

 Measuring Up.

Research-Based Pedagogy

of the *Measuring Up*
to the Texas Essential
Knowledge and Skills
STAAR Edition



Research

Research-Based Pedagogy of the *Measuring Up*® to the Texas Essential Knowledge and Skills STAAR Edition

INTRODUCTION

Since its inception in 1990, Mastery Education (formerly Peoples Education) has created student learning products based on continual review of the scientific research literature. The *Measuring Up* series, available in print and in digital format (*Measuring Up Live 2.0™*), is founded on a set of principles derived from the soundest current theory and research on reading and language arts, mathematics, writing, science, social studies, assessment, and literacy. Additionally, content experts creating this series built upon the methodology and best practices from the best-selling *Measuring Up* state-specific resources that have served over 13 million students in the last 12 years. This document serves both to provide information about the *Measuring Up* program and to explain the research on learning theory on which the series is based. Consequently, this document is organized to be useful to educators who are considering the soundness and the practical uses of the materials in classrooms.

First, the *Measuring Up* program articulates each principal that supports the design of the materials. Second, it gives the best known and most respected educational research that substantiates each principle. Third, a discussion of the way the *Measuring Up* to the Texas Essential Knowledge and Skills STAAR Edition materials specifically embody both the principle and its research-based foundation helps prospective educators see how educators can use the materials to help them collect information about their students' strengths and weaknesses and help students explore their own understanding of standards-based information.

THE CHALLENGE

In December 2015, President Barack Obama signed into law the Every Student Succeeds Act (ESSA), a revision of the No Child Left Behind Act of 2001. Under this law states must continue to adopt a challenging set of standards in English Language Arts, mathematics, and science. States must continue to assess student achievement in mathematics and ELA standards once a year for grades 3-8 and once for students in high school and must

continue to assess science, once in grades 3-8 and once in high school. These standards are to be aligned with higher education "entrance requirements for credit-bearing coursework" and with "relevant state career and technical education standards" (ESSA, 2015). "These assessments must involve multiple measures of student achievement, including measures that assess higher-order thinking skills and understanding,..." (ESSA, 2015).

Today's educators, schools, and districts face a daunting challenge: how to raise student achievement while incorporating the increasingly rigorous Texas Essential Knowledge and Skills (TEKS). It is well documented that implementing change is a daunting task that brings about uncertainty (Fullan, 2001).

The *Measuring Up* to the Texas Essential Knowledge and Skills STAAR Edition was created to help Texas educators understand, navigate, and teach the new standards, replacing uncertainty with confidence to prepare students for the rigors of the STAAR. Available in print as *Measuring Up* to the Texas Essential Knowledge and Skills STAAR Edition worktexts and in a digital format known as *Measuring Up Live 2.0™*, the series provides grade-appropriate lessons that encompass the new requirements for instruction of the rigorous, high-level skills incorporated in the standards. In both formats, these lessons are based on sound, research-based pedagogy to provide an easy-to-use resource to teach for and assess student mastery.

RESEARCH PRINCIPLE 1:**MEASURING UP TO THE TEXAS ESSENTIAL KNOWLEDGE AND SKILLS STAAR EDITION INCORPORATES SOUND RESEARCH-BASED PEDAGOGY**

The *Measuring Up to the Texas Essential Knowledge and Skills STAAR Edition* has been designed to support and enhance best practices for effective teaching of the Texas Essential Knowledge and Skills. There are some research-based unifying pedagogical principles, summarized in the following pages, that are common across Texas Essential Knowledge and Skills and that form the foundation of the *Measuring Up to the Texas Essential Knowledge and Skills STAAR Edition* design.

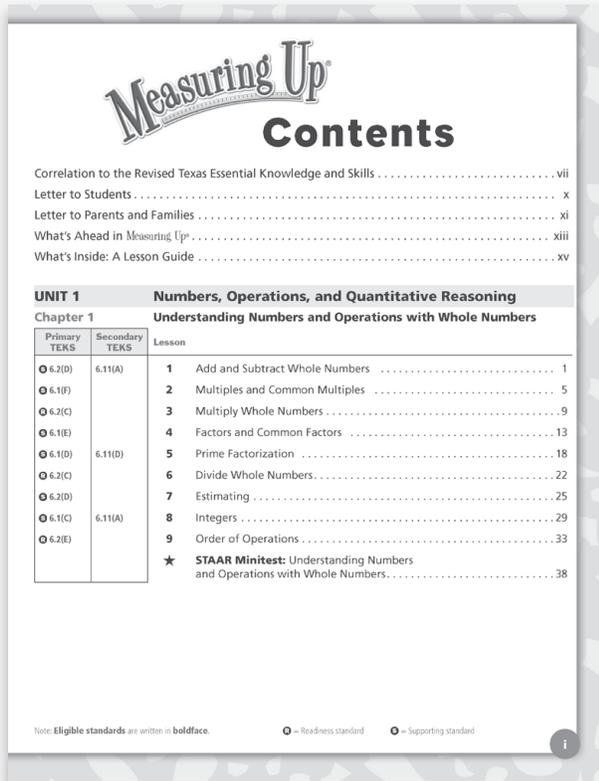
RESEARCH BASIS FOR PRINCIPLE 1: Each lesson follows a consistent format and embodies the principles of the whole-part-whole pedagogical framework. The framework provides learners with the ability to understand the content at a

variety of levels and allows for higher-order cognitive development (Swanson & Law, 1993). The whole-part-whole model provides a comprehensive conceptual framework for instruction throughout the series that is derived directly from the standards.

The systematic instruction provided in the student lessons, combined with resources in the teacher edition, is designed to help students master the challenges of the rigorous Texas Essential Knowledge and Skills. Each component of the lesson is purposeful and explicit, providing effective strategy instruction that is clearly explained, used, and applied (Duffy, 2002). Clearly written, teacher-friendly lessons serve as models of effective instruction, building teachers' confidence that they are meeting the rigorous requirements while navigating the changing educational environment.

Pedagogical Framework	Process and Purpose	Measuring Up to the Texas Essential Knowledge and Skills
Whole	The first "whole" provides a foundational understanding and purpose for learning.	<ul style="list-style-type: none"> • Understand the TEKS reviews and explains the skills with examples and problems from real life. • Words to Know lists the academic vocabulary used in the lesson for easy reference. Words are further highlighted in context.
Part	Then specific skills, or "parts," are examined in depth for mastery.	<ul style="list-style-type: none"> • Guided Instruction provides step-by-step problem-solving instruction and review to build mastery.
Whole	Finally, the "parts" are brought together within the context of the "whole" for deep understanding and application.	<ul style="list-style-type: none"> • On Your Own asks students to apply the skill with different types of questions and activities. Questions assess student learning of the lesson skill with a variety of formats, including multiple choice, short answer, and constructed response. • Kick It Up end-of-chapter project-based activities encourage students to extend and apply learning.
Assessment	Ongoing progress monitoring	<ul style="list-style-type: none"> • STAAR Minitests strategically placed throughout the student book provide opportunities for students to experience rigorous STAAR formatted questions.

Measuring Up to the Texas Essential Knowledge and Skills, Level F Grade 6



Measuring Up
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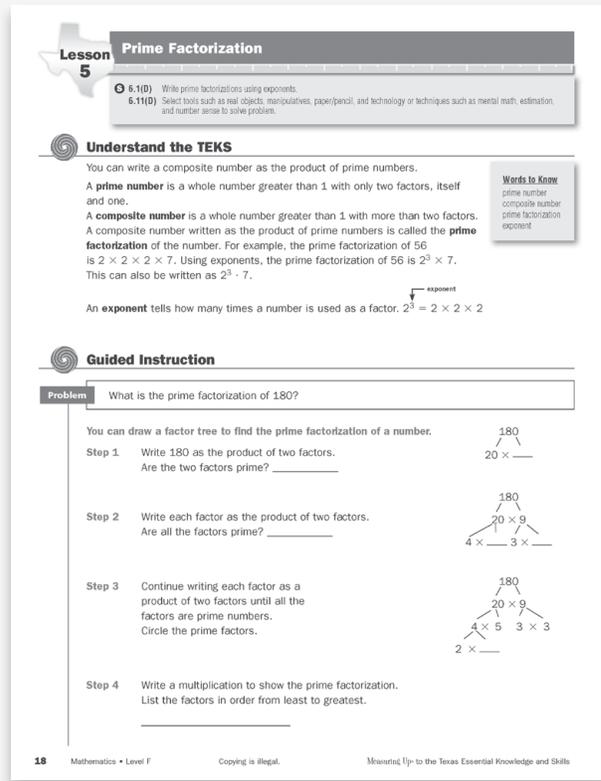
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UNIT 1 Numbers, Operations, and Quantitative Reasoning

Chapter 1 Understanding Numbers and Operations with Whole Numbers

Primary TEKS	Secondary TEKS	Lesson
6.2(D)	6.11(A)	1 Add and Subtract Whole Numbers 1
6.1(F)		2 Multiples and Common Multiples 5
6.2(C)		3 Multiply Whole Numbers 9
6.1(D)		4 Factors and Common Factors 13
6.1(E)	6.11(D)	5 Prime Factorization 18
6.2(C)		6 Divide Whole Numbers 22
6.2(D)		7 Estimating 25
6.1(C)	6.11(A)	8 Integers 29
6.2(E)		9 Order of Operations 33
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Note: Eligible standards are written in boldface. ● = Readiness standard ○ = Supporting standard



Lesson 5 Prime Factorization

6.1(D) Write prime factorizations using exponents.
 6.1(D) Select tools such as real objects, manipulatives, paper/pencil, and technology or techniques such as mental math, estimation, and number sense to solve problem.

Understand the TEKS

You can write a composite number as the product of prime numbers.
 A **prime number** is a whole number greater than 1 with only two factors, itself and one.
 A **composite number** is a whole number greater than 1 with more than two factors. A composite number written as the product of prime numbers is called the **prime factorization** of the number. For example, the prime factorization of 56 is $2 \times 2 \times 2 \times 7$. Using exponents, the prime factorization of 56 is $2^3 \times 7$. This can also be written as $2^3 \cdot 7$.

Words to Know
 prime number
 composite number
 prime factorization
 exponent

An **exponent** tells how many times a number is used as a factor. $2^3 = 2 \times 2 \times 2$

Guided Instruction

Problem What is the prime factorization of 180?

You can draw a factor tree to find the prime factorization of a number.

Step 1 Write 180 as the product of two factors.
 Are the two factors prime? _____

Step 2 Write each factor as the product of two factors.
 Are all the factors prime? _____

Step 3 Continue writing each factor as a product of two factors until all the factors are prime numbers.
 Circle the prime factors.

Step 4 Write a multiplication to show the prime factorization.
 List the factors in order from least to greatest.

18 Mathematics • Level F Copying is illegal. Measuring Up to the Texas Essential Knowledge and Skills

RESEARCH PRINCIPLE 2:

MEASURING UP TO THE TEKS STAAR EDITION PROVIDES COMPREHENSIVE COVERAGE OF ALL TEXAS ESSENTIAL KNOWLEDGE AND SKILLS

The Texas Essential Knowledge and Skills are a clear set of K–12 grade-specific expectations for reading, writing, mathematics, and science. These standards define what it means for students to be college and career ready in the 21st century. These standards are fewer, clearer, higher, evidence-based, and internationally benchmarked and are intended to prepare students for success in the global economy.

RESEARCH PRINCIPLE 2 APPLIED: Each grade-specific standard is easily identified within the *Measuring Up* to the Texas Essential Knowledge and Skills STAAR Edition series. Moreover, Readiness, Supporting, and Figure 19D standards are also identified at each grade level and are described at the beginning of each student resource, in both print and digital formats, and in the teacher edition. Additionally, each lesson in both resources clearly identifies the standards of study.

RESEARCH PRINCIPLE 3:

MEASURING UP TO THE TEKS STAAR EDITION PROVIDES RIGOROUS CONTENT AND APPLICATION OF KNOWLEDGE THROUGH HIGH-ORDER SKILLS

The Texas Essential Knowledge and Skills include rigorous content and application of knowledge through high-order skills. “A primary feature of STAAR’s test design is a focus on preparedness for success in subsequent grades or courses and, ultimately, for college and career. This requires the tests to emphasize depth rather than breadth in assessing student expectations” (Test Design and Setting Student Performance Standards for STAAR).

INCREASED RIGOR IN THE STAAR PROGRAM: General Characteristics of STAAR That Will Contribute to Rigor [STAAR Test Guidelines]

The rigor of items will be increased by

- assessing content and skills at a greater depth and higher level of cognitive complexity.
- assessing more than one student expectation in an item.

The rigor of the tests will be increased by

- assessing more focused student expectations but doing so multiple times and in more complex ways.
- including a greater number of rigorous items on the test, thereby increasing the overall test difficulty graduating students who are college and career ready.

[Test Design and Setting Student Performance Standards for STAAR]

Mastery Education has created this print and digital series to help students master the newest Texas Essential Knowledge and Skills and to get them to think on a higher level. The five chapters in each level are focused on a different set of skills, modeled on the TEKS. As students move through the high-quality instruction, activities, and review in this series, they are challenged to consider, analyze, interpret, and evaluate instead of just simply recalling facts.

Measuring Up to the Texas Essential Knowledge and Skills, Level E Grade 5

STAAR Minitest

4 Which of these sentences most clearly contains a detail that appeals strongly to the senses of touch and taste?

F When we stepped off the train, we were wrapped in a strong, salty sea breeze.

G We breathed in the delicious smells coming from colorful food tents.

H A group of big, tan Jindo dogs was doing tricks in the sand—rolling over, catching Frisbees, and even playing dead.

J Traditional drummers played into the sunset, and later, women began to sing and dance to the full moon.

5 Read the sentences below from paragraph 9.

I couldn't believe it—the sea was splitting apart. It looked as if someone had taken a pair of scissors and cut it in half.

The author uses this figurative description to suggest that —

A a magical creature used a giant pair of scissors to create the path

B the two seas formed are now permanently separated

C the path formed is crooked and shaky

D the sand between the seas looks like a straight line

Peoples Education Copying is illegal! STAAR Minitest: Sensory Language • Unit 3, Chapter 1 159

RESEARCH PRINCIPLE 4

THE MEASURING UP LIVE 2.0 DIGITAL RESOURCE PROVIDES AN EFFECTIVE TECHNOLOGY TOOL FOR EDUCATORS.

"In the 21st century, students must be fully engaged. This requires the use of technology tools and resources, involvement with interesting and relevant projects, and learning environments—including online environments—that are supportive and safe.

In the 21st century, educators must be given and be prepared to use technology tools; they must be collaborators in learning—constantly seeking knowledge and acquiring new skills along with their students."

— Arne Duncan, U.S. Secretary of Education, March 3, 2010

Measuring Up Live 2.0 has been designed to support and enhance best practices for effective teaching of the Texas Essential Knowledge and Skills via an easy-to-use digital delivery that is safe and non-threatening. Teachers who frequently use technology find that their students benefit from the increased emphasis on collaboration, communication, critical thinking, and problem solving—all important 21st century skills. (Dispelling Five Myths, 2010).

RESEARCH PRINCIPLE 4 APPLIED: Using *Measuring Up Live 2.0*, teachers are able to access all *Measuring Up* to the Texas Essential Knowledge and Skills STAAR Edition lessons and resources digitally. The digital format provide teachers with the flexibility to project lessons, giving them the tools they need to model a process while creating an interactive learning environment for students. Moreover, the ability to print on demand provides additional opportunities to assign practice to students—whether for completion in class or at home.

The standards, their research bases, and the educational application of the standards have been presented through a collaborative effort between Publisher's Partnership and Mastery Education.

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