NCTM Activity Sheets for

Middle School

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Middle School Resources
Activity Packet Contents

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Reminders for Beginning Teachers

—Chandra Guckeen

The ideas listed below are reminders to help you put a classroom-management plan in place. Implementing these ideas at the beginning of the school year can prove beneficial throughout the entire year.

1. **Try to greet every student at the door.** Each child should be acknowledged every day with a "hello" and a handshake. I have found this habit to be effective in building relationships with students.

2. **Make a seating chart.** This aid helps you learn all students' names as quickly as possible. During the first few days, use the chart to quiz yourself at the end of each period. Calling each student by his or her name is very important in establishing rapport.

3. **Get to know each student as a person.** Students want to know that you are interested in them as people rather than just as students. To show your interest, host a club, coach a sport, or attend events and activities in which students participate. Doing so gives students an opportunity to see you in roles other than that of "teacher."

4. **Establish rules, and consistently enforce them.** Your students should know what the classroom rules and consequences for infractions are, so that no surprises arise when it comes to discipline. Be consistent, firm, and friendly, and maintain a sense of humor.

5. **Post entering and exiting procedures.** Students should know what is expected of them when they enter and exit your classroom. Establishing routines creates a consistency that middle school students need.

6. **Create classroom jobs.** These jobs could be Homework Collector (collects homework from each group), Paper Distributor (passes out papers during class), Return-Papers Person (passes back graded papers first thing when students enter the room), and the Drawing Supervisor (pulls the name out of the jar for the weekly prize drawing).

7. **Have a weekly prize drawing.** Give students tickets for positively contributing to the classroom in some manner. Students simply write their names on the tickets and then place them in a jar for the weekly drawing.

I hope that these reminders have given you direction in the task of planning your classroom management for the year. Remember, the overall goal in classroom management is to maintain a safe and effective learning environment for students.

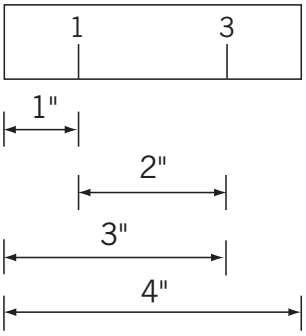
From *Empowering the Beginning Teacher of Mathematics in Middle School*, NCTM Stock number 12721.

Rule of 10

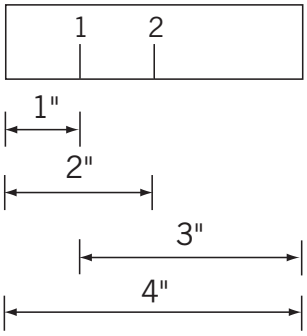
NAME:_____

Malik and Melinda each have an unmarked 4-inch wooden ruler. They realized that if they placed only two well-chosen marks on the rod, they could measure any inch unit length from 1 inch to 4 inches. Malik marked the 1-inch length and the 3-inch length. Melinda marked the 1-inch length and the 2-inch length.

Malik's Ruler (Not to Scale)



Melinda's Ruler (Not to Scale)



Suppose you had a 10-inch unmarked wooden ruler:

- What are the fewest marks needed on the rod to measure each inch unit length from 1 inch to 10 inches? _____
  How do you know? _____

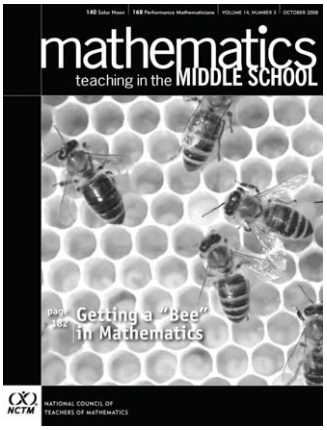
_____

- Where would you place the marks on the ruler?

This activity sheet is from:

Rule of 10

This activity targets grades 6–8.
Content: Problem Solving, Communications



Journal: Mathematics Teaching in the Middle School
Issue: October 2008
Department: *Solve It!*

The aim of *Solve It!* is to provide teachers with meaningful, mathematically rich problems that invoke thoughtful and innovative student responses. *Solve It!* poses a problem for classroom use and gives a solution to a previously published problem. *Solve It!* is a regular department of *Mathematics Teaching in the Middle School*. Student solutions are highlighted in *The Thinking of Students* department of *Mathematics Teaching in the Middle School.*

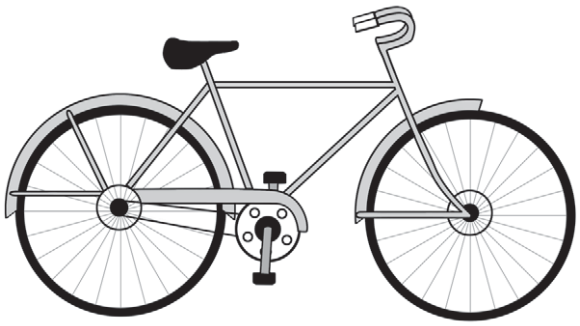
It is available *for members only* at:
http://www.nctm.org/publications/mtms.aspx

Mathematics Teaching in the Middle School (MTMS) is an official journal of the National Council of Teachers of Mathematics and is intended as a resource for middle school students, teachers, and teacher educators. The focus of the journal is on intuitive, exploratory investigations that use informal reasoning to help students develop a strong conceptual basis that leads to greater mathematical abstraction. The journal's articles have won numerous awards, including honors from the Society of National Association Publications.

MTMS is published nine times a year, monthly August through May, with a combined December/January issue.

Kyle and his Bike

NAME:_____



Kyle rode his bike for 12 miles. During the first third of the trip, he traveled on level ground at an average rate of 10 miles per hour. During the second third of the trip, he traveled uphill at an average rate of 6 miles per hour. During his last third of the distance, Kyle traveled downhill at an average rate of 15 miles per hour. How long did Kyle's 12-mile bike trip take?

Kyle's mother traveled the same 12-mile route as Kyle, but she drove her car. During the first third of the distance, Kyle's mother traveled at an average rate four times greater than Kyle's. During the second third of the distance, she traveled an average rate of 4 miles per hour less than the first third. During her last third of the distance, she traveled downhill at an average rate of 12 miles per hour greater than the second section. How long did it take Kyle's mother to travel the same 12 miles by car that Kyle traveled on his bike?

These problems were selected from:

MTMS's Palette of Problems

This activity targets grades 6–8.

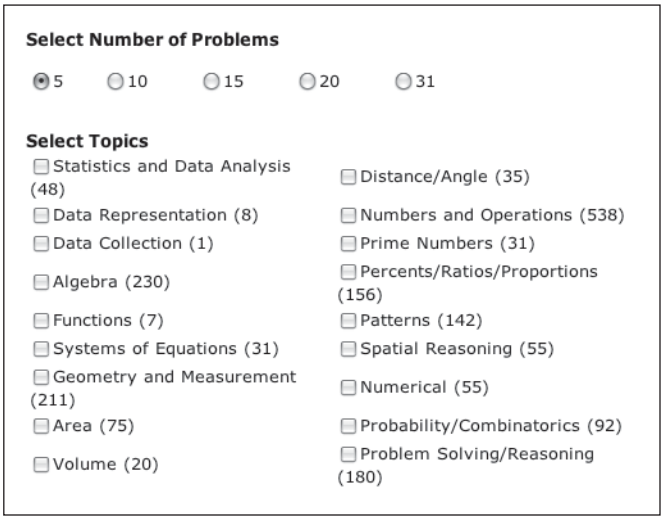
Source: www.nctm.org, Lessons and Resources pages

The purpose of the *Palette of Problems* is to provide teachers and students with a set of interesting and challenging problems that invite creative problem solving strategies. Teachers can use these problems as problem of the day or week, as warm-ups, as end of class challenges and/or brainteasers. *Palette of Problems* is a regular department of *Mathematics Teaching in the Middle School*.

The problem database is available ***for members only*** at:

https://my.nctm.org/ebusiness/members/calendar/default.aspx?journal_id=3

The problem database is sorted by topic. It includes thousands of problems featured in the *Palette of Problems* department of *Mathematics Teaching in the Middle School*. Only members have access to the problem archive.

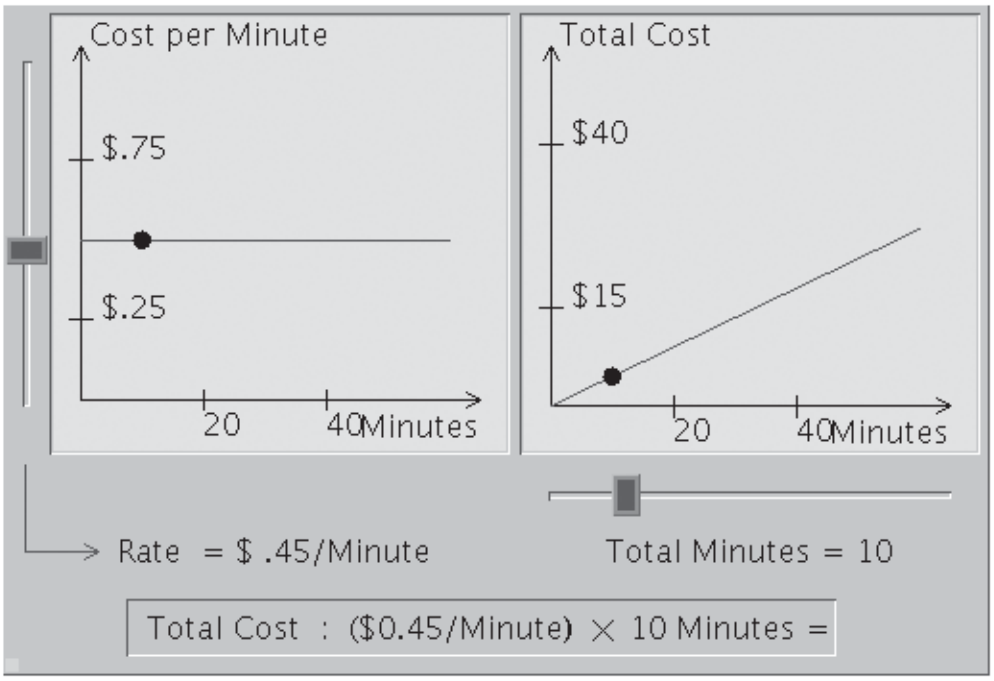


Screenshot of Middle School Problem Database

Rate of Change in Linear Functions

NAME:_____

ChitChat, a cellular-phone-service provider, has no monthly fee for cellular-phone service but does charge a $0.45 per minute usage fee.



1. Why is the slope of the first graph zero?

2. Will the second graph always have positive slope?

   What are the units for the slope?

3. As cost per minute increases, what happens to the slope of the first graph?

4. As cost per minute increases, what changes on the first graph?

5. As cost per minute decreases, what happens to the slope of the second graph?

6. As cost per minute decreases, what stays the same on the second graph?

This activity sheet was modified from:

Rate of Change in Linear Functions

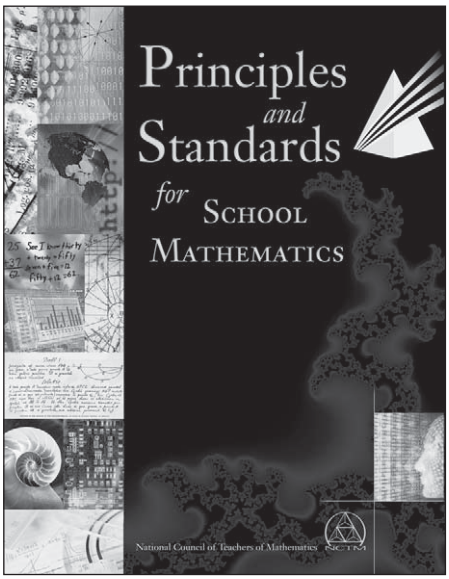
This activity targets grades 6–8.
Content: Algebra & Algebraic Reasoning, Communication

Have your students verify their solutions by using the applet found at
http://standards.nctm.org/document/eexamples/chap6/6.2/

Source: E-examples
NCTM Standards web site

It is available *free* at:
http://standards.nctm.org/document/eexamples/

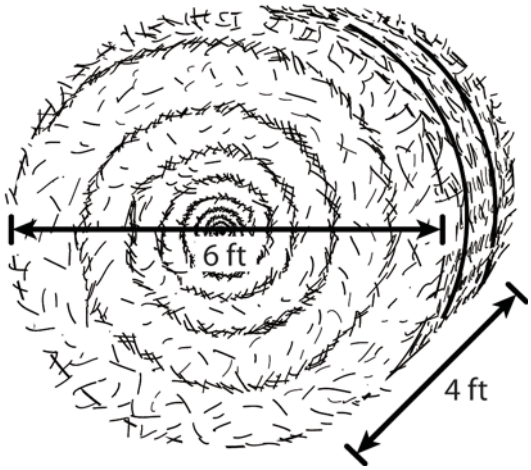
E-examples (Electronic Examples) are web-based interactive applets designed to provide students with the opportunity to gain experience with mathematical concepts. The Standards web site includes a collection of applets designed to accompany the *Principles and Standards for School Mathematics*.

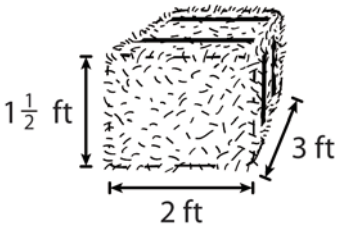


Hay Bale Farmer

NAME:_____

You are able to purchase one of the two different types of hay bales shown below: round or square. The round hay bale is 4 feet wide and has a diameter of 6 feet. The square hay bale has a width of 2 feet, height of $1\frac{1}{2}$ feet, and length of 3 feet. **Note:** You must purchase whole bales.





1. Approximately how many square bales would you need to purchase to have the same amount of hay as one round bale? Based on this result, do you think it's better to buy square bales or round bales? Why?

2. You need 16,000 ft^3 of hay to last through the year. Determine how many of each hay bale you would need to purchase if you purchase either all square bales or all round bales. If one round bale costs $20 and one square bale costs $2.75, which will be the better value?

3. Your barn measures 36 feet long, 36 feet wide, and 12 feet high. What is the greatest number of round bales that will fit in the barn? square bales? Show your model for each type of bale. Which type of hay bale will allow you to fit a greater volume of hay in the barn?

4. If you purchase enough round bales to have 16,000 ft^3 of hay, you will need to store some outside in the pasture. How many will not fit in the barn and need to be stored? Round bales stored outside lost 10% due to mold. How much hay will be lost, in cubic feet?

5. Which type of hay bale would you choose to purchase? Why? Use mathematics to explain your choice.

This activity sheet is from:

Hay Bale Farmer

This activity targets grades 6–8.
Content: Number & Operations, Measurement

In the lesson, students use dimensions of round and square hay bales to calculate and compare volumes. They also calculate unit prices to determine which hay bale is the better value. Finally, students explore how to fit round and square bales in a barn to maximize volume and decide which type of hale bale is the best choice.

It is available ***free*** at:
http://illuminations.nctm.org

Illuminations is a Web site with over 600 resources, including lessons such as this one, interactive activities, and more. Content ranges from levels pre-K to 12, including topics in all of NCTM's standards: Number & Operations, Algebra, Geometry, Measurement, and Data Analysis & Probability. All resources on the Web site are **free** with new content added regularly. Check us out the next time you're looking for creative, innovative resources for your classroom!

Take A Challenge

NAME:_____

During the 100 meter dash in the 1988 Olympic Games in Seoul, Florence Griffith-Joyner was timed at 0.91 seconds for 10 meters. At that speed, could she pass a car traveling 15 miles per hour in a school zone?

First, find out how many meters are in a mile. _____

And, how many seconds are in an hour? _____

A faucet drips every 2 seconds. In 1 week, how much water goes to waste – enough to fill a glass, a sink, or a tub?

Hint: One teaspoon holds about 20 drops. There are 96 teaspoons in a pint, and 8 pints in a gallon.

This activity sheet was modified from:

Figure This! Math Challenges for Families

This activity targets middle grades students.
Content: Algebra & Algebraic Reasoning, Numbers & Operations, Problem Solving

Figure This! Math Challenges for Families

Source: Figure This!

It is available *free* at:
http://figurethis.nctm.org

Figure This! demonstrates challenging mathematics problems and emphasizes the importance of high-quality math education for all students.

Figure This! Mathematical challenges for families provide interesting math challenges that middle-school students can do at home with their families.

There are 80 different challenges. Each challenge features:

- a description of the important math involved
- a note on where the math is used in the real world
- a hint to get started
- complete solutions
- a "Try This" section
- additional related problems with answers
- questions to think about
- fun facts related to the math
- resources for further exploration.

Motion Stories

NAME:_____

Circle the story you are going to work on:

Motion Story 1. The boy and girl start from the same position. The girl gets to the tree ahead of the boy.

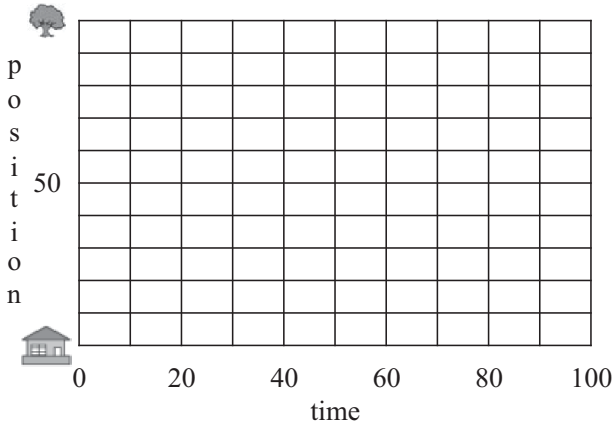
Motion Story 2. The boy starts behind the girl. The boy gets to the tree before the girl.

Motion Story 3. The boy starts at the tree and the girl starts at the house. The boy gets to the house before the girl gets to the tree.

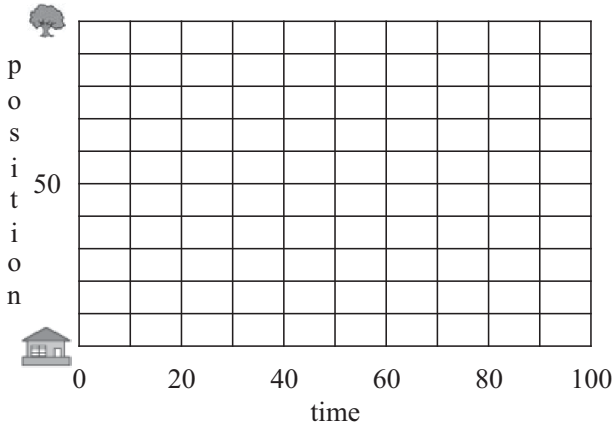
Motion Story 4. The boy and the girl walk with the same step size. The boy gets to the tree before the girl.

1. Try to act out the story with your partner. Write specific instructions that produce the action, including starting position and step size.

2. Draw what you think the graph for the story will look like.



3. Go to standards.nctm.org/document/eexamples/chap5/5.2/standalone.htm and test your instructions to see if they match your graph. If they don't, try to create a better graph. Draw your final graph from the applet.



4. Write a revised story, including more details about the actions of the boy and the girl.

5. Write a paragraph reflecting on this story. What observations can you make about the relationships in the starting position and step size in this story? Were your two graphs the same? If not, what was different?

This activity sheet was modified from:

Understanding Distance, Speed, and Time Relationships Using Simulation Software

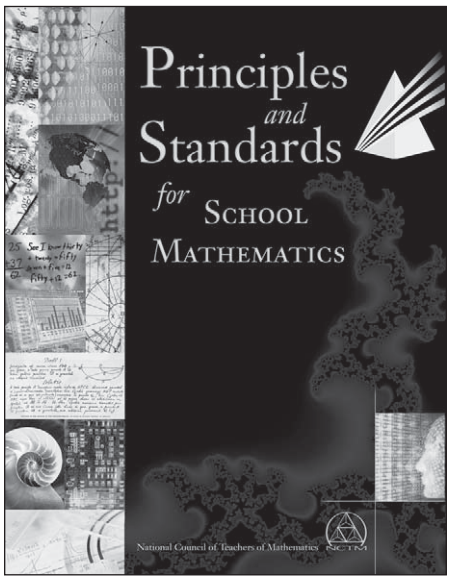
This activity targets grades 4–5.
Content: Algebra & Algebraic Reasoning, Graphing, Communication

Have your students verify their solutions by using the applet found at http://standards.nctm.org/document/eexamples/chap5/5.2/index.htm

Source: E-examples
NCTM Standards web site

It is available *free* at:
http://standards.nctm.org/document/eexamples/

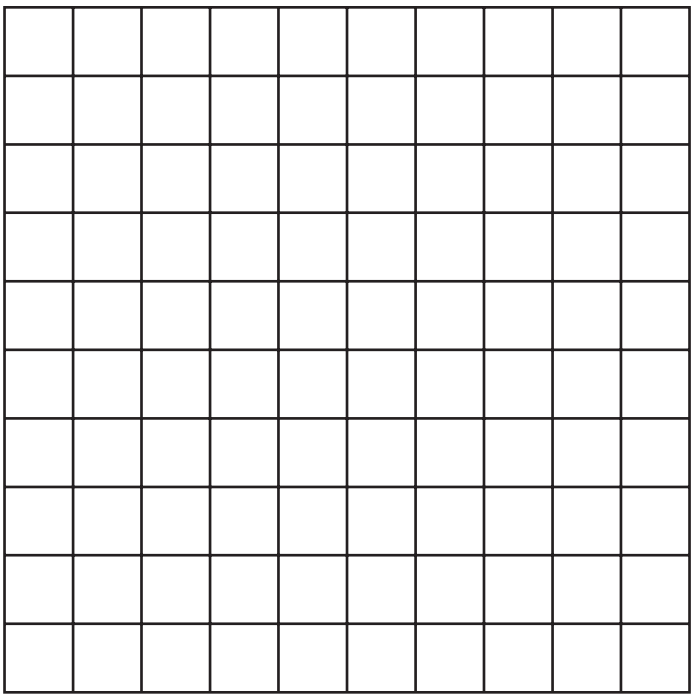
E-examples (Electronic Examples) are web-based interactive applets designed to provide students with the opportunity to gain experience with mathematical concepts. The Standards web site includes a collection of applets designed to accompany the *Principles and Standards for School Mathematics*.



Lesson on Bridges

NAME:_____

1. Suppose that a paper bridge 4” long can support a weight of 45 pennies and a bridge of 11” long can support a weight of 3 pennies. Construct a graph of this data, describing what is the independent variable and what is the dependent variable, and connect the two points with a line or a curve that you predict reflects the relationship between these two variables.



2. Based on your graph, explain in words, using mathematical language, exactly what happens to the breaking weight of a bridge as its length increases, assuming there is no change in its thickness.

_____

_____

_____

_____

_____

This activity sheet was modified from:

Lesson on Bridges

This activity targets grades 6–8.
Content: Graphing, Communication, Numbers & Operations

Source: Reflections, NCTM's Lessons and Resources page.

It is available *free* at:

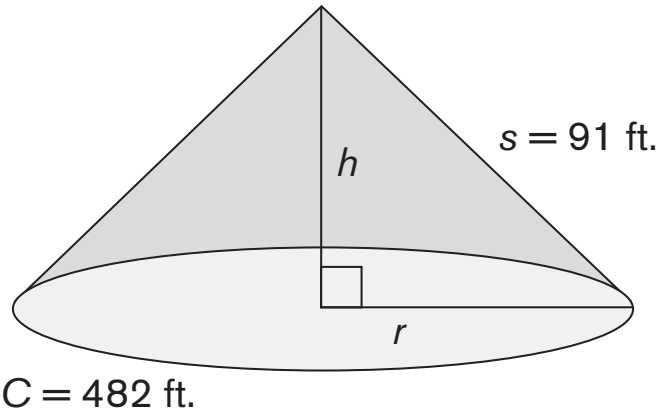
http://www.nctm.org/resources/content.aspx?menu_id=598&id=12174

Reflections, NCTM's video-based, professional development Web site, is designed to help teachers, individually and collectively, examine their teaching of mathematics. The site's components are designed to assist teachers in reflecting on the mathematics they teach, and as a tool to systematically observe, analyze, critique, and improve classroom practices. There is one lesson per grade.

Ritzville Experiments

NAME: _____

Suppose you are a farmer in Ritzville, Washington, and you have stacked your unsold wheat in an enormous pile whose shape is shown in the diagram.



Imagine that your pile of wheat has already been covered with heavy-duty protective vinyl for storage, but you want to know how much vinyl the covering used. You can easily walk around your stack and measure its *circumference*, *C*. In addition, the vinyl helps stabilize your pile of wheat, allowing you to measure the stack's slant height, s, directly. Note, however, that you cannot make direct measurements of either the height, *h*, of the stack or the radius, *r*, of its circular base.

Suppose that you measure the slant height of your pile of wheat as 91 feet and the circumference as 482 feet (making both measurements to the nearest foot).

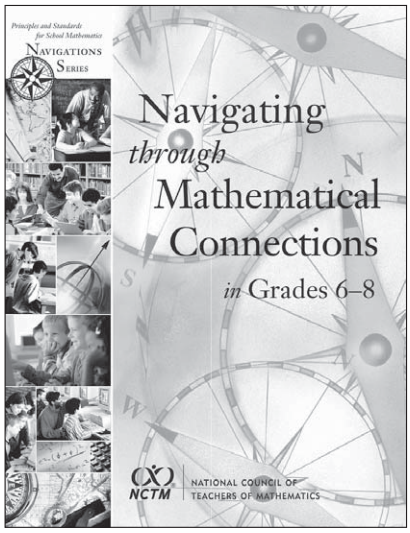
1. What would you need to measure to find the amount of vinyl in the covering on your pile of wheat? (Don't perform the mathematical operations now—just say what you would need to measure to solve the problem!)

2. Suppose that for an inventory at the storage area you must declare the amount of wheat in your stack. What would you need to measure to find the amount? (Again, don't try to perform the mathematical operations now—just say what you would need to measure to solve the problem!)

This activity sheet is from the book:

Navigating Through Mathematical Connections in Grades 6–8

Content: Geometry & Measurement, Surface Area, Volume, Communication, Connections



NCTM Stock Number: 13001

It is available *for sale* at:

http://my.nctm.org/eBusiness/ProductCatalog/product.aspx?ID=13001

The NCTM Process Standards recommend highlighting mathematical connections by actively involving students in five processes: problem solving, reasoning and proof, communication, connections, and representation. These processes help middle school students recognize connections among topics in mathematics and between mathematical ideas and diverse phenomena in other realms of experience. In turn, these connections help students become skillful problem solvers. Activities in this book invite students to connect ideas of number, algebra, geometry, measurement, and data analysis. Students discover the usefulness of mathematical modeling by solving problems in a variety of applied settings. For example, they investigate problems related to the outdoor storage of wheat, crime-scene forensics, and estimations of wildlife populations.

Cranberry Punch

NAME:_____

Southwestern Middle School Band is hosting a concert. The seventh-grade class is in charge of refreshments. One of the items to be served is punch. The school cook has given the students four different recipes calling for sparkling water and cranberry juice.

Recipe A:
2 cups cranberry juice
3 cups sparkling water

Recipe B:
4 cups cranberry juice
8 cups sparkling water

Recipe C:
3 cups cranberry juice
5 cups sparkling water

Recipe D:
1 cup cranberry juice
4 cups sparkling water

1. Which recipe will make punch that has the strongest cranberry flavor? Explain your answer.

_____

_____

2. Which recipe will make punch that has the weakest cranberry flavor? Explain your answer.

_____

_____

3. The band director says that 120 cups of punch are needed. For each recipe, how many cups of cranberry juice and how many cups of sparkling water are needed? Explain your answer.

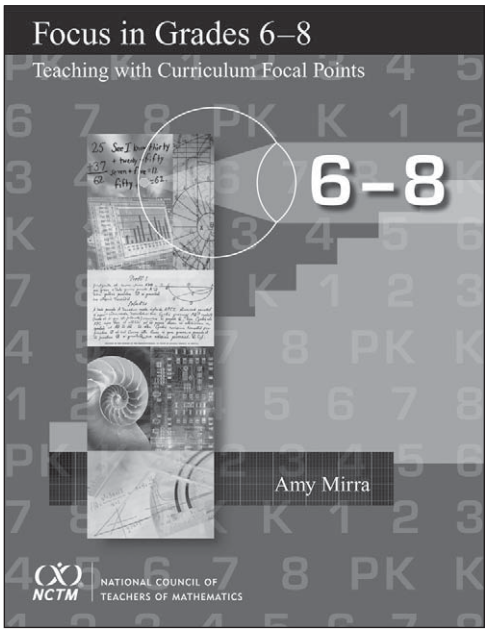
_____

_____

This activity sheet is modified from an activity in:

Focus in Grades 6–8
Teaching With Curriculum Focal Points

Content: Algebra & Algebraic Reasoning, Pre-number Concepts, Communication



Conference Special

25% off at the onsite NCTM Bookstore!

NCTM Stock Number: 13465

It is available *for sale* at:

http://my.nctm.org/eBusiness/ProductCatalog/product.aspx?ID=13465

Focus in Grades 6–8 shows teachers and other educators how they can incorporate NCTM's Curriculum Focal Points for PreK–8 into their current mathematics curricula. The book provides practical ideas for bringing focus to mathematics learning and instruction in the classroom. Intended as a professional development tool, it presents self- and group-reflection tasks, sample student work, a sample state mathematics curriculum organized around the Focal Points, and other helps that teacher educators can use with the preservice teachers in their classes.

Seven Things I Never Learned in Methods Class

—Margaret R. Meyer

1. **Do not think that students never notice what clothes you wear or when you last cut your hair.** They are quite observant about such things because these concerns are very important in their own lives. When building a professional wardrobe, do make the choice of comfort over fashion, especially when you are buying shoes.

2. **Do not bore your friends with school stories unless they are teachers, too.** A story that is funny to a teacher is often not funny to those in other occupations. Do try to balance your life with friends who work outside of education.

3. **Do not take your health for granted when working with children.** Keep a box of tissues on your desk, and insist that students use them. Ask students to bring in replacement boxes from home; they are usually happy to do so. Wash your hands frequently.

4. **Do not think you will always be twenty-something.** Pay attention to saving for your retirement. Take advantage of tax-sheltered savings plans.

5. **Do not take too long to recover from your undergraduate degree.** Start a graduate program as soon as possible. Doing so will pay off well in the long run.

6. **Do not isolate yourself behind your closed door.** Find colleagues with whom you can talk, plan, share successes and failures, and continue to grow professionally.

7. **Do not ever tell your students how old you are, especially when they ask you directly.** Instead, add at least thirty years to your age when answering because that age is how old they really think you are. Do think about retiring when your answer starts to sound believable.

From *Empowering the Beginning Teacher of Mathematics in Middle School*, NCTM Stock number 12721.

The Product Game

NAME:_____

Materials for each pair of students:

Several copies of the gameboard
2 paper clips
2 different colored markers

Allow your students to play the Product Game several times with their partners. Instruct them to look for interesting patterns and winning strategies.

Give them 10 minutes to free-write on their experience, asking them to reflect on strategies that worked or failed.

After they turn in their free-writes, facilitate a whole class discussion.

Product Games Rules

1. Player A puts a paper clip on a number in the factor list. Player A does not mark a square on the product grid because only one factor has been marked: it takes two factors to mark a product.

2. Player B puts the other paper clip on any number in the factor list (including the same number marked by Player A) and then shadesor covers the product of the two factors on the product grid.

3. Player A moves either one of the paper clips to another number and then shades or covers the new product.

4. Each player in turn moves a paper clip and marks a product. If a product is already marked, the player does not get a mark for that turn. The winner is the first player to mark four squares in a row—up and down, across, or diagonally.

The Product Gameboard

1	2	3	4	5	6
7	8	9	10	12	14
15	16	18	20	21	24
25	27	28	30	32	35
36	40	42	45	48	49
54	56	63	64	72	81

Factors:

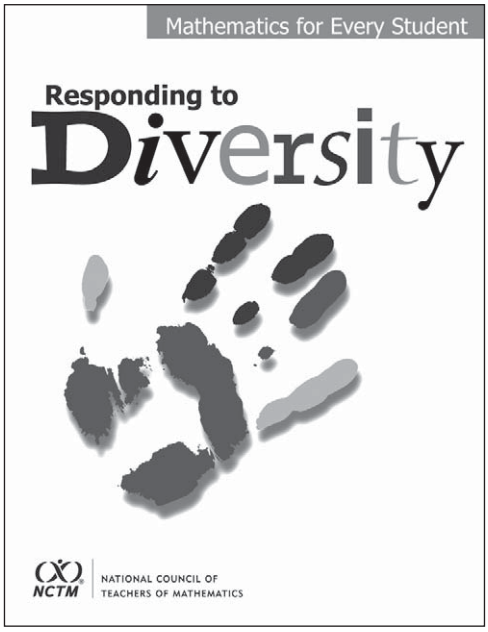
1 2 3 4 5 6 7 8 9

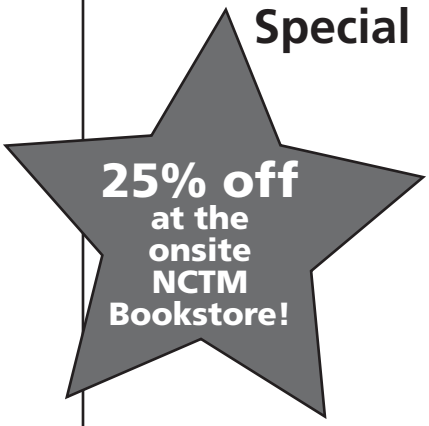
Source: Lappan et al. (1996c); used with permission.

This activity sheet is from the book:

Responding to Diversity: Grades 6–8

Content: Numbers & Operations, Multiplication & Division, Games / Puzzles





NCTM Stock Number: 13409

It is available *for sale* at:

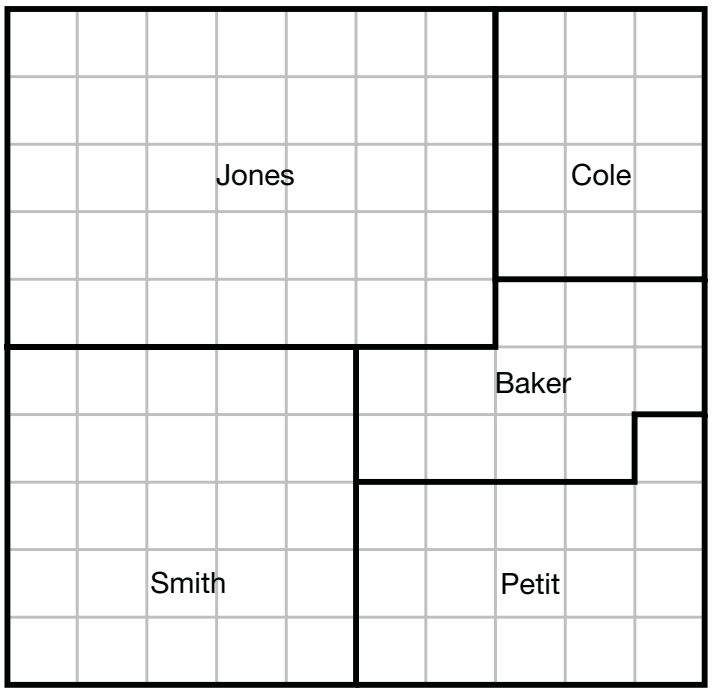
http://my.nctm.org/eBusiness/ProductCatalog/product.aspx?ID=13409

The instructional strategies presented in this volume reflect that diversity can come in various forms. Written by teachers who have experimented with different teaching techniques in the classroom, these articles are presented in three formats—cases of classroom practice, instructional strategies, and teacher development. The articles demonstrate how connecting real-life activities with mathematical concepts, and building on students' knowledge and experiences, can help them excel in the classroom. Strategies that can immediately be implemented to help students form better connections with the content they are studying are also described.

Farm Tax

NAME: _____

The map below shows some farms. The county charges a tax based on the size of each farm, not on the quality of the land, so all land is taxed at the same rate. The Joneses pay $5,250 per year in taxes. After the map was drawn, the Bakers purchased some property from the Petits and increased the size of their property to 125% of its size on the map. By approximately what percent will the Petit's tax bill decrease? Please make sure your solution strategy is clear.

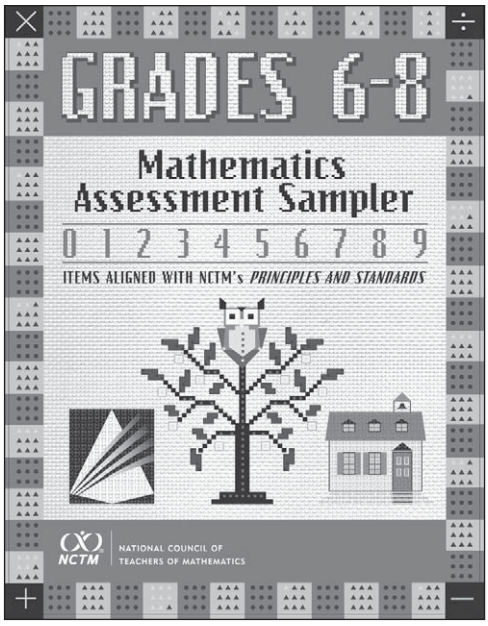


From *Mathematics Assessment Sampler: Grades 6–8*, NCTM Stock number 12940 .

This activity sheet was modified from:

Mathematics Assessment Sampler: Grades 6–8
Items Aligned with NCTM's *Principles and Standards*

This activity targets grades 6–8.
Content: Geometry & Measurement, Area, Numbers and Operations, Fractions / Decimals / Percents / Rational Numbers



NCTM Stock Number: 12940

It is available *for sale* at:

http://my.nctm.org/eBusiness/ProductCatalog/product.aspx?ID=12940

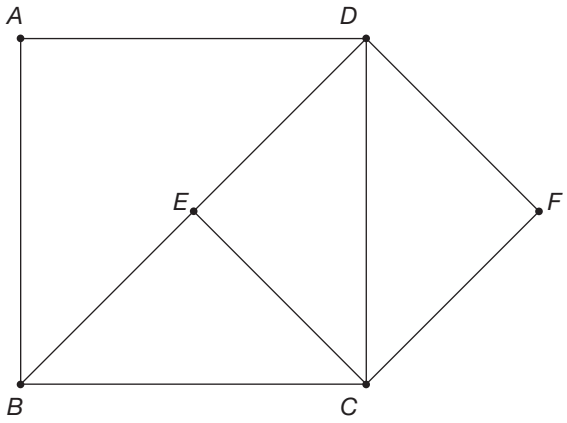
This collection highlights a professional development chapter that is designed to help in-service and preservice teachers understand and use levels of complexity for particular problems, use and adapt multiple-choice items, use assessment tasks as an in-service topic, employ scoring rubrics, use technology in assessment, and design their own assessment items.

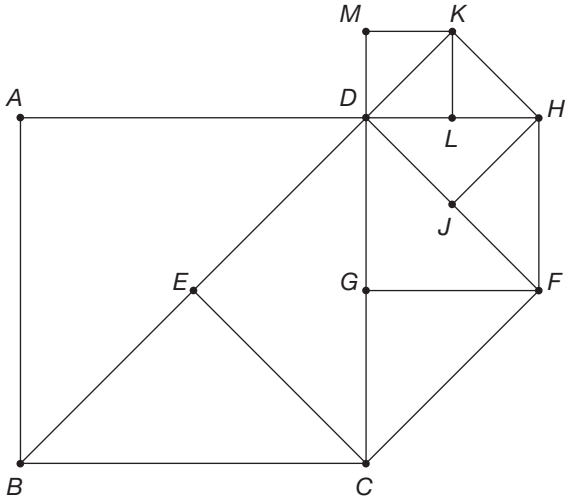
The hope is that teachers find this compilation of problems and items interesting and helpful as they seek to learn about their students' thinking and consider how their students' responses might guide their instruction.

Tesselating Pentagons

NAME: _____

Figure 1 is a special kind of pentagon in which *ABCD* is a square and *E* is the midpoint of the diagonal *BD*; then square *DECF* is drawn to make the pentagon *ABCFD*. Figure 2 continues drawing similar figures, starting with square *ABCD*, then adding square *ECFD*, and so on.





a. Find three pentagons similar to *ABCFD*.

_____ _____

_____

b. If $\overline{DM}$ is 2 cm long, how long is $\overline{DA}$?
Explain your reasoning.

_____

_____

_____

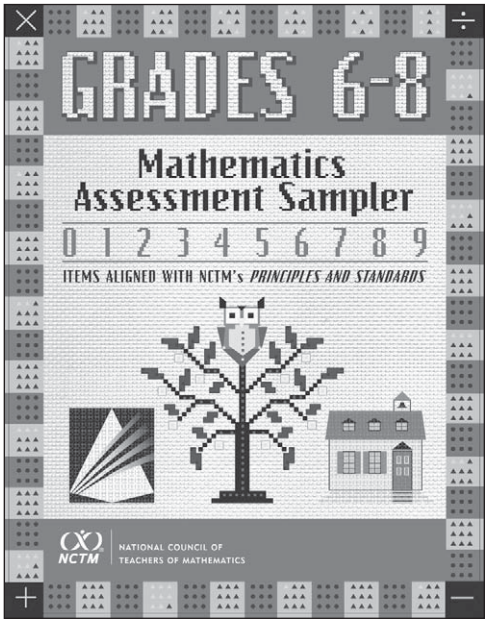
_____

From *Mathematics Assessment Sampler: Grades 6–8*,
NCTM Stock number 12940.

This activity sheet was modified from:

Mathematics Assessment Sampler: Grades 6–8 Items Aligned with NCTM's *Principles and Standards*

This activity targets grades 6–8.
Content: Geometry & Measurement, Geometric Patterns, Length, Similarity / Congruence



This collection highlights a professional development chapter that is designed to help in-service and preservice teachers understand and use levels of complexity for particular problems, use and adapt multiple-choice items, use assessment tasks as an in-service topic, employ scoring rubrics, use technology in assessment, and design their own assessment items.

The hope is that teachers find this compilation of problems and items interesting and helpful as they seek to learn about their students' thinking and consider how their students' responses might guide their instruction.

The Marvels of Multiplication

NAME: _____

Explain your answers in full sentences on a separate sheet of paper.

One day in math class, Mrs. Marcet marveled at how her students solved a multiplication problem in so many different ways, and yet all arrived at the same solution. Nissa's, Diana's, and Richie's work appear below.

Nissa	Diana	Richie
27	27	27
× 15	× 15	× 15
35	135	135
100	270	200
70	405	+ 70
+ 200		405
405		

1. What two factors did Nissa use to find each of the following products?

   35 → 5 × 7
   100 _____
   70 _____
   200 _____

2. What two factors did Diana use to find each of her products?

   _____ _____

3. What three factors did Richie use to find each product?

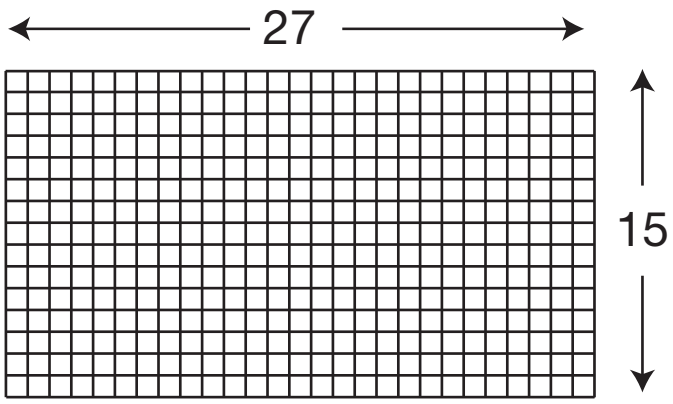
   _____ _____ _____

4. Explain why each strategy provided the same correct answer.

5. Do you think each strategy will always work? Why, or why not?

Marvels of the Area Model

A rectangular area model is one representation of multiplication that may help you to understand the concept of multiplication and the quantities represented by the digits in the problem. Below is an area model of the product of 15 and 27.



Area = 405 square units

You can write the number 15 as the sum of 1 ten (10) and 5 ones (5). In the same way, you can also write the number 27 as the sum of 2 tens (20) and 7 ones (7).

6. Draw lines on the grid of 15 × 27 to separate the length into sections of 20 + 7 and the width into sections of 10 + 5.

7. Find the areas of each of the four sections in that rectangle.

8. Find the sum of these areas. What do you notice about this sum and the area of the rectangle that measures 15 by 27?

9. What do you notice about the areas above and Nissa's strategy for multiplying 15 × 27? Why does this occur?

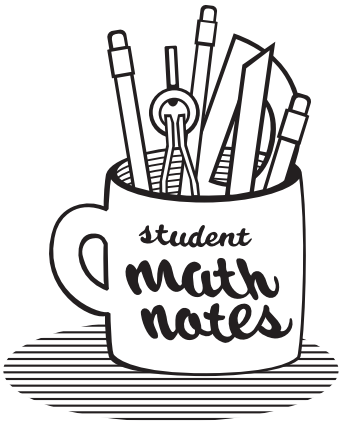
From *Student Math Notes*, November 2008.

This activity sheet was modified from:

The Marvels of Multiplication

This activity targets grades 5–8.
Content: Numbers and Operations, Algorithms,
Multiplication & Division, Representation

Source: Student Math Notes
Issue: November 2008



Student Math Notes offers great resources for teachers and teacher educators at grades 5-10. Downloads are free to individual members of NCTM.

It is available *for members only* at:
http://my.nctm.org/eresources/journal_home.asp?journal_id=5

Top Ten Things I Wish I Had Known When I Started Teaching

—Cynthia Thomas

10. Not every student will be interested every minute. No matter how much experience you have or how great you are at teaching, you will encounter times in the classroom when no student is interested! The solution is to change your tone of voice, move around the room, or switch from lecturing to some other activity. Maybe you can even use a manipulative to increase the students' understanding and, possibly, their level of interest.

9. If a lesson is going badly, stop. Even if you have planned a lesson and have a clear goal in mind, if your approach is not working—for whatever reason—stop! Regroup and start over with a different approach, or abandon your planned lesson entirely and go on to something else. At the end of the day, be honest with yourself as you examine what went wrong and make plans for the next day.

8. Teaching will get easier. Maybe not tomorrow or even next week, but at some point in the year, your job will get easier! Try to remember your first day in the classroom. Were you nervous? Of course; all of us were. See how much better you are as a teacher already? By next year, you will be able to look back on today and be amazed at how much you have learned and how much easier so many aspects of teaching are!

7. You do not have to volunteer for everything. Do not feel that you always have to say yes each time you are asked to participate. Know your limits. Practice saying, "Thank you for thinking of me, but I do not have the time to do a good job with another task right now." Of course, you must accept your responsibility as a professional and do your fair share, but remember to be realistic about your limits.

6. Not every student or parent will love you. And you will not love every one of them, either! Those feelings are perfectly acceptable. We teachers are not hired to love students and their parents; our job is to teach students and, at times, their parents as well. Students do not need a friend who is your age; they need a facilitator, a guide, a role model for learning.

5. You cannot be creative in every lesson. In your career, you will be creative, but for those subjects that do not inspire you, you can turn to other resources for help. Textbooks, teaching guides, and professional organizations, such as NCTM, are designed to support you in generating well-developed lessons for use in the classroom. When you do feel creative and come up with an effective and enjoyable lesson, be sure to share your ideas with other teachers, both veterans and newcomers to the profession.

4. No one can manage portfolios, projects, journals, creative writing, and student self-assessment all at the same time and stay sane! The task of assessing all these assignments is totally unreasonable to expect of yourself as a beginning teacher. If you want to incorporate these types of exercises into your teaching, pick one for this year and make it a priority in your classroom. Then, next year or even the year after that, when you are comfortable with the one extra assignment you picked, you can incorporate another innovation into your teaching.

3. Some days you will cry, but the good news is, some days you will laugh! Learn to laugh with your students and at yourself!

2. You will make mistakes. You cannot undo your mistakes, but berating yourself for them is counter-productive. If the mistake requires an apology, make it and move on. No one is keeping score.

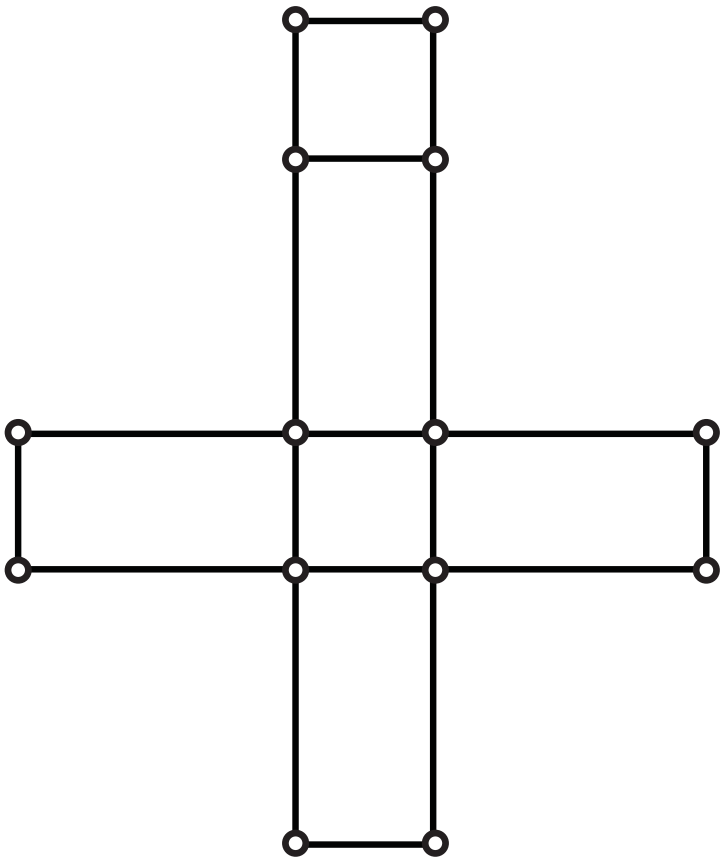
1. This is the best job on earth! Stand up straight! Hold your head high! Look people in the eye and proudly announce, "I am a teacher!"

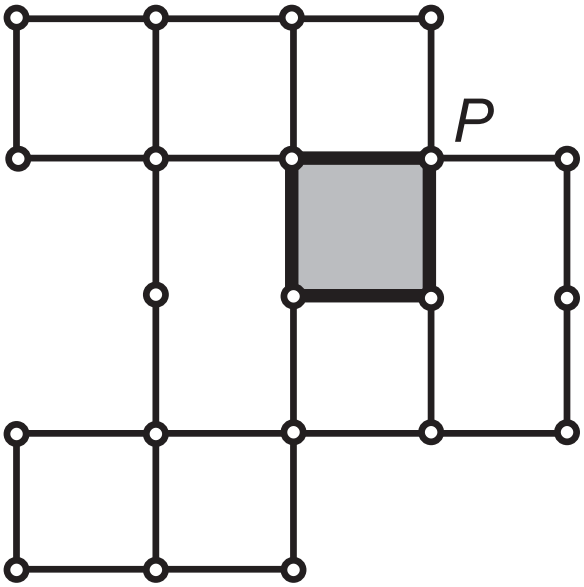
From *Empowering the Beginning Teacher of Mathematics in Middle School*, NCTM Stock number 12721.

Folding Boxes

NAME:_____

Each of these templates may be cut out and folded to form a 1 × 1 × 2 rectangular box. Use the grid on the next page to see how many different templates you can find to make the same box.



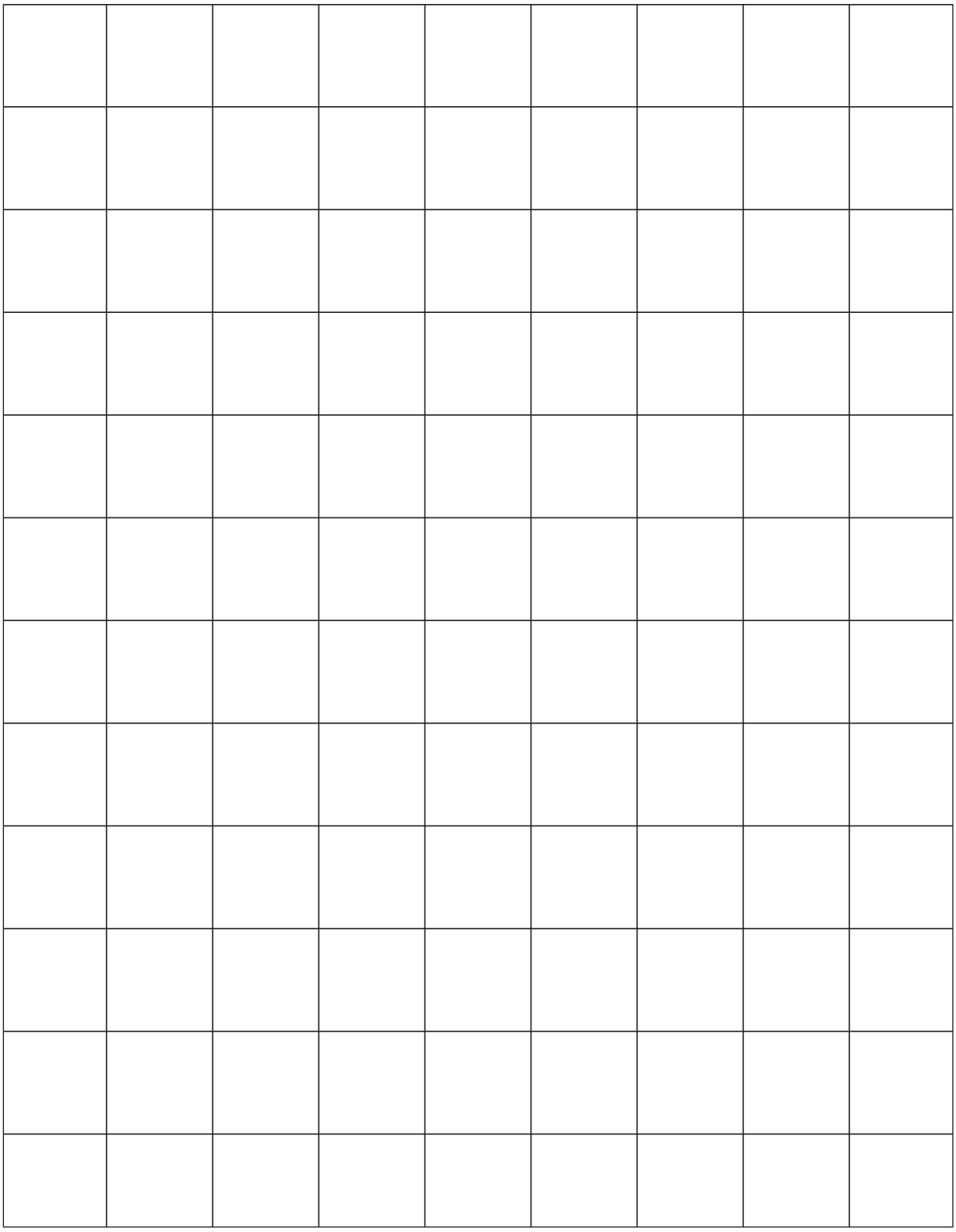


Note: The black square is not part of the panels to be folded, and the two 1 × 1 squares that touch at point *P* are not attached there, but separated when the shape is folded into the 1 × 1 × 2 box.

From *Understanding Geometry for a Changing World Seventy-first Yearbook*, NCTM Stock number 13466.

Folding Boxes (continued)

NAME: _____

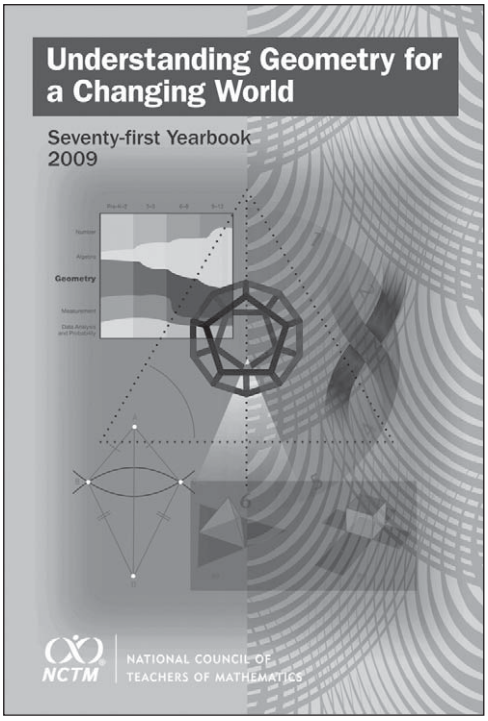


From *Understanding Geometry for a Changing World Seventy-first Yearbook*, NCTM Stock number 13466.

This activity sheet is from:

Understanding Geometry for a Changing World
Seventy-first Yearbook

This activity targets grades 6–8.
Content: Geometry & Measurement, 3-D Shapes, Constructions



Conference Special

25% off at the onsite NCTM Bookstore!

NCTM Stock Number: 13466

It is available *for sale* at:
http://my.nctm.org/eBusiness/ProductCatalog/product.aspx?ID=13466

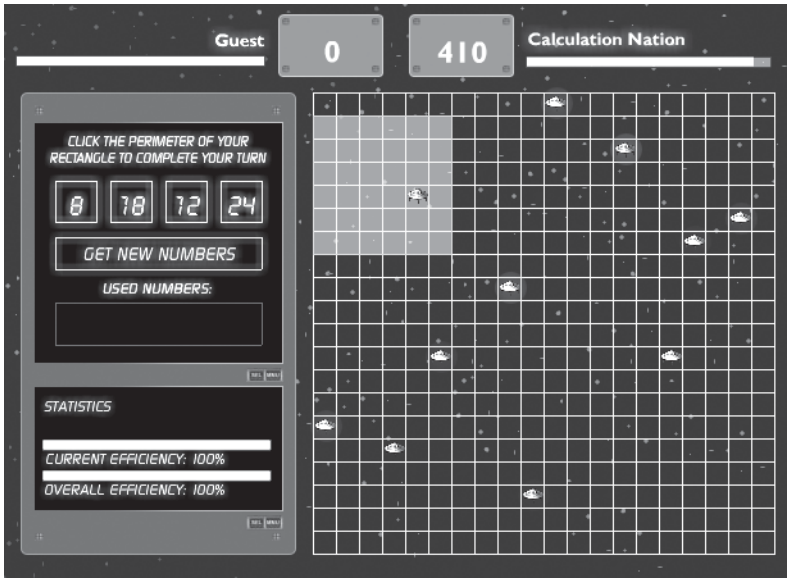
NCTM's *Principles and Standards for School Mathematics* (2000) asserts that geometry is the one content standard that should receive relatively constant attention from prekindergarten through grade 12. NCTM's seventy-first yearbook focuses on the developments made in the understanding of student's learning of geometry and the availability of new tools for teaching this important subject.

Square Off

NAME:_____

Login to Calculation Nation at http://calculationnation.nctm.org/ and play Square Off.

After playing at least one full game, answer the following questions.



1. Given a particular perimeter, what type of rectangle will have the maximum area? Explain your reasoning.

2. The perimeter of Rectangle A is greater than the perimeter of Rectangle B. Which of the following statements is true? Choose one, and explain. Provide examples in your explanation.

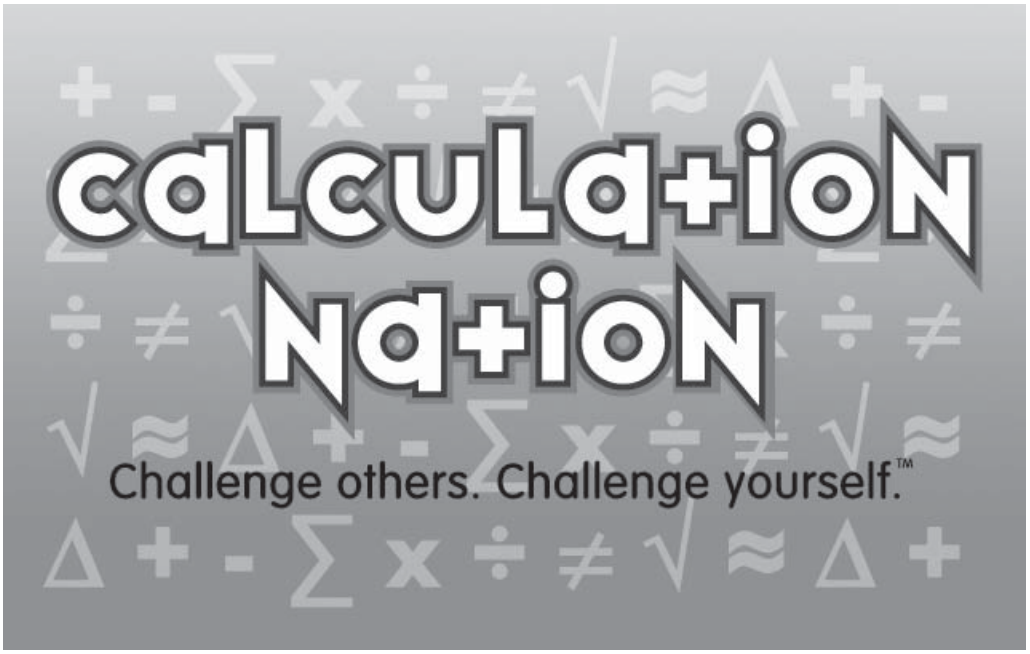
a. The area of Rectangle A is greater than the area of Rectangle B.
b. The area of Rectangle A is less than the area of Rectangle B.
c. The area of Rectangle A could be greater than, less than, or equal to the area of Rectangle B.

3. On each turn during the game, you were given four possible perimeters to choose from. How did you decide which number to choose? Explain your strategy in detail.

This activity sheet was modified from:

Calculation Nation

This activity targets grades 5–10.
Content: Geometry, Area & Perimeter



It is available at:
http://calculationnation.nctm.org/Games/

Grab your passport and head over to Calculation Nation where citizens are facing off against one another in mathematical games! Calculation Nation currently features several, free online games that cover fractions, factoring, algebra, area and perimeter and more. A couple of games are highlighted for you below.

Students save the universe as they control force fields to capture alien space ships in *Square Off*. On each turn, the engineers from mission control provide students with four numbers, representing the perimeters of various force fields that students can create. On the grid, students create a rectangular force field with one of the given perimeters, trying to surround as many spaceships as possible.

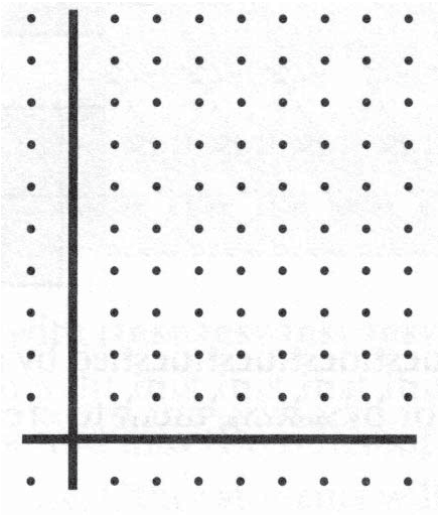
Good Questions – Reflections

NAME:_____

One vertex of a triangle is at the point (1,2). After a reflection, one vertex is at the point (5,8). Name all three vertices of the original and final triangles.

(1, 2) , _____, and _____ : original
_____, _____, and (5, 8) : final

Draw the reflection line onto the grid.

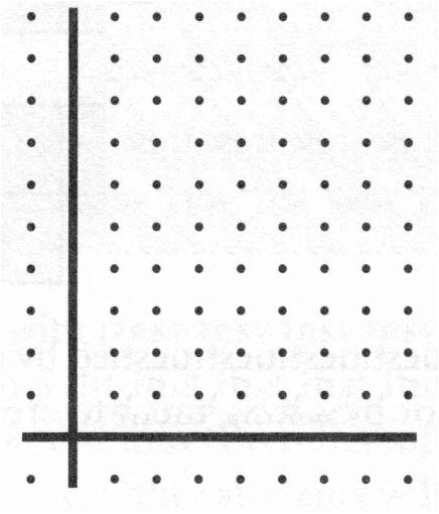


Challenge:
What is the equation of the reflection line?

Is there another solution to this problem? Try again below.

(1, 2) , _____, and _____ : original
_____, _____, and (5, 8) : final

Draw the reflection line onto the grid.



Challenge:
What is the equation of the reflection line?

Good Questions – Area

NAME:_____

You start with a parallelogram. You increase its height by the same amount as you decrease its base length.

How does the area change?

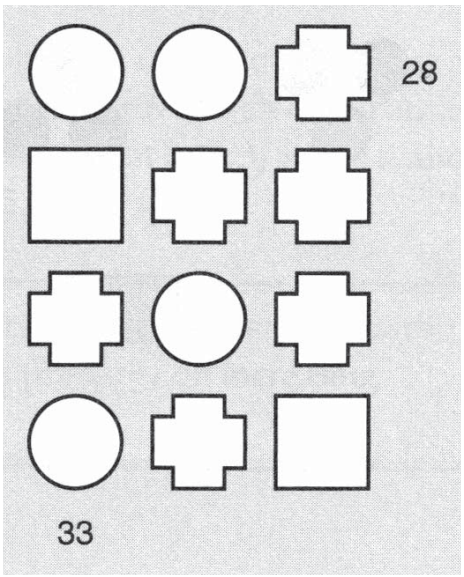
Make a table and draw a picture for each of your examples.

Is this always true? Explain your reasoning in sentences.

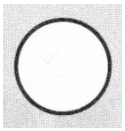
Good Questions – Worth of a Shape

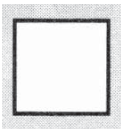
NAME: _____

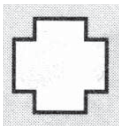
Copies of three different shapes are placed in a grid. Each shape is worth a different amount. The total amounts for one of the rows and one of the columns are given.



How much might each shape be worth?

 = _____

 = _____

 = _____

Are there any shapes that can only take on one value? How do you know? Explain your reasoning.

_____

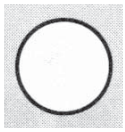
_____

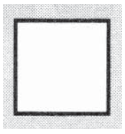
_____

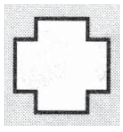
_____

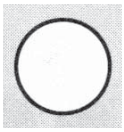
_____

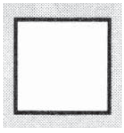
Challenge yourself to use some negative numbers and some fractions for the worth of the shapes.

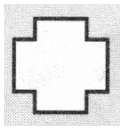
 = _____

 = _____

 = _____

 = _____

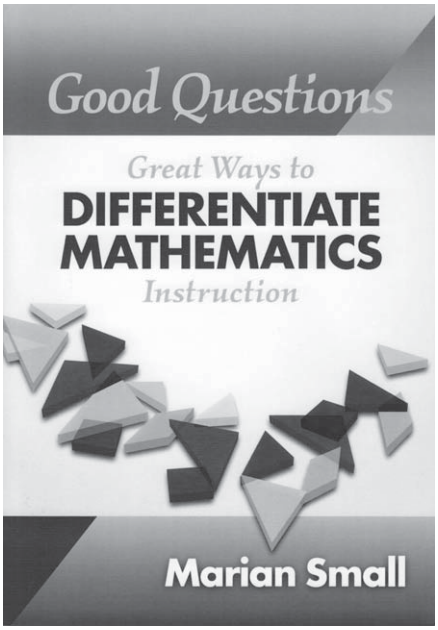
 = _____

 = _____

This activity sheet is from the book:

Good Questions: Great Ways To Differentiate Mathematics

This activity targets grades 6–8.
Content: Various



It is available *for sale* at:

http://www.nctm.org/catalog/product.aspx?ID=13513

Copublished with Teachers College Press

Using differentiated instruction in the classroom can be a challenge, especially when teaching mathematics. This book cuts through the difficulties with two powerful and universal strategies that teachers can use across all math content: *Open Questions* and *Parallel Tasks*. Specific strategies and examples for grades K–8 are organized around NCTM's content strands: Number and Operations, Geometry, Measurement, Algebra, and Data Analysis and Probability. This resource will help teachers create a more inclusive classroom with mathematical talk that engages students from all levels.

The content of the featured problems in the three previous pages is geometry, transformations, area, and algebraic reasoning.

Knife, Fork and Spoon

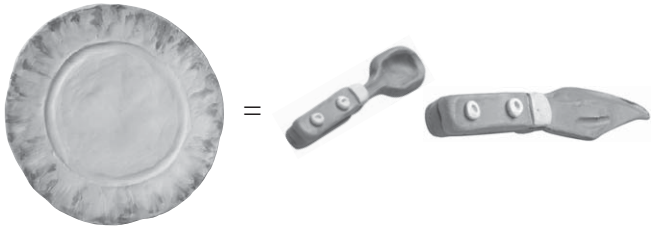
NAME:_____

Knife, Fork, and Spoon. On a balance scale, a knife balances a spoon and a fork, five spoons balance a knife and a fork, and a plate balances a knife and a spoon. You can represent this symbolically by $k = s + f$, $5s = k + f$, and $p = k + s$. If a fork weighs four ounces, how much does a plate weigh? [Mar. 1996 (7)]

A plate weighs _____.

$k = s + f$ 

$5s = k + f$ 

$p = k + s$ 

How did you solve this problem? Explain your answer step by step in sentences. Include equations in your sentences.

From *Menu Collection: Problems Adapted from* Mathematics Teaching in the Middle School, NCTM Stock number 726.

This activity sheet is from the book:

Menu Collection: Problems Adapted from *Mathematics Teaching in the Middle School*

This activity targets grades 6–8.
Content: Algebra & Algebraic Reasoning, Systems of Equations

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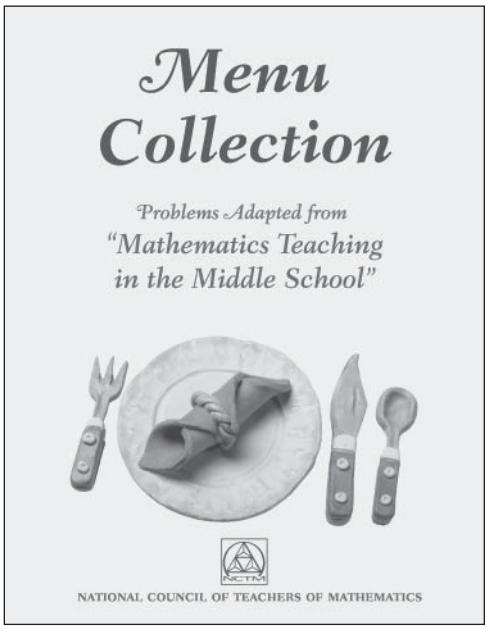


It is available *for sale* at:

http://www.nctm.org/catalog/product.aspx?ID=726

Copublished with the National Middle School Association

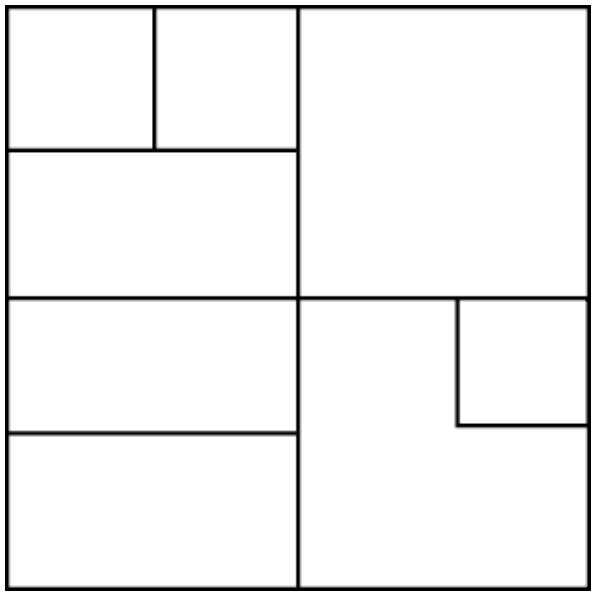
This unique compilation includes more than 225 problems from *Mathematics Teaching in the Middle School,* ranging from "appetizers" (warm-up problems) through "main courses" (more challenging problems) and "desserts" (suitable for students with more experience in solving problems). The problems are conveniently grouped by topic or theme for easy selection.

Squares

NAME: _____

How many squares are there in the figure?

_____



How did you organize your work to be sure you didn't miss any squares?

_____

_____

_____

_____

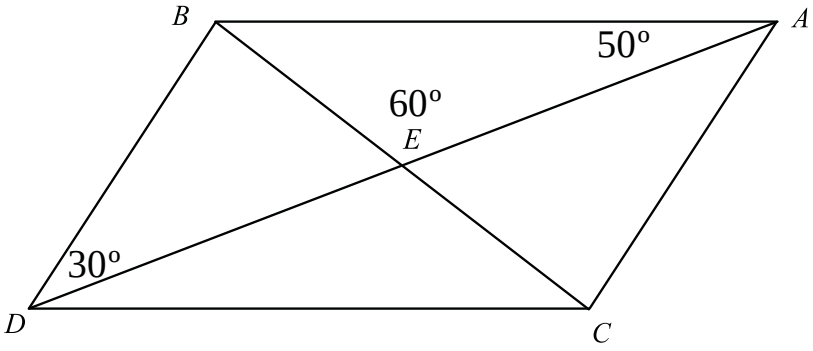
_____

ABDC is a parallelogram,

$m\angle EAB = 50^\circ$,

$m\angle BEA = 60^\circ$, and

$m\angle BDE = 30^\circ$.



Find the measures of all of the angles.

_____

_____

How can you "check" your answer?

_____

_____

_____

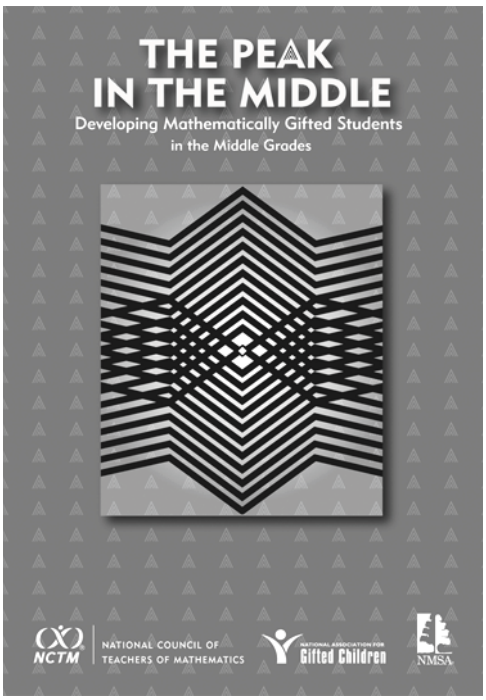
From *The Peak In The Middle: Developing Mathematically Gifted Students in the Middle Grades*, NCTM Stock number 13519.

This activity sheet is from the book:

The Peak In The Middle: Developing Mathematically Gifted Students in the Middle Grades

This activity targets grades 6–8.

Content: Geometry, Reasoning & Proof



It is available *for sale* at:

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The Peak in the Middle provides the rationale for offering advanced mathematical content in the middle grades as well as the practical information that school leaders need to develop procedures for assessing promising math students, selecting program options for their schools, making student placement decisions, and implementing appropriate professional development.… Educators will find practical guidance and much to consider in this well-balanced publication.

Estimation and Ratios

NAME: _____

1. Is 701.12 a reasonable answer for 1.4×50.08?
   Why or why not? Explain your reasoning.

   _____

   _____

2. Is 10.1061 a reasonable answer for 37.43×0.27?
   Why or why not? Explain your reasoning.

   _____

   _____

3. How can you estimate $9.1 \div 11.9$? _____

   Can you do it another way? Which do you think is closer?

   _____

   _____

4. How can you estimate $5\frac{7}{8} \times \frac{7}{12}$? _____

   Can you do it another way? Which do you think is closer?

   _____

   _____

Aspect Ratio Problem

For some rectangular TV screens, the aspect ratio is 4:5 (width:length), which means that if one dimension is 4 units long, the other is 5 units long. What would be the length of a TV screen that has an aspect ratio of 4:5 whose width is 12 inches? Draw a picture to support your answer.

From *Focus in Grade 6: Teaching with Curriculum Focal Points*, NCTM Stock number 13630.

This activity sheet is from the book:

Focus in Grade 6: Teaching with Curriculum Focal Points

This activity targets grade 6.

Content: Estimation, Approximation, Number Sense, Ratios & Proportions

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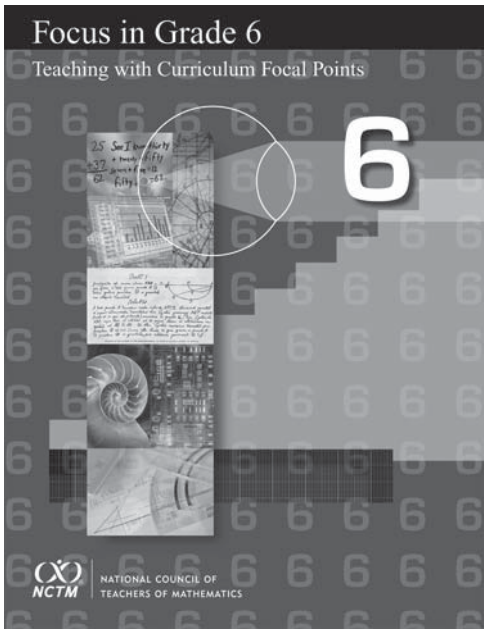

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Focus in Grade 6 shows teachers and other educators how they can incorporate NCTM's Curriculum Focal Points for Pre-K–8 into their current mathematics curricula. The book provides practical ideas for bringing focus to mathematics learning and instruction in the classroom. Intended as a professional development tool, it presents self- and group-reflection tasks, sample student work, and other tools that teacher educators can use with the preservice teachers in their classes.

By focusing more intensely on fewer topics at each grade level, students gain a deeper understanding of mathematical ideas. This volume will help teachers think about what a focused curriculum means and how they might begin to build focus into their existing curricula.

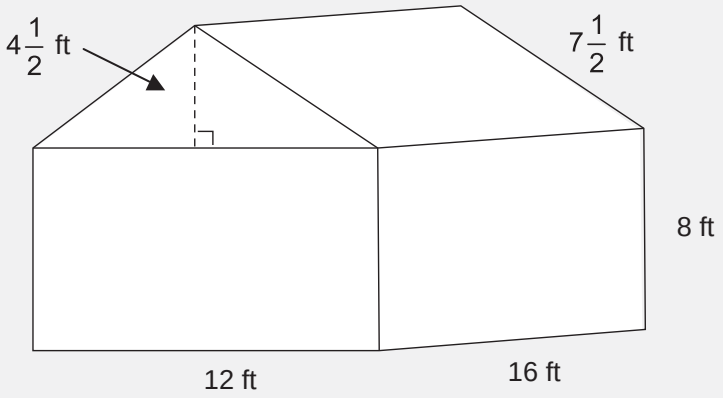
Composite Figures

NAME:_____

On another sheet of paper, answer the questions in full sentences. Fully explain each step in getting to your final solution. Include all formulas and calculations.

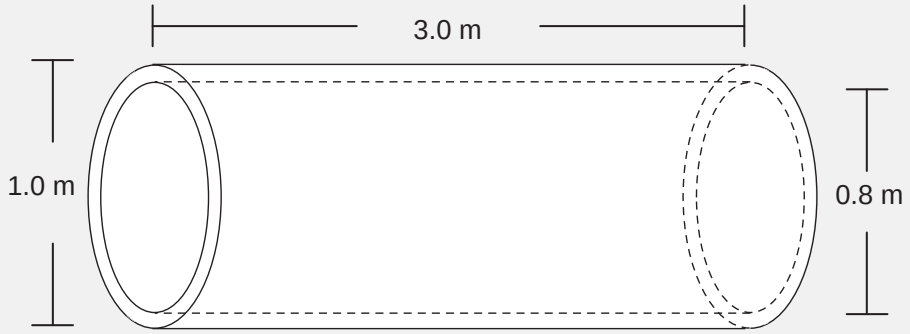
Problem 1:

You are designing a small building to serve as a workshop. To stay within a budget for building materials, you want the exterior surface area to be less than or equal to 800 square feet. To know what size air conditioner to buy, you need to know the volume inside the workshop. Your design consists of a triangular prism on top of a rectangular prism, as shown. Does the design satisfy the exterior surface requirement? What is the interior volume of the shed?



Problem 2:

The concrete pipe shown below has the shape of a cylindrical shell with an outside diameter of 1.0 meter and an inside diameter of 0.8 meter. Concrete weighs about 5300 pounds per cubic meter. What is the weight of the pipe to the nearest pound? What is the total surface area of the pipe to the nearest hundredth of a square meter?



From *Focus in Grade 7: Teaching with Curriculum Focal Points*, NCTM Stock number 13631.

This activity sheet is from the book:

Focus in Grade 7:
Teaching with Curriculum Focal Points

This activity targets grade 7.
Content: Geometry & Measurement, Area, Volume, Weight

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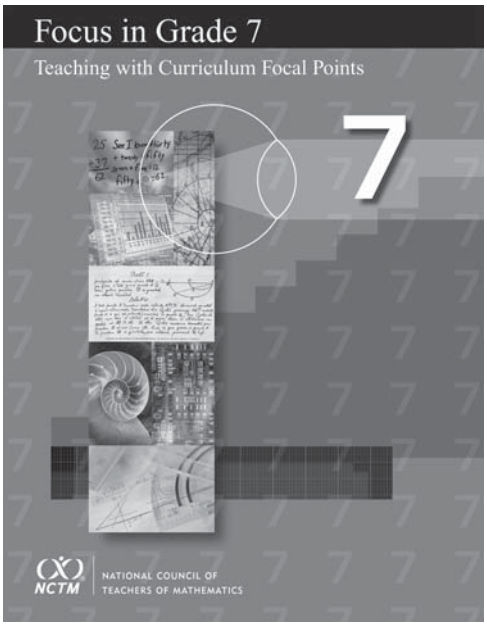

It is available *for sale* at:

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Focus in Grade 7 shows teachers and other educators how they can incorporate NCTM's Curriculum Focal Points for Pre-K–8 into their current mathematics curricula. The book provides practical ideas for bringing focus to mathematics learning and instruction in the classroom. Intended as a professional development tool, it presents self- and group-reflection tasks, sample student work, and other tools that teacher educators can use with the preservice teachers in their classes.

By focusing more intensely on fewer topics at each grade level, students gain a deeper understanding of mathematical ideas. This volume will help teachers think about what a focused curriculum means and how they might begin to build focus into their existing curricula.

A Field Trip to the Museum

NAME: _____

Problem:
Students, parents, and teachers are on an eighth-grade field trip. Sixty of them go in a museum. The ticket prices are $2 per student and $4 per adult. The total cost for the tickets is $140. How many adults and how many students bought tickets?

1. Write equations to model the problem. Let x represent the number of student tickets bought and y represent the number of adult tickets bought.

_____

_____

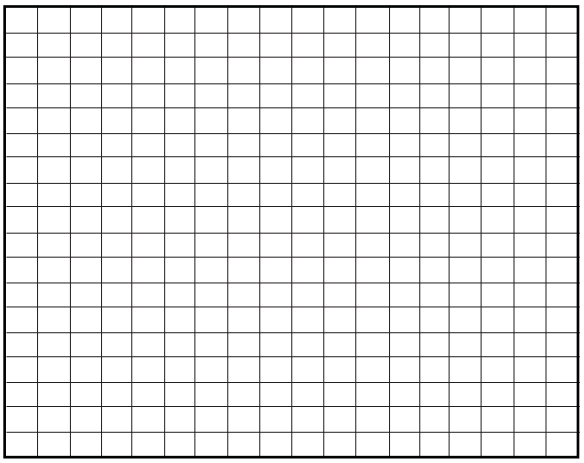
2. Solve with algebra.

_____

_____

_____

3. Solve with a graph. Don't forget to label the axes!



4. Did you get the same answer?

_____

Which method do you prefer? Why? Explain in sentences.

_____

_____

_____

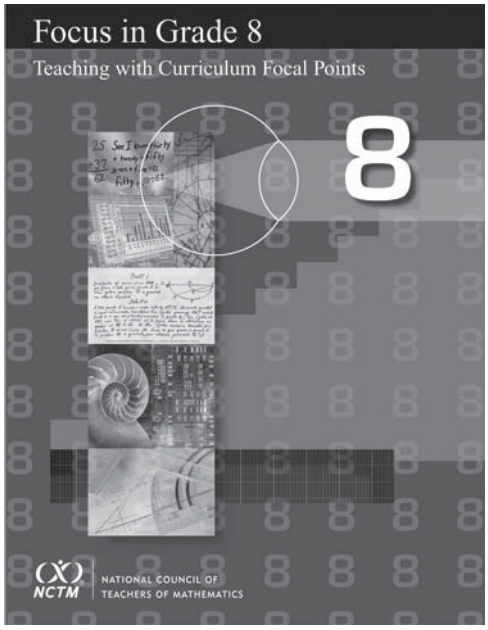
_____

From *Focus in Grade 8: Teaching with Curriculum Focal Points*, NCTM Stock number 13632.

This activity sheet is from the book:

Focus in Grade 8:
Teaching with Curriculum Focal Points

This activity targets grade 8.
Content: Algebra, Systems of Equations



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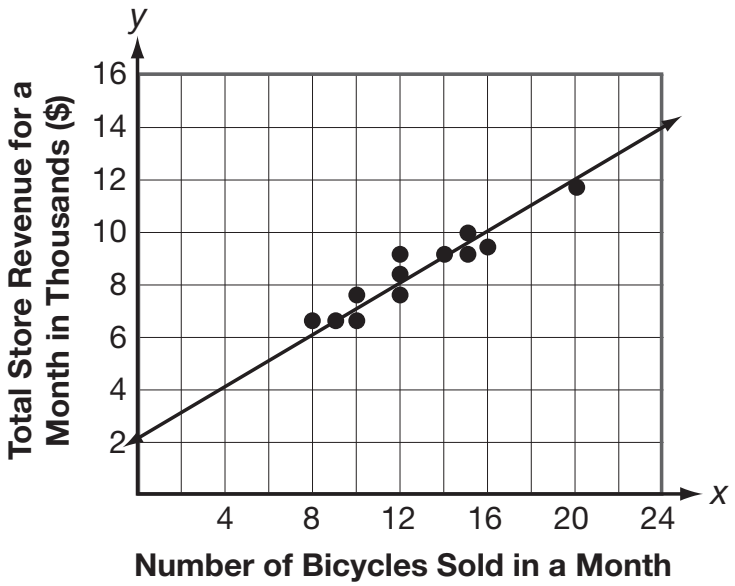
Toy Mart: Comparing Bicycle Sales Revenue and Total Revenue

NAME: _____



Respond in full sentences.
Use the scatter plot shown.

Problem 1: What type of correlation is shown in the scatter plot, and how do you know?

Problem 2: What does a positive correlation indicate about the relationship between revenue and bicycles sold?

Problem 3: Locate the point at (12, 9). What does this point mean in the context of the store revenue?

Problem 4: In other months in which twelve bicycles were sold, the store's revenue was $7,800, $8,100, and $9,000. How could this be?

Problem 5: Does the graph indicate that the positive correlation between bicycles sold and total revenue has a causal relationship, that is, can we tell from the graph that the total revenue went up because more bicycles were sold? Explain your answer.

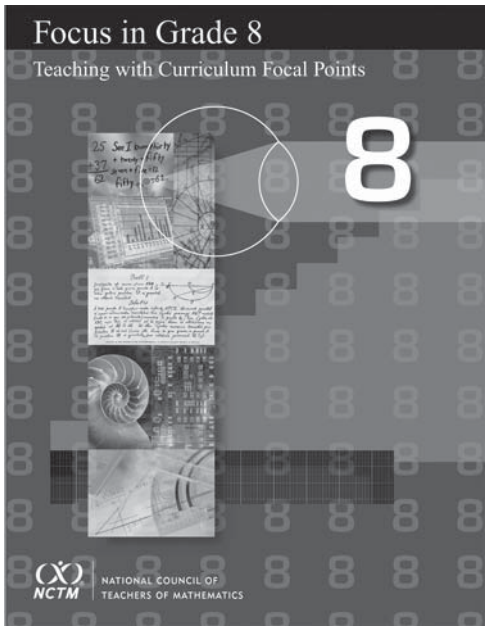
Problem 6: Use the trend line to predict the total revenue if eighteen bicycles are sold one month. Explain your reasoning.

From *Focus in Grade 8: Teaching with Curriculum Focal Points*, NCTM Stock number 13632.

This activity sheet is from the book:

Focus in Grade 8:
Teaching with Curriculum Focal Points

This activity targets grade 8.
Content: Data Analysis, Correlation



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SDAP10

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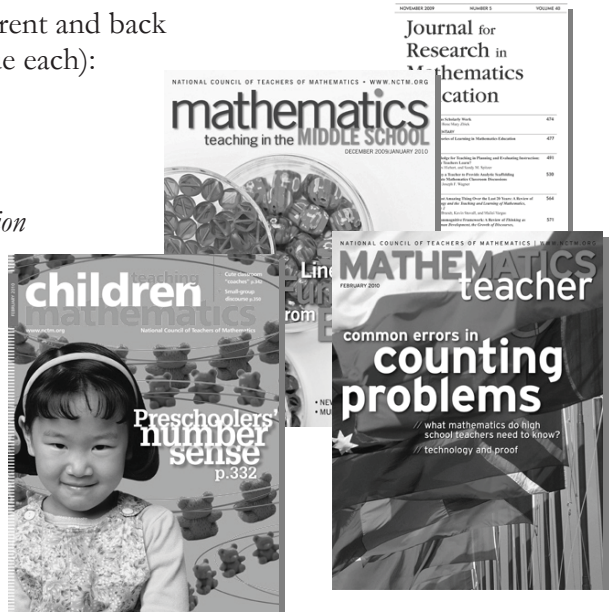

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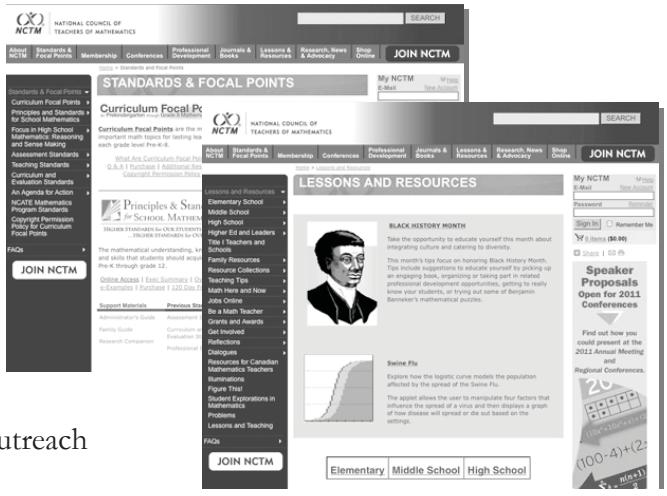

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