Teacher's Guide for ODYSSEY

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Teacher's Note:
This guide contains project ideas, short answer, extended response, fill-in, and true/false with correction. The variation is designed to have the students think critically, as well as to test their comprehension. An answer key to the short answer sections can be found at the end of the guide.

Extended Response: Comprehension & Critical Thinking
The questions below can be used as written, simply answered in complete sentences or easily transformed into longer essay (ELA) style questions, or even research topics. In any case, have the students support their answers with details from the text or use critical thinking skills to create a thorough and interesting answer. The questions, essays and projects have been aligned with the **Common Core Standards**. Consider the level of your students when deciding how to use the questions.

"How to Read a Building" p. 6-9
Choose the correct name of the building for each statement. You may use an answer more than once.

Lincoln Memorial **National Museum of the American Indian**
Institute of Peace **Washington DC Castle**
Supreme Court Building **Library of Congress**
Capitol Building

_____ 1. This magnificent red sandstone fortress once housed science laboratories, lecture halls, libraries, and a museum gallery in its great hall.

_____ 2. The flame of knowledge atop the dome is a clue to the purpose of this building.

_____ 3. This building was designed to resemble a Greek temple and is decorate with ancient symbols of unity and strength.

_____ 4. One of the most famous landmarks in America, this building houses the meeting chambers for the Senate and the House of Representatives.

_____ 5. This roof suggests a dove's wings, the perfect symbol for this building.

_____ 6. Visitors must climb 145 steps to gaze at the massive statue of this former president.

_____ 7. The motto, "Equal Justice Under Law" greets visitors to this building.

_____ 8. A bronze Statue of Freedom crowns this building.

_____ 9. The rounded form of the rough limestone looks like it was carved by nature's forces of wind and water.

_____ 10. The architect's design of this building conveys authority and dignity of the judicial branch of our government.

"Zaha Hadid" p. 10-13

1. Explain the early life and influence of Zaha Mohammed Hadid.
2. Why did growing up in region known as the cradle of civilization have an enormous impact on Hadid?
3. When did Hadid know she wanted to become an architect? Why?
4. When did Hadid's family leave Iraq?
5. What was Hadid's experience at the Architectural Association School of Architecture?
6. How did Hadid go from student to architect?
7. Describe Hadid's first building that actually got built?
8. Despite a successful start, why did Hadid think about quitting architecture in 1995?
9. When did Hadid's design practice take a giant leap?
10. Describe Hadid's architectural designs.
11. When and why was Hadid awarded architecture's most prestigious award, the Pritzker? Why was it so monumental?
12. ***Opinion:*** Why do you think that Hadid dedicates time to teaching?
13. How has Hadid's work evolved over the years?

"Creature Comforts" p. 14-16
Match the term with the correct definition.

1. Biophilia — A. Systems modeled on living processes

2. Biomorphisim — B. An appreciation for life and the living world.

3. Biomimicry — C. Using the forms/shapes/patterns of living things.

4. Describe the features of biophilic designs.
5. Describe the features of biomorphic designs.
6. What are biomimetric architects interested in?
7. What are the advantages for architects when borrowing from the B's?

"Building for Pests" p. 17-20

1. When did our ancestors move house from temporary, tent-like structures to more enduring abodes that might last a lifetime or longer?
2. Why are the stables at Versailles overwhelmingly glamorous?
3. Why does the definition of 'pest' vary from country to country, city to city, and even person to person?
4. Why does Hwang want the homes she designs for bats, bees, squirrels, and other critters to look cool and beautiful?
5. How are bats helpful to humans?
6. Why does Hwang think that it is still important to build bat houses, even though she knows that the bats may not inhabit them?
7. What was Fritz Haeg commissioned by the Whitney Museum of Art in New York City to make? How did he do it?
8. What is the goal of Haeg's Animal Estates?
9. Explain how Haeg's building tactics essentially opposite for Hwang's?
10. How does NYU's Krinsky define architecture?
11. What is the aim of both Haeg and Hwang?

"Amorous Architects" p. 21-23
Mark the following statements TRUE or FALSE. Provide the correct answer if false.

_____ 1. Bowers are elaborate structures that bowerbirds make for nesting eggs.

_____ 2. Bowerbirds live in New Guinea and Australia, and 17 out of 20 species make bowers.

_____ 3. The females build the arbor-like structures out of sticks, and depending on the species, decorate them with an assortment of stones, shells, flower petals, beetles, and berries.

_____ 4. The female bowerbird judges the male suitor as a builder, decorator, dancer and imitator.

_____ 5. Factors that determine how likely a male is to mate includes neatness, intelligence and the quality of the bower and the number of decorations.

_____ 6. Symbolic selection is a behavior that has evolved because it aids an organism's ability to successfully mate.

"Saving Falling Water" p. 24-27

1. What 4 materials is Fallingwater made from?
2. How was Wright's design, though bold and innovative, also flawed?
3. Who was Fallingwater originally built for?
4. What was the relationship connection between Edgar jr. and Wright?
5. Explain how Wright's design differed from traditional buildings.
6. What problem arose from a simple fact about cantilevers?
7. What change did the engineering firm on the project insist on making? Why was this significant?
8. What was the goal of the Western Pennsylvania Conservancy and Robert Silman Associates in 1995?
9. How did the workers begin repair?
10. Explain the process of 'post-tensioning'. Why was this a perfect solution for the problems at Fallingwater?

"The Galloping Gertie" p. 28-31

Read the article in its entirety and then fill in the blanks. Refer back to the text if necessary.

1. _____ bridges stretch across large open bodies of water.

2. The Tacoma Narrows Bridge was the third-longest suspension bridge in the _____ when it was completed in July of 1940.

3. Upon noticing unusual movement on Tacoma Narrows Bridge, _____ were made to the bridge as the design was reevaluated.

4. All bridges are subject to _____ three laws of motion.

5. Newton's First Law states that an object at rest will stay at rest unless acted upon by an _____ force.

6. Newton's Second Law states that the force on an object is equal to its mass times _____.

7. _____ is an acceleration that causes a force upon a bridge and its parts.

8. Newton's Third Law states that every action has an _____ and _____ reaction.

9. _____ is one of the two primary forces at work on a suspension bridge. The other primary force is _____.

10. Suspension bridges make use of the strongest, most _____ materials possible.

11. A _____ must be reached between the weight of the structure alone and the weight of the bridge with the live load.

12. The four main components of suspension bridges are abutments, cables, the deck, and _____.

13. The _____ in particular is an important part of the load on long bridges that stretch across open expanses of water.

14. Every bridge is designed so that there is a bit of 'play': an allowance for the bridge to have a bit of _____ and still function.

15. Professor Farquharson discovered that it was possible that Galloping Gertie would fail if the conditions caused a twisting of the _____.

16. Ultimately, Galloping Gertie failed because the swaying caused the bridge to become _____ beyond what it had been designed to tolerate.

17. The Galloping Gertie collapse led to a deeper appreciation of the effect of _____ forces upon a bridge and for wind tunnel testing to be an integral part of the design process today.

"Robots at Work" p. 40-41

1. What is 'contour crafting'?
2. How is a robot arm useful in assembling inclusions?
3. How have colonies of social insects (termites) inspired a more portable approach to construction?
4. Compare and contrast some of the robotic building approaches that are discussed in the article.

ANSWER KEY

"Read a Building"

1. *Washington DC Castle*
2. *Library of Congress*
3. *Lincoln Memorial*
4. *Capitol*
5. *Institute of Peace*
6. *Lincoln Memorial*
7. *Supreme Court*
8. *Capitol*
9. *National Museum of the American Indian*
10. *Supreme Court*

"Creature Comforts"

1. *B*
2. *C*
3. *A*

"Amorous Architecture"

1. *False, for wooing females*
2. *True*
3. *False, males*
4. *True*
5. *True*
6. *False, sexual selection*

"Galloping Gertie"

1. *Suspension*
2. *world*
3. *modifications*
4. *Newton's*
5. *unequal*
6. *acceleration*
7. *gravity*
8. *opposite and equal*
9. *tension, compression*
10. *light-weight.*
11. *balance*
12. *towers*
13. *wind*
14. *movement*
15. *deck*
16. *imbalanced*
17. *aerodynamic*