A SHORT GUIDE TO THE COURSE CONTENT

MEETING	CHAPTERS	PAGES	CONTENT

1. T 7/03 R 1-30 Arithmetic basics
   Check your skill in arithmetic -- exponents, factors, fractions, decimals.
   It's important to know how fractions and exponents work.
   Classwork: how math works, map your understanding of algebra.

2. Th 7/05 1.1-1.8 31-118 Numbers and expressions
   Check your skill with many types of numbers (+,−,x,÷) -- a lot to do.
   Problem areas: negative numbers (+,x), abstraction, like terms.
   Classwork: identify weak areas with types of numbers.

3. T 7/10 2.1-2.4 119-162 Solving linear equations
   What equations are, and how to follow symbolic rules to solve them.
   Problem area: hidden and confusing notation, what makes math hard to learn.
   Challenges: keeping equals equal, what solving means, word problems.
   Classwork: identify patterns in expressions, follow the rules.

4. Th 7/12 2.5-2.6 163-196 Formulas & word problems
   Translating from textual description to mathematical formulas.
   Challenges: unnatural language, weak tools, how to accept symbols.
   Classwork: problem-solving groups.

5. T 7/17 3.1-3.4 197-282 Graphing equations
   Translating from math formulas to math pictures -- a lot to do.
   Challenges: new ways of thinking, visualization.
   Homework: use a web-based graphing tool.

6. Th 7/19 3.5,4.1 283-340 Graphing two equations and inequalities
   New uses for straight-line graphs.
   Homework: use a web-based graphing tool.

7. T 7/24 4.2-4.3 341-374 Solving two equations
   Using the tools of algebra
   Challenges: seeing through structural tangles.
   Classwork: which techniques make the most sense to you.

8. Th 7/26 Review Word problems
   Rest and catch up. Techniques for dealing with word problems.
   Challenges: improve your bookkeeping and efficiency.
   Classwork: discussion, dealing with overload.

9. T 7/31 5.1-5.4 375-425 Exponents and polynomials (+,−)
   The generality of exponents. The polynomial type of math structure.
   Challenges: understanding and using exponents.
   Classwork: place-value and polynomial notation.

10. Th 8/02 5.5-5.7 426-468 Polynomials (x,÷), special patterns
    Manipulation of polynomial patterns.
    Challenges: seeing patterns in structure.

11. T 8/07 6.1-6.2 469-480 Factoring polynomials
    Changing polynomials into products of smaller polynomials.
    Challenges: searching for an answer as well as following rules.

12. Th 8/09 6.3-6.5 481-528 Patterns, equations
    More polynomial patterns to simplify. How to use zero.
    Challenges: all your algebra skills need to be working.

13. T 8/14 7.1-7.2 529-553 Rational expressions (x,÷)
    Making fractions out of polynomials. Large and complex expressions.
    Challenges: each problem is a lot of work, must have good bookkeeping.

14. Th 8/16 7.3-7.6 554-612 Rational expressions (+,−), compound forms
    Doing complex manipulations with polynomial fractions.
    Challenges: overload, keeping up, catching up.

15. T 8/21 Review Cumulative review
    Rest and catch up. Prepare for cumulative review questions.
    Take cumulative review as soon as possible.
    Course evaluation.

16. Th 8/23 Review
    Catch up.
    Take cumulative review if not already done.
    Classwork: map your understanding of algebra.

MATH 99 CUMULATIVE REVIEW

This is the cumulative review for Math 99. It consists of 40 problems from your text. The problems and their page numbers are recorded below; you should find each problem in the text even though most are written below.

USE A SEPARATE SHEET OF PAPER for your answers. Show your work on your answer sheet, and check your answers for accuracy. Don't work more than TWO HOURS.

First, do as many problems as you can without using the book for help.
Skip the ones that you don't know how to do.

Second, go back and use the book to do those problems that you need help on.
Mark them "WITH BOOK".

PROB#	PAGE	SECTION	NUMBER		PROBLEM
1.	29	1.2	62	simplify:	$4[-8 - (8 - 10)]$
2.	66	1.4	36	simplify:	$(y - 5)^4 \bullet (y - 5)^2$
3.	68	1.4	108	simplify:	$(2^{-1} p^{-7} q)^{-4}$
4.	68	1.5	130	scientific notation:	0.000000000313
5.	121	2.1	54	solve:	$14n - 6 - 17 = 9n + 12 - 2n$
6.	134	2.2	30	solve for b_1:	$A = \frac{1}{2}(b_1 + b_2)h$
7.	150	2.3	54	solve:	$6n + 10 \leq 4n - 10$
8.	175	2.5	28	solve:	$\lvert n - 9 \rvert = 12$
9.	239	3.3	36	graph:	$x + 2y = 8$
10.	244	3.3	60	word problem:	SEE TEXT
11.	260	3.4	42	find equation:	SEE TEXT
12.	273	3.5	26	graph:	$6x + 3y > 9$

PROB#	PAGE	SECTION	NUMBER		PROBLEM
13.	291	3.6	28	evaluate:	$f(x) = 2x^2 + x$ for $f(-2)$, $f(-\frac{1}{2})$, $f(a)$, $f(-3a)$
14.	350	4.2	40	solve:	$3x - 6y = -9$ $4x - 3y = 13$
15.	363	4.3	10	solve:	$x - y - z = 3$ $-x + y + 3z = 3$ $-x - 3y + 2z = 8$
16.	383	4.5	6	graph:	$3x - 9y \le 12$ $5y + 5x \le 15$
17.	384	review	38	word problem:	SEE TEXT
18.	414	5.1	62	simplify:	$(4x^3 - 3x^2) + (x^2 + 2x - 10) - (x^3 + x - 15)$
19.	426	5.2	20	multiply:	$(10p^2 + 7p + 9)(3p^2q)$
20.	427	5.2	42	multiply:	$(2x - 9)(2x - 7)$
21.	437	5.3	12	divide:	$(4x^6 + 10x^4 - 2x^3) \div (-2x^3)$
22.	455	5.5	24	factor:	$p^2 - pq - 2q^2$
23.	456	5.5	58	factor:	$3n^2 - 14n + 16$
24.	476	5.7	38	solve:	$r(r + 11) = -30$
25.	505	6.1	34	simplify:	$(2p^2 + 14p + 20) \div (p^2 + 10p + 25)$
26.	506	6.1	44	reduce:	$\frac{24ab}{15a^3} \bullet \frac{20a^3}{16a^2b^2}$
27.	519	6.2	22	add:	$\frac{4}{9a^2} + \frac{2}{15ab}$

PROB#	PAGE	SECTION	NUMBER		PROBLEM
28.	529	6.3	20	simplify:	SEE TEXT
29.	544	6.4	16	solve:	$y - (6/y) = -1$
30.	544	6.4	28	solve:	$5/(y - 1) = 9/(y + 3)$
31.	598	7.2	48	simplify:	$\sqrt{125a^7b^9}$
32.	605	7.3	16	simplify:	$19a\sqrt{5b} - 10a\sqrt{5b}$
33.	618	7.4	26	multiply:	$(\sqrt{5} + 1)(\sqrt{5} - 6)$
34.	619	7.4	70	divide:	$(\sqrt{36p}) / (4\sqrt{q})$
35.	630	7.5	32	solve:	$\sqrt{3y - 2} = y$
36.	643	7.6	56	multiply:	$(4 + 3i)^2$
37.	669	8.1	8	solve:	$2x^2 - 6 = 0$
38.	682	8.2	4	solve:	$x^2 + 8x - 4 = 0$
39.	683	8.2	28	solve:	$(x + 2)(x - 4) = 1$
40.	693	8.3	18	solve:	$(3x - 2) - 6\sqrt{3x - 2} = -8$

MATH 102 PROJECTS

Each student in Math 102 should participate in three group or individual projects, one for each topic in the course (trigonometry, sets/logic, exponential models). Project presentations to the class should include these elements:

symbolic A mathematical equation that usually represents the general model for the problem being presented.

numerical Values that represent a specific case of the symbolic model; the data; the solution of the problem.

visual A visual or graphical representation of the problem.

communication The human element of the presentation. The story behind deciding on the problem and how to approach it, the dynamics of the team process, discoveries and pitfalls, and other emotional components that make the process of selecting and solving the problem interesting.
Include entries from the Discovery Journal (see below).

Topics and Type of Project

Trigonometry Select a problem that is solved by trigonometry. The project may be an application problem from the text, or it may include going out and making physical measurements.

Sets/Logic Solve a set classification problem or a logic problem, or prove a logic theorem.

Exponential Modeling Collect data (probably from the Internet) that can be modeled by an exponential process. Find the exponential equation that best describes that data.

Discovery Journal

A brief record of your emotional reactions to the content of each topic of the course. What grabbed your attention, what felt good and what felt bad, the process of discovery and learning, frustrations, insights, confusions, group and individual successes, etc.

This journal should consist of brief notes only, enough to remind you of your experiences. Each student's discovery process should be included in the group project presentations. Interesting entries into the Discovery Journal are often identified by these responses: aha!, haha!, ohhh!, ohno!, arghhh!, duh!, oops!, hummm!, ahh!

MATH 80 FINAL EXAM: PART I

Autumn 2007

Name:_____

This exam is given to all Math 80 students; it counts as 30% of your grade. There are 40 problems on the test. Each problem is worth one point.

DIRECTIONS: You must **show your work** in the space provided to receive credit. Put your final answer in the box.

NO CALCULATORS FOR PART I.

1) Write 17% as a fraction.

$$\frac{17}{100}$$

2) Round 530.2548 to the nearest hundredth.

530.25

3) How many centimeters are in 3 kilometers?

100 x 1000 x 3 = 300,000

4) Find the unit rate: 12.5 liters in 5 hours.

12.5/5 = 2.5 liters/hour

5) Three out of every fifteen students live in the city.
Express this ratio as a percent.

3/15 = 20%

6) Find the average (the mean) of these four scores:

93, 85, 62, 89

329/4 = 82.25 or 82 1/4

7) 15 is what percent of 60?

15 = x * 60

x = 1/4 1/4 = 25%

8) Write $35\frac{7}{8}$ as a decimal.

35.875

9) Simplify: $47.38 \div 2.3$

$$47.38/2.3 = 20.6$$

10) Simplify: $5 + 3 - 7 + (-2) - (-8)$

$$7$$

11) Simplify: $(0.2)^3$

$$.2 * .2 * .2 = .008$$

12) Simplify: $36 + 2(7 - 4)^2$

$$36 + 2*9 = 54$$

13) Simplify: $-5(2) - (3 \times 4 - 2^3)$

$$-10 - (12 - 8) = -14$$

For Problems 14-18, simplify, and reduce all fractions to the lowest terms:

14) $\frac{2}{9} + \frac{1}{4}$

$$\frac{17}{36}$$

15) $\frac{3}{5} \times 4$ Write the answer as a mixed number.

$$2\ \frac{2}{5}$$

16) $3\frac{2}{3} \times 1\frac{4}{11}$

$$11/3 * 15/11 = 5$$

17) $\left(\frac{5}{9}\right)\left(-\frac{3}{5}\right)$

$$-\frac{1}{3}$$

18) $\left(-\frac{2}{3}\right) \div \left(-\frac{5}{6}\right)$

$$\frac{4}{5}$$

19) Simplify: $10w - 16 - w + 5$

$$9w - 11$$

20) Given the formula: $y = mx + b$

find the value of y when $m = -2$, $x = 3$, and $b = 4$.

$$y = (-2)*3 + 4 = -2$$

MATH 80 FINAL EXAM: PART II

Autumn 2007

Name:_____

DIRECTIONS: You must **show your work** in the space provided to receive credit. Put your final answer in the box.

YOU MAY USE A CALCULATOR FOR PART II.

For Problems 21-25, solve each equation for x:

21) $x + 2.67 = 8$

$x = 5.33$

22) $4x = 120$

$x = 30$

23) $\frac{2}{3} = \frac{x}{14}$

$x = 9\frac{1}{3}$

24) $7x + 5 = 40 + 2x$

x = 7

25) $2x + 6(x - 1) = 34$

x = 5

26) Translate this sentence into an equation.
You do not need to solve the equation.

The difference between five times n and 14 equals 16.

5n − 14 = 16

27) A 220 inch pipe is cut into two pieces. One piece is four times the length of the other piece. What is the length of the longest piece?

x + 4x = 220
x = 44 inches
4x = 176 inches (longest piece)

28) Write an equation for this word problem, using x as the variable. You do not need to solve the equation.

A person worked two hours on Monday and three hours on Tuesday. He was paid a total of $30. How much did he earn each hour?

$$2x + 3x = \$30$$

29) A person should take 10 grams of medicine for every 15 pounds of body weight. How much medicine should a person who weighs 120 pounds take?

$$10/15 = x/120$$

$$x = 80 \text{ grams}$$

30) If the purchase price of an item is $5.00 and the sales tax rate is 8.8%, what is the final price after sales tax has been added?

$$\text{finalprice} = \$5.00 + .088 * \$5.00$$

$$\text{finalprice} = \$5.44$$

31) Write an equation for this word problem, using x as the variable.
You do not need to solve the equation.

The cost of a telephone call is \$0.08 for each minute.
The total cost of a call was \$1.20. How long was the call?

$$.08x = 1.20$$

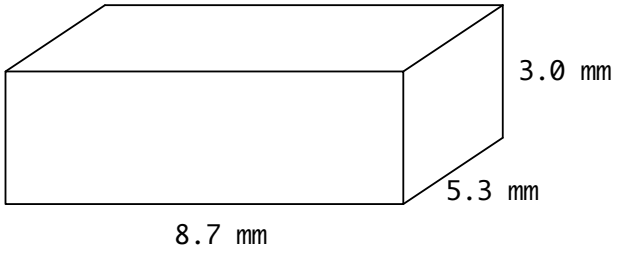
or $$8x = 120$$

32) Convert 875.23 centimeters into feet. Use the unit-fraction method.
(1 inch = 2.54 cm, 1 foot = 12 inches)

$$875.23 \text{ cm} * 1/2.54 \text{ in/cm} * 1/12 \text{ ft/in}$$

$$28.71 \text{ ft}$$

33) Find the volume of this rectangular solid:

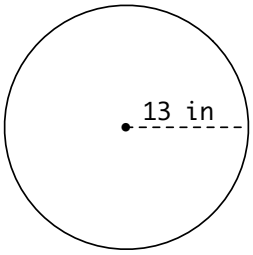


$$V = 8.7 \text{ mm} * 5.3 \text{ mm} * 3.0 \text{ mm} = 138.33 \text{ mm}^3$$

34) Find the perimeter of this rectangle:

$2(8 + 3) = 22$ cm

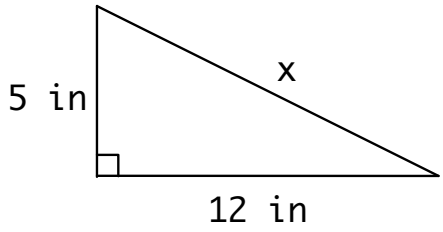
35) Find the circumference of this circle:



circumference = $2\pi r$

$2\pi * 13$ in = 81.68 in

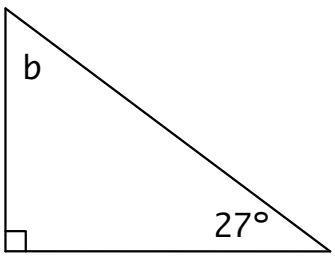
36) Find the length of side *x* for this right triangle:



$x^2 = 5^2 + 12^2$

$x = 13$ in

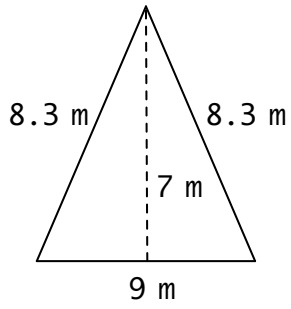
37) Find angle *b* in this triangle:



$27^o + b^o = 90^o$

$b = 63^o$

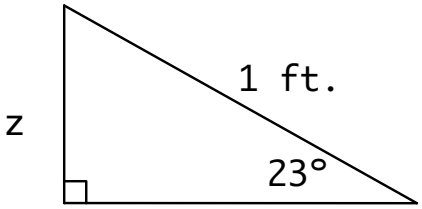
38) Find the area of this triangle:



$A = 1/2 * h * b$

$1/2 * 7\ m * 9\ m = 31.5\ m^2$

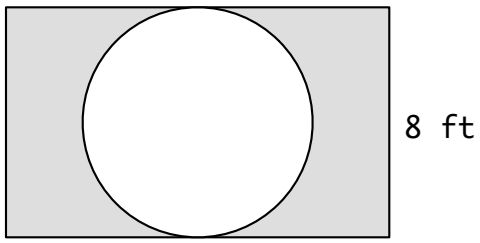
39) Find the length of side *z* for this right triangle:



$z = \sin 23^o$

$z = .39$ ft

40) Find the area of the shaded region.
The area of a circle is given by the formula: $A = \pi r^2$



Area rectangle = $12 * 8 = 96\ ft^2$
Area circle = $4^2 * \pi = 50.26\ ft^2$
Shaded area = $45.74\ ft^2$

class	STANDARD	MATH CONTENT	ACTIVITIES	RESOURCES	CLASS	DISCOVERY JOURNAL
NUMBER AND OPERATION						
1a	Use numbers and numerals	number recognition, counting, one-to-one correspondence	Match quantity to number of kids. Count objects and identify corresponding numeral. Stamp and count bingo stamp dots Use egg cartons to sort objects	Felt board Attendance Number Bingo Bingo Dot Counting Egg Carton Sort	Organize Math Portfolio, *Going Camping* video, Interactive play with kids	Create a flannel board number recognition activity to share with the class
1b		count with understanding, recognize how many	Guess numbers using lower/higher questions Sort then count quantity of each color Teach kids to count in sequence Count manipulatives	Number Guessing M & M Counting Chart Counting to 10 Counting to 10 & beyond	Begin discovery journal *The M&M's Counting Book*, McGrath	Observe the ways kids use mathematical thinking and record observations
2a	Solve problems using number facts and operations (+, –, x, ÷)	solve simple numerical problems	Solve problems using 1, 2, and 3 objects Physical and virtual manipulatives to 5 Count knots on a cord with eyes closed Show and hide objects, guess how many are hidden	How Many Bears on the Bed? Blocks & Pattern Block Frames How Many knots now? Under the Bed	Begin felt board project *Anno's Counting House*, Anno	Prepare felt board activity to share
MEASUREMENT						
2b	Compute and estimate using a variety of tools	explore quantity and number	Count letters in names Experience numbers to 9 or 10 Add 1 more to number Count 1 more with manipulatives, collage pieces	How Many Letters in Your Name? Adding One More Number Collage	Share felt board activities, handouts for Math Portfolio *Ten Black Dots*, Crews	Observe strategies kids use to communicate quantities
3a		connect numbers to quantities they represent	Tactile activities to teach written numerals Choose number to represent collection up to 5, 10 Tally up to 10, connect with number	Sandpaper Number Tracing Writing Numerals Get the Number Tally it!	Sandpaper number trace boards *Bennuy's Pennies*, Brisson	What numbers do kids use naturally?
3b	Compare quantities	same, less than, greater than	Compare handprint size Make handprint sets on different sized trays Measure height and compare Compare numbers of objects in a bag Roll dice for pennies	Handprints How Tall are You? Fruit Graph Money Match	Finger play songs *Anno's Math Games*, Anno	Observe the ways kids use comparison

4a	Measure quantities	measurement tools and words	Describe ways to measure a puddle Describe things that are measured by workers Use 6" rulers to find string lengths Name measuring tools pictured on cards	Measure a puddle Measuring the Neighborhood Measure It Scavenger Hunt Name That Tool!	*Sara Measures* video, Demonstrate measurement using non-standard units and measurement words. *One Grain of Rice,* Demi	Observation how kids measure
4b		time and sequence	Arrange activity pieces in temporal order Jump, tap, wave for timed periods Set timer to guess length of a process Guess if song is longer/shorter than egg timer	Felt board Schedule 10 Second Timing Set the Timer Egg Timer Songs	*Numberworlds* video Domino Identify *Time to Sleep*, Holt	Observe kids use of sequence
5a	Estimate	use comparative words	Compare animal sizes using height, weight, pounds Guess water level changes when adding objects Choose the right box to send a present Guess how many steps between two points	How Big is Big? Sink the Fruit Find the right box Step Guessing	*Experimenting with Balls* video, Kids test bounciness of different balls *Millions of Snowflakes*, Siddals	Extend activities from *Experimenting with Balls* video, describe your strategy
5b	Use technology and tools to solve simple problems	read instruments describe observations	Use a food scale to measure food servings Describe volume levels Observe rain gauge readings Read outdoor/indoor thermometers	Weigh your food Turn down the Music! Rain Gauge Rain What is the Temperature?	*Numberworlds* video Count and Compare *Pigs Will be Pigs*, Axelrod	Find out who can use a calculator
PATTERN / ALGEBRA						
6a	Find patterns and relationships	sort and classify	Sort folded socks by color/size/owners Choose criteria to sort blocks Sort recyling trash Sort puzzle pieces by shape Separate pieces of mixed puzzles	Sort the Socks Sort Pattern Blocks Recycle Puzzle sorting	*Marvelous Math: A Book of Poems*, Lee Bennett Hopkins	Find natural examples of sorting in the classroom
6b	Describe relationships	recognize and describe simple patterns in shapes, sounds and time	Describe, compare, and count crackers Put away toys according to shapes on shelves Categorize and describe house lighting Describe appearance of pattern block designs, Play sound tracks of seasonal occurrences	Counting Crackers Shape template marked shelves Lights On When? Pattern Block Design Guess the season	*Counting Crackers* video, *Counting Caterpillars and Other Math Poems*, Franco	Describe ways you can share with parent how their kids participate in math activities
7a		put objects in order	Construct and use graphs to sort blocks Sort buttons using sorting cards Observe properties of objects Play Bingo with shapes	Sort Pattern Blocks Grandma's button box Alike and Different Shape Bingo	*Tiger Math: Learning to Graph from a Baby Tiger*, Ann Whitehead Nagda	List household items that you can sort with kids, and how you would guide the activities
7b	Solve problems using patterns	compare patterns, describe changes	Learn how to use simple graphs Make graph of food by time eaten Make graph to sorted buttons by type Describe, share graph observations to group	Naming Rows and Columns Food Graph Button Graph Show and Tell Graphs	*Magnets and Cars* video, Kids predict the parts of a car that are magnetic, *G Is for Googol: A Math Alphabet Book*, Schwartz	Explain ways you can interact with parents about math activities at home

GEOMETRY AND SPATIAL						
8a	Recognize geometric objects	recognize geometric shapes such as points, lines, planes and space	Identify and sort shapes on felt board Trace outlines of objects and describe Identify common traffic signs and shapes Use geoboards to make shapes	Felt board shapes The Outline of Things Traffic signs Geoboard shapes	Bethany Draws a Wheel, recognize, duplicate, and extend simple patterns *Sir Cumference and the First Round Table*, Neuschwander	What shapes do kids already know?
8b	Use geometric concepts	find and compare locations and sizes	Use treasure map to find objects in a room Google map familiar places Describe rooms and places in house Make a map of your neighborhood	Treasure Map Google It! Rooms! Make a map	*Numberworlds* video, Number Bear Path *How I Learned Geography*, Shulevitz	Discuss your interaction with kids when solving estimation problems.
9a	Solve problems using geometric concepts	describe geometric relationships, qualitative change in patterns	Use tunnels, stools, hoops, to describe actions Read stories about distant places Make simple globe of Earth from balloon Sing songs about places, show on map, describe how to get there	Over, under around, and through Faraway Places Make a globe Songs about Places	*Farmers Market*, Johnson	Reflect on how you can interact with kids to build their confidence and abilities in math
DISPLAYING AND ANALYZING DATA						
9b	Structure and use data	represent data using concrete objects	Paste seeds next to drawings of plants Identify sorted items by color, size, and shape Use name cards to identify objects on shelves	Seeds Chart Properties Everywhere Namecards	*Mathematickles*, Franco	Do kids know their age, their height?
10a		make predictions	Observe sky to guess weather Use sense of smell to guess food cooking Guess characteristics of objects	Guess tomorrow's weather What's cooking? How can you tell?	*Math Games and Activities from Around the World*, Zaslavsky	What do kids think will happen tomorrow?
10b	Gather and analyze data and communicate findings	pose questions	Pose mathematical questions about self and surroundings Use felt board to describe weather each day Analyze footprint cutouts to guess animal Think of questions to ask an astronaut, race car driver, movie star	Eye to Eye Weather Felt Board Footprint mystery 3 Questions!	Summarize portfolio *Seeing Stars: Shining Star Light*, Charles Hobson	Sort and organization your journal entries

PROCESS STANDARDS emphasis across classes:

Focus on problem solving

2a, 3b, 4b, 5b, 6a, 7a, 7b, 9a, 9b, 10a, 10b

Consolidate math understanding through communication

1b, 2a, 3a, 4a, 5a, 5b, 6b, 8a, 8b, 9a, 10b

Use a diversity of math representations, perspectives, and modalities

1a, 2b, 3a, 4a, 5a, 5b, 6a, 6b, 7b, 9b

Acknowledge the role of reasoning

1b, 2b, 3b, 5a, 6a, 7a, 7b, 8b, 9a, 10a, 10b

Approach math as a unified whole

1a, 3a, 6a, 8a, 10a