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Focused Mathematics Booster Pack—Level 7

This sample includes the following:

Management Guide Cover (1 page)
Table of Contents (1 page)
How to Use This Product (4 pages)
About the Books and Activities (2 pages)
Booster Card Workspace A-C (3 pages)
My Mathematician Checklist (1 page)
Mathematician Rubric (1 page)
Answer Key (1 page)
Booster Card (3 pages)
Reader (17 pages)

To Create a World in which Children Love to Learn!

Level 7

Focused Mathematics

Booster Pack

Management Guide

Teacher Created Materials
PUBLISHING

Table of Contents

Kit Components

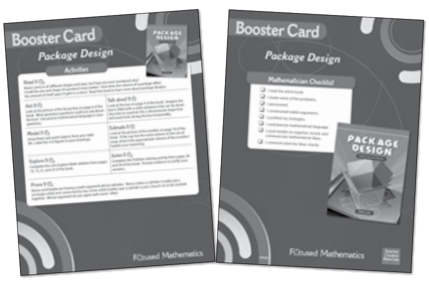
High-Interest Books (six copies of six titles)

Books feature various, high-interest topics across content areas.

Overview Cards

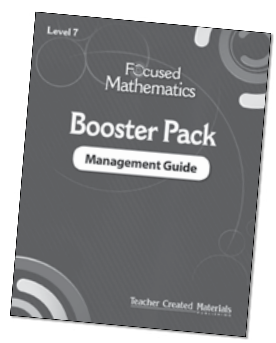
Overview cards include a book summary, mathematics objective, reading levels, mathematics vocabulary, and cross-content connections.

Booster Cards



Activities engage students in real-world mathematics and require students to demonstrate mathematical practices and processes.

Management Guide



The Management Guide includes a brief overview of the research, standards correlations, and instructional options and suggestions. Resources include student activity sheets, reproducible manipulatives, and rubrics.

Digital and Audio Resources

PDFs of the books, Booster Cards, Response pages, as well as professional audio recordings of the books are included. A complete list of available resources is listed on page 40.

Pacing and Instructional Setting Options

The following pacing and instructional setting options show suggestions for how to use this product. The *Focused Mathematics: Booster Pack* series is designed to be flexible and can be used in tandem with a core curriculum and a teacher's preferred instructional framework, such as Guided Math.

Pacing

Teachers should customize pacing according to student need. Each Booster Card includes 100 minutes of activities for a total of 600 minutes. Teachers may assign specific activities to meet instructional objectives or allow students to choose activities. Students may complete one activity or several activities to match the time available and their instructional needs.

Activity	Approximate Time
Read It	30 min.
Ask It	5 min.
Talk about It	5 min.
Model It	10 min.
Estimate It	5 min.
Explore It	20 min.
Solve It	15 min.
Prove It	10 min.

Instructional Setting Options

Whole-Class Instruction

Whole-class instruction is best suited for introducing each text to students or for teaching specific strategies or content-area concepts as they apply to instructional standards and objectives. In this setting, every student engages with the same text at the same time. PDFs of the books are available in the Digital and Audio Resources and are great for displaying to the whole class for a shared-literacy experience.

Small-Group Instruction

Instructional frameworks, such as Guided Math, support teachers who want to work with a specific group of students on a targeted comprehension or content skill. During small-group instruction, the teacher works with a select group of students with similar instructional needs. Students may sit with the teacher, either at a table or on the carpet. This setting promotes a sense of teamwork and collaboration and encourages participation in mathematical discussions. Working with students in small groups is also a great opportunity for teachers to informally assess student progress and make anecdotal notes.

Workstations or Centers

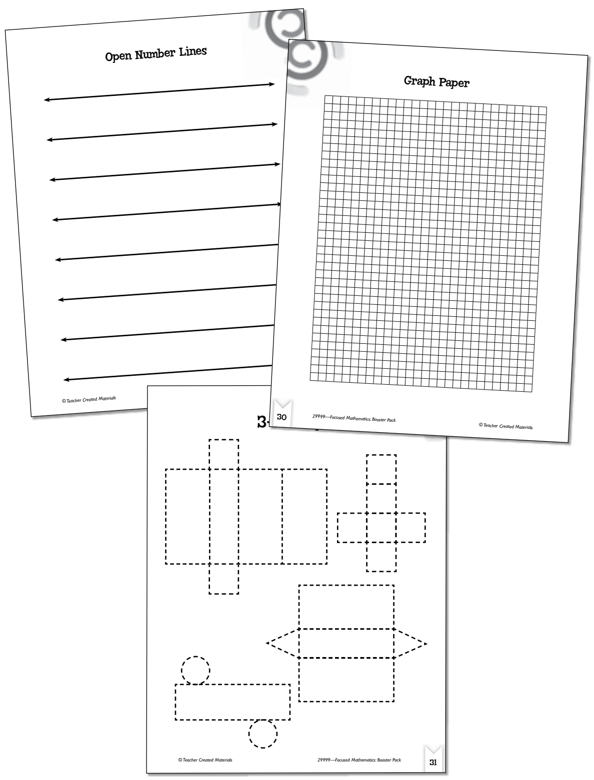
Students may engage independently or with partners at workstations or centers to build fluency, comprehension, and vocabulary, while applying math concepts and process skills. When working within this instructional setting, it is important that procedures and expectations are clear and students are able to complete the activities with little to no teacher guidance so that teachers can spend time with small groups.

Strategies for Differentiating Booster Card Activities

Below-Level Learners

You may choose to support below-level learners with some or all of these suggestions:

- **Manipulatives:** Provide below-level learners with concrete or representational manipulatives to help them explore the mathematics concepts. PDFs of reproducible open number lines, graph paper, and 3-D shapes (pages 29–31) are available in the Digital and Audio Resources.



- **Numberless word problems:** Rewrite word problems, leaving blanks in place of the numbers; or, place small sticky notes over the numbers in the problems. Have students figure out what the problems re about before revealing the numbers, focusing on reading comprehension only. Then, have students brainstorm numbers that would make sense for the problems, justifying their suggestions. Finally, add the numbers back into the word problems, and have students solve.

Above-Level Learners

You may choose to support above-level learners with some or all of these suggestions:

- **New Booster Cards:** Have students create Booster Cards for books in your classroom library.
- **Multimedia Presentation:** Challenge students to create multimedia presentations to demonstrate what they learned from the *Focused Mathematics: Booster Pack.*

English Language Learners

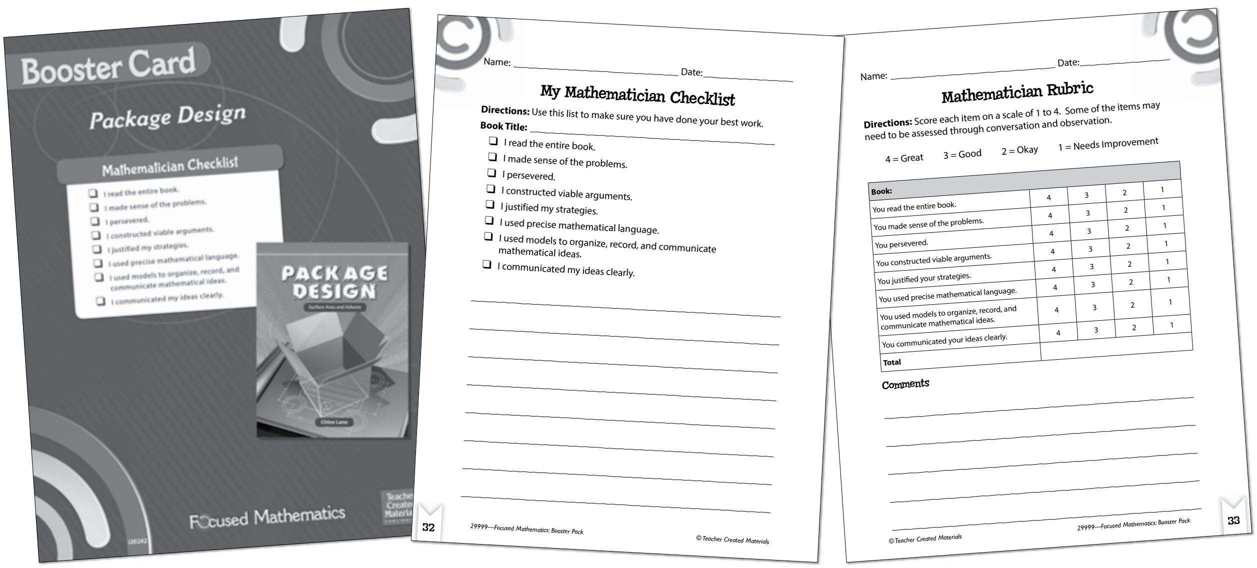
You may choose to support English language learners with some or all of these suggestions:

- **Professional Audio Recordings:** Model fluent reading by having English language learners listen to the professional audio recordings of the books that are available in the Digital and Audio Resources.
- **Sentence Frames:** Support language development and acquisition with sentence frames, such as the following: *The measurement of the angle is _______. It is __________ than 90 degrees. The angle is a (an) __________ angle.*

Assessing Activities

Each *Focused Mathematics: Booster Pack* offers multiple assessment opportunities. Teachers can gain insight into student learning through small-group observations and analysis of student responses to the Booster Card activities. These formal and informal assessments provide teachers with additional data to help make informed decisions about what to teach and how to teach it. An answer key is provided (pages 34–39) to help evaluate student responses.

The Mathematician Checklist on the back of the Booster Cards provides an opportunity for students to reflect on their work. Distribute copies of the *My Mathematician Checklist* activity sheet (page 32) to students to guide self-reflection. Use the *Mathematician Rubric* (page 33) to assess students' mathematical practices and processes. These rubrics may be used in conjunction with each other to guide conversation during teacher-student conferences.



▲ Use the Mathematician Checklist on each Booster Card as a quick reference while completing activities.

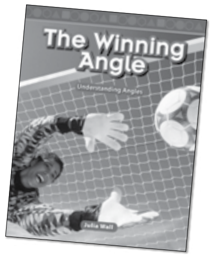
▲ Distribute copies of the *My Mathematician Checklist* (page 32) to students as a way to encourage self-reflection and mathematical practices and processes.

▲ Complete the *Mathematician Rubric* (page 33) to give students feedback.

Book Summaries

Below are summaries of each book for teacher reference. This way, teachers can decide which books match the content that they would like to cover with their students. Also, teachers can use these summaries as a way to begin a group discussion with students about the books.

The Winning Angle



To be a great athlete, you had better understand angles! From making the perfect basket to banking the perfect shot, you need to understand how angles work to get the ball where you want it to go.

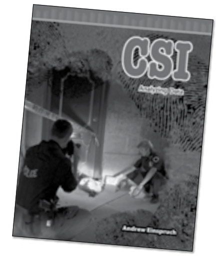
Package Design

Have you ever wondered how packages are designed and created? People who figure out the best way to package products have to know a lot about surface area and volume. Learn about how the size and shape of a product helps determine its packaging size.

STEM Careers: Reinventing Robotics

Robotics is a branch of science, engineering, and technology in which robots are designed, built, and operated. In this book, you will read about real robots, which have advanced technology, mechanization, and automation to improve the speed and consistency of products people produce.

CSI



Experience the mystery and intrigue of crime scene investigation! This book focuses on different types of data that investigators collect to solve a case, such as fingerprints, blood type, DNA, and lie detectors.

Fun and Games: Building Miniature Models

Miniature models are major fun! People enjoy building them as a hobby. But, models are more than popular crafts. They are also created to solve problems, simplify ideas, and even bring movie scenes to life.

Hurricane Hunters

What would you do if you were caught in the middle of a hurricane? Learn about measures of central tendency as you follow the lives and work of some brave individuals—hurricane hunters!

Reading Levels and Content Areas

Teacher Created Materials takes great care to maintain the integrity of authentic informational text while leveling it to make the text accessible for all students. In this way, our content-area books provide rich informational reading experiences from which students can learn and be ready for the complexity of college-and-career level reading.

To preserve the authenticity of these reading experiences, it is crucial to maintain important academic and content vocabulary.

To support leveled instruction, new and challenging terms are used repeatedly and defined in text to promote understanding and retention.

The measures in this chart are for reference only. Books in the *Focused Mathematics: Booster Pack* series were chosen to include a range of grade-appropriate reading levels to support grade-level mathematics standards. **Note:** Reading levels vary from program to program and do not correlate exactly.

Title of the Book	Lexile® Level	Guided Reading
The Winning Angle	790L	S
Package Design	920L	U
**STEM Careers: Reinventing Robotics*	890L	W
CSI	750L	R
**Fun and Games: Building Miniature Models*	840L	S
Hurricane Hunters	920L	U

**These titles have been officially leveled using the F&P Text Level Gradient™ Leveling System.*

Name: ______________________________ Date: ____________________

Booster Card Workspace A

Directions: Complete the Booster Card activities in the workspaces. Circle the activity title(s) to label your work.

Book Title: ____

Ask It · Talk about It · Model It · Estimate It
Explore It · Solve It · Prove It

Ask It · Talk about It · Model It · Estimate It
Explore It · Solve It · Prove It

Name: ________________________________ Date: __________________

Booster Card Workspace B

Directions: Complete the Booster Card activities in the workspace. Circle the activity title(s) to label your work.

Book Title: ____

Ask It · Talk about It · Model It · Estimate It
Explore It · Solve It · Prove It

Name: ______________________________ Date: ________________

Booster Card Workspace C

Directions: Complete the Booster Card activities in the workspace. Circle the activity title(s) to label your work.

Book Title: ____

Ask It · Talk about It · Model It · Estimate It
Explore It · Solve It · Prove It

Name: ________________________________ Date: __________________

My Mathematician Checklist

Directions: Use this list to make sure you have done your best work.

Book Title: ____

- ❑ I read the entire book.
- ❑ I made sense of the problems.
- ❑ I persevered.
- ❑ I constructed viable arguments.
- ❑ I justified my strategies.
- ❑ I used precise mathematical language.
- ❑ I used models to organize, record, and communicate mathematical ideas.
- ❑ I communicated my ideas clearly.

Name: ______________________________ Date: __________________

Mathematician Rubric

Directions: Score each item on a scale of 1 to 4. Some of the items may need to be assessed through conversation and observation.

4 = Great   3 = Good   2 = Okay   1 = Needs Improvement

Book:				
You read the entire book.	4	3	2	1
You made sense of the problems.	4	3	2	1
You persevered.	4	3	2	1
You constructed viable arguments.	4	3	2	1
You justified your strategies.	4	3	2	1
You used precise mathematical language.	4	3	2	1
You used models to organize, record, and communicate mathematical ideas.	4	3	2	1
You communicated your ideas clearly.	4	3	2	1
Total				

Comments

____

____

____

____

____

Answer Key *(cont.)*

b. 18 ft.^{2}

c. 30 ft.^{2}

d. 78 ft.^{2}

e. SA = 2(lw) + 2(hw) + 2(lh) or
SA = 2lw + 2hw + 2lh or
SA = 2(lw + hw + lh)

page 25 sidebar:

a. 445.88 mm^2

b. 158.29 mm^2; 316.58 mm^2

c. 762.46 mm^2

d. SA = $2\pi r^2 + 2\pi rh$

Solve It

a. All dimensions of Container B are the same. V = 85.18 ft.^{3}

b. V = 17.4 ft.^{3}

c. Container A: 69.82 ft.^{2}; Container B: 116.16 ft.^{2}; Container C: 39.54 ft.^{2}

d. Volume is the most important measurement because it indicates how much space a 3-D shape occupies.

Prove It

Arguments can be made for both. Nancy's statements discuss the net of a cylinder, which is a rectangle and two circles on either end. Kawika is thinking about a cylinder as circles stacked, which can also build a cylinder.

STEM Careers: Reinventing Robotics

Ask It

Answers will vary but may include, "How long is the assembly line in feet?"

Talk about It

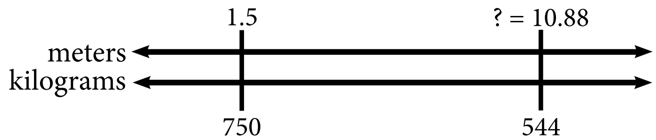
Answers will vary but may include, "I converted hours to minutes to see a comparison of the same unit: 12 hours = 720 minutes. There are 8 groups of 90 minutes in 720 minutes. Therefore, the invention of the assembly line automated the work to be 8 times faster per car than before the assembly line!"

Model It

Answers will vary but may include a robotic vacuum cleaner, it will need to use geometry to calculate the area to vacuum.

Estimate It

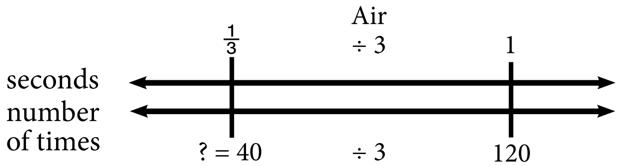
Strategies will vary but may include visualizing a double number line :

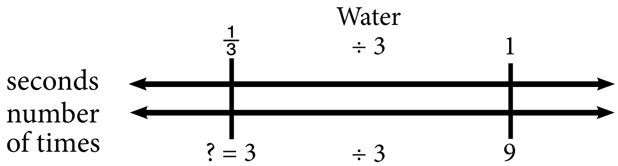


Explore It

Answers will vary but may include a synchronized robot dancing game where they use proportional relationships to control robots so they dance at the same time.

Solve It





Prove It

Answers may vary but may include, "In a ratio, you compare two quantities. The order of the ratio is number of flaps in air to number of flaps in water. So, 120:9 is the ratio to represent the situation. An equivalent ratio to that is about 13:1 because 120 is about 9 times greater than 13. If we are rounding, then it is fair to say that 13:1 is correct. Or, for every 13 flaps in the air, RoboBee makes one flap in the water."

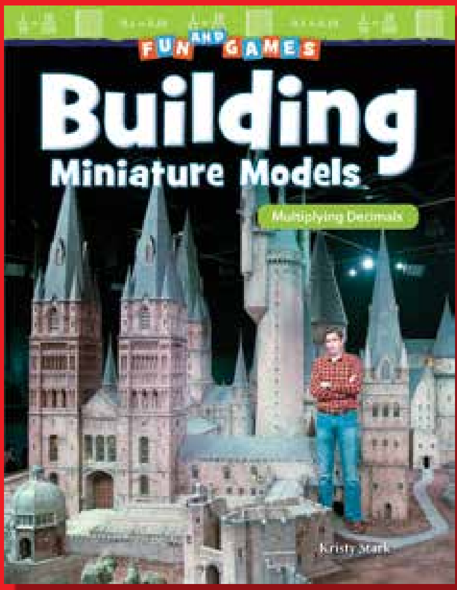
CSI

Ask It

Answers will vary but may include, "Why do Aboriginal Australians not have Blood Type B or AB?"

Overview Card

Focused Mathematics



Reading Levels
Lexile®: 840L
Guided Reading: S

Fun and Games:
Building Miniature Models

Book Summary

Miniature models are major fun! People enjoy building them as a hobby. But, models are more than popular crafts. They are also created to solve problems, simplify ideas, and even bring movie scenes to life.

Objective

Analyze proportional relationships and use them to solve real-world, mathematical problems.

Mathematics Vocabulary

decimal	ratio	scale factor
model	rational number	

Cross-Content Connections

(Science) Page 12 of the book shows a model of the solar system. Have students create a model of a solar eclipse using a light source and other classroom materials.

(Art) Wax museums are famous for re-creating proportional models of famous people. The models, unlike miniature models, are life-size. Have students create their own proportional models of famous people using modeling clay or online tools

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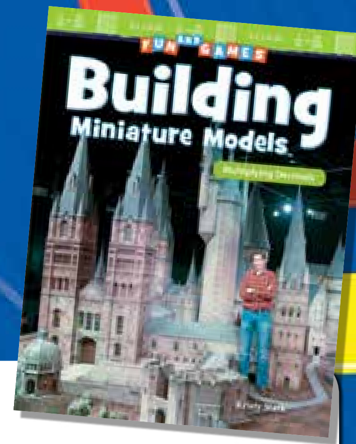
Booster Card

Fun and Games:
Building Miniature Models



Activities

Read It 30
Miniature models are smaller versions of real objects, such as vehicles, airplanes, trains, landscapes, cities, and towns. Building scale models is a fun project and also serious work. Read this book to learn more about using ratios to build scale models.

Ask It 5
Examine the pictures on pages 12 and 13 of the book. What mathematical questions can you ask? Use precise mathematical language in your questions.

Talk about It 5
On page 23, Bridget's dad builds her a dollhouse using furniture that is 0.08 times the size of the real furniture. She says it's a 1 to 12.5 scale factor. Do you agree? Explain your reasoning to a partner.

Model It 10
In this book, you learn about different objects that have been made into miniature models. What is an object not mentioned in the book that you would want made into a miniature or enlarged model? What scale factor would you want to use? Draw the model on a sheet of paper and determine the scale factor.

Estimate It 5
The caption on page 14 of the book states that the model car is about two-hundredths the size of the real car. Using your knowledge of scale factors, estimate the inverse: the actual car is ________ times larger than the model car.

Explore It 20
Complete the Let's Explore Math sidebars on pages 7, 15, and 23 of the book.

Solve It 15
Complete the Problem Solving activity from pages 28 and 29 of the book. Provide evidence to justify your answers.

Prove It 10
Companies commonly use a 1 to 32 scale for plane models in their design process. Molly says this means the model plane should be 32 times smaller than the actual plane or the actual plane is 32 times larger than the model airplane. She says another way to say this is that the model airplane is 0.03125 the size of the actual plane. Do you agree with her? Provide evidence to justify your answer.

Focused Mathematics

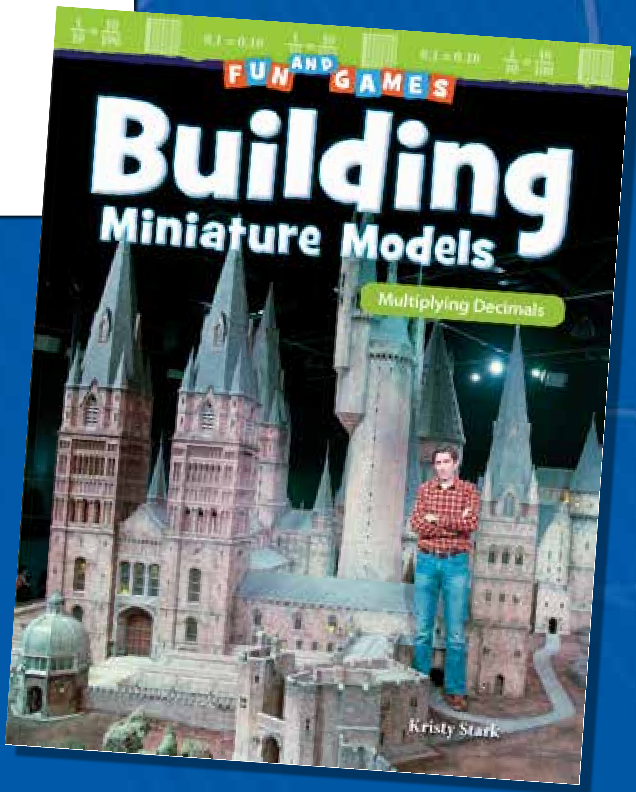
Booster Card

Fun and Games:

Building Miniature Models

Mathematician Checklist

- ❑ I read the entire book.
- ❑ I made sense of the problems.
- ❑ I persevered.
- ❑ I constructed viable arguments.
- ❑ I justified my strategies.
- ❑ I used precise mathematical language.
- ❑ I used models to organize, record, and communicate mathematical ideas.
- ❑ I communicated my ideas clearly.



Focused Mathematics

i20245

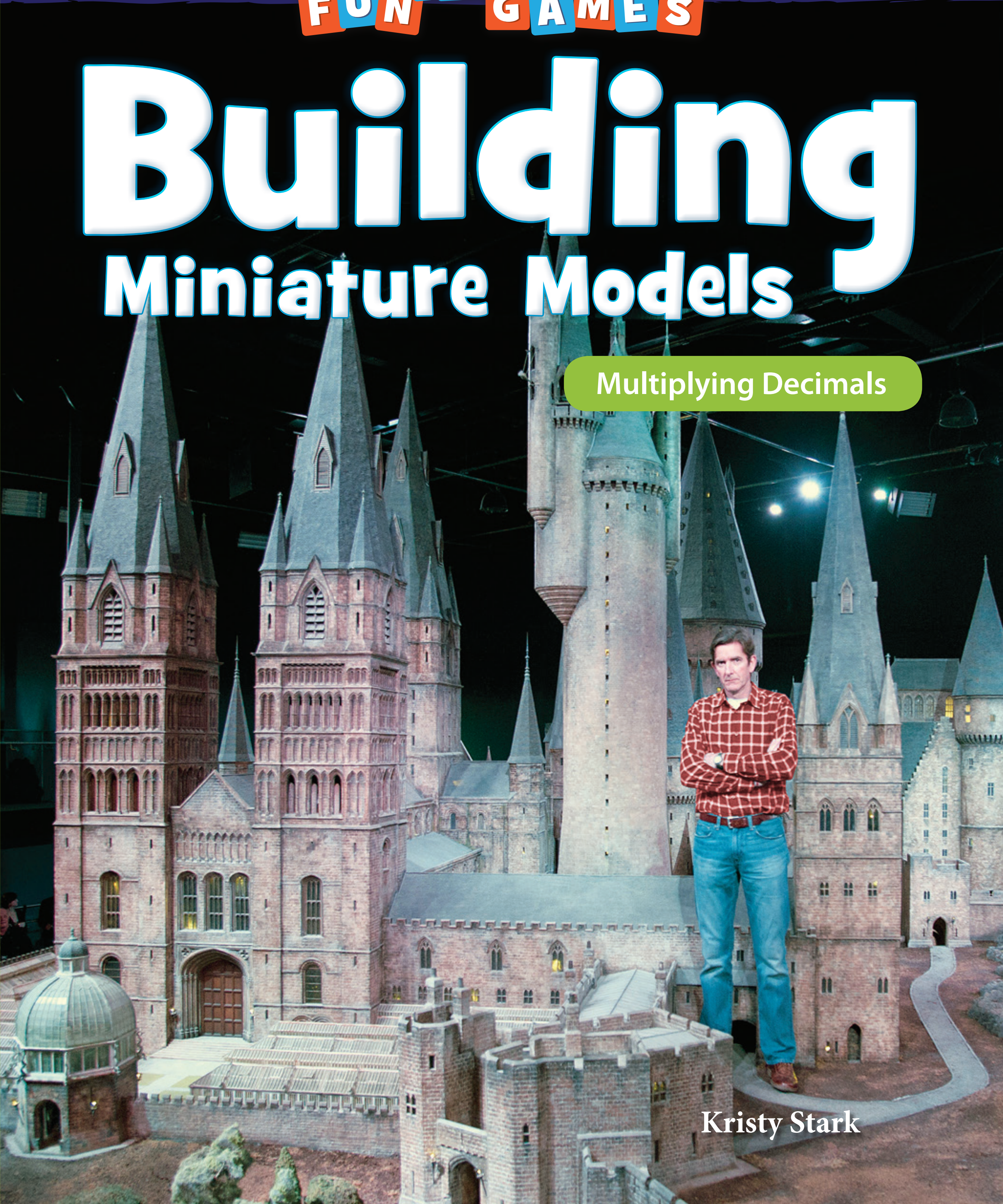
Teacher Created Materials PUBLISHING

$\frac{1}{10} = \frac{10}{100}$ 0.1 = 0.10 $\frac{1}{10} = \frac{10}{100}$ 0.1 = 0.10 $\frac{1}{10} = \frac{10}{100}$

Fun and Games

Building Miniature Models

Multiplying Decimals



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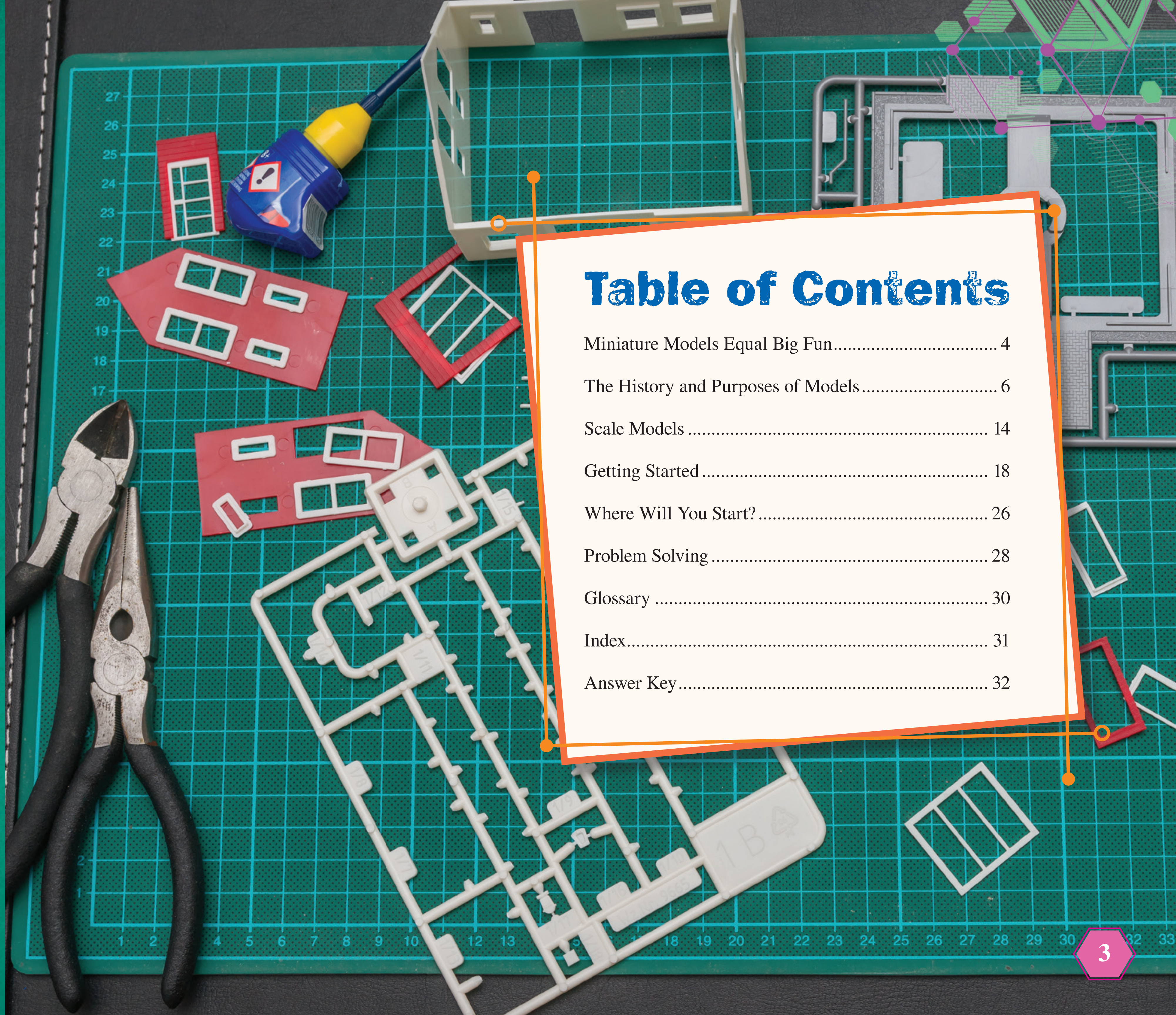


Table of Contents

Miniature Models Equal Big Fun

Do you like to build things? Maybe you started building with blocks when you were younger. Perhaps you made tall towers and other types of buildings. Maybe you have used building bricks to make cars and airplanes.

If you enjoy building things, you may be interested in building **miniature** models. These are smaller versions of real objects. Models can be made for buildings, vehicles, airplanes, and trains. Models of landscapes can be made to show a favorite place. Some people make models of entire cities and towns, too. The possibilities are endless when it comes to the available choices of miniature models.

Building models requires many different types of skills. You might paint a model. You might need to sew fabric for parts of the model. Some models have working lights, so you might even have to wire lights to batteries.

Building miniature models, also called **scale** models, is a fun project for people who like to work with their hands and build things. But, building models is not only for people looking for a fun activity. Models are also used to create many of the things you see in the world around you.

A model-plane enthusiast works on a large-scale model aircraft in England.

Model maker Sylvia Menelao competes in a model-building contest in Germany.

The History and Purposes of Models

Throughout recorded history, scale models have been used for many things, including fun projects and many types of jobs.

Models are used to create new buildings and other structures. They are even used in the creation of movies. Models are used to show **complex** science concepts, too.

Architect Models

Architects have used models since the early fifteenth **century**. Architects build and design skyscrapers, houses, and offices. They draw building plans called **blueprints**. Then, architects build a model. Models are made before workers start laying a building's **foundation**. Models show how buildings will look when they are finished.

Construction workers use blueprints and models to understand an architect's design. Models help them see where a building's doors and windows will be placed. Models help them see the position and location of a building, too.

If models don't look right, architects know that they need to **modify** plans. Models can also help show weaknesses in the **structure** of buildings. It is **crucial** to find things that are wrong with a design before workers start building.

LET'S EXPLORE MATH

Architects use several different sizes of rectangular paper to draw blueprints. The smallest size has dimensions of about 30.5 centimeters by 22.9 centimeters. Which of the following choices is the area of the paper? Explain your reasoning.

A. 6.9845 square centimeters

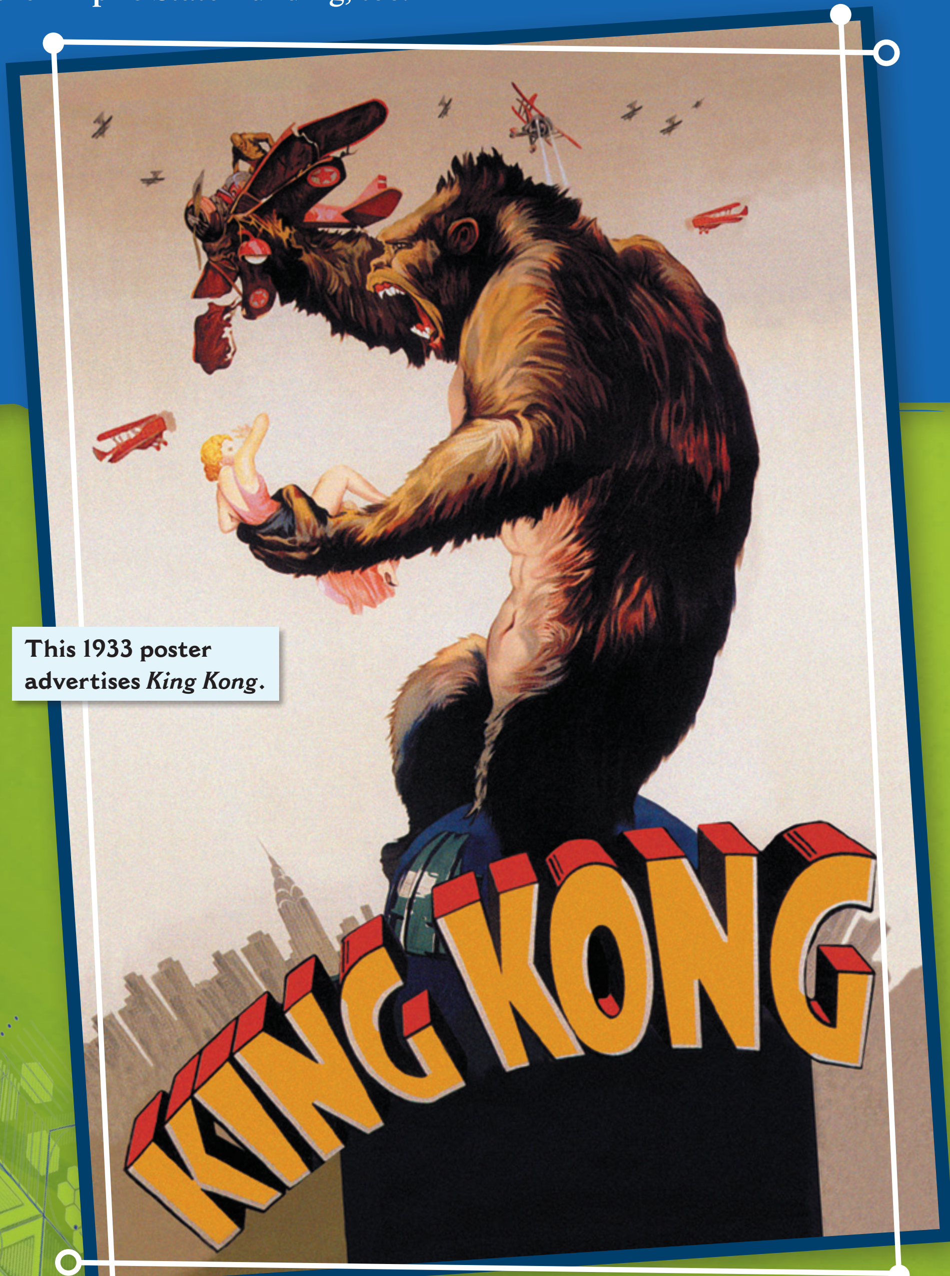
B. 69.845 square centimeters

C. 698.45 square centimeters

D. 6,984.5 square centimeters

Movie Models

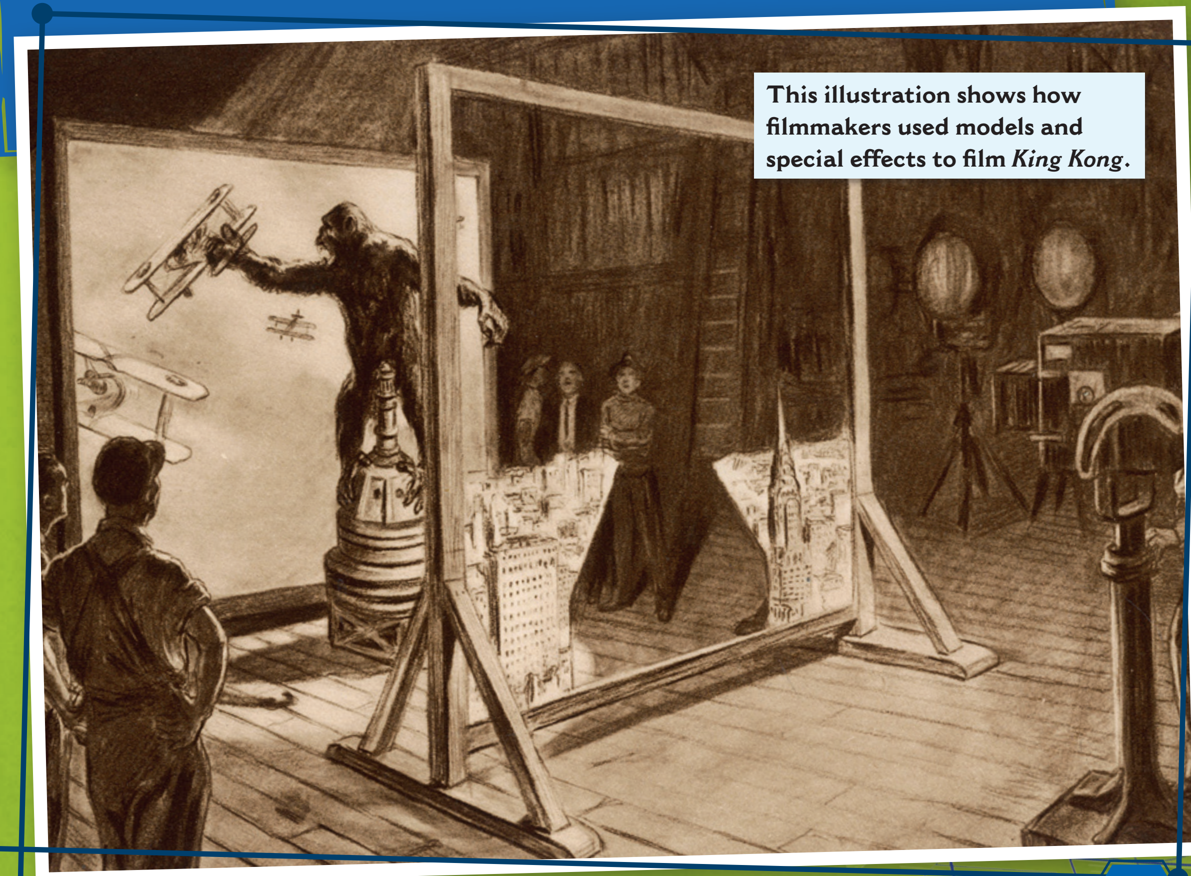
In 1933, the movie *King Kong* was made. It was one of the first major films to use models. In the movie, a huge gorilla wreaks havoc on New York City. A model of the giant beast was created to look like a real gorilla. The moviemakers created a model of New York City and the Empire State Building, too.



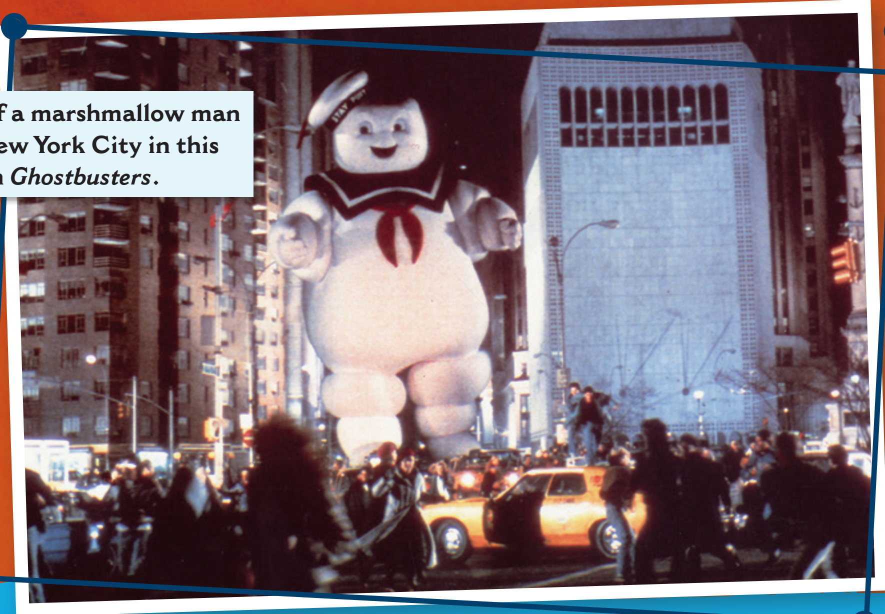
This 1933 poster advertises *King Kong*.

Throughout the history of movies, scale models have been used for special effects. Directors and producers use models to form make-believe creatures. They also use models of cities, cars, buildings, and other things that they want to destroy in a scene. Models help create the scene without destroying real objects. Models allow filmmakers to make fictional scenes look real.

The Empire State Building was the tallest building in the world at the time *King Kong* was made. The building was the focus of a famous scene in the movie. King Kong kidnaps a woman and climbs to the top of the Empire State Building. He swats at planes that circle the building as people try to rescue the woman.



This illustration shows how filmmakers used models and special effects to film *King Kong*.



A model of a marshmallow man invades New York City in this scene from *Ghostbusters*.

Since *King Kong*, lots of films have used models to show special effects. The first *Ghostbusters* movie from 1984 used models of a giant marshmallow man. The large man walks down a street in New York City. The scene has models of small cars on the street, too. These elements create the **perspective** that the man is as big as the buildings in the city.

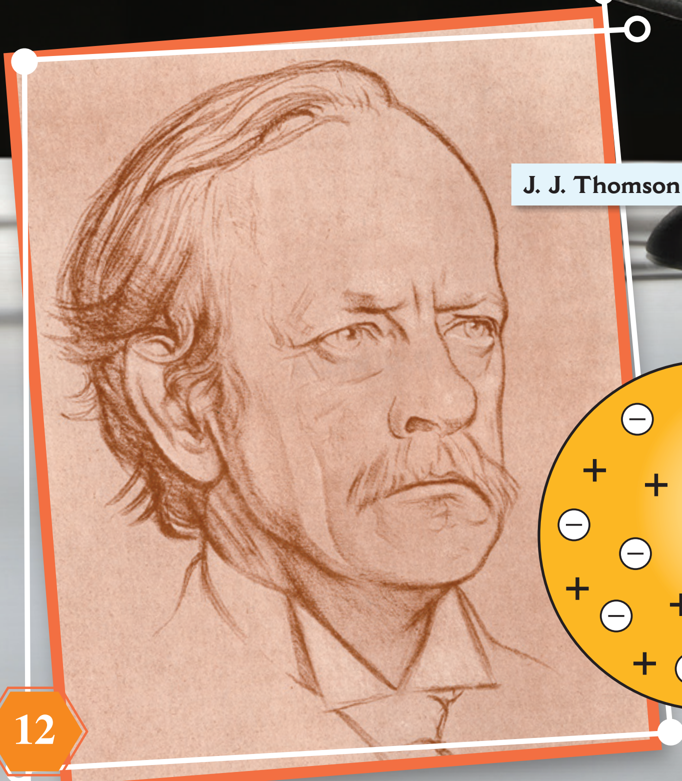
In the 1996 film *Independence Day*, aliens invade Earth. They blow up the White House. Of course, filmmakers could not destroy the place where the president lives! So, a model was used in the scene.

Most action movies made in the past 30 years have used models of some sort. However, in recent years, more and more movies use computer-generated imagery (CGI). Computers have become more advanced. Many models are now made on computers instead of with materials. CGI software lets people build and destroy a scene without using a physical model. CGI allows more options when it comes to making movies now and in the future.

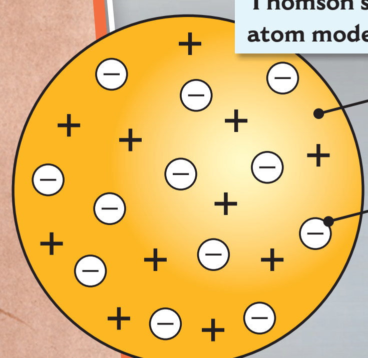
Some filmmakers may choose to use physical models to save money. Or, they may want to keep scenes simple and not have CGI images take away from the storyline. Whether it's a spaceship, a skyscraper, or an imaginary creature, mini models are a part of filmmaking that audiences have come to appreciate.

Models make it look like an alien spacecraft is targeting the White House in this scene from *Independence Day*.

This model of the solar system shows how planets orbit the sun.



J. J. Thomson



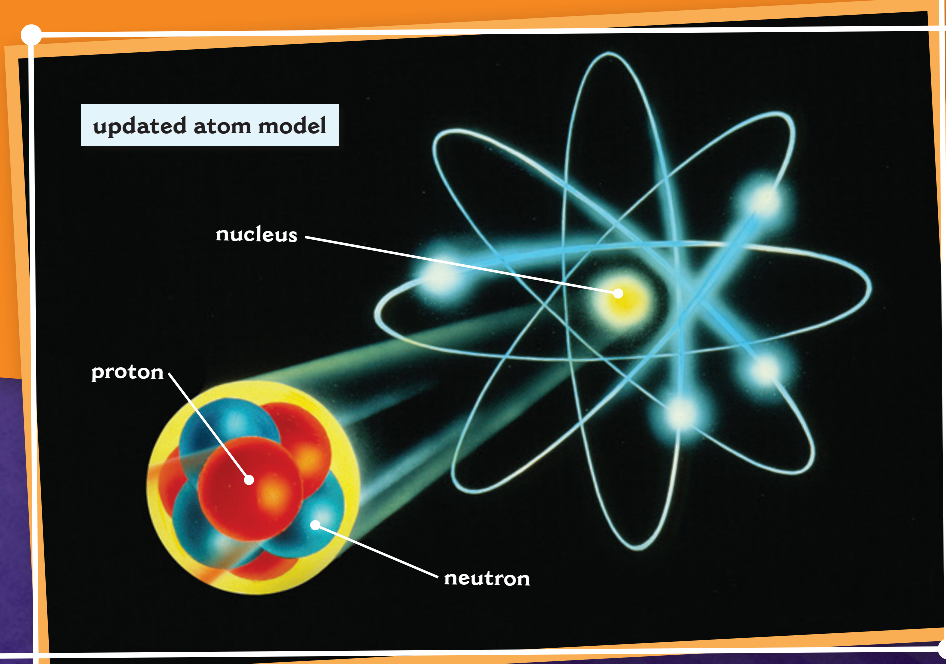
Thomson's atom model

Scientific Models

Scientists often study things that are too small to see without powerful microscopes. They study parts of **atoms**, cells, and tiny organisms. Most people do not have the tools needed to view these things. So, scientists create models that can show people these small structures.

In 1904, J. J. Thomson made the first model of an atom. Scientists since Thomson have continued to revise his model. The updated models are more accurate based on new research. They show that a nucleus, which is the control center of a cell, is made up of protons and neutrons. The models show that electrons are outside of the nucleus. Without models of atoms, people may not be able to understand their complex structures.

Scientists have also built models of very large things. For example, the solar system is too large to see in a photo. So, models help people understand how parts of the system work together as a whole. These models show the locations and orbits of the planets. Perhaps you have even built a model of the solar system yourself for a science project.



updated atom model

Scale Models

A scale model is a smaller version of a real thing. But, a model does not use random numbers and measurements. Instead, scale models are based on relationships. The relationships are based on the real items.

The greater a model's scale, the smaller the model will be. For instance, a model car with a 1 to 25 scale is 25 times smaller than the real car. It is much larger than a model with a 1 to 50 scale. The model with the 1 to 50 scale will be 50 times smaller than the real car!

It is important for a model builder to understand the scale of the model. It is advised that a first-time model builder start with a model that has a smaller scale. This means the model will be larger and have bigger pieces. As a builder gains experience, he or she can start to build models with a higher scale.

This model car is about two-hundredths the size of the real car.

A scale model of a helicopter is displayed at an aviation exposition in Russia.

LET'S EXPLORE MATH

This radio controlled model car is 10 times smaller than the real car. Which factor can you multiply the real car's measurements by to calculate the measurements of the model? Explain your reasoning.

A. 0.01

B. 0.1

C. 10

D. 100

Car makers use a model to introduce a new car to the media in Detroit.

Model building kits use a **consistent** scale for the whole model. The model shows the real car in smaller form. So, each piece of the model car needs to have the same scale. For example, the wheels of the car cannot use a larger scale than the body of the car. If this were the case, the wheels would be disproportionate to the size of the car. The model car would not look like the real car.

Different types of models use different sizing scales. These differences date back to when the first models were produced. Each company created their models using a scale they chose. The scale usually varied from company to company.

Over the years, companies have become more consistent in using standard and widely accepted scales. But, there are still variations among different types of models. For instance, companies commonly use a 1 to 32 scale for plane models. In contrast, 1 to 43 is the most popular scale used around the world for model cars.

LET'S EXPLORE MATH

Jamie is building a model boxcar for his trainset that is 0.04 times as small as a real boxcar. Place the decimal point in the product of each equation to find the dimensions of the model boxcar.

Dimension	Real Boxcar (inches)		Model Boxcar (inches)
Length	480	$\times$ 0.04 =	192
Width	108	$\times$ 0.04 =	432
Height	96	$\times$ 0.04 =	384

A student builds a robotic vehicle model with her technology teacher.

Getting Started

Architects and scientists use models, but most miniature models are built by ordinary people. It is such a popular hobby that you can find model kits, tools, and materials in most craft and hobby stores.

It can be a **daunting** task to start a new hobby or project. But, with some preparation and thought, you can be organized and ready to start building.

Find a Workspace

The first step to getting started is to find a good workspace for building. The workspace should be a place where you can organize your tools and materials. The space should have enough room to work without having to move things around to create more space.

Your workspace should be in an area where you will not bother other people. Building models takes time and involves a lot of small parts. You need to make sure that your materials will not get in the way of other family members. You also don't want younger brothers or sisters to get ahold of small pieces.

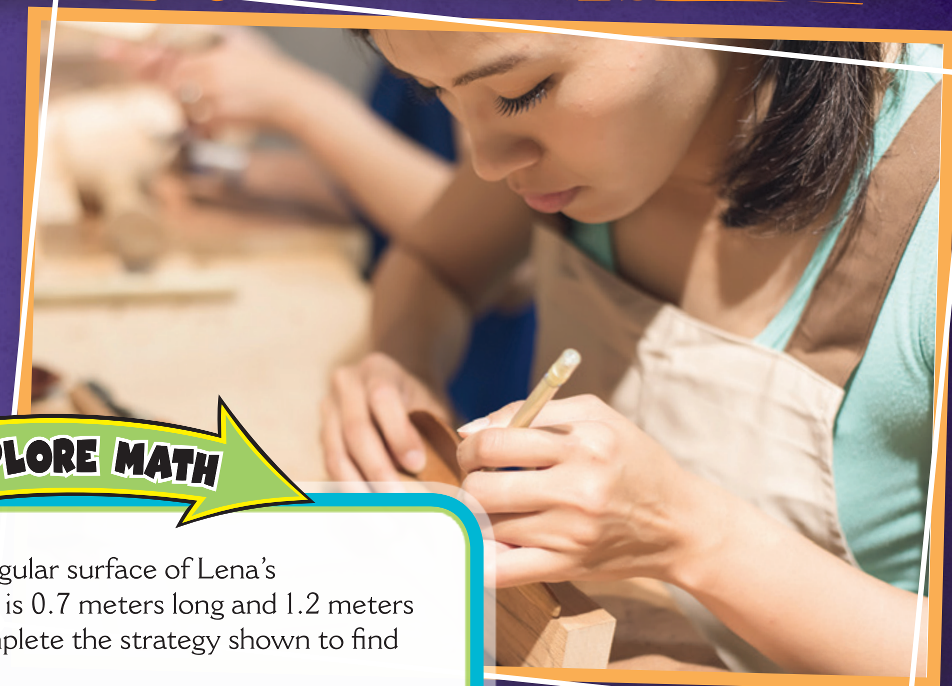
You also want a workspace that you do not have to take apart every day. You need to find a place where you can work for several days or weeks. You should be able to tidy up every day without having to move everything.

A workbench in a garage can be a good space to build.

Gather Tools and Materials

Once you have a space to work, you can gather the tools and materials you will need to build. The necessary tools depend on whether you are building a model from a kit or from scratch. If you purchase a kit, some materials will be in the box. You may need to purchase glue and paint if they are not included.

If you build a model from scratch, you may need a small screwdriver and screws or a hammer and nails. You will likely need glue and paint, too. Find a small bin or shoebox to help you store your tools and supplies. That way, you will always be able to find what you need when you need it.



LET'S EXPLORE MATH

The rectangular surface of Lena's workbench is 0.7 meters long and 1.2 meters wide. Complete the strategy shown to find its area.

0.7 × 1.2 = (______ × 1) + (0.7 × ______)

= ______ + ______

= ______ square meters

In addition to tools, you also need materials to build models. You might build a model from wood or cardstock, depending on what you want to build. You might use wood to build a dollhouse. You might choose to use cardstock to make a model airplane.

There are other tools that you'll need to build models whether you have a kit or not. These tools make it easier to build and put pieces together. Tweezers are handy for picking up small pieces. Cotton swabs and toothpicks can be used to glue and paint tiny pieces. You will probably need a pencil, paintbrushes, and a ruler. It is a good idea to have scissors and tape available, too.

It is important to think about everything you will need before you start a project. Being prepared will keep you from constantly stopping to search for needed items.

Many people would agree that homework is easier to complete when school supplies are organized. Chefs don't start cooking until ingredients and tools have been gathered. This same idea is true of building models. When materials are organized, it is easier to stay focused and do your best work.

A father and daughter work together to build a model.

LET'S EXPLORE MATH

Bridget's dad helps her build furniture for her dollhouse. The dollhouse furniture is 0.08 times as small as real furniture.

1. The real kitchen table is 0.7 meters tall. How tall is the dollhouse kitchen table (in meters)?
2. The real kitchen chair's seat height is 0.4 meters. What is the seat height for the dollhouse kitchen chair (in meters)?

A family reads directions as they start to build a model.

Read and Follow Instructions

It is important to follow directions when building models. Directions are like blueprints that architects create and use. Blueprints show exactly how structures should look when finished. Directions must be followed for buildings or models to turn out the correct way.

If you use a kit, directions will be included in the box. The plans will have pictures that show how the completed model will look. There will be pictures that show each step of the building process. There will be step-by-step written directions, too.

Carefully read the instructions before you start working. The plans will give you a list of materials and tools that you will need.

If you make a model from scratch, you can find building plans for many types of models on the Internet. Or, you can design and draw your own plans for the model you intend to make. For your first project, start with a model that has simple plans.

Whether you use printed directions or make your own, start with a clear plan before you begin building your model.

This model kit has many pieces that have to be organized and assembled.

Where Will You Start?

Some people like the challenge of building something by hand. They enjoy working hard to finish a project. Many people display models in their homes as a reminder of their hard work. They are proud of what they've built.

Some people also want to interact with other model builders. There are clubs and organizations that people can join. This is a way to meet people who have the same hobby. They can admire other people's hard work. They may share tips they have learned over the years. They may share suggestions for how new builders can get started.

A museum worker builds a scale model that is about one-hundredth the size of real landmarks in Russia.

Members of a model boat club meet to sail their creations.

Many of these organizations have conventions. Conventions are events where people with common interests can meet one another and learn. Model conventions give people a place to buy new model kits and meet other model builders. People can see **elaborate** model displays, too.

If you want to start making models, you might want to find a club in your local area. A simple Internet search will likely **yield** many results showing clubs in your area. There are clubs for people who build model trains. There are other clubs for people who build military models. Whatever your preference, you could quickly become a master model maker.

LET'S EXPLORE MATH

Paolo is a member of a model boat club. He is buying sail cloth which is sold by the square meter.

1. Paolo needs a rectangular piece of sail cloth with a length of 0.8 meters and width of 0.5 meters. How many square meters of cloth will he buy?
2. Sail cloth is $30 per square meter.
   a. Will Paolo's cloth cost more or less than $30? How do you know?
   b. How much will Paolo's cloth cost?

Problem Solving

Arthur is building a scale model of a rock formation and medieval tower for his social studies class. He is deciding whether to build a model that is 0.1 times as small or 0.01 times as small as the real formation and tower. Help him decide by calculating the measurements for each feature and answering the questions.

1. What patterns do you see in the table? Why do you think this happens?
2. Arthur's rectangular display board has a length of 0.8 meters and width of 0.75 meters. What is the area of the display board?
3. Which scale model do you recommend Arthur build? Why?

Feature	Actual Measurements (meters)	Scale Model Measurements (meters): 0.1 Times as Small	Scale Model Measurements (meters): 0.01 Times as Small
Rock formation height	41.5		
Tower length	2.7		
Tower width	3.6		
Tower height	19.8		

Glossary

architects—people who design buildings

atoms—the smallest parts of a substance

blueprints—detailed plans for a building

century—a time period of 100 years

complex—not easy to understand or explain

consistent—continues to happen in the same way

crucial—very important

daunting—very difficult to deal with

elaborate—made with great care and detail

foundation—concrete structure that a building is built on

miniature—small

modify—change

perspective—depth or distance of objects in relation to other objects

scale—the size of something in comparison to something else

structure—the way something is built, organized, or arranged

yield—to produce

Index

Answer Key

Let's Explore Math

page 7:

C; Explanations will vary but may include using estimation to show that 30 × 20 is 600, so the most reasonable answer must be around 600 square centimeters.

page 15:

B; Explanations will vary but may include that 0.1 is equal to one-tenth, so multiplying real measurements by this factor will result in scaled measurements that are 10 times as small.

page 17:

19.2; 4.32; 3.84

page 21:

0.84 sq. m; 0.7; 0.2; 0.7; 0.14; 0.84

page 23:

1. 0.056 m
2. 0.032 m

page 27:

1. 0.4 sq. m
2. **a.** Less than $30; He is buying less than 1 sq. m of sail cloth, so it must cost less than $30.

   b. $12

Problem Solving

Rock formation height: 4.15 m; 0.415 m

Tower length: 0.27 m; 0.027 m

Tower width: 0.36 m; 0.036 m

Tower height: 1.98 m; 0.198 m

1. The decimal point moves to the left each time because the products are ten times smaller.
2. 0.6 sq. m
3. Answers will vary. Example: The scale model that is 0.01 times as small is the best choice because it has measurements that are more reasonable to fit on a display board and take to school.

Math Talk

1. How are tenths and hundredths related?
2. How is multiplication with whole numbers, fractions, and decimals similar? How is it different?
3. How can estimation help you decide whether products are reasonable when multiplying decimals?
4. When multiplying two decimals that are less than 1, why is the product less than at least one of the factors?
5. Do you think it is easier to multiply a whole number by a fraction or by a decimal? Why?
6. Why might people building miniature models need to multiply decimals?