CHAPTER 6

CHOOSING TASKS

The Heart of a Lesson

Frustrated, Jessica stared at the mathematics standard and the lesson seed idea provided by her school district (Figure 6.1):

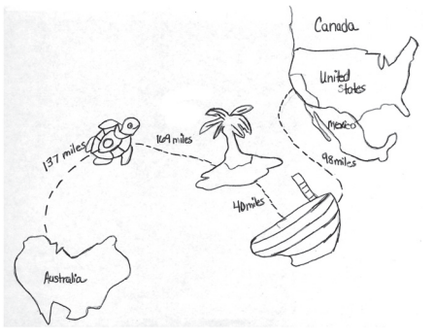
Figure 6.1

Standard	Lesson Task
Add up to four two-digit numbers using place value models.	Jacob was on vacation at the beach with his family and found 23 seashells on the beach on Monday. On Tuesday, he found 13 more. On Wednesday, he found 34 seashells. How many seashells did Jacob find?

"This is just not going to work," she said to herself. Her students did not take beach vacations, and most of them had probably not held a seashell. She needed to make sure she used a task that reflected the students' interests and experiences. Lately, they had been completely obsessed with the *Finding Dory* movie. Even students who had not seen the movie seemed intrigued with the Dory stickers she had brought in to share with them. Jessica knew that this task needed to match the standard, be interesting to the students, be robust, and promote productive struggle. She also wanted the students to be able to create a mathematical argument. After several revisions, Jessica decided on the task shown in Figure 6.2.

Figure 6.2

This is a map of Dory's travels.



Dory thinks she will travel a total of 326 miles. Can you help Dory figure out if she is correct? Use place value to prove your thinking, and explain why she is or is not correct.

Source: Jessica Steinbacher, Stevenson University.

Jessica decided to present the task and ask them to solve it in pairs and small groups. She was so excited to share this task with students, she could hardly wait!

A worthwhile task is the heart of a lesson. In fact, selecting the task is the most important decision teachers make that affects instruction (Lappan & Briars, 1995; Smith & Stein, 2011). This chapter will address the following questions:

- Why are tasks important?
- What is a worthwhile task?
- How do you adapt a task?
- What are some sources for worthwhile tasks?

WHY ARE TASKS IMPORTANT?

Effective teachers understand that the **tasks** they choose influence how their students make sense of mathematics. Tasks should challenge students to explore mathematical concepts; they should not be designed simply to have children work to get the right answer. Getting students to use **higher-order thinking skills,** such as those from Bloom's Taxonomy (create, evaluate, apply, and so forth), is a hallmark of a worthwhile task. As you plan your lessons, be sure to select tasks to reach this goal. Consider the following two examples.

Example 1: Jennifer

Jennifer gives her first-grade students this challenge:

> There are 7 candy bars on two tables. Draw a picture to show how the 7 candy bars can be arranged on the two tables. Can you find more than one way? How many ways do you think there are?

Example 2: Carlos

Carlos asks his first graders the following question:

> John has 4 apples and Maria has 3 oranges. How many pieces of fruit do John and Maria have altogether?

These two examples illustrate the types of questions that teachers ask students all the time. However, only one is an example of a worthwhile task. The following section will identify the characteristics of a worthwhile task.

WHAT IS A WORTHWHILE TASK?

There are eight characteristics of worthwhile tasks:

1. Uses significant mathematics for the grade level
2. Rich
3. Problem solving in nature
4. Authentic/interesting
5. Equitable
6. Active
7. Connects to the Process Standards
8. High cognitive demand

Take a look at each feature in more detail.

Uses Significant Mathematics for the Grade Level

The big ideas, essential questions, and standards from your lesson should be your guiding light for finding a worthwhile task; these three elements keep your lesson plan coherent. Tasks based on significant mathematics focus on students' understandings and skills, and they stimulate students to make sense of the mathematics they are learning. A task should take into account students' prior knowledge and the understandings and skills already taught at this grade level or previous grades.

Rich

Each task should be challenging, requiring students to use higher-order thinking skills. Smith and Stein (1998) refer to this kind of task as a *high cognitive demand task*. A **high cognitive demand** task encourages students to represent their thinking in multiple ways, explore various solution pathways, and connect procedures to mathematics. The task selected invites students to "do" the mathematics.

A rich task also has the potential for students to make connections and extend their thinking. Students must regulate their thinking and monitor their ideas and strategies to solve the problem.

As you evaluate the success of your tasks, keep this in mind: If students immediately know the answer, then the task was not challenging.

Problem Solving in Nature

When a task is problem solving in nature, students will not know how to immediately and routinely solve it. They will need to reason and develop a new strategy or try previously learned strategies to seek a solution. Simply applying an algorithm to arrive at the answer is not problem solving. **Productive struggle** is a hallmark of problem solving. This means that students wrestle with a solution strategy and must apply effort to make sense of the mathematics—to figure something out that is not obvious. The challenge may not come easy to them, but they persevere. Good problems have multiple entry points so that all students have an opportunity to learn.

Authentic/Interesting

An authentic and interesting task is one that represents mathematics as a useful tool for navigating the real world. It captures students' curiosity and invites them to wonder and make conjectures. Authentic/interesting tasks prompt classroom discourse and pique student interest either through the topic or the method of engagement. This does not mean that the task must be real world. In fact, many young children are just as interested in fanciful stories that stimulate their curiosity.

Equitable

When a task is equitable, it has multiple entry points and representations so that students of all levels, abilities, and skills can access the task. Nrich (2011) from the University of Cambridge describes these kinds of tasks as having a low threshold and high ceilings (LTHC), and Jo Boaler (2015) describes them as having low floors and high ceilings. Essentially, this means that when a task is equitable, "everyone in the group can begin and then work at their own level, yet the task also offers lots of possibilities for learners to do much more challenging mathematics, too" (Nrich, 2011, para. 6). The content can be fairly simple, but the processes and the thinking that students do are much more complex. Some students may solve a task using manipulatives while others apply symbols at a more abstract level. The task is also nonbiased, meaning it does not contain information that stereotypes individuals or groups of people, and it is culturally sensitive. The teacher honors and respects all students' ideas and solutions pathways.

Active

With an active task, students are engaged in doing the mathematics. They are decision makers. An active task requires more than simply applying an algorithm. Students must develop reasons, offer explanations, and actively figure things out to make sense of the task and its solution.

Connects to the Process Standards

The tasks you select should be designed to encourage students to exhibit process standards. Sometimes, teachers believe the way to challenge learners is by presenting them with higher-level content. However, this act alone does not necessarily support all students to reason, communicate mathematically, use and apply representations, see and use patterns, and recognize the underlying structure of the mathematics they are learning. By ensuring that a task incorporates opportunities for students to demonstrate the process standards, you support their learning.

High Cognitive Demand

According to Van de Walle et al. (2016), "A high cognitive demand task is a task that requires students to engage in a productive struggle, that challenges them to make connections to concepts and to other relevant knowledge" (p. 37). These tasks always call for some degree of higher-level thinking, and students cannot routinely solve them. Students often use multiple representations such as manipulatives or diagrams to help develop the meaning of mathematical ideas and to work through the task to develop their understanding (Smith & Stein, 2011).

Based on these characteristics, it is important to point out that all worthwhile tasks are problems, but not all problems are worthwhile tasks.

To determine if a task is worthwhile for you to use in a lesson, use the rubric shown in Figure 6.3. The first column identifies the characteristic, and the next three columns allow you to rate the degree to which you feel the task has met that characteristic by checking the box, with 1 being not acceptable and 3 being a good example of that characteristic. The final column is for any comments you would like to discuss with your colleagues.

Figure 6.3

Determining a Worthwhile Task Rubric

Characteristic	1	2	3	Notes
Uses significant mathematics for the grade level				
Rich				
Problem solving in nature				
Authentic/interesting				
Equitable				
Active				
Connects to Standards for Mathematical Practice or Process Standards				
High cognitive demand				

This Determining a Worthwhile Task Rubric can be downloaded for your use at resources.corwin.com/mathlessonplanning/k-2

Thinking about Jennifer and Carlos and their tasks, rate the tasks using the checklist in Figure 6.3. Discuss your results with a colleague. Whose example is a worthwhile task and why? Note your thoughts below.

HOW DO YOU ADAPT TASKS?

In the vignette presented at the beginning of the chapter, Jessica wanted to develop a task that more closely aligned to her students' experiences and interests. You may also have experienced a time when you encountered a textbook or school district task that did not match the unique needs of your learners. Like Jessica, many teachers choose to adapt tasks to increase the cognitive demand (Smith & Stein, 2011) and to provide more entry points for students to reason mathematically. Here are a few examples.

Example: Michaela

Michaela, a second-grade teacher, found the task in Figure 6.4 in her textbook and adapted it to incorporate the process standards.

Figure 6.4

Original Task	Adapted Task
Leo counted 32 books on the top shelf of his bookcase and 48 on the bottom shelf. How many books does he have on his bookcase?	Leo and Lettie are arguing about who has the most books on their bookshelves. Leo has two shelves with 32 books on one shelf and 48 on the other. Lettie has three shelves with 22, 18, 37 on each of her shelves. Who has the most books and how do you know?

Example: Marty

Marty, a first-grade teacher, was given the task in Figure 6.5 by his school district. He wanted to design a low-floor high-ceiling task to provide more entry points for his students.

Figure 6.5

Original Task	Adapted Task
Margot saw 2 dogs in the dog park. Each dog has 4 paws. How many paws did she see?	Margot saw 4 dogs in the dog park. How many paws did she see? How many ears? Did Margot see more ears or paws?

Example: Andrea

Andrea, a second-grade teacher, found the task in Figure 6.6 after an Internet search.

Figure 6.6

Original Task	Adapted Task
Decide if the statement is true or false. 3 + 4 = 6 + 2 12 = 3 + 8	Some of these equations are true and some are false. Alex says that three are true and Mariana says that four are true. Explain who is correct. 6 + 8 = 5 + 5 12 = 9 + 3 11 = 6 + 4 2 + 8 = 7 + 4 9 + 7 = 8 + 8 3 + 4 = 0 + 7

What do you notice about how each of the teachers enhanced the task? How might you "open" up your tasks to make them worthwhile? Jot a few notes below.

WHAT ARE SOME SOURCES FOR WORTHWHILE TASKS?

Tasks can be problems, short- or long-term projects, or games. In Chapter 5, we listed many tasks as they relate to K–2 learning intentions. You'll find some reliable sources for K–2 worthwhile tasks both online and in print form in Appendix C.

Building Unit Coherence

Tasks are another great way to build coherence and ensure rigor throughout a unit. As you look across the unit, you can connect the tasks that you construct or select. Some primary teachers do this by linking the tasks across a theme. Others do this by extending tasks over two or three days so students have plenty of time to dive into the concept.

Example: Huan

Huan, a kindergarten teacher, designed a counting task that spanned three days for her students. Each day, the kindergartners counted and charted items in bags using different tools like ten frames, ice cube trays, bowls, and egg cartons to keep track of the amounts. At the conclusion of the three-day task, students shared their counting and recording techniques and decided which tool helped them accurately count.

Kindergarten Snapshot

Task Selection

Three kindergarten teachers, Marilyn, Eliza, and Rena, are reviewing several tasks for the standard they selected on counting. They know they will need to teach several tasks for this lesson, and decide that they would like to have the students explore a counting task that aligns to their science unit on insects.

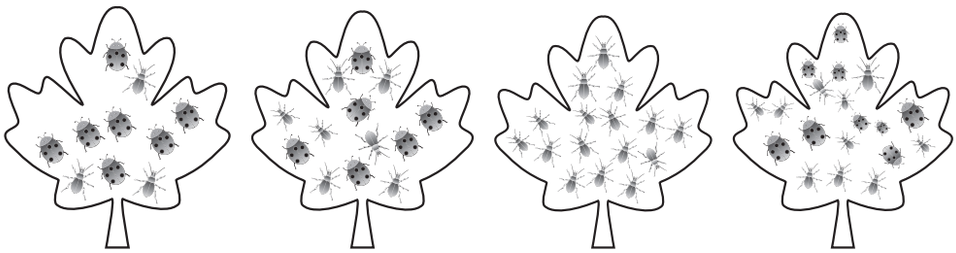
Rena shares, "Although we don't always have to match our tasks to other content areas, I find that some of the students retain more when we make cross-curricular connections."

Marilyn suggests, "We also need to be able to connect the task to the *counting, construct a mathematical argument,* and *use precise language learning intentions*. I would like to have them estimate first and then count."

Task:

How Many Insects?

The insects are crawling all over the leaves! We need to find out how many insects are on each leaf. How can we find out?



Note: The downloadable student worksheets contain 11 leaves representing numbers 10 to 20.

See the complete lesson plan in Appendix A on page 178.

online resources This task can be downloaded for your use at resources.corwin.com/mathlessonplanning/k-2

Why do you think this is a good kindergarten task? Use the task checklist to help you decide. Write any thoughts or concerns below.

First-Grade Snapshot

Task Selection

Sarita hopes to convince her teammates to design a task that will match the conceptual purpose for developing place value. When she meets with Rena and Karlo, Rena shares how much the students enjoy hearing about the teachers' families. Karlo explains that his aunt is starting a cupcake business just down the road from the school. Together, they decide that this would be the perfect context for the place value task. Karlo will gather real pictures of his aunt's cupcake business! Sarita also reminds them that they need to make sure the task engages the students in problem solving and provides multiple entry points for students to reason.

Task:

Aunt Jasmine and Uncle Ronnie's Cupcakes

Aunt Jasmine has a new cupcake business. Uncle Ronnie is helping Aunt Jasmine keep track of how many she sells. He wants to know how many cupcakes she sold last week, but she doesn't know! She is so busy making cupcakes that she cannot keep track of her orders!

Aunt Jasmine needs your help sorting the cupcake orders. Uncle Ronnie needs to know how many groups of ten are in each order and how many leftovers are in each order. Can you help find the number of groups of tens and ones? You must be able to show and explain all of your thinking. The orders they received today are 47, 56, 39, 87, and 62.

Aunt Jasmine's Cupcakes Order Form	*Aunt Jasmine's Cupcakes Order Form*	*Aunt Jasmine's Cupcakes Order Form*	*Aunt Jasmine's Cupcakes Order Form*	*Aunt Jasmine's Cupcakes Order Form*
47	56	39	87	62

See the complete lesson plan in Appendix A on page 183.

online resources This task can be downloaded for your use at resources.corwin.com/mathlessonplanning/k-2

Why do you think this is a good first-grade task? Use the checklist to help you decide. Write any thoughts or concerns below.

Second-Grade Snapshot

Task Selection

When the second-grade teachers meet to plan lessons, Aliyah shares the following:

> After our discussion about developing robust tasks, I realized that my tasks were not very robust. I would like to see how we could change some of the tasks we are using to encourage students to incorporate multiple learning intentions. I would also like the tasks to encourage the students to communicate mathematically and to develop mathematical arguments to justify their reasoning. Do you think we could set up our place value task to do this?

Dwayne agrees and says, "I think this will also engage them in wanting to find a solution and prove they are correct."

Wilma exclaims, "Yes, let's do this!"

Task:

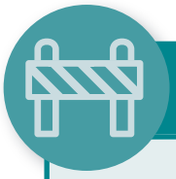
Bucket of Blocks!

Elaine, Roberto, and Janine all grabbed a bucket of base-ten blocks. Elaine's bucket has 2 hundreds, 9 tens, and 2 ones. Roberto's bucket has 8 ones, 6 hundreds, and 5 tens. Janine's bucket has 50 ones and 20 tens. Elaine, Roberto, and Janine each think they have the greatest value. Help them figure out who has the greatest value. Represent and explain your thinking to prove who is right!

See the complete lesson plan in Appendix A on page 188.

online resources This task can be downloaded for your use at resources.corwin.com/mathlessonplanning/k-2

Why do you think this is a good second-grade task? Use the checklist to help you decide. Write any thoughts or concerns below.



Under Construction

Using your lesson plan that is under construction, add a task. Be sure it follows from your previous work and matches your instructional purpose.

Task:

online resources Download the full Lesson-Planning Template from resources.corwin.com/mathlessonplanning/k-2
Remember that you can use the online version of the lesson plan template to begin compiling each section into the full template as your lesson plan grows.