links to see and read about many different ecosystems. Links include desert, temperate deciduous forest, rivers and streams, ponds and lakes, wetlands, grasslands, taiga, tundra, rainforest, shorelines, temperate oceans, and tropical oceans.
<b>Resource #3</b>	
Topic/Title of Resource	Environmental Biology-Ecosystem
Web address	<a href="http://www.marietta.edu/~biol/102/ecosystem.html">http://www.marietta.edu/~biol/102/ecosystem.html</a>
1-2 sentence description of the resource/site	This is a resource for students who are advanced. Lower level students may also use this resource with guidance. It offers more than one visual aid. Visual aids include "Energy Flow Through Ecosystems," "Food Chains and Webs," "The Water Cycle," "Carbon Cycle," "Nitrogen Cycle," and "Phosphorous Cycle."

## Worksheet: Web Site Treasure Hunt

Your name	Kaci May
Your email address	<a href="mailto:kaci_may@gmail.com">kaci_may@gmail.com</a> or <a href="mailto:kaci_may2000@yahoo.com">kaci_may2000@yahoo.com</a>
What is the question that students are researching on this Treasure Hunt?	Which populations of organisms live together and which physical factors interact to compose an ecosystem?
<b>LIST THE WEB SITES YOU WANT STUDENTS TO EXPLORE BELOW</b>	
<b>Resource #1</b>	
Topic/Title of Resource	Welfare of Animals
Web address	<a href="http://www.grdodge.org/frontiers_pastprojects_1998.htm">http://www.grdodge.org/frontiers_pastprojects_1998.htm</a>
1-2 sentence description of the resource/site	The Geraldine R. Dodge Foundation provides real world examples of the impact of industrialization on ecosystems. Students can relate to bullfrogs, wolf hybrids, working buffalo, and snakebites among many other examples discussed on at this web site.
<b>Resource #2</b>	
Topic/Title of Resource	Food Chains and Webs
Web address	<a href="http://www.vtaide.com/png/foodchains.htm">http://www.vtaide.com/png/foodchains.htm</a>
1-2 sentence description of the resource/site	This resource defines food chains and herbivores/carnivores. It also provides students with the opportunity to make their own food chain using a pre-designed format that is easy and quick to use.
<b>Resource #3</b>	
Topic/Title of Resource	Interesting Facts About Food Chains
Web address	<a href="http://www.arcytech.org/java/population/facts_foodchain.html">http://www.arcytech.org/java/population/facts_foodchain.html</a>
1-2 sentence description of the resource/site	This is a great resource to provide definitions like producers, consumers, herbivores, carnivores, omnivores, and trophic levels. There are also visual aids on the web site. The web site offers links to ways to protect the environment.

## Worksheet: Teacher Resource Hot List

1. Your name	Kaci May
2. Your email address	<a href="mailto:Kaci_may2000@yahoo.com">Kaci_may2000@yahoo.com</a>
3. What is the topic of this resource hotlist?	Ecosystems
4. Do you want the resources listed below organized into categories? If so, list the categories and the resource numbers.	No
<b>Resource #1</b>	
Topic/Title of Resource	What's It Like Where You Live?: Temperate
Web address	<a href="http://mbgnet.mobot.org/sets/temp/index.htm">http://mbgnet.mobot.org/sets/temp/index.htm</a>
1-2 sentence description of the resource/site	Mammals: Bank Voles, Black Bear, Grey Squirrel, Raccoon, White-tailed Deer, Wild Boar Birds: Cardinal, Goshawk, Turkey, Yellow-bellied Sapsucker Reptiles: Rat Snake Amphibians: Spring Peeper
<b>Resource #2</b>	
Topic/Title of Resource	What's It Like Where You Live?: Tundra
Web address	<a href="http://mbgnet.mobot.org/sets/tundra/index.htm">http://mbgnet.mobot.org/sets/tundra/index.htm</a>
1-2 sentence description of the resource/site	Plants: Lichen, Dark Red Leaves, Cushion Plants, Seeds, Cotton Grass, "In Between Rocks" Birds: Gyrfalcon, Rock Ptarmigan, Ruddy Turnstone, Snow Bunting, Snowy Owl, Tundra Swan Mammals: Arctic Fox, Caribou, Musk Ox, Norway Lemming, Polar Bear, Sled Dogs
<b>Resource #3</b>	
Topic/Title of Resource	What's It Like Where You Live?: Taiga
Web address	<a href="http://mbgnet.mobot.org/sets/taiga/index.htm">http://mbgnet.mobot.org/sets/taiga/index.htm</a>
1-2 sentence description of the resource/site	Plants: Conifers, Needles, Spruce Trees Birds: Bohemian Warwig, Hawk Owl, Pine Gosbeak, Red-Throated Loon Mammals: Ermine, Eurasian Red Squirrel, Lynx, Marten, Moose, Snowshoe Rabbit, Wolverine
<b>Resource #4</b>	
Topic/Title of Resource	What's It Like Where You Live?: Rainforest
Web address	<a href="http://mbgnet.mobot.org/sets/rforest/index.htm">http://mbgnet.mobot.org/sets/rforest/index.htm</a>
1-2 sentence description of the resource/site	Plants: too many to mention Animals: Bearded Pig, Brazilian Tapir, Capybara Chimpanzee, Common Tree Shrew, Crested Guan, Indian Cobra, Orangutan, Slow Loris, Vine Snake
<b>Resource #5</b>	
Topic/Title of Resource	What's It Like Where You Live?: Grassland
Web address	<a href="http://mbgnet.mobot.org/sets/grasslnd/index.htm">http://mbgnet.mobot.org/sets/grasslnd/index.htm</a>
1-2 sentence description of the	Animals: African Elephant, Bison, Black Rhinoceros, Black-Footed Ferret, Giraffe, Greater Prairie Chicken, Lion, Ostrich, Prairie Dog,

resource/site	Pronghorn, Warthog
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**Teacher Resource Hot List Worksheet, contd.**

<b>Resource #6</b>	
Topic/Title of Resource	What's It Like Where You Live?: Desert
Web address	<a href="http://mbgnet.mobot.org/sets/desert/index.htm">http://mbgnet.mobot.org/sets/desert/index.htm</a>
1-2 sentence description of the resource/site	Plants: Cactus, Dragon Tree, Ocotillo plant, Desert Spoon, Aloe, Yucca Animals: Addax, Cactus Wren, Desert Lark, Dingo, Fat Sand Rat, Fennec Fox, Gila Monster, Great Jerboa, Great Mouse-Tailed Rat, Lappet-Faced Vulture, Sidewinder, Thorny Devil
<b>Resource #7</b>	
Topic/Title of Resource	The Botanist of Tomorrow
Web address	<a href="http://www.rbg.ca/greenlegacy/pages/botanists_future.html">http://www.rbg.ca/greenlegacy/pages/botanists_future.html</a>
1-2 sentence description of the resource/site	This site briefly describes the job of botanists in the future.
<b>Resource #8</b>	
Topic/Title of Resource	Important Botanist of the Past
Web address	<a href="http://www.rbg.ca/greenlegacy/pages/botanists_past.html">http://www.rbg.ca/greenlegacy/pages/botanists_past.html</a>
1-2 sentence description of the resource/site	This site describes contributions of previous botanist.
<b>Resource #9</b>	
Topic/Title of Resource	Ituri Forest: The Ways of Knowing
Web address	<a href="http://www.brookfieldzoo.org/pagegen/wok/index_f4.html">www.brookfieldzoo.org/pagegen/wok/index_f4.html</a>
1-2 sentence description of the resource/site	Students take a virtual field trip as they learn an ecosystems and diverse cultures.
<b>Resource #10</b>	
Topic/Title of Resource	
Web address	
1-2 sentence description of the resource/site	

# Worksheet: Science Role Model Page

1. Your Name	
2. Name of the Scientist	
3. Scientist's discipline	
4. Date of birth/Date of death	
5. How did the scientist become interested in his/her field?	
6. Where did s/he go to school?	
7. What did s/he study?	
8. How did s/he train for his/her career?	
9. Where did s/he earn his/her PhD?	
10. What was his/her first professional position?	
11. What barriers did s/he encounter in training or positions?	
12. Does s/he have any advice for students?	
13. Where is s/he working now?	
14. What is the topic of his/her current research?	

List websites related to the role model and his/her work.

Resource #1	
Topic/Title of Resource	
Web address	
1-2 sentence description of the resource/site	
Resource #2	
Topic/Title of Resource	
Web address	
1-2 sentence description of the resource/site	
Resource #3	
Topic/Title of Resource	
Web address	
1-2 sentence description of the resource/site	

## Cooperative Learning Project Rubric A: Process

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Class: \_\_\_\_\_

<b>Group Participation</b>	All students enthusiastically participate	At least 3/4 of students actively participate	At least half the students confer or present ideas	Only one or two persons actively participate
<b>Shared Responsibility</b>	Responsibility for task is shared evenly	Responsibility is shared by most group members	Responsibility is shared by 1/2 the group members	Exclusive reliance on one person
<b>Quality of Interaction</b>	Excellent listening and leadership skills exhibited; students reflect awareness of others' views and opinions in their discussions	Students show adeptness in interacting; lively discussion centers on the task	Some ability to interact; attentive listening; some evidence of discussion or alternatives	Little interaction; very brief conversations; some students were disinterested or distracted
<b>Roles Within Group</b>	Each student assigned a clearly defined role; group members perform roles effectively	Each student assigned a role but roles not clearly defined or consistently adhered to	Students assigned roles but roles were not consistently adhered to	No effort made to assign roles to group members

## Links

[Cooperative Learning](#), from the U.S. Department of Education, offers valuable resources and references on cooperative learning.

**Cooperative Learning Project Evaluation Form A: Process**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Class: \_\_\_\_\_

- Group Participation**
- Shared Responsibility**
- Quality of Interaction**
- Roles Within Group**

COMMENTS:



### Presentation Rubric

Evaluating Student Presentations					
Developed by Information Technology Evaluation Services, NC Department of Public Instruction					
	1	2	3	4	Total
<b>Organization</b>	Audience cannot understand presentation because there is no sequence of information.	Audience has difficulty following presentation because student jumps around.	Student presents information in logical sequence which audience can follow.	Student presents information in logical, interesting sequence which audience can follow.	
<b>Subject Knowledge</b>	Student does not have grasp of information; student cannot answer questions about subject.	Student is uncomfortable with information and is able to answer only rudimentary questions.	Student is at ease with expected answers to all questions, but fails to elaborate.	Student demonstrates full knowledge (more than required) by answering all class questions with explanations and elaboration.	
<b>Graphics</b>	Student uses superfluous graphics or no graphics	Student occasionally uses graphics that rarely support text and presentation.	Student's graphics relate to text and presentation.	Student's graphics explain and reinforce screen text and presentation.	
<b>Mechanics</b>	Student's presentation has four or more spelling errors and/or grammatical errors.	Presentation has three misspellings and/or grammatical errors.	Presentation has no more than two misspellings and/or grammatical errors.	Presentation has no misspellings or grammatical errors.	
<b>Eye Contact</b>	Student reads all of report with no eye contact.	Student occasionally uses eye contact, but still reads most of report.	Student maintains eye contact most of the time but frequently returns to notes.	Student maintains eye contact with audience, seldom returning to notes.	
<b>Elocution</b>	Student mumbles, incorrectly pronounces terms, and speaks too quietly for students in the back of class to hear.	Student's voice is low. Student incorrectly pronounces terms. Audience members have difficulty hearing presentation.	Student's voice is clear. Student pronounces most words correctly. Most audience members can hear presentation.	Student uses a clear voice and correct, precise pronunciation of terms so that all audience members can hear presentation.	
				<b>Total Points:</b>	