North Dakota Grade 3 to Grade 4 Engineering Design Summer Bridge Workbook

Engineering Design: Review, Readiness, and Practice

Dr. A. Nazari

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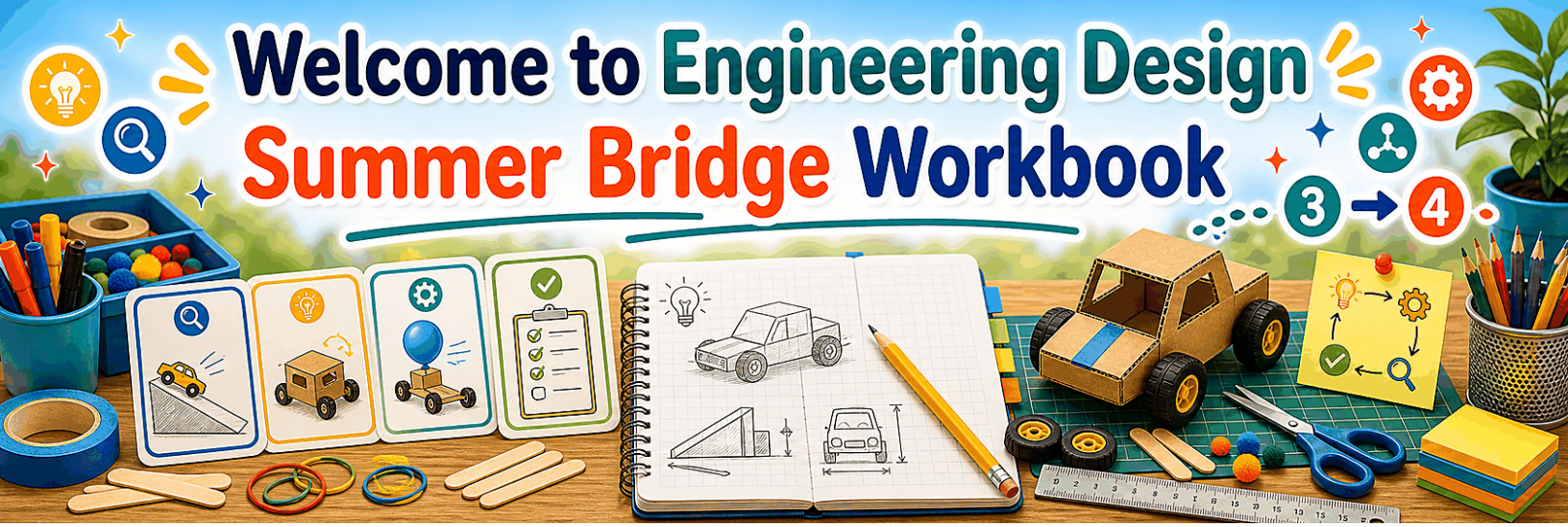
Welcome to Engineering Design Summer Bridge Workbook



A practice notebook for growing from Grade 3 design skills into Grade 4 readiness.

This bridge workbook gives students space to practice and stretch. It begins with Grade 3 engineering design review, then adds readiness work where students explain decisions more clearly and use evidence more carefully.

Review and practice

- name the problem before the solution
- mark criteria and constraints
- compare choices fairly
- read test data closely
- write short improvement reasons

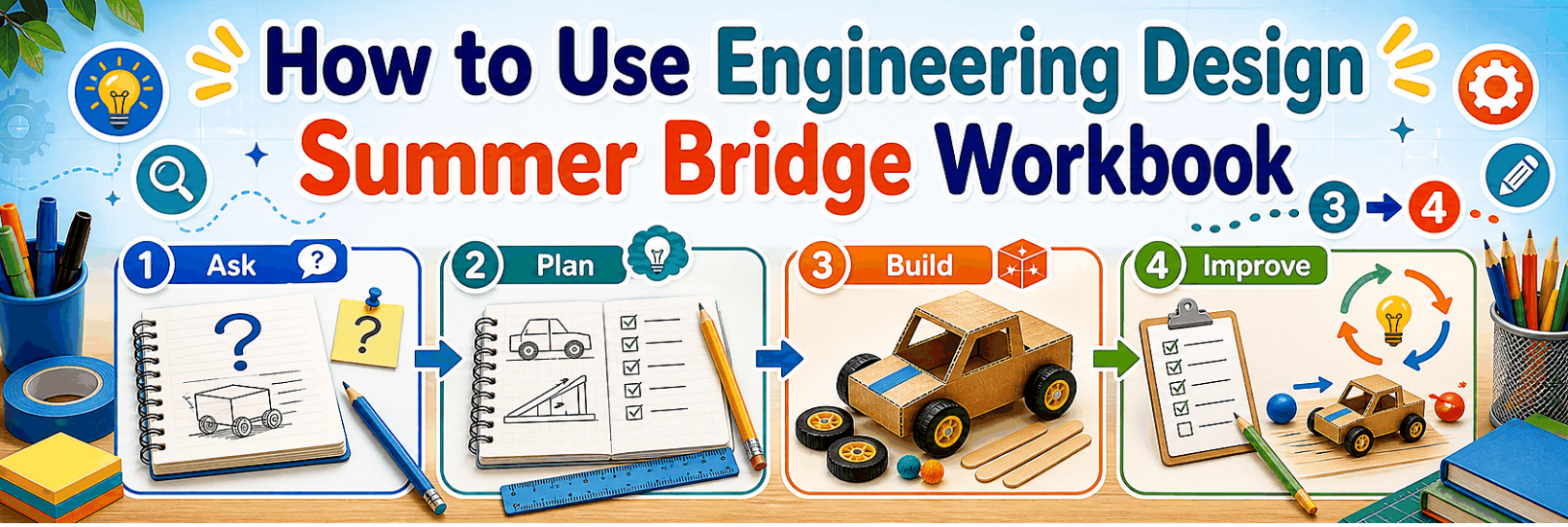
Readiness habits

- make notebook-style observations
- connect research to brainstorms
- defend choices with evidence
- keep test variables controlled
- plan the next version of a design

Use the page like a designer's notebook

Students should mark clues, try every question, and correct with evidence. A good engineering answer does not need to be long; it needs to match the problem, the criteria, the constraints, or the test results.

How to Use Engineering Design Summer Bridge Workbook



Use each page to practice a small design move.

This workbook mixes review with readiness. Students practice Grade 3 engineering design and then try Grade 4-style thinking in small steps: clearer problem statements, better evidence, fairer tests, and stronger improvement plans.

Daily work	Complete one page. Read the problem carefully, mark the important design clue, and answer before checking.
Mixed review	Use the weekly page to switch between review and readiness. Students may define, compare, test, and improve on the same page.
Best pace	Plan for about 15–20 minutes. Extra time should go to explaining the reason, not doing more pages.
After checking	Correct missed answers and write one quick note: problem, rule, test, or fix. That note names what to remember.

Notice

Mark what matters in the problem, picture, decision table, or test data.

Use

Use the design process: define, brainstorm, compare, test, and improve.

Grow

Add one Grade 4 readiness habit, such as stronger evidence or a clearer next step.

For students

Use small notes and marks. If you change an answer after checking, write why. That is how designers improve a first idea.

For parents and teachers

Ask for one sentence of evidence: "I chose this because..." Keep the focus on design reasoning, not on memorizing a long explanation.

My Bridge Workbook Progress

Track review lessons, readiness lessons, and each Friday mixed-review score.

5 review weeks | 3 readiness weeks | 8 Friday reviews

This grade 3 to grade 4 science summer bridge workbook belongs to: _____

Week	Focus	Mon	Tue	Wed	Thu	Friday Review
1	Defining Design Problems and Comparing Solutions	☐	☐	☐	☐	____ / 10
2	Comparing Solutions and Testing and Improving Mix	☐	☐	☐	☐	____ / 10
3	Defining Design Problems and Comparing Solutions	☐	☐	☐	☐	____ / 10
4	Testing and Improving and Defining Design Problems	☐	☐	☐	☐	____ / 10
5	Defining Design Problems and Comparing Solutions Mix	☐	☐	☐	☐	____ / 10
6	Grade 3 Review and Grade 4 Preview	☐	☐	☐	☐	____ / 10
7	Grade 4 Preview: Generating and Comparing Solutions and Fair Tests and Failure Points	☐	☐	☐	☐	____ / 10
8	Grade 4 Preview: Defining Design Problems and Generating and Comparing Solutions	☐	☐	☐	☐	____ / 10

Reflection Notes

A design idea that feels strong: _____

A design idea to practice again: _____

Table of Contents

Here's what we'll explore together!

Let's learn and have fun!

WEEK

1

Defining Design Problems and Comparing Solutions

Practice this week's science ideas.

This Week's Days

Answer Key & Explanations

Check the answer first, then read the explanation to see the evidence or reasoning.

Week 1 Day 1: Problems, Needs, and Wants

Answers

1. B
2. A
3. C
4. True
5. False
6. True
7. problem
8. need
9. solutions
10. yes
11. See Explanation
12. See Explanation

Explanations

1. The problem names the need, crossing safely, before choosing a bridge as the solution.
2. Changing from paper maps to phone maps shows that people improve technology as needs change.
3. A solution is the object, tool, process, or system designed to solve the problem.
4. Engineers often begin by asking what people need or want to improve.
5. A bridge is already one possible solution; the problem is that people need to cross safely.
6. Engineering solutions can be many kinds of designs, not only objects.
7. A problem is the need or want that starts engineering work.
8. Keeping dry can be stated as the need before choosing an umbrella or roof design.
9. Solutions are the designs engineers create after the problem is clear.
10. The example shows a newer solution replacing an older one.
11. It names a solution too early. A stronger problem statement says that people need to cross the stream safely.
12. A good problem statement names the need, such as students need a way to carry books safely without dropping them.

Week 1 Day 2: Criteria and Constraints

Answers

1 A | 2 C | 3 A | 4 True | 5 False | 6 True | 7 criteria
8 constraints | 9 time | 10 yes | 11 See Explanation | 12 See Explanation

Explanations

1. A criterion tells what success looks like, such as holding five books.
2. Using only classroom materials is a limit on how the design can be made.
3. Testable criteria let engineers decide whether a solution really met the goal.
4. Those limits affect what solutions are possible.
5. Criteria should describe success that can be checked, not a preference by itself.
6. Using the same success rules makes the comparison fair.
7. Criteria describe what the finished solution must do.
8. Constraints are the limits engineers must work within.
9. Time is a common limit, along with materials and cost.
10. Checkable criteria help people judge whether the design worked.
11. Both parts are criteria because they state what the successful feeder must do.
12. A materials limit is a constraint, so the team must choose designs that can be made with those materials.

Week 1 Day 3: Define Your Own Problem

Answers

1 B | 2 A | 3 B | 4 True | 5 False | 6 True | 7 user | 8 criteria

9 constraints | 10 yes | 11 See Explanation | 12 See Explanation

Explanations

1. It names the need and includes a constraint, so a team could start designing.
2. The user is the person or group that has the need.
3. Criteria and constraints tell the team what success means and what limits apply.
4. Many design problems need several success rules.
5. Teams need to know constraints so they can design within the limits.
6. Clear problem statements give enough information for others to begin designing.
7. The user is the person or group the design is meant to help.
8. Criteria tell how the design will be judged, so they act as the success rules.
9. Constraints describe limits such as materials, time, or cost.
10. A design may need to meet more than one success rule.
11. It should include the user, the need or want, the criteria for success, and the constraints.
12. A partner can check whether the need, criteria, and constraints are clear enough to start designing.

Week 1 Day 4: More Than One Way

Answers

1 A | 2 A | 3 A | 4 True | 5 False | 6 True | 7 research

8 brainstorm | 9 sketch | 10 peers | 11 See Explanation | 12 See Explanation

Explanations