

# Baseline Proficiencies

Math 140-141

2008-2009

## Introduction

In order to pass courses in the *Concepts and Processes* sequence, you must demonstrate sufficient mastery of fundamental concepts by passing “baseline proficiencies.” Baseline proficiencies can be taken as quizzes, parts of regular class tests, or interviews. If you don’t pass a proficiency the first time, after working to understand your mistakes, you can retake the proficiency either orally or in writing. There is no official limit on retakes, but must show that you have worked to understand the material between times you retake the proficiency. When you pass a proficiency, you pass it forever.

This document explains all ten baseline proficiencies in more detail. Proficiencies A-C should be passed by the end of Math 140; all proficiencies must be passed by the end of Math 141. See the last page for a Baseline Proficiency Completion Checklist.

A passing score on a baseline proficiency quiz is 80%. Your instructor may change the order of quizzes and may split a proficiency into two separate quizzes

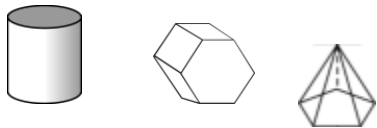
## Topic II: Geometry and Measurement

### A: Properties and Names of 2D and 3D Figures

To satisfy this proficiency you must show that you have a basic knowledge of vocabulary and properties associated with polygons and polyhedra. Terms you should know include: Parallel, perpendicular, isosceles, equilateral, equiangular, regular, obtuse, acute, right, scalene, convex, concave, diagonal, bisector, polygon, quadrilateral, parallelogram, kite, rhombus, trapezoid, prism, square, rectangle, pentagon, hexagon, octagon, decagon, cylinder, sphere, hemisphere, prism, pyramid, cone, tetrahedron, octahedron, dodecahedron, and icosahedron.

#### Examples:

Give the most precise name of each of the 3D-figures below:



Draw the following 2D figures:

An equilateral quadrilateral that is not equiangular.

A concave octagon.

An isosceles right triangle.

Which of the properties below must a rhombus always have? Explain.

Right angles, perpendicular diagonals, equilateral, equiangular, two pairs of parallel sides.



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### Don't Forget!

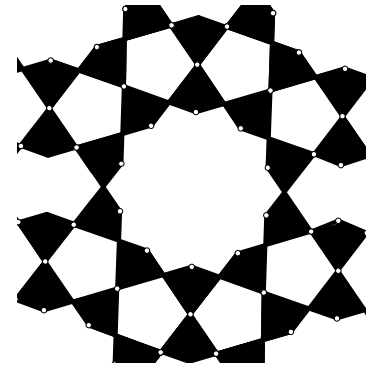
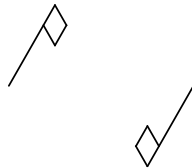
- You must pass all the proficiencies to pass the course
- Once you've passed a proficiency, you've passed it forever
- You get many tries to pass the proficiencies
- You can take the proficiencies orally or in writing

## B: Transformations and Symmetry

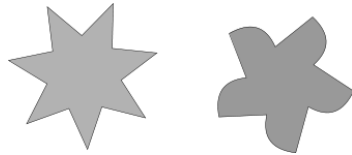
To satisfy this proficiency you must demonstrate that you understand the meanings of rotation, reflection, dilation, and translation in two-dimensions, as well as basic properties of reflective and rotational symmetry. You should be able to find lines of symmetry, centers of rotation, angles of rotation, translation vectors, and to perform the four transformations.

### Examples:

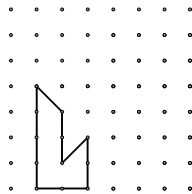
Describe the one transformation that will move the top figure to the figure below it (show centers of rotation and give angles of rotation, lines of reflection, or translation vectors, and be sure to name the transformation):



Identify all lines of symmetry and centers of rotation in the figures below:



Translate the figure below -1 unit horizontally and 2 units vertically.

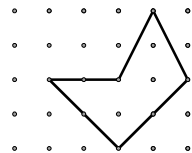


**You can use tracing paper, transparencies, Miras, rulers, protractors, blocks, and other tools and manipulatives to help with these proficiencies.**

## C: Measurement

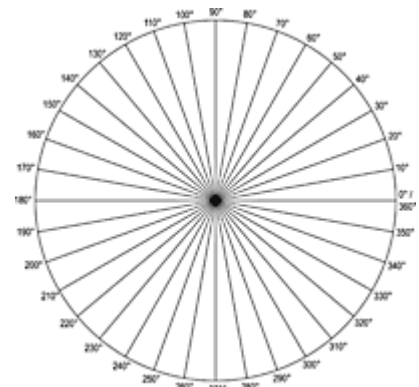
To satisfy this proficiency you must demonstrate knowledge of measurement of lengths, angles, areas, and volumes using a variety of appropriate units.

Assuming that the smallest square on the geoboard (marked by four pegs) has area one, find the area of pentagon below. Show work to indicate how you found the area.

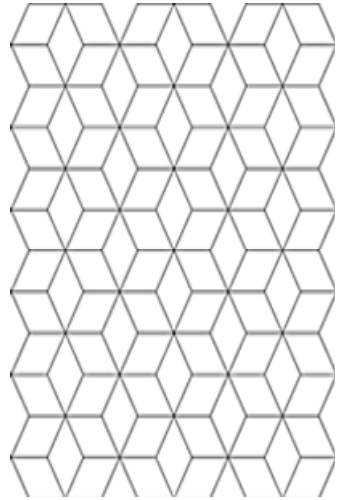
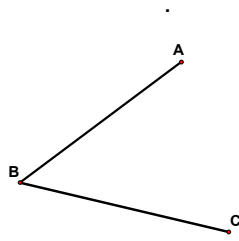


Draw a line that is  $6 \frac{3}{4}$  inches long

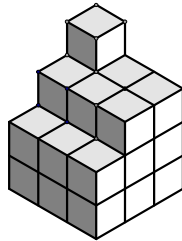
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Use a protractor to measure angle ABC below



Find the volume of the solid depicted below. Assume that each small cube has volume one and that there are no hidden holes in the back of the figure:



Topic IV: Number Systems

D: Number Bases

To satisfy this proficiency you must demonstrate your ability to move between representations of numbers in various bases, including visual representations. You must also demonstrate your understanding of counting in other bases.

Examples:

What comes after  $145_6$ ?

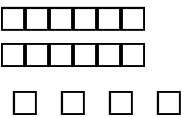
What comes before  $320_7$ ?

Represent in base 10:  $243_5$ :

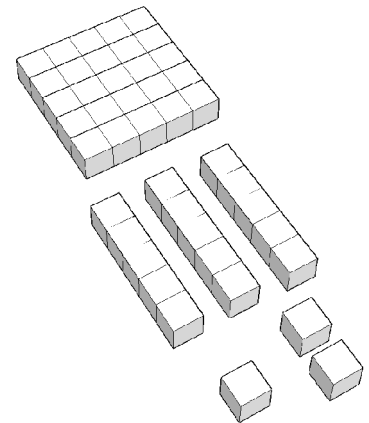
Represent the following base ten number in base 2: 25.

What base 5 number is represented by the figure at the right?

Fill in the blanks in the chart below:

Representation with Base Blocks	Base Six Numeral	Base Ten Numeral
	234	
		56
		

**Many students find the base blocks helpful for deepening understanding of place value and number bases.**



## Topic IV: Numbers & Operations

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### E: Mental Math (Add/Sub)

To satisfy this proficiency, you must demonstrate that you know several strategies for mental addition and subtraction. You will be given a list of addition and subtraction problems, and for each problem you must show two different strategies for computing the sum or difference mentally. No calculators allowed on this baseline proficiency.

**Example:**  $259 + 47$

Solution 1:  $250 + 50 = 300$  and  $9-3=6$  and  $300+6=306$

Solution 2:  $59+47 = 60+46 = 106$  and  $200+106=306$

Solution 3:  $259 + 41 = 300$  and  $47-41=6$  so  $300+6$ .

**Example:**  $85-19$

Solution 1:  $85-20=65$ ,  $65+1 = 66$

Solution 2:  $85+1=86$ ,  $19+1=20$ ,  $86-20=66$

Solution 3:  $85-10 = 75$ ,  $75-5=70$ ,  $70-4 = 66$ .

### F: Mental Math (Mult/Div)

To satisfy this proficiency, you must demonstrate that you know several strategies for mental multiplication and division. You will be given a list of multiplication and division problems, and for each problem you must show two different strategies for computing the product or quotient mentally. No calculators allowed on this baseline proficiency.

**Example:**  $26 \times 9$ .

Solution 1:  $20 \times 9 = 180$  and  $6 \times 9 = 54$  so  $26 \times 9 = 180+54 = 234$

Solution 2:  $26 \times 10 = 260$  and  $260-26 = 234$

Solution 3:  $25 \times 9 = 225$  and  $225+9=234$

**Example:**  $1200 \div 50$

Solution 1:  $1200 \div 50 = 2400 \div 100 = 24$

Solution 2:  $1200 \div 50 = 120 \div 5 = (40 \times 3) \div 5 = 8 \times 3 = 24$

Solution 3:  $1200 \div 50 = 120 \div 5 = (100+20) \div 5 = 20+4=24$



**Practice Mental Math when you are shopping – see if you can figure out the total before the cashier does. Make up your own strategies!**

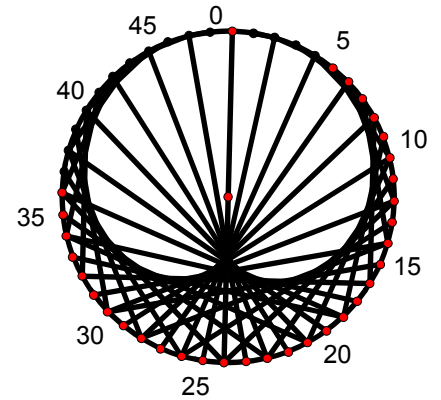


## G: Fraction Models

To satisfy this proficiency, you must demonstrate understanding of fraction models and use your understanding of the models to answer questions about the size of fractions.

### Examples:

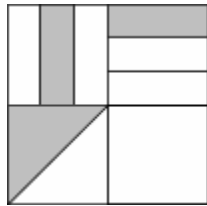
The rectangle below represents a cover blocking your view of  $\frac{4}{7}$  of the circles. Draw the missing circles inside the rectangle.



Indicate the approximate location of  $\frac{11}{6}$  on the number line below.



What fraction of the area of the picture below is shaded? Explain



Name two fractions between  $\frac{1}{4}$  and  $\frac{1}{3}$ . Explain.

Which is bigger,  $\frac{8}{9}$  or  $\frac{8}{13}$ ? Explain

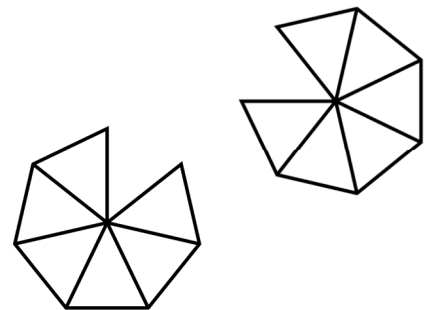
## H: Connecting Fraction Expressions to Situations

To satisfy this proficiency, you must demonstrate that you understand how to translate between simple story situations and number expressions involving fractions and one of the four basic operations.

### Examples:

Make up a story situation that illustrates  $\frac{2}{3} - \frac{1}{4}$ .

Write a number expression that corresponds to this situation: Keith had  $\frac{1}{3}$  of a pizza left. He gave  $\frac{3}{4}$  of his pizza to Aya. How much pizza did Aya get? Your expression should use the numbers  $\frac{1}{3}$  and  $\frac{3}{4}$  and one operation.



**With fraction stories, be careful about confusing subtraction and multiplication, and always, always pay attention to the unit.**

## I: Number and Operation Sense

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To satisfy this proficiency, you must demonstrate an understanding of the size of decimals and of the effects of the four operations on the size of fractions and decimals. No calculators allowed on this quiz.

### Examples:

Indicate the approximate location on the given number line of  $5 \div 3/25$ .

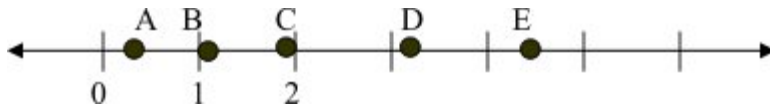
Which of the following is closest to  $0.02 + 0.004653$ ? Explain how you made your choice: a)  $1/10$  b)  $2/10$  c)  $1/4$  d)  $1/2$

The decimal point has been omitted from the following number, which is a rounded off solution to  $32.674 \times 0.092345$ . Insert the decimal point in the correct place. Explain how you made your choice. 3 0 1 7 2 8 0 5 3

Which is bigger, 0.04 or 0.044? Explain.

Name two fractions that are between 0.6 and 0.7.

Which of the lettered points on the number line below is closest to the product  $(2/5)(71/659)$ . Explain how you made your choice.



Put the following numbers in order from smallest to largest.

$$\frac{1}{9}, \frac{3}{4}, 0.07, 0.077, \frac{7}{10}$$

## Topic VI: Number Theory

### J: Number Theory

To satisfy this proficiency, you must show that you understand basic concepts of number theory, including multiples, factors, primes, greatest common factor, and least common multiple.

#### Examples:

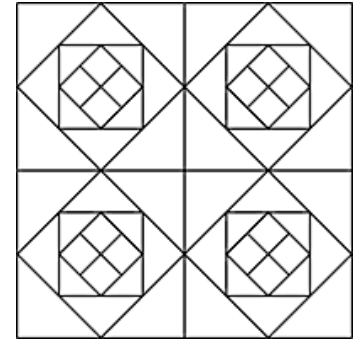
List all the factors of 52.

Give the prime factorization of 408.

Find the GCF and the LCM of 51 and 136.

Is 667 prime or composite? Give a convincing explanation.

Find a prime number between 200 and 250. Give a convincing explanation that your number is prime.



**For Number and  
Operation Sense:  
Estimate,  
Estimate,  
Estimate.**

# Baseline Proficiency Completion Checklist 2008-2009

Student \_\_\_\_\_

Instructor \_\_\_\_\_

## MAT 140

### Method of Completing Proficiency and Date Completed

#### *Topic II: Geometry and Measurement*

A) Properties and Names of Two- and  
Three-Dimensional Figures

\_\_\_\_\_

B) Transformations and Symmetry

\_\_\_\_\_

C) Measurement

\_\_\_\_\_

## MAT 141

#### *Topic IV: Number Systems*

D) Number Bases

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#### *Topic V: Numbers and Operations*

E) Mental Math: Addition/Subtraction

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F) Mental Math: Multiplication/Division

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G) Models of Fractions

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H) Connecting Expressions to Situations

\_\_\_\_\_

I) Number/Operation Sense

\_\_\_\_\_

#### *Topic VI: Number Theory*

J) Number Theory

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