ILLUSTRATIVE TASKS AND EXPERIENCES

As part of ongoing mathematics instruction in Grades K-4, students should have instructional experiences like the following:

1. Body Proportions

Provide students with string and scissors to explore nonstandard measurements of body ratios. Ask students to estimate how many times a length of string the same length as their heights would wrap around their heads. As students work with partners, they will discover that their heights are equal to about three times the circumference of their heads. Encourage recording in the following ways:

$$\text{head:height} = 1{:}3, \text{ or } \frac{\text{head}}{\text{height}} = \frac{1}{3}$$

Ask students to predict the ratio of the length of one of their feet to their height and then use the string to check the accuracy of their prediction. Ask students to explain what they did to find this ratio.

Allow each student to continue this investigation by exploring the ratios of the lengths of other body parts, e.g., feet, arms, with a partner. Ask them to record at least 10 ratios, using the notations above, and to compare their ratios with those of other groups and to describe their findings.

Extensions: Ask students to compare height to reach with both arms outstretched. Are you a square (equal height and reach)? Are you a tall rectangle (height is longer than reach)? Are you a wide rectangle (longer reach than height)? Have students compare results with those of their classmates. Record the class results on a graph.

Measure and draw the heights and arm spans of your family members. Write about the shape of these dimensions.

2. Pattern Block Families

Have students use pattern blocks to conduct the following activity.

Using orange squares, you can construct larger squares that are **similar** to the original one. For example:

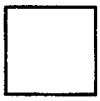


Figure 1 = **1**

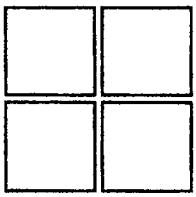


Figure 2 = **4**

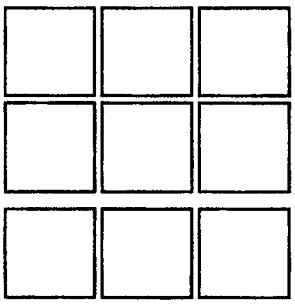


Figure 3 = **9**

Now use triangles to construct the next larger triangle that is similar to the green triangle. Trace around the blocks to show the shapes.

Construct the next larger shapes for each original block. Be sure to use the fewest blocks possible. On another sheet of paper, trace around all the blocks and shapes (Baby, then Mama, then Papa, and so on) that work in this way.

Determine a pattern for how many blocks you needed for each larger family member. Count the blocks for each member and record the number in the table below.

Figure	1	2	3	4	5
Number of Blocks	**1**	**4**			

Describe the number pattern of the blocks you needed for each larger figure:

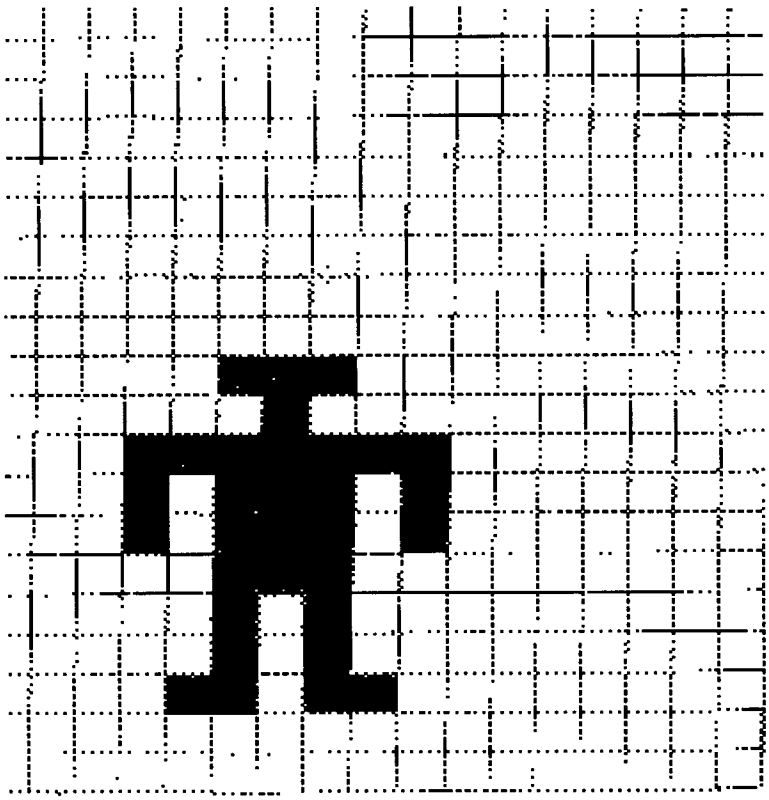
(plus 3, plus 5, etc.)

Describe the pattern of the number of blocks for the sides of each figure:

Describe any other patterns you can find:

3. So Big!

Distribute copies of the centimeter grid paper robot design. Ask students to draw an identical robot that is twice as large. Tell students that they can use centimeter grid paper and then share their solution strategy with a partner. Ask students to write about the steps they had to take to create the new "monster" robot. Discuss the various ways of interpreting "twice as large," that is, twice the area, or each dimension doubled.



Literature Connection Extension: Students might enjoy reading *The Robot Age*, by Graham Storrs (The Bookwright Press, 1985), or *Robotics Past, Present and Future*, by David C. Knight (William Morrow & Co., Inc., 1983).

Art Connection Extension: Have students complete more complicated drawings, e.g., drawings that are not vertically or horizontally symmetrical.

As part of ongoing mathematics instruction in Grades 5-8, students should have instructional experiences like the following:

1. The Yellow Roof Inn Claim

Present students with the following situation. Yellow Roof Inns once advertised: "Did you know that most hotel chains charge up to 50 percent more than Yellow Roof? So, say you spend $1 million a year on hotels. You would save $500,000 a year by staying at Yellow Roof Inns." Have students explain what's wrong with this advertising claim.

2. Supermarket Challenge

Distribute grocery store register tapes to pairs of students and ask them to sort the items on the list into the following categories:

- meat and poultry (including eggs, peanut butter, dried beans and other sources of protein)
- fruits and vegetables
- bread and cereal (including crackers, flour, etc.)
- dairy products (including milk, cheese, ice cream, etc.)
- junk foods
- pharmacy items
- pet supplies
- baby supplies
- cleaning supplies
- other items

Ask students to work in pairs to organize their data into a table that identifies the number of items and the total cost of the items in each category. Ask students to use the data in their table to find the fractional part (by items and by cost) each category represents of the total. Then ask students to display their data using a pictograph, a bar graph and a circle graph, and use the graphs to help visualize the relative magnitude of the fractional parts.

Next, ask each pair of students to use their data and their graphs to write, solve and share five story problems based on the data on their register tapes. The first two problems should use different operations, the second two should involve ratios and proportions, and the last should be a two-step problem.

Extension: Use the register tape to make and defend conjectures about the family's spending and eating habits.

3. Battle Of The Stars

Present the following situation to students: You are on the committee that must decide who is to play on the all-star college basketball team. There is one spot open and two possible candidates from which to choose. Your choice is between Ray Allen from UConn and John Wallace from Syracuse. Your decision is to be based on the shot charts from each player's last five games. Statistics from these games are shown below.

SHOTS MADE IN EACH GAME

Player	Game 1	Game 2	Game 3	Game 4	Game 5
Allen	10 for 20	11 for 18	9 for 17	13 for 30	14 for 18
Wallace	8 for 15	9 for 22	11 for 22	12 for 18	12 for 20

Which player would get your vote for the all-star team? Please state your choice in writing and back it up with strong mathematical justification.

4. Fruit Sense

Give each group of students a pineapple, orange, apple, banana and kiwi, along with a work sheet including the following tasks:

- In your group, discuss and estimate the average weight (in grams) of each of the pieces of fruit and record your results on the chart provided. Also, record your estimates on a large piece of paper to display your group's chart for the class.
- Compare and discuss your estimates with those of other groups in the class, e.g., on what basis did your group arrive at your estimate.
- Weigh each fruit and record your results on the chart. Compare your results with those of other groups in class.
- Discuss and estimate the percentage of edible fruit for each of the pieces of fruit. Record your results on the chart and compare and discuss with those of other groups.
- Weigh and calculate the percentage of edible fruit for each piece of fruit, e.g., peeled banana, cored apple. Record your results and compare with other groups. Find the average percentage of each piece of fruit that is edible.
- Discuss how many pounds or kg of bananas you would need to buy in order to get 1 pound or kg of edible bananas for a recipe? Continue with the other four fruits.
- Discuss variables that would affect the cost of the fruit. Decide if cost should be the only factor in determining which fruit is the best buy. Considering all of the variables, which fruit does your group feel is the best buy? Explain your position in writing.

	Estimated Weight of Fruit	Actual Weight of Fruit	Estimated % of Edible Fruit	Weight of Edible Fruit	Actual % of Edible Fruit
Pineapples					
Oranges					
Apples					
Bananas					
Kiwis					

As part of ongoing mathematics instruction in Grades 9-12, students should have instructional experiences like the following:

1. A Matter Of Taste

Explain to students that beverage companies often use taste tests to show that consumers prefer their product over other brands. Ask students to work with partners to design a taste test, using classmates as the "consumers." Then ask students to share their taste test designs with the class. Some questions your students may want to consider are:

- How many brands should you test?
- How can you keep the identity of the brands a secret from the taster?
- How can ratios and percents support your results?
- How can you present your results?

2. Tons And Tons Of Trash

Inform students that *50 Simple Things You Can Do to Save the Earth* (EarthWorks Press; Ashland, OR; 1989) states that the average American generates 8 pounds of garbage each day and that good recycling programs can reduce the garbage stream by 25 percent by weight. You live in a community of 40,000 people and must sign a contract with the regional trash-to-energy plant guaranteeing a specific number of tons of garbage per year. There is a penalty if the total garbage delivered is 5 percent more or 5 percent less than the guaranteed amount. Assuming that your community has a good recycling program in place, determine how many tons of garbage your community should contract for annually with the trash-to-energy plant. Write a letter to your City Council explaining your recommendation and your reasoning.

3. Enlarging And Reducing

Ask students to investigate the effect of 65 percent reductions and 125 percent enlargements of the length and the area of figures that are copied on the school's photocopy machine. Each group of students should receive a ruler, an original of a reduction and an enlargement of a figure or picture. Appropriate tasks might include the following:

- What exactly do the 65 percent and the 125 percent represent?
- Suppose someone has left the copy machine set on 80 percent and, after making a copy of your original, you threw it away. What setting should you use to return the 80 percent reduction to the original size?
- Suppose you wanted to reduce a figure to half its original size on a machine that reduces no less than 65 percent. What sequence of reductions could you use to achieve your goal of half the size?
- Suppose you wanted to enlarge a picture to twice its original area on a machine that enlarges no more than 115 percent. What sequence of enlargements could you use to achieve your goal of twice the area?

4. The Right Ladder

Explain to students that a Fire Department policy on ladder safety requires that ladders form an angle with the ground of no more than 80 degrees and no less than 70 degrees. Ask students to discuss why using ladders at angles greater than 80 degrees or less than 70 degrees might be unsafe. Now, help students develop an understanding of trigonometric ratios and applications of these ratios using a series of ladder problems like the following.

- What length ladder would be best to wash second-story windows, the tops of which are 18 feet above the ground? Show your work and explain your reasoning.
- An extension ladder that opens to 30 feet could safely be used to reach what height on a wall?
- A three-foot-wide alley runs between two buildings. How long a ladder could you safely use in this alley and how far up the side of each building would it reach?

PROTOTYPE ASSESSMENTS AND SAMPLES OF STUDENT WORK

As a result of an instructional program in mathematics like that described in this guide, by the end of Grade 4, all students should be expected to complete work like the sample below:

A TALE OF TWO CANDIES

Jiffy's Store offers you 3 chocolate kisses for 5¢.

Tony's Store offers you 5 chocolate kisses for 3¢.

1. Which store gives you the best deal? Explain how you know?

2. How much would it cost to buy 15 chocolate kisses at:

   Jiffy's Store? _____

   Tony's Store? _____

   Show how you got your answers.

3. A bag of chocolate kisses is priced at 30¢. How many would you expect to get in a bag at:

   Jiffy's Store? _____

   Tony's Store? _____

   Show how you got your answers.

4. If each store sold single chocolate kisses, how much would you expect to pay for just one chocolate kiss at:

   Jiffy's Store? _____

   Tony's Store? _____

   Show how you got your answers.

NAME:_____ GRADE:____ TEACHER:_____

A TALE OF TWO CANDIES

Jiffy's Store offers you 3 chocolate kisses for 5¢

Tony's Store offers you 5 chocolate kisses for 3¢

1. Which store gives you the best deal? Explain how you know.

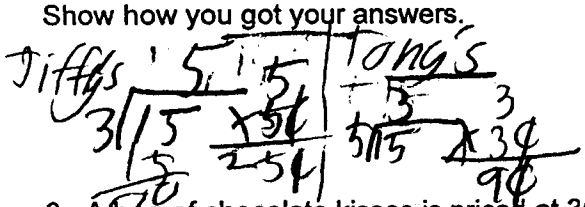
Tony's. Because you can get more kisses, Also it cost less

2. How much would it cost to buy 15 chocolate kisses at:

Jiffy's Store? 25¢

Tony's Store? 9¢

Show how you got your answers.

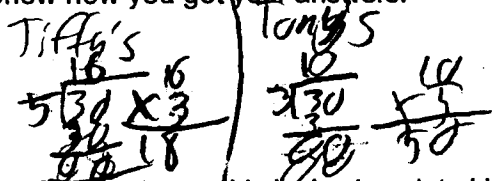


3. A bag of chocolate kisses is priced at 30¢. How many would you expect to get in a bag at:

Jiffy's Store? 18

Tony's Store? 50

Show how you got your answers.

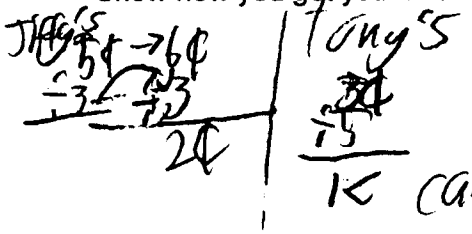


4. If each store sold single chocolate kisses, how much would you expect to pay for just one chocolate kiss at:

Jiffy's Store? 2¢

Tony's Store? 1¢

Show how you got your answers.



It can't be for free rounds to 1¢

As a result of an instructional program in mathematics like that described in this guide, by the end of Grade 8, all students should be expected to complete work like the sample below:

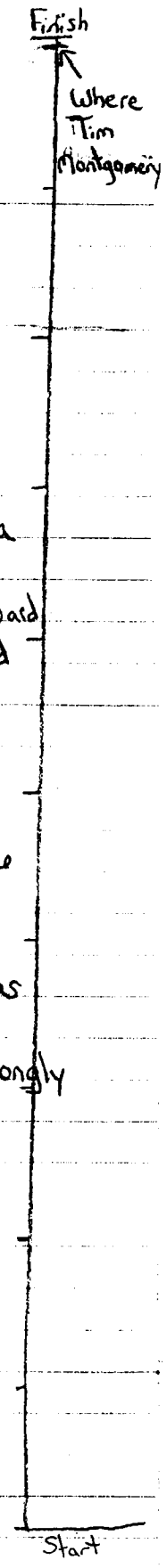
"NO RECORD FOR 9.96 IN THE 99.96 METERS"

A recent sports section headline announced, "No Record for 9.96 in the 99.96 Meters." The article went on to explain that Tim Montgomery of Odessa, Texas was not awarded the designation of recordholder after it was discovered that his time of 9.96 seconds in the 100-meter dash came on a track that was only 99.96 meters long.

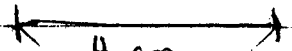
1. Draw a line segment that shows by what length the track fell short of 100 meters.

2. Determine what Tim's time would have been if the track was 100 meters in length and he continued running at the same rate.

3. Write a letter to the Texas International Amateur Athletic Federation that explains – using mathematics – why you believe Tim did or did not deserve to set the record.



Tim Montgomery fell short of the 100 meter line by 4cm.



$\frac{9.96 \text{ sec}}{99.96 \text{ m}} = \frac{X \text{ sec}}{100 \text{ m}}$

$9.96 \times 100 = 996$

$996 \div 99.96 = 9.963985594$

$X = 9.963985594$

Dear Texas International Amateur Athletic Federation,

My partner and I have dignosed that dilema of whether or not Tim Montgomery should recieve the award.

Mike and I have come to the conclusion that Tim should the award because if his time is 9.96 sec. for 99.96 meter, his time would be 9.963985594 sec. for 100 meters which is virtually the same thing. To get the time of 9.963985594 for 100 meters, I used the process of cross-multiplication. I took 9.96 sec. and put that over 99.96. Then I took x which represents sec over 100 m. To cross-multiply, I multiply 9.96 sec by 100 meters and got 996 seconds. Then I took 996 second and divided by 99.96 m. My final answer is 9.963985594. If you round 9.963985594 to the nearest hundredth you get 9.96 which technically was Tim Montgomery's time.

Tim only missed the finish line by 4 cm. So, Mike and I, strongly believe Tim should have won the award.

Sincerely,

As a result of an instructional program in mathematics like that described in this guide, by the end of Grade 12, all students should be expected to complete work like the sample below:

EFFECTIVE TAX RATES

This question requires that you show your work and explain your reasoning. You may use drawings, words and numbers in your explanation. Your answer should be clear enough so that another person could read it and understand your thinking. It is important that you show all of your work.

One plan for a state income tax requires those persons with incomes of $10,000 or less to pay no tax and those persons with incomes greater than $10,000 to pay a tax of 6 percent, only on the part of their incomes that exceed $10,000.

A person's effective tax rate is defined as the percent of total income that is paid in tax.

Based on this definition, could any person's effective tax rate be 5 percent? Could it be 6 percent? Explain your answer. Include examples, if necessary, to justify your conclusions.

10,000 < pay no tax

10,000 > pay 6% tax only a[illegible] over 10,000

effective tax rate = % of total income

total salary	# exceeding 10k	tax on # exceeding 10k	% of total
10,000	0	0	0
20,000	10,000	600	3%
30,000	20,000	1200	4%
40,000	30,000	1800	4.5%
50,000	40,000	2400	4.8%
* 60,000	50,000	3000	5%
70,000	60,000	3600	5.14%
80,000	70,000	4200	5.25%
110,000	100,000	6000	5.45%
150,000	140,000	8400	5.6%
200,000	190,000	11400	5.7%
300,000	290,000	17400	5.8%
500,000	490,000	29400	5.88%
10,000,000	9990000	599400	5.994%
11,000,000	10990000	659400	5.994%
15,000,000	14990000	899400	5.996%
1,000,000,000	999990000	59999400	5.99994%
9,000,000,000	8999990000	539999400	5.99994333%

5% = effective tax rate Yes

6% effective tax rat NO!

For this question we were asked to determine if it is possible for someone's effective tax rate to be 5% or 6%. An effective tax rate is defined as the percent of total income that is paid in tax. In simpler terms, we needed to determine if 6% of a persons total income could be equal to 6% of the person's income minus ten thousand dollars. Also we were to determine if 6% of someones total income could equal 5% of that persons total income minus $10,000. What we did to figure this question out was to test different amounts of income. What we figured out was that it is possible to pay any percent of your total income less than 6%. This means you could pay .1%, 5% or even 5.9999% but it is impossible to pay an effective tax rate of 6%.

CONTENT STANDARD 5: Measurement

Students will make and use measurements in both customary and metric units to approximate, measure and compute length, area, volume, mass, temperature, angle and time.

K-12 PERFORMANCE STANDARDS

Educational experiences in **Grades K-4** will assure that students:

- use and describe measures of length, distance, capacity, mass, area, volume, time, temperature and angle;
- compare and order objects according to some measurable attribute;
- develop and use personal referents, such as fingers and arm spans, as estimates for standard units of measure; and
- select and use appropriate standard and nonstandard units of measurement to solve problems.

Educational experiences in **Grades 5-8** will assure that students:

- estimate, make and use measurements to describe and compare phenomena, and explore the structure and use of systems of measurement, including converting units within systems;
- select and use appropriate measurement units and tools to make measurements to the degree of accuracy required by the situation;
- solve problems involving the concept of, calculation of, and relationships among length, perimeter, area, volume, angle measure, capacity, weight, mass and temperature; and
- develop and use formulas and procedures for solving measurement problems.

Educational experiences in **Grades 9-12** will assure that students:

- extend, apply and formalize understandings of measurement, including strategies for determining perimeters, areas and volumes, and the dimensionality relationships among them;
- describe and apply the effect of a change in length on the area and volume of an object;
- choose appropriate tools and techniques to measure quantities to specified degrees of precision and accuracy;
- use techniques of algebra, geometry and trigonometry to measure quantities indirectly; and
- use and create scales and calibrations to solve problems involving measurement.

ILLUSTRATIVE TASKS AND EXPERIENCES

As part of ongoing mathematics instruction in Grades K-4, students should have instructional experiences like the following:

1. Scavenger Hunt

Each student is given an inch/centimeter ruler and is sent on a classroom scavenger hunt for objects that are about 10 inches or 15 centimeters long. See if the class can compile a list of 20 objects for each length. Repeat this activity using yard/meter sticks on a search for objects that are about 30 inches or 50 centimeters long. After several lists have been completed, randomly select several of the objects and ask students to estimate their length in both inches and centimeters.

2. Teddy Bear Math

Ask each student to bring a teddy bear to class. Ask students to use a meter stick or centimeter tape and complete the following table of measurements:

Measurement	Me	Teddy Bear	Difference
Height	____cm	_____ cm	_____cm
Arm Length	____cm	_____ cm	_____cm
Leg Length	____cm	_____ cm	_____cm
Waist	____cm	_____ cm	_____cm

Use the bears and the data in the table to answer questions and complete tasks like the following:

- How much taller are you than your bear?
- Which of the measurements of you – height, arm, leg or waist – is closest to being the same as that of your bear?
- Use your bear to measure your height. How many bears tall are you?
- Describe what makes your bear so special. How is it like the other bears? How is it different?
- Order the bears in a special way.
- In what other ways can we compare ourselves to bears, e.g., age, weight, number of fingers and toes, length of smile?
- Write a story using your bear facts.

3. Mix And Munch

Explain to students that they are going to make a double batch of trail mix, using the following recipe for a single batch:

- 2 1/2 cups granola
- 3/4 cup peanuts
- 3/4 cup sunflower seeds
- 1 1/4 cups raisins

The problem, however, is that they can use only one measuring cup to make the double batch and must select one measuring cup from among the following: 1/2 cup, 1/3 cup, 1/4 cup and 1/8 cup. Ask students questions such as the following:

- Which measuring cup will you select? Why?
- How much of each ingredient will you need to double the recipe?
- Would you select the same measuring cup to make half a batch of the same trail mix? Explain why.

Now, working with partners and using actual measuring cups and ingredients, have the students make a double batch of trail mix.

4. Crocodile Bread

Read to students or have students read *Have You Seen the Crocodile*, by Colin West (Harper Collins Children's Books, 1986); and *Crocodile Beat*, by Gail Jorgensen and Patricia Mallins (Aladdin Books, 1994). Students working in groups should be given one-pound pieces of dough and asked to work the dough into a crocodile-shaped loaf and to bake it. Trace your bread shape onto 12-by-18-inch paper. Students then should be given the following tasks:

- Find the perimeter of the bread by placing Unifix Cubes (touching) around the bread tracing.
- Fill in the rest of the shape with Unifix Cubes to find the area of the bread.
- Discuss the reasons why one group's area and perimeter are different from those of other groups, keeping in mind that each group started with the same amount of dough.
- Now give each group a baby food jar half-filled with cream and estimate how many shakes it will take to make butter. Hang the various estimates on a line and then take turns shaking the jar 10 times and recording one tally mark for the 10 shakes. When butter forms, the tally marks are counted and the results are compared to the estimates.
- Discuss the contents of the jar. What is the watery "stuff"? Why is the butter yellow when the cream was white? What happened? What is butter really made of?

Pour off the watery "stuff" and taste it. Cut up your bread and eat it with the butter!

As part of ongoing mathematics instruction in Grades 5-8, students should have instructional experiences like the following:

1. Squeeze Across America

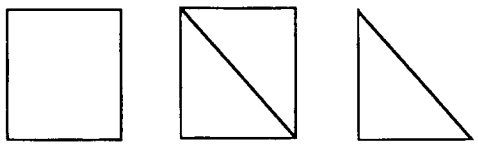
Ask students to estimate when a hand squeeze across America (where people lined up from New York to Los Angeles passed a hand squeeze from east to west) would have to start in New York so that it would end at the stroke of midnight on New Year's Eve in Los Angeles. Justify your prediction. Then use the data generated by the class to calculate both how many people would be required to conduct a "Squeeze-Across-America" event and how long it would take to cover the 3,000 miles across the country. Explain the assumptions you made and your best estimate of when to start the squeeze in New York.

2. Decks And Decks Of Cards

Ask students to estimate the number of playing cards that would be required to "wallpaper" the walls of the classroom (excluding windows and doors) and justify their estimates. Have students work in groups on other questions, such as: How far from your school will 5,000,000 playing cards extend if you lay them end to end? First estimate, then use meter sticks and maps of Connecticut to see how reasonable your estimate is. Finally, ask students to formulate their own measurement problems with decks of playing cards and share their problems with their classmates.

3. Paper Shapes

Conduct an activity where students use scissors and rectangular shapes of grid paper to derive formulas for the areas of triangles, parallelograms and trapezoids by relating the areas of these shapes to the area of a rectangle. For example:



Guide students through the discovery of these formulas, allowing them to make and test conjectures. Students can check the formulas through the use of shapes created on geoboards.

4. Max And Min Perimeter

Give each pair of students 25 square tiles and ask them to create a shape using all 25 tiles that has the smallest perimeter. Next, ask students to create a shape using all of the tiles that has the greatest perimeter, and to record their maximum and minimum perimeters for 25 tiles. Repeat the process for 30, 35, 40 and 50 tiles. Ask students to look for patterns in their data and find a rule for predicting the minimum and maximum perimeters for different numbers of square tiles.

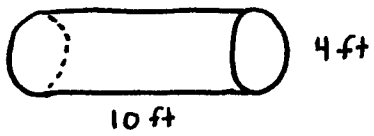
As part of ongoing mathematics instruction in Grades 9-12, students should have instructional experiences like the following:

1. Belt Around The Earth

Explain to students that an old mathematical "chestnut" involves lengthening the proverbial belt around the earth's circumference of 25,000 miles. Suppose, as the story goes, that a leather belt drawn tightly around the equator of the Earth – assuming an entirely flat Earth at sea level – is lengthened by six-feet, providing a little breathing room between the belt and the earth's surface. The question is: Could an ant, a mouse, a human or an elephant now fit under the belt? Ask students to show their work and to explain in writing how they arrived at their answers.

2. Oil Tank

The landfill has a large cylindrical tank for storing recycled motor oil. The tank is 10 feet long and has a diameter of 4 feet (see figure below). The landfill manager knows that 7.5 gallons of oil have a capacity of 1 cubic foot. Students are instructed to answer the following questions:



- How many gallons of oil can be stored in the tank?
- When the landfill manager checks the depth of the tank one day, he finds the oil depth to be 14 inches. How many gallons of oil are in the tank?

3. Buying Melons

Provide students with the following situation: You have a difficult choice. You can purchase either two medium-sized melons that are 5 1/2-inches in diameter with a 1/2-inch thick rind OR one large-sized melon that is 7 1/2-inches in diameter with a 3/4-inch thick rind. You know that all melons have a 2-inch diameter center core filled with pulp, seeds and air. The edible melon is what is left after "subtracting" the rind and the central pulp and seeds.

Use diagrams, show your work and explain your reasoning for the following problems:

- Which option – two mediums or one large – provides you with the greatest amount of edible melon for a fruit cocktail?
- What would the diameter of each of the two medium melons have to be to get the same amount of melon as the one large melon?
- If a melon scoop has a diameter of 3/4-inch, about how many edible melon balls would you expect to get from the 7 1/2-inches in diameter melon?

4. The Snake-Infested River

Take students outside and ask them to make believe that the track around the football field or the street in front of the school is a snake-infested river with no bridges and no way of crossing. Explain to students that their job is to design a bridge across the river, but they do not know the width of the river. Using stakes on one side, and some physical object on the other, as well as their trigonometric understandings, inform students that their task is to use "indirect measurement" to find the width of the "river" and to explain how they calculated this distance.

PROTOTYPE ASSESSMENTS AND SAMPLES OF STUDENT WORK

As a result of an instructional program in mathematics like that described in this guide, by the end of Grade 4, all students should be expected to complete work like the sample below:

PETTING ZOO PERIMETERS

A petting zoo is being planned by the high school Future Farmers of America. Each of the high school students will be bringing in one of the baby animals they have been raising at home to put in the petting zoo. The students in your school will be able to go on a field trip to visit this zoo and pet the animals.

Your classroom has been asked to help design the pens for the baby animals. The high school students have pieces of fence left over from another project. Each piece of fence is 24 yards long. The animals that will be brought in for the petting zoo include:

- a baby lamb;
- a mother duck and eight babies;
- a pair of rabbits;
- a small pony;
- six baby chicks; and
- a baby goat.

Use some graph paper to design six pens that would be the best home for each of the sets of animals. Remember the perimeter – the amount of fence around the outside edge of each pen – will always be the same, 24 yards. Show all the different pen shapes you can make. Label each pen. Use labels to show which animal or animals will live in which pen and tell why you chose that pen.

USE THIS PAPER, AND THE GRAPH PAPER FOR YOUR WRITTEN EXPLANANTION OF THE "PETTING ZOO" PROBLEM.

Small pony.
I chose this pen for the pony because He'll have lot's of space to run around In.

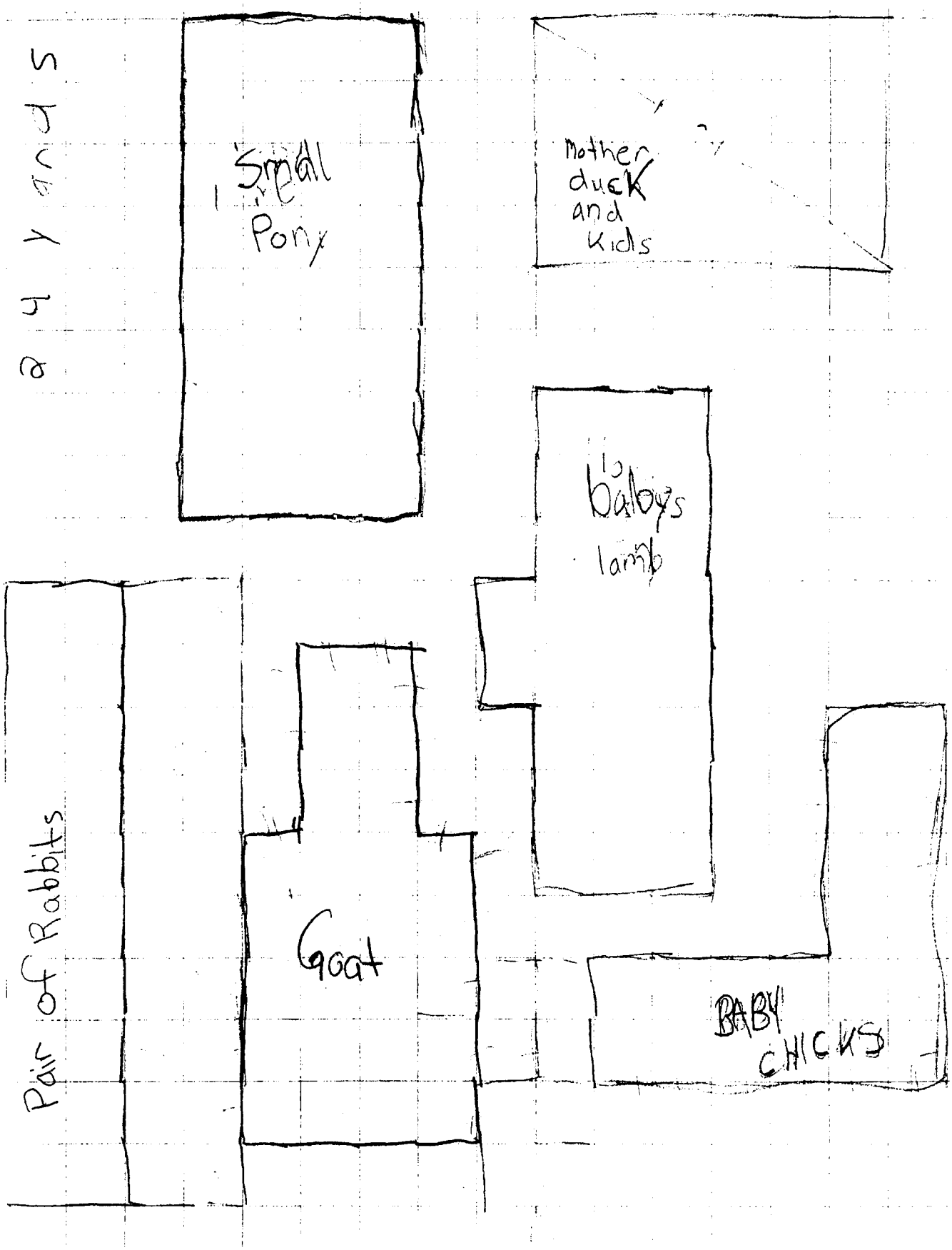
Baby Lamb.
I chose this Pen because It has a nice size Place, and a place to rest.

Pair of rabbits.
I chose this pen because the rabbits can hop all the way down and back and they also can have races if they want to.

6 chicks.
I chose this pen because the chicks are only little now, but when they grow up they'll need more space.

Mother Duck and 8 ducklings.
I chose this pen because just like the chicks when the babies grow up they'll need more space.

Goat.
I chose this pen because a goat doesn't have any shape it would like it's pen to be.


a hay yard
1 Small Pony
Mother duck and kids
10 babys lamb
Pair of Rabbits
Goat
BABY CHICKS

As a result of an instructional program in mathematics like that described in this guide, by the end of Grade 8, all students should be expected to complete work like the sample below:

HAVE A HEALTHY HEART

The human heart beats billions of times in a lifetime.
It works all day and all night without rest.

A local public service agency is planning a campaign to fight heart disease. You receive the following request from the director:

> Please check the accuracy of the enclosed ad before we release it. Is the assertion that a heart beats billions of times reasonable?

Construct a brief report including:

- whether or not you agree with the claim and why;
- your own estimate for how many times a heart beats in a lifetime (explain how you got your estimate so that I can understand it and state any assumptions being used); and
- an explanation of how I can estimate how many times my own heart has beaten. (Today is my 26th birthday.)

Respond to the director's requests.

Use the space below for your written report: I checked my pulse for one minute. It beat 56 times at res

here is my work...

56 beats a minute (at rest)
× 60 minutes in an hour
3,360 beats per hour
× 24 hours a day
80,640 beats a day
× 7 days a week
564,480 beats a week
× 4 weeks per month
2,257,920 beats a month
× 12 months per year
27,095,040 beats a year (at rest)

↓

approx. 31,000,000 beats a year (with some excercise everyday)
× 85 years in an average lifetime
± 2,635,000,000 beats in an average lifetime

↳ With approximatly 2,635,000,000 heartbeats in an average lifetime, I think billions would be saying to mua Maybe saying over 2½ billion times would be better, ever though it loses some of its advertising effectiveness.

↳ If you multiply 31,000,000 beats a year by 26 years, you will have an approximate number of beats in your lifetime.

31,000,000 approx. beats a year
× 26 your age
approx. 806,000,000 beats in 26 years

As a result of an instructional program in mathematics like that described in this guide, by the end of Grade 12, all students should be expected to complete work like the sample below:

Planning a Bookcase

At its last meeting, the French Club voted to obtain a bookcase for the club's growing collection of literature. You receive the following memo from Mr. Collins, the faculty sponsor of the club:

To: President of the French Club
Re: Bookcase for the club
From: Mr. Collins

Spradlees offers the lowest prices in the area, but Sally suggested we might save money by making the bookcase in the wood shop here at school. The club's cash reserves are low, so saving money is important. Mr. Hewey said we can use the shop tools and supplies at no cost, if we pay for the wood. He will help with construction. The bookcase will go against the wall, between the desk and the file cabinet, in a space a little over 6 feet wide.

Please analyze the situation and determine which is better: making or buying the bookcase. Can we save money by making it ourselves? I have enclosed an ad with lumber prices to help you estimate construction costs.

We need to decide about the bookcase at today's meeting. Since you will not be there, please prepare a written report for the club to use as the basis for our decision. Be sure to include

- a clear explanation of the possibilities you considered and how you estimated their costs
- a comparison of relative costs of different possibilities
- your recommendation for what we should do and why.

Thanks.

Write a report responding to Mr. Collins' memo. Include drawings or other graphics, if needed, to effectively communicate your findings and your suggested course of action.

Connecticut Common Core of Learning Project • Supported by a grant from the National Science Foundation

Goodwin's Lumberyard

Kiln-Dried Pine Shelving

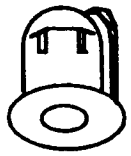
For bookcases and closet shelving.
1"x10" ready to finish and install.

8'	10'	12'
$5.25	$6.30	$7.30

Plywood: 4'x8'x1/2 "

$23.99

Quality sanded plywood
Interior/Exterior use



Recessed Light

Prewired
Assembled
UL Approved

$34.99

PAINT SALE

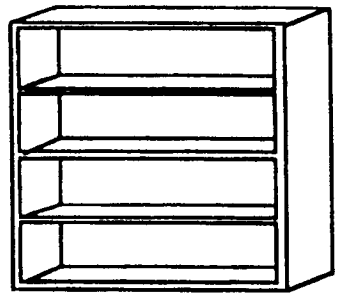
Every gallon on sale!

Latex paint $9.49 a gallon.

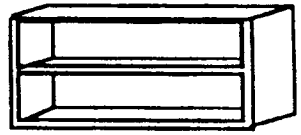
Wood stain $10.49 a gallon.

Back to School Sale!

Unfinished Pine Furniture



Bookcase 6' x 4' x10" **$59.87**



Bookcase 6' x 2' x10" **$24.87**

Typing Table **$25.87**
3' x 24" x 18"

File Cabinet
$49.87

Open 9 am to 9 pm

Shop before 11 am and get an extra 10% off !

SPRADLEES

Use the space below for your written report:

Although: Spradlees is having a very good sale, considering your book collection is growing the 6'x2'x10" bookcase will probably not do us much good. It is possible to buy two or three of them and stack them on top of one another but then we are already spending $150-$175 on an unfinished bookcase that still needs to be painting. Add the paint to the cost and we are spending $160-$85. On the other hand, we could buy one 6'x4'x10' for $160 + paint for $10 and be paying about the same money. Another option is to buy a few pieces of plywood at about $24 a piece and completely start from scratch. Best of all, I think the most wise decision would be to buy 3 12' Kiln-Dried Pine Shelvings and for book cases. 3 of the 12' (18') Shelves could be cut in half to make 6 shelves (ch 6' long against) the wall and then using the 10' shelf cut it in half to make the sides of the Shelves high each. Some sort of devise to make this stay on the wall may be an additional cost but as of now you have only spent about $28.00. $10 for paint. Compare this $38.00 to $160-$85