# Washington Grade 3 Engineering Design Summer Workbook

*Engineering Design: Practice and Readiness*

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Published by View Math Education
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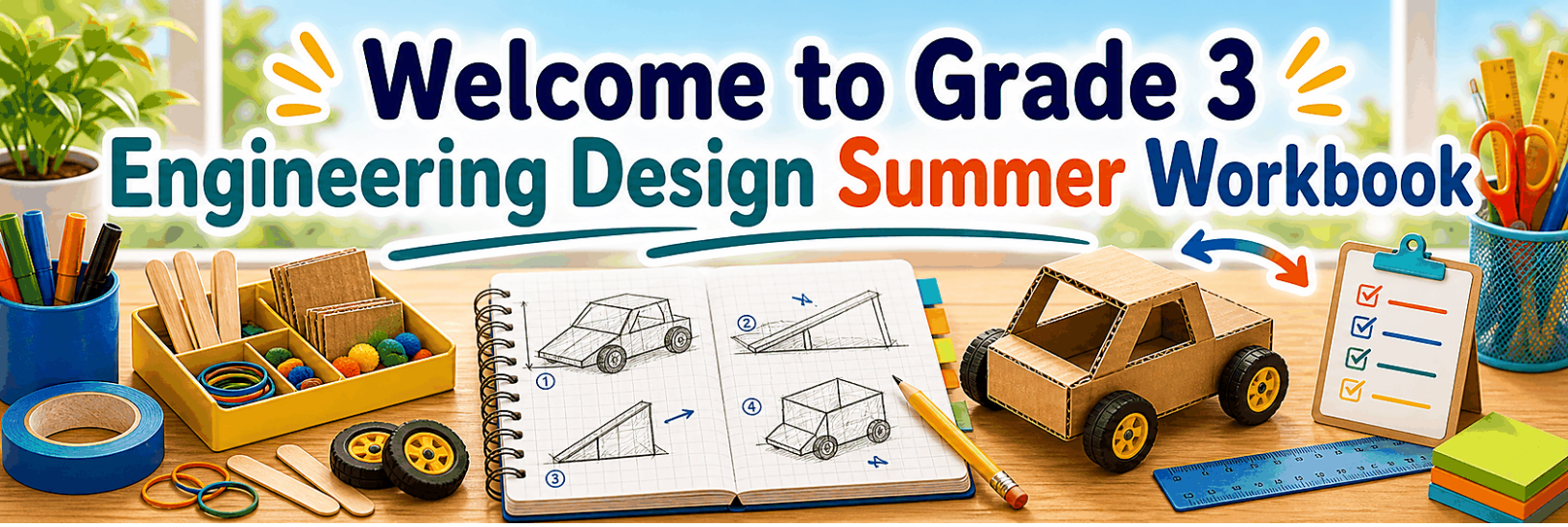
# Welcome to Grade 3 Engineering Design Summer Workbook



## A hands-on Grade 3 engineering workbook for practicing design decisions.

This workbook gives students regular practice with the choices engineers make: What problem are we solving? What counts as success? What limits do we have? Which solution works best, and what should we improve after testing?

### What students build on

- writing clear design problems
- sorting criteria from constraints
- sketching and comparing ideas
- reading test results from data
- choosing fixes that match evidence

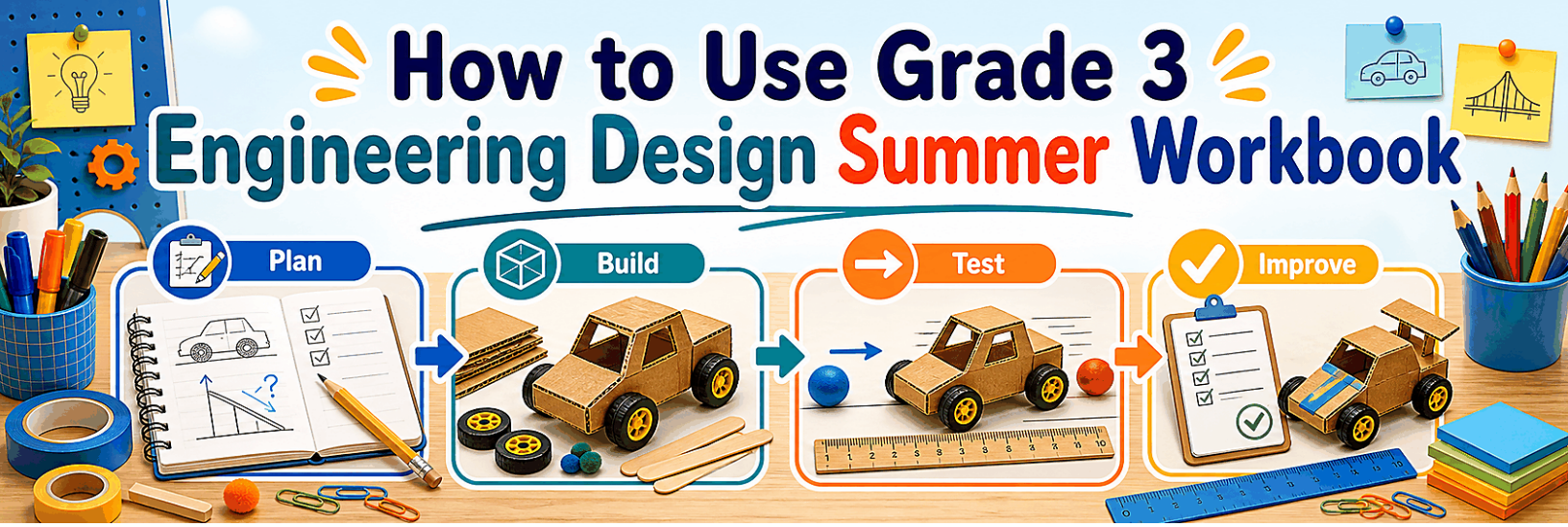
### What students do

- answer short practice sets
- complete quick design charts
- use diagrams, models, and tables
- explain choices in simple sentences
- review mixed questions each week

**Practice like a designer**

Designers learn by trying, checking, and improving. Encourage students to mark evidence in the question, choose an answer, and then use the explanation to make their next design decision stronger.

# How to Use Grade 3 Engineering Design Summer Workbook




## Use the workbook to practice decisions, not just answers.

Each page asks students to use one part of the design process. Some questions ask for a best answer. Others ask students to explain, sort, compare, or choose an improvement from evidence.

| | |
|---|---|
| **Daily work** | Complete one practice page. Underline the problem, circle a criterion or constraint, and look carefully at any diagram or table. |
| **Mixed review** | Use the end-of-week page to connect the ideas. Students may need to define, compare, test, and improve in the same sitting. |
| **Best pace** | Plan for about 15–20 minutes. If a page feels hard, pause after one section and return later. |
| **After checking** | Read explanations for missed items. Ask, "What evidence should I have used?" Then correct the work. |

### Find

Find the need, want, rule, limit, or test result that matters most for the question.

### Decide

Compare choices by the same criteria and constraints. Do not pick just because an idea sounds fun.

### Improve

When a design fails, name the failure point and choose a fix that matches the evidence.

### For students

Show your thinking with small marks: circle, underline, or jot one word. A designer's notebook is useful because it keeps track of evidence.

### For parents and teachers

Ask, "Which rule or result helped you decide?" If the student is stuck, point back to the problem, criteria, constraints, or data table.

# My Science Workbook Progress

Track each practice day, then write the Friday mixed-review score.

8 weeks | 32 practice days | 8 Friday reviews

This grade 3 science summer 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 | Testing and Improving and Defining Design Problems | ☐ | ☐ | ☐ | ☐ | ____ / 10 |
| 7 | Comparing Solutions and Testing and Improving | ☐ | ☐ | ☐ | ☐ | ____ / 10 |
| 8 | Defining Design Problems 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. B
3. B
4. True
5. True
6. True
7. solution
8. want
9. user
10. students
11. See Explanation
12. See Explanation

### Explanations

1. The correct choice names the need before choosing materials, colors, or a final design.
2. A need is important for safety or daily work, while a want may only be helpful.
3. Wet backpacks show the shelter is not meeting the user need during rainy weather.
4. Starting with the problem helps the solution match the real need instead of a guess.
5. A want may make a design nicer, but it is not the most necessary need.
6. Engineers check the user and need so the design solves the right problem.
7. A solution is the design made to solve a problem or meet a need.
8. A color choice may be nice, but it is usually not required for safety or daily work.
9. The user is the person or group the solution is designed to help.
10. Students are the users in the playground rain shelter example.
11. It names one solution too early. A stronger statement explains that students need a way to stay dry.
12. The wet lunches show the current shelter does not protect belongings, so the problem is real and specific.

## Week 1 Day 2: Criteria and Constraints

### Answers

1 A | 2 C | 3 B | 4 True | 5 True | 6 False | 7 criterion
8 constraint | 9 meet criteria | 10 materials | 11 See Explanation
12 See Explanation

### Explanations

1. A criterion tells what success looks like, such as working safely.
2. A constraint is a limit, and using only cardboard limits the materials.
3. Using only ten craft sticks is a material limit, so it is a constraint.
4. The rules and limits give each design the same target to meet.
5. Safety describes what the solution must do well, so it can be a success rule.
6. Constraints are limits, while criteria are the success goals for the design.
7. A criterion is one rule for judging whether the solution works.
8. A constraint limits materials, time, cost, size, or another part of the design.
9. Criteria describe the jobs the solution must do, so engineers try to meet them.
10. A materials constraint tells which supplies are allowed or limited.
11. The same rules and limits are used for both designs, so the comparison is based on evidence.
12. The team should check the size constraint and revise the design so it fits the desk.

## Week 1 Day 3: Define Your Own Problem

### Answers

1 B | 2 B | 3 B | 4 True | 5 True | 6 False | 7 problem

8 materials | 9 criterion | 10 user | 11 See Explanation | 12 See Explanation

### Explanations

1. The clear statement names the user need and includes a useful limit.
2. A strong statement names the need and gives rules and limits for the solution.
3. This statement names the need and limit without choosing one final design.
4. If the statement does not pick one design too early, teams can compare ideas.
5. Choosing one design too soon can keep the team from comparing different ideas.
6. The user matters because the solution is designed to help that person or group.
7. Defining the problem gives the design work a clear target.
8. Materials are a common constraint because teams may only use certain supplies.
9. A criterion tells how engineers will judge whether the solution works.
10. The user is the person or group the design is meant to help.
11. The need tells what to solve, and the limit tells what the team must work within.
12. A better problem is: students need a way to keep markers sorted using available classroom materials.

## Week 1 Day 4: More Than One Way

### Answers

1 A | 2 B | 3 A | 4 False | 5 True | 6 False | 7 sketch

8 more than one | 9 parts | 10 brainstorm | 11 See Explanation

12 See Explanation

### Explanations