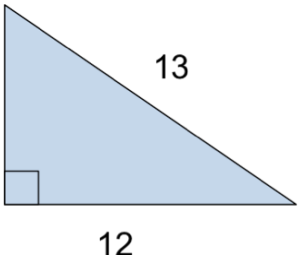
Scaffolding Learning with Questions

The following is a conversation between a student and her teacher. Look for ways in which the teacher is attempting to guide the student's thinking away from an incorrect line of thought to a more appropriate line of reasoning.

The task is for the student to find the area of this triangle.



(The teacher shows the student the problem.)
Teacher: What is this task asking you to do?
Student: I need to find the area of this triangle.
Teacher: What do you already know that will help you?
Student: I know a formula for the area… you taught us the formula ½ bh.
Teacher: Ok.
(The student responds by calculating ½ x 12 x 13.)

Teacher: Tell me about your calculation. How do you know what to do?
Student: Well, I multiplied ½ times 12 times 13. The formula says to multiply ½ times the base and times the height.
(While saying this the student is pointing to the leg of length 12 for the "base" then over to the side of unknown length for the "height". The student pauses and then writes out the formula from the Pythagorean Theorem to calculate the missing leg length.)

Teacher: Show me how you found the length.
Student: With the Pythagorean Theorem; a squared plus b squared equals c squared.
Teacher: And what are "a", "b", and "c"?
Student: "a" and "b" are legs of the triangle and "c" is the hypotenuse.
(The student is pointing to the legs and hypotenuse while she explains.)
Teacher: Ok, now what?
(The student finds the area of the triangle.)

Teacher: How do you know you have the correct area?
Student: This one is right. See, before I had calculated ½ x 12 x 13, but 13 is not the height of the triangle. So I had to find this height (points to leg with missing length) and use it. So the area is ½ x 12 x 5 or 30.
Teacher: I understand what you're saying.

Scaffolding Learning with Graphic Organizers

One reaction to student work may be to provide the student with a means of organizing written work. Organizing written work can help students keep their own thoughts organized and better communicate their ideas to their classmates and their teacher.

Ex.) How are a prism and a cylinder alike and different?

Alike	*Different*

Word Bank

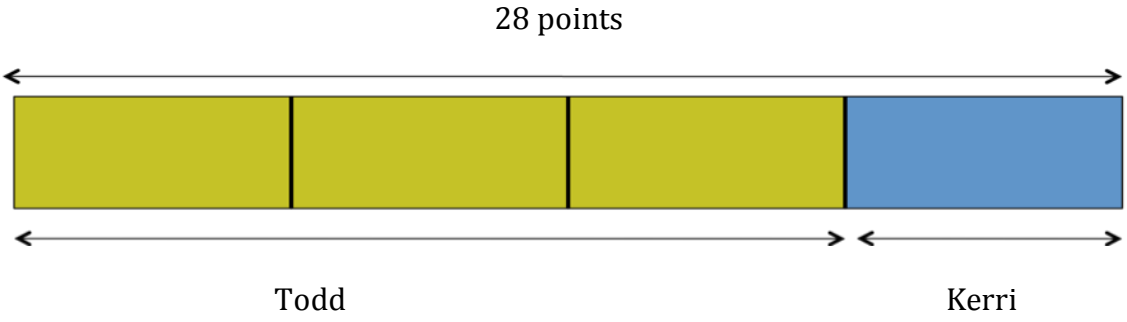
(A ready made chart with (or without) a word bank, filled in with vocabulary or left blank for the child to fill in, can be very helpful scaffolding for students, especially for those for whom organization is a challenge. It leaves the student able to focus on the question, not on the organization of his/her ideas.)

Ex.) Together Todd and Kerri earned 28 points in the basketball game. Todd earned 3 times as many points as Kerri. How many points did Todd earn?

Facts: [*or "What I know"*]	Drawings: [*or "What I need to find out"*]
Computation: [*or "My work"*]	Solution:

(See the next page for another graphic representing this problem.)

Ex.) Together Todd and Kerri earned 28 points in the basketball game. Todd earned 3 times as many points as Kerri. How many points did Todd earn?



(This model is similar to the Singapore Math model for creating a visual representation of a problem. It will be helpful for some, perhaps many, students to "see" the relationships in the problem in a more meaningful way. As students begin writing equations with variables, the equation and its solution should be related back to the graphic. This will help in students' understanding of how the variable and constants in the equation represent the information given in the problem.)

Ex.) Tim had $1.00 in coins. He had 15 coins which were only dimes and nickels. How many of each kind of coin did he have?

Work Space:

_____dimes _____nickels

(This is a less structured organizer that simply provides spaces for the child to place the answer and a specified work space. This organizer reminds the student of the question to be answered by providing the space for dimes and nickels at the bottom.)

For notes on Scaffolding- Varying Problem Structure

Sean invested $1,000 in a money market account. How much interest would he earn on his money after 2 years at a yearly simple interest rate of 5%?

Varying Problem Structure

Given your grade level problem, rewrite the problem three different ways so that the new problem asks for something different from the original.

6th Grade Example:

A. Each tablet in a box of allergy medicine weighs 0.3 gram. Find the total weight of the tablets in the box if there are 50 tablets.

7th Grade Example:

A. A school population rose from 234 to 440 over a period of two years. What is the percent increase in students, to the nearest tenth of a percent?

8th Grade Example:

A. One third of a number plus three times the same number is sixty. Find the number.

6th Grade Example:

B. Each tablet in a box of allergy medicine weighs 0.3 gram. Find the total weight of the tablets in the box if there are 50 tablets.

C. Each tablet in a box of allergy medicine weighs 0.3 gram. The total weight of all the tablets is 15 grams. How many tablets are in the box?

D. A box of allergy medicine contains 50 tablets. If the total weight of all the tablets is 15 grams, how much does each tablet weigh?

E. Boxes of allergy medicine come in a variety of sizes. The total weight of all the tablets is anywhere from 15 grams to 45 grams. If the smallest box contains 50 tablets, how many tablets are in the largest box of allergy medicine?

7th Grade Example:

B. A school population rose from 234 to 440 over a period of two years. What is the percent increase in students, to the nearest tenth of a percent?

C. A school population increased 88% from 234 students in year one. How many students are there in year two?

D. The current school population is 440 students; this was an increase of 88% from the number of students in year one? What was the school's population in year one?

E. Sam and Tara both worked the following problem: A school population increased 88% from 234 students in year one. How many students are there in year two?

Sam multiplied 234 by 0.88 and said there were 206 students in year two.

Tara multiplied 234 by 1.88 and said there were 440 students in year two.

Who is correct? Explain.

8th Grade Example:

B. One third of a number plus three times the same number is sixty. Find the number.

C. Twins, Callie and Jasper just received new iPods for their birthdays. Blake, their older brother, has a certain number of songs downloaded on his iPod. Callie has three times as many songs downloaded as Blake and Jasper has one-third as many songs as Blake. Together Callie and Jasper have 60 songs downloaded. How many songs does Jasper have downloaded?

D. Twins, Callie and Jasper just received new iPods for their birthdays. Blake, their older brother, has a certain number of songs downloaded on his iPod. Callie has three times as many songs downloaded as Blake and Jasper has one-third as many songs as Blake. Together Callie and Jasper have 60 songs downloaded. How many songs does Blake have downloaded?

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Tiered Assignment Example: Linear Relationships

Essential Standard: Grade 8, Algebra

8.A.4 - Interpret the meaning and value of slope of linear relationships

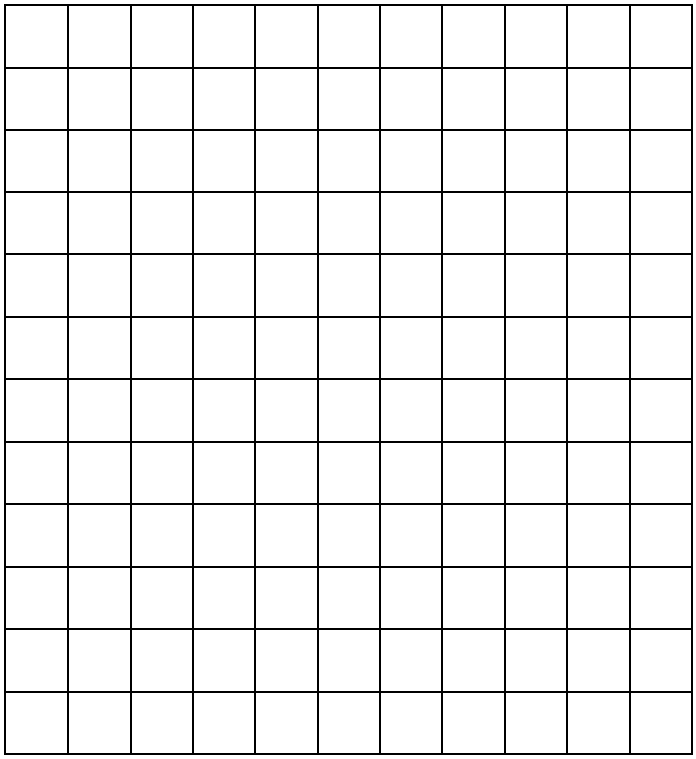
Clarifying Objective: 8.A.4.1 – Represent slope given a table, graph, linear equation or two points

Learning Target for the lesson -
I will be able to determine the slope of the line graphed from values in a table.
I will be able to relate the slope to the variables represented in a table

Tier 1 Problem

Create a graph of the ordered pairs listed in the given table, connecting the points you plot.

X	Y
-3	-5
-2	-3
0	1
1	3
2	5
3	7



What is the slope of the line that you drew?

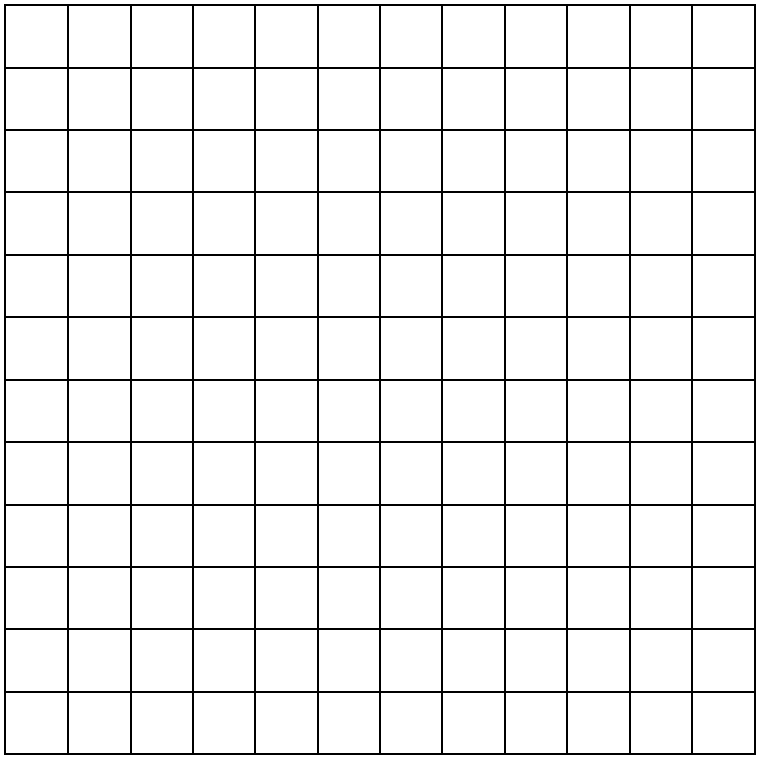
Draw a rise and run staircase in your picture to illustrate the change in x-values and the change in y-values that generate that slope. Relate the slope to your picture and explain that relationship in words.

Use the slope to describe the rate of change in the relationship that exists between the variables in the table. Use the variable names in your explanation.

Tier 2 Problem

Create a graph of the ordered pairs listed in the given table, connecting the points you plot.

X	Y
-3	7
-2	5
0	1
1	-1
2	-3
3	-5



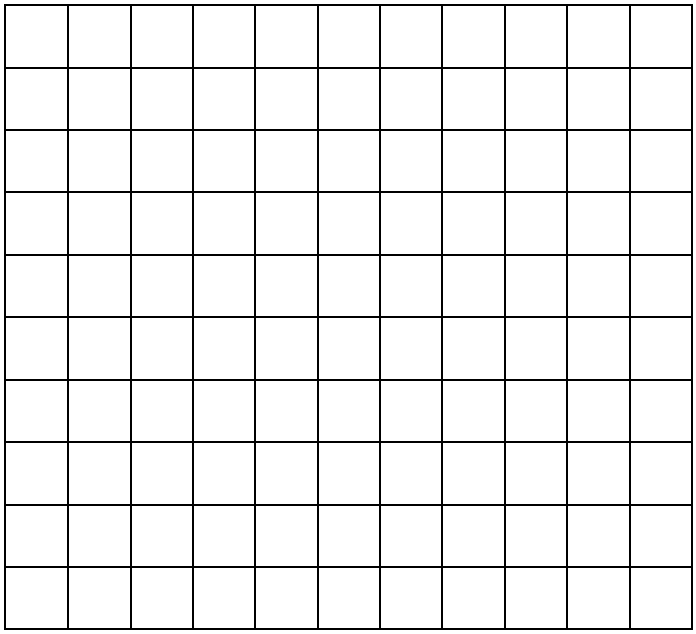
What is the slope of the line that you drew? How do you know?

Use the slope to describe the rate of change in the relationship that exists between the variables in the table. Use the variable names in your explanation.

Tier 3 Problem

Create a graph of the ordered pairs listed in the given table, connecting the points you plot. Determine an equation that represents the relationship between the two variables in the table.

X	Y
-4	3
-2	2
0	1
2	0
4	-1
6	-2



What is the slope of the line that you drew? How do you know?

Use the slope to describe the rate of change in the relationship that exists between the variables in the table. Use the variable names in your explanation.

Determine an equation of a line with the same slope as the line described above, but that includes the point (0,4). Describe how this line relates to the original and include its graph in grid above.

Original Task

Carlos has 100 cookies in his bake shop. He then bakes 20 additional cookies per hour. Write an equation that represents the total number of cookies Carlos has in the bakery.

Equation: $C = 20h + 100$

TIER 1

Interpret:

What does the C stand for?
What does the h stand for?
Create a table of values to determine the total number of cookies in the bakery at any given time.
Graph this equation.

Apply:

If Carlos baked for 5 hours, how many cookies does he have?
If Carlos has 200 cookies, how long did he bake?

TIER 2

(Students are given the exact same information as the students in Tier 1. Then students are given a different scenario. They use the first scenario as an example to complete the same assignment, questions, and activities for the new scenario.)

Given a new scenario:
A salesperson receives a weekly salary of $300 plus a commission of $15 for each TV sold. Write an equation that represents the salesperson's total weekly pay.

Interpret:

Write an equation.
What is the independent variable? What is the dependent variable?
Create a table of values to determine the total weekly pay for any number of televisions sold.
Graph this equation.

Apply:

If the salesperson sold 5 televisions, what was the salesperson's total weekly pay?
If the salesperson earned total weekly pay of $645, how many televisions did he sell that week?

TIER 3

(Students are given ONLY the scenario. They must develop an equation, apply, graph, and interpret the data in a series of questions. They have no example as a guide.)

Carlos has 100 cookies in his bake shop. He then bakes 20 additional cookies per hour. Write an equation that represents the total number of cookies Carlos has in the bakery.

Interpret:
Write an equation.
What is the independent variable? What is the dependent variable?
Interpret the slope and *y*-intercept in the context of the problem.
Graph this equation.

Apply:
If Carlos has 230 cookies, how long did he bake.
Carlos sells 8 cookies every hour and continues to bake 20 cookies every hour, write an equation that represents the total number of cookies Carlos has in his bakery.
Compare and contrast your two equations.
Graph the equation for the second scenario on the same graph as the first scenario.
Compare and contrast your two graphs.

Anchor Activities, Choice Boards, Menus

Resource Page

"In this class we are never finished---Learning is a process that never ends."

General Ideas for Anchor Activities:
http://www.foridahoteachers.org/anchor_activities.htm

Best Practices for Anchor Activities:
http://www.saskschools.ca/~bestpractice/anchor/index.html

Critical Thinking and Brain Teasers:

http://www.internet4classrooms.com/daily_dose.htm

Brain Boosters: http://school.discoveryeducation.com/brainboosters/

Lots to Know about Anchored Activities:
http://www.beginwiththebrain.com/resources/I_M%20DONE_NOW_WHAT_ASCD_07_comp.pdf

Anchor Activities from Middle School to High School:
http://www.forpd.ucf.edu/strategies/PDFs/Anchor%20Activities%20High%20School%20Example.pdf

Choice Boards: http://daretodifferentiate.wikispaces.com/Choice+Boards

Choice Boards in Middle Grades Math:
http://www.trenton.k12.nj.us/mathhelponline/choice_board.htm

Differentiation and Choice:
http://www.pvusd.net/departments/GATE/choiceboards.php

Meaningful Menus for Creating Choice in Your Classroom:
http://www.nisd.net/departments/giftedandtalented/gtac_handouts/MeaningfulMenus.pdf

Generic Think-Tac-Toe Form

Create three word problems from information learned in this unit.	Create a poster demonstrating the topics/skills learned in this unit.	Solve three of the five challenge problems.
Complete the review problems in the textbook.	Student Choice (with Teacher Approval)	Write a letter to someone who was absent describing the computations/processes learned in this unit.
Develop a review game.	Identify four ways the concepts in this unit are used in the real world.	Define the unit's vocabulary words with pictures/diagrams.

Think-Tac-Toe Example:
Number

Here is a set of numbers: {2, 3, 5, 7, 11, 13, 17}. What do these numbers have in common? How are they alike?	The weather is reported every 18 minutes on WMAT and every 12 minutes on WSUB. Both stations broadcast the weather at 1:30. When is the next time the stations will broadcast the weather at the same time?	For a given pair of numbers, how can you tell whether the least common multiple will be less than or equal to their product?
How do you know when you have found all the possible factors for a given number? What is the greatest factor possible for any whole number? Why does this make sense?	Our GCF is 5. If you write us as a fraction in simplest form, you get $\frac{3}{8}$. What two numbers are we? What is our least common multiple?	Do you think it makes sense to split a day into twenty-four hours? Would another number have been a better choice? Why or why not?
Four students in Mrs. Brown's math class were comparing locker numbers. They made the following observations: Our four lockers are relatively prime to one another. Exactly two of our locker numbers are prime. What might the students' locker numbers be?	Can a square number be a prime number? Why or why not?	What are the numbers? Clue 1: The greatest common factor is 7 Clue 2: Both of these numbers have 2 digits Clue 3: The least common multiple is 70 Clue 4: One of the numbers is even and the other is odd

Resource Pages . . .

Class Discussions

There are many benefits to high quality class discussions of mathematical ideas

- Opportunities for students to participate in mathematical thinking
- Chances for students to reflect on their own thinking processes
- Reasoning and logic are promoted as students question others, defend their position, and/or provide examples or counter-examples

  -adapted from Chapin, et al, *Classroom Discussions: Using Math Talk to Help Students Learn,* Math Solutions Publications, 2003

Classroom discussions – at least those of high quality which are mathematically productive – have many benefits for promoting student thinking and learning. Discussions give students more opportunities to observe and listen to mathematical thinking in their peers as well as to participate in the conversation themselves.

"[In] whole-class discussion, the teacher … is attempting to get students to share their thinking, explain the steps in their reasoning, and build on one another's contributions.… The teacher facilitates and guides quite actively, but does not focus on providing answers directly. Instead, the focus is on the students' thinking."

-Chapin, et al, *Classroom Discussions: Using Math Talk to Help Students Learn,*2003, p. 17

Guidelines to Evaluate Responses to Questions/Problems

1. What do I know about students' understanding when they answer this question/problem?

2. Do students know the answer or how to get the answer as soon as they finish reading the problem? [Is it a real problem and not just an exercise?]

3. Is there more than one way to find the solution for the problem?

4. Can I ask more than one question about this problem?

5. Can students generalize from working with this problem?

6. Can I reverse the process and ask an interesting question?

7. What happens if…?

Asking Good Questions

Necessary traits for an interviewer

- ✓ Patience
  - "Children must be allowed time with their own minds."
    -Gwen Clay, Meredith University
  - When the interviewer and the student become comfortable with periods of silence, the quality of the interview is increased.
- ✓ Persistence
  - Keep the original emphasis for why you are asking questions or interviewing, but
  - Pursue worthwhile questions that come up in interview

Patience:

Time is always an issue for teachers, but when interviewing a child to get at his/her thinking it is necessary to take the time to let the child think about his/her thinking and work on putting that thinking into words. Put yourself in the child's place. We do not want to be asked a question, especially one that is probing our deeper understanding of an idea, and then be expected to give an answer within a few seconds. And we might want to be able to think on our feet and revise our thinking as we talk about it. Children should be given the same opportunity. It is also important for us as teachers to understand that silence is not necessarily a sign of a lack of understanding, but may be the opportunity for the child to organize his/her thoughts or to clarify them or to put them into words. A musician once said that the silences in a piece of music are as important and as much a part of the whole piece of music as the notes are. In the same way, the silences in a conversation or interview of a child are as important as the words to the final product of finding out about the child's real thinking and understanding.

Persistence:

It is easy to give up when a child does not give a quick response or a first response that is the one we want, but the job of the teacher/interviewer is to keep in mind what he/she is trying to find out, to think carefully about the next question based on what he/she is learning from the child, and to keep the questioning environment one that is safe enough and supportive enough for the child to give honest responses and to perhaps correct his/her own thinking.

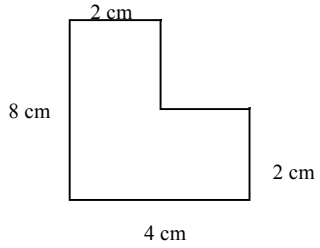
Changing Targets in Mid-Stream

A fifth grade teacher was starting a unit on area and perimeter. She knew that the students had an introduction to area and perimeter in fourth grade, so her plan was to build on that with some extension activities, e.g., finding areas of irregular shapes made of rectangular regions. Her learning targets included

- Find the area and perimeter of irregular shapes composed of rectangular regions
- Find the area of a rectangular region surrounding another rectangular region, e.g., the walkway around a garden or pool
- Explore the area of triangles as half of the area of a rectangular region
- Explore the relationship of area to perimeter and vice versa

She planned to start with this problem:

Find the area of this shape:

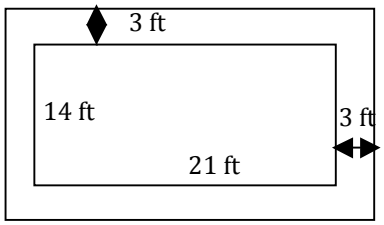


She decided to do a quick pre-assessment to make sure the students knew what she expected them to know. As the students wrote answers to her questions, she realized that there was not as much recall of the basic concepts of area and perimeter as she expected. A major gap was a lack of understanding of the concept of a unit. Some students didn't know or recall the meaning of perimeter. Some couldn't recall how to find the area and/or the perimeter.

She went ahead with her plan of giving the students the problem above, asking them to work with a partner or group to solve and discuss their solutions. Then she had them share the different ways that they solved the problem. This was a stretch for some students, but most seemed to have some refreshed understanding after doing this activity.

She had planned to continue the extensions of area work during the next class with this problem:

A garden is 14 feet by 21 feet. It is surrounded by a walkway that is 3 feet wide as shown. Find the area of just the walkway.



After giving the pre-assessment and seeing the students work on the first problem, she realized that her learning targets had to change immediately. She decided that it was necessary to review the fundamental concepts of area and perimeter, filling in gaps in either understanding or recall. Her learning targets expanded to include

- Understand the meaning of "unit" as used in measurement, and in area and perimeter in particular
- Know the units in the customary and metric systems used for measuring area and perimeter
- Be able to choose an appropriate unit for measuring a region to find the area and/or perimeter
- Measure a rectangular region and accurately find it's area and perimeter

On the second day, with these new targets in mind, she chose to focus first on the customary measurement system. She had the students fill out a chart with the customary units used to measure perimeter (inches, feet, yards, miles) and area (square inches, square feet, square yards, square miles), and find the equivalences among the units of area in particular. She used models of the units which they had created in the previous year to help them find these equivalences. The students kept this chart in their notebooks for future reference. She then had them work in pairs to 1) choose a region to measure in one of the customary units, 2) draw a representation of the region on dot paper in order to see the square units, and 3) find its area, showing the equation and labeling the area with the correct unit. A class discussion followed in which the pairs shared the region they chose, the unit they chose to measure in, and the area of their region.

In the next class, she chose to focus on the equivalencies between the units of area in the customary system. She had the class brainstorm some available regions that would make sense to measure in feet. In pairs, the students chose a region to measure, drew a representation of it (this time without the dot paper), and found the area in square feet. Using the chart made the day before and the area in square feet, the students found the area in square yard (having to divide the number of square feet by 9) and in square inches (having to multiply the number of square feet by 144). They then found the perimeter in feet, yards, and inches. On following days, she replicated these activities using the metric measurement units for perimeter and area.

Following these activities, she was able to go back to the walkway around the garden problem and have the students work in pairs to solve it. For those who finished before others, she asked them to find a second way to solve. After all students had the chance to at least give the problem some good thought (with some needing scaffolding questions from the teacher or peers), she debriefed the problem with the whole class, having students share their various ways of solving it.

After building this foundation for some of the fundamental ideas related to area and perimeter, she looked for (and created some) good problems that would give meaningful practice related to her original targets of finding areas of regions beyond a simple rectangle. She was able to plan differentiated activities, moving into some more exploratory activities with some students who showed a mastery level of understanding of these ideas, and providing meaningful but less complex activities for students who needed more experience with finding areas and perimeters. Allowing both groups to work as pairs or small groups, along with her interactions with individuals or small groups, provided the scaffolding each group needed to feel and be successful.

The moral of this true story is that as careful as we may be in planning learning targets for our units and individual lessons, what we learn from student work, student responses, and conversations with students, can and sometimes (maybe often) will cause us as teachers to change our targets. We may find, as in this case, that the students are not as prepared as we thought for tackling the targets we have in mind. We may likewise find that the students (or at least some students) have a deeper understanding or knowledge of the concepts we plan to present and our targets need to change to ones that delve more deeply into the mathematics. This is formative assessment in action – what we learn from working with our students informing our learning targets and instructional plans.

Vygotsky's Zone of Proximal Development

"Zone of Proximal Development" or ZPD as defined on wikipedia.com: "ZPD is Vygotsky's term for the range of tasks that are too difficult for the child to master alone but that can be learned with guidance and assistance of adults or more-skilled children. The lower limit of ZPD is the level of skill reached by the child working independently. The upper limit is the level of additional responsibility the child can accept with the assistance of an able instructor. The ZPD captures the child's cognitive skills that are in the process of maturing and can be accomplished only with the assistance of a more-skilled person. Scaffolding is a concept closely related to the idea of ZPD. Scaffolding is changing the level of support. Over the course of a teaching session, a more-skilled person adjusts the amount of guidance to fit the child's current performance. Dialogue is an important tool of this process in the zone of proximal development. In a dialogue unsystematic, disorganized, and spontaneous concepts of a child are met with the more systematic, logical and rational concepts of the skilled helper."

--From Santrock, J (2004). *A Topical Approach To Life-Span Development*. Chapter 6 Cognitive Development Approaches (200 – 225). New York, NY: McGraw-Hill, quoted on wikipedia.com

Zone of Proximal Development

- ✓ The best social learning occurs when conversations in the classroom are within the child's Zone of Proximal Development
- ✓ Classroom discussion based on students' own ideas and solutions to problems is absolutely "foundational to children's learning."
- ✓ "Scaffolding" refers to the way the adult guides the child's learning via focused questions and positive interactions.

-Balaban, Nancy. (1995) "Seeing the Child, Knowing the Person." In Ayers, W. "To Become a Teacher," Teachers College Press. (quoted in http://en.wikipedia.org/wiki/Zone_of_proximal_development)

Differentiated Instruction

Principles of Differentiation

"There is no recipe for differentiation. Rather, it is a way of teaching and learning that values the individual and can be translated into classroom practice in many ways."

-Carol Ann Tomlinson, University of Virginia

This quote from Carol Ann Tomlinson at the University of Virginia indicates that differentiation is not a program or formula, but is the result of a teacher's mindset that each child is valuable and worthy of instruction from which he/she can learn, and takes many varied forms.

While there is no recipe, Tomlinson outlines principles which do apply to a differentiated classroom:

1) Assessment is ongoing and tightly linked to instruction – That's what formative assessment is all about;
2) Teachers work hard to ensure "respectful activities" for all students – equally interesting, appealing, focused on essential understandings and skills, and accomplished through worthwhile meaningful tasks for all. This is an especially important point. The interventions for children who are struggling or "don't get it" should not be more of the same that already hasn't worked for them. It should be as interesting and engaging as the activities that the children who "got it" are doing; the difference is that the interventions for struggling children are geared to their needs as are the more complex or challenging activities given to the children who need those.
3) Students are allowed to work with a variety of their peers over the course of days, including whole group activities. There is no "tracking." Groupings are flexible not rigid.

"Differentiated Instruction is an organized, yet flexible way of proactively adjusting teaching and learning to meet students where they are and help all students achieve maximum growth as learners."

-Carol Ann Tomlinson (1999). *How to Differentiate Instruction in Mixed-ability Classrooms*. Alexandria , VA : ASCD.

Tomlinson makes the point that all instruction should be based on "best practices," And that there is no point in differentiating instruction unless you're beginning with instruction that ranks as best practice. "The starting point is what you need to do to challenge the highly able student. What you're then doing is insuring that all kids get the best-practice instruction. Whenever you have teachers doing that, it reshapes how they teach all kids."

(Carol Ann Tomlinson quoted in Mary Ann Hess, *Although Some Voice Doubts, Advocates Say Differentiated Instruction Can Raise the Bar for All Learners*, www.weac.org/Home/Parents_Community/differ.aspx

What is Differentiated Instruction?

Instruction may be differentiated in

- ✓ Content (what students need to learn)
- ✓ Process (how they will learn it: what children do to practice or make sense of the content)
- ✓ Product (how they express what they have learned: the outcome of the lesson or unit)

This list is what is being differentiated. In differentiated instruction the teacher proactively plans *varied approaches* to what students need to learn (*content*), how they will learn it (*process*), and/or how they can express what they have learned (*product*) in order to increase the likelihood that each student will learn as much as he or she can as efficiently as possible. (Tomlinson, 2003, p. 151)
The content is the input – the material being presented, the learning target for the lesson or unit. The process is what the children actually do to make sense of the content, to learn it in meaningful ways, or to practice it to solidify understanding and recall. The product is what the student uses to express the understandings and skills learned through the lesson or unit. It might be a test, a project, a report, a poster, or any other expression of what the child has learned.
(From: "Tiered Lessons: One Way to Differentiate Mathematics Instruction" by Rebecca L. Pierce and Cheryll M. Adams in *Math Education for Gifted Students*, Prufrock Press)

Differentiation may be based on

- ✓ Readiness
- ✓ Interest
- ✓ Learning Profile

These are the ways in which instruction can be differentiated.
Readiness refers to prior knowledge and a student's current skill and proficiency with the material presented in the lesson. It is largely readiness that will be determined by formative assessments.
Interest and *Learning Profile* must also be considered as lessons are planned so that children are *engaged* in activities through which they are able to learn depending on *how they learn best*. When determining what a student doesn't know or understand or doesn't "quite get," we must consider the kinds of activities to which he/she has already been exposed in terms of his/her learning profile. Has the kinesthetic learner been able to use "hands-on" materials? Has the child who works best alone been able to do that? Has the auditory learner only been exposed to visual representations?
It is also important to note that content, in particular, can be differentiated in response to any combination of readiness, interest, and learning profile.

A Quick List of Methods for Differentiating Instruction:

- Flexible groupings
- Tiered Assignments
- Choices/Anchors
- Learning Contracts
- Compacting
- Mini-lessons
- Scaffolding

While there is no recipe for differentiation, there are proven methods, including these on this quick list. The choice of method will depend on the inferences made about what individual children or groups of children need. Some of these will be discussed more thoroughly in the next slides.

Flexible Grouping

Flexible grouping is a hallmark of a differentiated classroom.
Tomlinson: "We know huge amounts about how individuals learn. Most of us have memories of being in places where we thought we were going to scream if someone repeated one more time something we'd understood seemingly forever — and places where we were about to explode with frustration because we simply could not grasp the ideas at the pace they were presented. We also all know what a difference it makes if we can work alone when we need space to think things through by ourselves, or work in a group when we need sounding boards."

If we know and respect these things about ourselves, she asks, don't we owe the same to our students?

Flexible groupings allow teachers to work with students with similar needs, students to see themselves in a variety of contexts, and teachers to see students in different settings and with different kinds of work. Groupings are FLEXIBLE – not rigid – and may take many forms, depending on what the need is for the current task, topic, concept, etc.

Tiered Assignments

From enhancedlearning.ca: "Tiered activities are a series of related tasks of varying complexity. All of these activities relate to essential understanding and key skills that students need to acquire. Teachers assign the activities as alternative ways of reaching the same goals taking into account individual student needs."
From Pierce and Adams, Prufrock Press
"Tomlinson (1999) described tiered lessons as 'the meat and potatoes of differentiated instruction.' A tiered lesson is a differentiation strategy that addresses a particular standard, key concept, and generalization, but allows several pathways for students to arrive at an understanding of these components based on their interests, readiness, or learning profiles."

Anchoring Activities

Anchors (or anchoring activities) may be a list of activities that a student can do to at any time when they have completed present assignments or it can be assigned for a short period at the beginning of each class as students organize themselves and prepare for work. These activities may relate to specific needs or enrichment opportunities, including problems to solve or journals to write. They could also be part of a long-term project that a student is working on. These activities may provide the teacher with time to provide specific help and small group instruction to students requiring additional help to get started. Students can work at different paces but always have productive work they can do. Some time ago these activities may have been called seat-work, and should not be confused with busy-work. *These activities must be worthy of a student's time and appropriate to their learning needs.*

Learning Centers

Learning Centers have been used by teachers for a long time and may contain both differentiated and compulsory activities. However a learning centre is not necessarily differentiated unless the activities are varied by complexity taking in to account different student ability and readiness. It is important that students understand what is expected of them at the learning centre and are encouraged to manage their use of time. The degree of structure that is provided will vary according to student independent work habits. At the end of each week students should be able to account for their use of time.

Adjusting Questions

From enhancedlearning.ca: During large group discussion activities, teachers direct the higher level questions to the students who can handle them and adjust questions accordingly for student with greater needs. All students are answering important questions that require them to think but the questions are targeted towards the student's ability or readiness level.

Making Differentiation Work

From Mary Ann Hess, *Although Some Voice Doubts, Advocates Say Differentiated Instruction Can Raise the Bar for All Learners*, www.weac.org/Home/Parents_Community/differ.aspx

How? In classrooms where differentiation is alive and well, teachers:

- Keep the focus on concepts, emphasizing understanding and sense-making, not retention and regurgitation of fragmented facts.
- Use ongoing assessments of readiness and interests, and pre-assess to find students needing more support and those who can leap forward. They don't assume all students need a certain task.
- Make grouping flexible. They let students work alone sometimes and also in groups based on readiness, interests, or learning styles. They use whole-group instruction for introducing ideas, planning, or sharing results.
- See themselves as a guides. They help students set goals based on readiness, interests, and learning profiles — and assess based on growth and goal attainment.

See www.enhancelearning.ca for other differentiation information.

A Short List of Resources for Differentiation:

Tomlinson, Carol Ann. *How to Differentiate Instruction in Mixed Ability Classrooms (2nd Edition)*. 2 ed. Columbus, Ohio: Association For Supervision & Curriculum Development (ASCD), 2004.

Eidson, Caroline Cunningham, and Carol Ann Tomlinson. *Differentiation in Practice: A Resource Guide for Differentiating Curriculum, Grades K-5*. Alexandria, VA: Association For Supervision & Curriculum Development, 2003.

Eidson, Caroline, Robert Iseminger, and Chris Taibbi. *Demystifying Differentiation in Elementary School Book and CD*. Beavercreek, OH: Pieces Of Learning, 2008.

Dacey, Linda, and Jayne Bamford Lynch. *Math For All: Differentiating Instruction, Grades 3-5*. Math Solutions Publications, 2007.

Heacox, Diane. *Differentiating Instruction in the Regular Classroom: How to Reach and Teach All Learners, Grades 3-12*. Free Sprint Publishing, 2002.

Mctighe, Jay, and Carol Ann Tomlinson. *Integrating Differentiated Instruction & Understanding by Design (Connecting Content and Kids)*. Alexandria, VA: ASCD, 2006.

http://www.caroltomlinson.com/index.html

http://www.ericdigests.org/2001-2/elementary.html (Eric digest article – full text)

http://www.prufrock.com/client/client_pages/GCT_Readers/Math/Ch._4/Tiered_Lessons_for_Gifted_Children.cfm (PDF of brief above)

http://www.ehancelearning.ca (click on links to differentiation information)

http://members.shaw.ca/priscillatheroux/differentiatingstrategies.html