INSTRUCTIONAL GUIDE

Including Essential Questions and Common Core Connections

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Industrial Design: Why Smartphones Aren’t Round and Other Mysteries with Science Activities for Kids

In Industrial Design: Why Smartphones Aren’t Round and Other Mysteries with Science Activities for Kids, readers ages 10–15 engage in and learn about the engineering design process from its earliest beginnings, when individuals designed and crafted their own tools, to today, when engineers work to find the best design for products that are then manufactured in bulk by automated machines. Throughout Industrial Design, inquiry-based activities, essential questions, links to online primary sources, and an extensive engineering glossary all serve to highlight the importance and beauty of engineering design and the role it plays in our world.

Industrial Design is part of the Technology for Today set of four STEM books that explore the digital landscape of today and tomorrow. Other titles in this set include Artificial Intelligence, Big Data, and Projectile Science.

Learn more about Industrial Design at nomadpress.net/nomadpress-books/industrial-design/

Age: 10–15
Grade: 5–10
Softcover: 9781619306721, $17.95
Hardcover: 9781619306707, $22.95
eBook: all formats available, $12.99
Specs: 8 x 10, 128 pages, color interior
Focus: Engineering & Technology
GRL: Z
ESSENTIAL QUESTIONS TO ASK

BEFORE READING

1 Establish Background Knowledge
   a What do you already know about industrial design?
   b Are there products that you use every day that you wish were a little different? How would you change them?
   c What questions should designers be asking when they consider a new product?

2 Skill Introduction
   a What do you do when you come to a word or phrase you do not know?
   b How do photographs and videos help someone learn about a topic?

CCC: CCSS.ELA-Literacy.SL.7.1a Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

DURING READING

1 Check for Understanding
   a What objects have you used today that were influenced by industrial design?
   b What’s the difference between mass producing an item and crafting individual items? Why has the world moved from crafting to mass producing?
   c How does nature influence design?
   d Why is the engineering design process useful?

CCC: CCSS.ELA-Literacy.RH.6-8.3 Identify key steps in a text’s description of a process related to history/social studies (e.g., how a bill becomes law, how interest rates are raised or lowered).

You can watch a 1956 Today Show television interview with Ray and Charles Eames about their innovative chair design at this website.
https://www.youtube.com/watch?v=IIEb4HcgZ4s
ESSENTIAL QUESTIONS TO ASK

1. Summary and Expansion
   
a. How does storyboarding work in the design process? Why are drawings and sketches an important part of design?

b. How have 3-D printers changed the world of industrial design?

c. Why is testing an important part of design? Who should test products?

d. How does the look and feel of a product affect its usefulness and functionality? Would you buy an item that wasn’t attractive?

e. How has technology changed from last century to this century? Do you think the pace of change has sped up?

f. Are advances in industrial design always positive? Can you think of designs that have not been beneficial to humans?

g. How is industrial design changing health care? Can you think of some examples of things that are possible now that weren’t possible 50 years ago?

CCC: CCSS.ELA-Literacy.L.7.5 Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

CCC: CCSS.ELA-Literacy.SL.7.2 Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

CCC: CCSS.ELA-Literacy.RH.6-8.7 Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.

COMMON CORE CONNECTIONS

Grade: 7 Language CCSS.ELA-Literacy.L.7.3,4,4a,4b,4c,5,5c,6

Grade: 6-8 History/Social Studies CCSS.ELA-Literacy.RH.6-8.1,2,3,4,5,6,7,8,9,10

Grade: 6-8 Science & Technical Subjects CCSS.ELA-Literacy.RST.6-8.1,2,3,4,5,6,7,8,9,9

Grade: 7 Speaking & Listening CCSS.ELA-Literacy.SL.7.1,1a,1c,1d,2,3,4,5,6

Grade: 7 Writing HST CCSS.ELA-Literacy.WHST.6-8.1,2,4,6,7,8,9,10
Grade: 7 Language
CCSS.ELA-Literacy.L.7.3,4,4a,4b,4c,4d,5,5b,6
3 Use knowledge of language and its conventions when writing, speaking, reading, or listening.
4 Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 7 reading and content, choosing flexibly from a range of strategies.
4a Use context (e.g., the overall meaning of a sentence or paragraph; a word’s position or function in a sentence) as a clue to the meaning of a word or phrase.
4b Use common, grade-appropriate Greek or Latin affixes and roots as clues to the meaning of a word (e.g., belligerent, bellicose, rebel).
4c Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.
4d Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).
5 Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
5b Use the relationship between particular words (e.g., synonym/antonym, analogy) to better understand each of the words.
6 Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Grade: 6-8 History/Social Studies
CCSS.ELA-Literacy.RH.6-8.1,2,3,4,5,7,8,9,10
1 Cite specific textual evidence to support analysis of primary and secondary sources.
2 Determine the central ideas or information of a primary or secondary source; provide an accurate summary of the source distinct from prior knowledge or opinions.
3 Identify key steps in a text’s description of a process related to history/social studies (e.g., how a bill becomes law, how interest rates are raised or lowered).
4 Determine the meaning of words and phrases as they are used in a text, including vocabulary specific to domains related to history/social studies.
5 Describe how a text presents information (e.g., sequentially, comparatively, causally).
7 Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.
8 Distinguish among fact, opinion, and reasoned judgment in a text.
9 Analyze the relationship between a primary and secondary source on the same topic.
10 By the end of grade 8, read and comprehend history/social studies texts in the grades 6–8 text complexity band independently and proficiently.

Grade: 6-8 Science & Technical Subjects
CCSS.ELA-Literacy.RST.6-8.1,2,3,4,5,6,7,8,9,9
1 Cite specific textual evidence to support analysis of science and technical texts.
2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
5 Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
6 Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
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Grade: 7 Speaking & Listening
CCSS.ELA-Literacy.SL.7.1,1c,1d,2,3,4,5,6
1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others’ ideas and expressing their own clearly.
1c Pose questions that elicit elaboration and respond to others’ questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.
1d Acknowledge new information expressed by others and, when warranted, modify their own views.
2 Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.
3 Delineate a speaker’s argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.
4 Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.
5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.
6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (See grade 7 Language standards 1 and 3 here for specific expectations.)

Grade: 6-8 Writing HST
CCSS.ELA-Literacy.WHST.6-8.1,2,4,6,7,8,9,10
1 Write arguments focused on discipline-specific content.
2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
6 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
9 Draw evidence from informational texts to support analysis, reflection, and research.
10 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
Mind mapping is one technique that people use to brainstorm and generate ideas. A mind map is a diagram that links words, concepts, objects, or tasks to a central idea or subject. It is an easy way to brainstorm without worrying about order and structure.

- **To start**, get a large piece of paper and several different-colored pens or pencils. In the center of the paper, describe the problem to be solved by industrial design in one to three words. Circle it.

- **Next**, think of words that are related to your original word or idea. Write these words on the paper around the original word. Circle them and draw a line from their circle to the original circle. Keep adding words until you can’t think of any more.

- **Once you’ve run out of words that connect to the original circle**, repeat the process for each circle in your second group of circles. Repeat until the paper is filled. Remember that the goal of mind mapping is to generate as many words and ideas as possible within a short period of time.

- **Review the words and ideas that you generated**. Does the process of mind mapping help you come up with a design solution to your problem? Do you feel comfortable with this method of brainstorming?

**Try This!**

Investigate other brainstorming techniques. Which one works the best for you?
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