

Unit Title: <i>Review of Major Topics (Pests in the City)</i>	Course: <i>Living Environment</i>	Length (# days):	
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Should we eradicate pests in our urban homes . . . or learn to live with them?

Pest treatment and eradication is a complex topic in urban ecosystem studies that draws on most (if not all!) of the topics students have covered in Living Environment: human body systems, pesticide resistance, ecosystem components and dynamics, and genetics. In this unit, students study an urban pest -- lice, roaches, bed bugs, or mosquitoes -- and develop a plan for getting rid of this pest. In the context of doing this work, students may revisit the Living Environment content that they most need to review in the weeks leading up to the exam. They will create an argument for a specific pest management strategy, taking into account science concepts from all of Living Environment that are relevant to their plan.

DESIRED RESULTS

<p>Enduring Understanding(s): Species evolve over time; the evolution of rapidly reproducing organisms like insects can take place very quickly, especially in response to introduction of pesticides and antibiotics.</p> <p>An ecosystem is shaped by the nonliving environment as well as its interacting species. Every population is linked, directly or indirectly, with many others in an ecosystem. Disruptions and environmental changes can upset ecosystem stability.</p> <p>Human beings are a part of Earth’s ecosystems, and human activities may alter ecosystems, causing both positive and negative effects. This is true for large ecosystems, and also small ecosystems like those that household urban pests occupy.</p>	<p>Knowledge: Students will know...</p> <ul style="list-style-type: none"> ● reproductive adaptations ● human impact ● pesticide resistance and evolution ● ecosystem components <ul style="list-style-type: none"> ○ abiotic and biotic factors ○ invasive vs. native species ● human body and homeostasis <p><i>Note: These are all review topics, selected because they are high-frequency on the Living Environment Regents exam. See the review matrix below.</i></p>
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ASSESSMENT EVIDENCE

<p>Summative Assessment - Performance Task</p> <p>Should we eradicate pests in our urban homes ... or learn to live with them? In this unit, students research one urban pest in order to develop a detailed pest management plan for getting rid of this pest in an environmentally friendly way. Use background research and understanding of core Living Environment content to create a "do-it-yourself" pamphlet that will address the possible pest problems of your chosen urban ecosystem (apartment, school, classroom) and outline the environmental and evolutionary effects that your suggested action plans will have. Then, share your action plan with someone from outside school, and gather their feedback/responses to your planning.</p>

[Pests in the City Task Description for Teachers](#)

[Pests in the City Task Description and Research Organizer for Students](#)

[Resource Index](#)

LEARNING PLAN

Essential Questions:

Is it better to get rid of household pests (roaches, bed bugs, lice, mosquitoes), or should we learn to live with them in order to avoid using pesticides in our homes? Is it bad to use pesticides in our homes? Can we make a decision based on pros and cons?

Embedded Regents Review

Note that this unit is designed to be a flexible. After analyzing results from a mock Regents exam (or other baseline data) make targeted decisions about what to emphasize in this unit. There are so many different perspectives on this issue, and it brings together a number of different science topics. Additionally, each part could be explored in more depth and expanded to serve as the starting point for a 6-week LE Regents review course.

The learning plan is divided into these sections:

[Introduction](#): Pests in the City

[Part 1](#): Reproduction and **genetics*** of pests

[Part 2](#): Pests' role in the **ecosystem***

[Part 3](#): Pesticides and pesticide resistance (**evolution/ natural selection**)*

[Part 4](#): Pesticides, Pests, and Human Health (immunity, organ systems, and **homeostasis**)*

*[LE Regents Exam](#) - high frequency topics

Regents Readiness Review Matrix: Pests in the City

Regents Skills →	Cause-Effect <i>Cause and effect relationships</i>	Visual Literacy <i>Interpreting data tables, complex diagrams, and graphs</i>	Discipline Specific Literacy <i>Vocabulary, deconstructing passages & prompts</i>	Hands-on Tasks <i>Laboratory work to reinforce lab skills and re-engage in core content</i>
High Priority Content Topic				
<u>Module 1: Reproduction & Genetics</u>		X	X	Relationships & Biodiversity
<u>Module 2: Ecosystems</u>	X		X	Relationships & Biodiversity
<u>Module 3: Evolution & Natural Selection</u>		X	X	Beaks of Finches
<u>Module 4: Homeostasis</u>	X	X	X	Making Connections Diffusion Across a Membrane
<u>Suggested Group Learning Routines</u>	Read-Generate-Sort-Solve Diagrams & Models	Idea Carousel	Think-Talk-Open Exchange + Buzzwords Sort-List-Label	See-Think-Wonder

Additional Outside Resources for Review:

- [Quizlet](#) - free online flashcards for LE
- [Review Biology.com](#) - free online games, practice questions, & review worksheets
- [YouTube LE](#) - free online review videos

Introduction: Pests in the City challenge

Guiding Question: What kind of pests are a problem in NYC? How do we deal with them?

In this section of the unit, students figure out which pest they are going to study in depth, and this becomes the lens for their review work in the rest of the unit. A teacher may decide to have different groups in the class study different pests, or simply study one urban pest together.

Day	Content Objective	Regents Skill Objective	Resource - Folder of all Unit Resources
½ day	SWBAT express their prior knowledge on urban pests and pest management		Students complete a pre-assessment where they answer questions about a pest they know to be a problem in their home/neighborhood. This open-ended pre-assessment is meant to gather any information or background knowledge students have! Optional additional task: Find one resource or article online about your pest.
½ day	SWBAT collect background information on their selected pest.		Introduce the task: Pests in the City Performance task

Part 1: Reproduction and Genetics of Pests

Guiding Question: How does your pest reproduce?

In this section of the unit, students review reproduction and genetics topics, in the context of learning how their pest reproduces. This topic is relevant because many pest-management strategies hinge on preventing pests from reproducing -- often by eliminating a resource they need to

reproduce (such as standing water for mosquitoes).

[Key Vocabulary from Unit 5](#)
[Regents Item Bank from Unit 5](#)

Day	Content Objective	Regents Skill Objective	Resources and Activity Descriptions									
1 day	SWBAT explain the difference between sexual and asexual reproduction SWBAT understand the process of meiosis and fertilization in sexual reproduction	SWBAT interpret and classify reproduction diagrams (Visual literacy) SWBAT review key reproduction vocabulary (Discipline-specific Literacy)	<p>Sort-list-label directions Students review core concepts in reproduction by sorting, categorizing, and labeling a set of key words and diagrams from the reproduction unit.</p> <p>After students have categorized and labeled their lists of words and diagrams, take the opportunity to clarify understanding and review the processes involved.</p>									
1 - 2 days	SWBAT apply information about reproduction of pests species to develop a pest control strategy	SWBAT interpret texts, highlighting relevant information (Discipline-specific literacy)	<p>Ask students to predict how/where their insect might reproduce. This is a good way to assess what they know, and get them to apply/engage before reading.</p> <p>As students read the text:</p> <ol style="list-style-type: none"> 1) Annotate by indicating haploid (egg or sperm) and diploid cells (zygote) and the point of fertilization. Students can circle words that are unfamiliar so they can be clarified before moving on. 2) Students create a sequence chart on the reproduction and life cycle of their pest, using this graphic organizer. <ul style="list-style-type: none"> • Sequence charts should demonstrate the stages between egg and adult (it's not necessary to show every single stage, but the idea that insects go through several different-looking stages is important here!) <p>Reproduction of different pests:</p> <table border="1" data-bbox="976 1279 1999 1502"> <thead> <tr> <th></th> <th>Digest</th> <th>Additional Resources</th> </tr> </thead> <tbody> <tr> <td>Lice</td> <td>Student text</td> <td>Online text from IPM</td> </tr> <tr> <td>Bed Bugs</td> <td>Student text</td> <td>Traumatic insemination General reproduction</td> </tr> </tbody> </table>		Digest	Additional Resources	Lice	Student text	Online text from IPM	Bed Bugs	Student text	Traumatic insemination General reproduction
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1 day	SWBAT review key concepts involved in reproduction and genetics	SWBAT gather information from diagrams and figures. (Visual Literacy)	<p>Students annotate regents question diagrams on reproduction. After they have annotated the diagrams, provide students with the diagrams and their prompts.</p> <p>This activity can also be done using the Group Learning Routine, Idea Carousel</p> <ol style="list-style-type: none"> 1. In the first round, each poster contains 1 diagram (the diagram only, NOT the prompt) 2. Small groups annotate the diagram (label what they know, ask questions, describe the process, circle what is most important) 3. Each group rotates and annotates other group's posters 4. In the second round, provide the Regents prompt that corresponds with the diagram 5. The group responds to the prompt, providing reasoning on the poster 6. As each group rotates, read all responses - students can agree, disagree, add to the reasoning, or ask new questions 7. The original group reconsiders their response and reasoning once they are back at their poster 8. Share out as a whole class 						

Part 2: Pests' Role in the Ecosystem

Guiding questions: What is your pest's food chain? What is your pest's place in its ecosystem?

In this section of the unit, students review components of ecosystems -- abiotic factors (light, temperature, moisture), biotic factors, and place in the food web.

[Regents Bank from Unit 7](#)

[Key Vocabulary from Unit 7](#)

Day	Content Objective	Regents Skill Objective	Resource - Folder of all Unit Resources															
1 day	SWBAT construct a food chain and identify biotic and abiotic factors in an organism's environment	SWBAT use information from a text to generate a food chain and important components and relationships of an ecosystem (Discipline-specific literacy)	<p>Use the pest information articles below to identify:</p> <ul style="list-style-type: none"> ● Abiotic factors ● Biotic factors ● Predator / prey ● Parasite / host <p>Use one article and an example insect food chain to draw the food chain for your given pest.</p> <table border="1" data-bbox="1056 597 1997 911"> <thead> <tr> <th></th> <th>Digest</th> <th>Additional Resources</th> </tr> </thead> <tbody> <tr> <td>Lice</td> <td>Student text</td> <td>Kids Health Article</td> </tr> <tr> <td>Bed Bugs</td> <td>Student text</td> <td>Bed Bugs article</td> </tr> <tr> <td>Mosquitos</td> <td>Student text</td> <td>Online Article</td> </tr> <tr> <td>Roaches</td> <td>Student text</td> <td></td> </tr> </tbody> </table>		Digest	Additional Resources	Lice	Student text	Kids Health Article	Bed Bugs	Student text	Bed Bugs article	Mosquitos	Student text	Online Article	Roaches	Student text	
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2 - 3 days	SWBAT construct a food web and explain the interdependence between organisms and organisms and their environment	<p>SWBAT interpret diagrams (Visual Literacy)</p> <p>SWBAT use information from a text to generate a food chain and describe cause and effect relationships (Discipline-specific literacy) (Cause-Effect)</p>	<p>Ecosystem</p> <p>Resources on ecosystem components for pests (resources from previous day can be used again, unless additional resource is needed):</p> <ol style="list-style-type: none"> 1. Students work together in groups to create a poster-size diagram that contains all of the biotic and abiotic factors related to their pest - this may include a food web, abiotic & biotic factors, and the relationships between organisms (predator prey, symbiotic, etc) and between organisms and abiotic factors (nesting sites, CO2, temperature, etc) 2. Students complete this handout, answering questions about all the other diagrams in the the room. 3. In small groups of students working on the same pest, use the Group Learning Routine, Read-Generate-Sort-Solve to investigate the cause - effect relationships related to their pest -- in order to begin to draft a pest management plan. 															

1 day	SWBAT review the NYS Lab Relationships & Biodiversity	SWBAT review one of the core concepts involved in the NYS Lab Relationships & Biodiversity in order to apply their thinking to a new prompt related to pests (Hands-on/Lab Skills)	<p>Students investigate the relationship between ecosystem stability and the increase in pest species.</p> <p>Guiding prompt: <i>What is the relationship between biodiversity loss and the increase in pests?</i></p> <ol style="list-style-type: none"> All students review and annotate the article found in NYS Lab Relationships & Biodiversity, <u>The Biodiversity Crisis</u> (p 7 of student packet) In groups of three, jigsaw the following readings: <ul style="list-style-type: none"> Pesticides causing biodiversity loss article Biodiversity loss increasing pests & infectious disease article Climate change and increase in pests article Use the Group Learning Routine, <u>Think-Talk-Open Exchange</u>, to engage students in discussing the guiding prompt Students collaboratively generate a concept map or cause and effect chart to demonstrate the connections between biodiversity loss and the increase in pests.
1 day	SWBAT review ecosystem vocabulary and diagrams	SWBAT interpret diagrams in order to review core vocabulary (Visual Literacy) (Discipline-specific literacy)	<p>Students review ecosystem/food web vocabulary through interacting with a diagram and writing sentences based on the relationships between keywords:</p> <ol style="list-style-type: none"> In pairs/groups students label <u>a diagram</u> of an ecosystem/food web, using the a <u>word bank</u>. Students share work with the class/teacher/other groups and misunderstandings are clarified Students use the diagram and the prompts to create relationship sentences between keywords Ecosystem vocabulary <u>review questions</u>

Part 3: Pesticides and Pesticide Resistance

Guiding Questions: *What happens if we use pesticides to get rid of a pest? Will pesticides be less effective over time?*
As a review of evolution, students will look at how common household pests have evolved resistance to pesticides.
[Unit 8 Regents Item Bank](#)
[Unit 8 Vocabulary](#)

Day	Content Objective	Regents Skill Objective	Resource - Folder of all Unit Resources
2 days	SWBAT explain the process of evolution through natural selection	SWBAT review key evolution vocabulary (Discipline-specific literacy) (Visual Literacy)	<p>Students will explore the evolution of pesticide resistance through natural selection</p> <p>1) Watch a video/animation on drug resistance on silent; name the steps in the process.</p> <ul style="list-style-type: none"> • Antibiotic resistance video <p>2) Interpret visuals depicting pesticide resistance, using the Group Learning Routine, Idea Carousel</p> <ul style="list-style-type: none"> • Diagram 1 • Diagram 2 <p>3) <i>Note: Mosquitos and cockroaches have interesting physiological and behavioral adaptations to resist pesticides. Challenge students to explain the detailed process in these organisms.</i></p> <p>Resources: ‘Super’ Mosquitos Cockroaches that avoid sugary baits</p>
1 day	SWBAT explain the evolution of pesticide resistance	SWBAT respond to an open ended regents prompt on the evolution of resistance (Discipline-specific literacy)	Students work with a partner to address an open ended Regents prompt on pesticide resistance. After reading the prompt, students identify common errors in typical responses. Students discuss the errors and correct information found in the responses to construct an appropriate explanation.

Part 4: Pesticide, Pests, and Human Health (organ systems, toxins, vector born disease & homeostasis)

Guiding Questions: *How do pests impact human health? How can toxins, such as insecticides, used to combat pests affect homeostasis both in humans and other organisms?*

In this portion of the unit, students review immunity and homeostasis by thinking about how pests, such as mosquitos, may be vectors of disease.

**This module draws upon high leverage concepts found in Units 2 - 4.

Unit 2 - [Regents Item Bank](#) [Vocabulary](#)

Unit 3 - [Regents Item Bank](#) [Vocabulary](#)

Unit 4 - [Regents Item Bank](#) [Vocabulary](#)

Day	Content Objective	Regents Skill Objective	Resource - Folder of all Unit Resources
1- 3 days	SWBAT explain the factors that impact the process of diffusion across biological membranes	SWBAT review key concepts and skills from the NYS Lab <i>Diffusion Through A Membrane</i> (Hands-on/Lab Skills)	<p>Students re-engage in a state lab using a new hands-on activity</p> <ol style="list-style-type: none"> 1) Students review the NYS state lab <i>Diffusion Through a Membrane</i> And make predictions about a new activity, using these prompts 2) Students complete the new diffusion lab and tie their findings back To the state lab <p>Depending on student need:</p> <ul style="list-style-type: none"> • Osmosis re-engagement • Macromolecules & indicators
1 day	SWBAT explain how specific immune response differs from non-specific immune response.	SWBAT review key immunity vocabulary using annotation and a graphic organizer (Discipline-specific literacy)	<ol style="list-style-type: none"> 1) Pair up students and provide them with one each of the following re <ul style="list-style-type: none"> • Why mosquito bites itch (non specific immune response) • Guide to West Nile Virus (specific immune response) 2) Students annotate their reading - underlining terms related to immunity and illness 3) Using terms underlined in the reading (and others provided by the teacher) students work together to complete a Venn diagram comparing non and specific immune responses
	SWBAT explain how the immune system helps humans maintain homeostasis.	SWBAT respond to an open ended regents prompt on the immune response (Discipline-specific literacy)	<p>Student pairs complete a sequence chart detailing how the body responds to a mosquito bite (a mosquito transmitting west nile or malaria)</p> <p>Students collaboratively respond to an open ended Regents question on the immune response</p>
	SWBAT explain how multiple systems work together to maintain homeostasis	SWBAT analyze results from an experiment. SWBAT graph data from an experiment. (Hands-on/Lab Skills)	<p>Effect of Toxins on Heart Rate in Daphnia</p> <ul style="list-style-type: none"> • Students use the Group Learning Routine, See-Think-Wonder to surface patterns in collected data <p>An alternative lab: Effect of exercise on heart rate in Daphnia <i>Note: the basic protocol can be used to review experimental design</i></p>

Conclusion: Making a plan

Day	Content Objective	Regents Skill Objective	Resource - Folder of all Unit Resources
			<p>Taking all this information and making a plan</p> <p>Additional Resources (some may be too challenging for general use):</p> <ul style="list-style-type: none">● NYC Dept of health info on roaches.● article on head lice treatment, including pesticide resistance.● head lice treatments - may be good to look at the chemicals listed here, then have students see what chemicals are on the shelf for treating their insect. They may find many of the same chemicals.