MA 202 Exam 4 Review Worksheet

1. Tell whether each statment is *true* or *false*. Justify your answer.

    (a) Every whole number is a rational number.

    (b) Every rational number can be written as a terminating or repeating decimal.

    (c) Every rational number can be written as a ratio of a whole number to a whole number.

    (d) Every natural number is a rational number.

    (e) Every rational number can be written as a terminating decimal.

    (f) Every rational number can be written as the ratio of an integer to an integer.

2. Classify the following numbers in as many ways as possible:

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	Natural	Integer	Rational	Irrational	Real
$\frac{1}{3}$					
$\sqrt{5}$					
$-\sqrt{4}$					
0					
$\frac{-5}{4}$					
$2.\overline{3}$					
2π					

3. What rational number is its own additive inverse? Explain.

4. Find an irrational number between the real numbers 1 and $\sqrt{8}$.

5. Determine what information you need to solve the following problem.
   One day, you jog for 7 minutes and then run for 15 minutes. Each day after the first day, you jog for 7 minutes, but increase the time that you run. After how many days will you be exercising for a total of 90 minutes per day.

6. Write and solve an equation to model the statement: "Thirteen more than the quotient of a number n and forty-eight is twenty-one."

7. Explain whether the following statements are *always*, *sometimes*, or *never* true. Explain your reasoning.

   (a) Two right angles are supplementary.

   (b) Two acute angles are complementary.

   (c) Two sides of a right triangle are congruent.

   (d) Two angles of an obtuse triangle are supplementary.

   (e) Two obtuse angles are supplementary.

   (f) One of two supplementary angles is obtuse.

   (g) The acute angles of a right triangle are complementary.

   (h) The acute angles of an obtuse triangle are complementary.

8. Determine whether the following statements are *always*, *sometimes*, or *never* true. Explain your reasoning.

   (a) A rectangle is a rhombus.

   (b) A trapezoid is convex.

   (c) The parallel sides of an isosceles trapezoid are congruent.

   (d) A parallelogram is a rectangle.

   (e) Two lines that are parallel intersect at exactly one point.

9. (a) What is the sum of the interior angle measure of an n-gon?

   (b) What is the interior angle measure of a *regular* n-gon? Explain how you can use the previous part to derive this formula.

   (c) Which of the regular polygons can be used to tessellate the plane? Explain.

10. Your water bottle is about 40% empty. The total capacity of the bottle is 24 fluid ounces. How many liters of water are left in the bottle?

11. You want to bake muffins for a bake sale. Each batch of muffins calls for $\frac{1}{4}$ cup milk. How many batches of muffins can you make with $\frac{3}{4}$ gallon of milk?

12. You can estimate how far away a storm is by counting the seconds between the time you see a lightning strike and the time you hear thunder. The speed of sound is about 340 meters per second.

   (a) How many kilometers away is a storm when 24 seconds pass between a lightning strike and thunder?

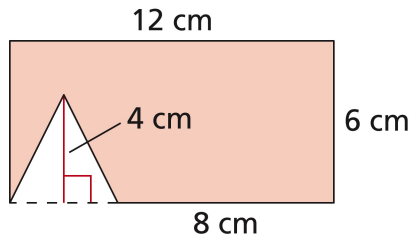   (b) How many seconds will pass between a lightning strike and thunder of a storm that is 1 mile away?

13. Find the perimeter and area of the composite figure. Each grid block is 1 unit by 1 unit.
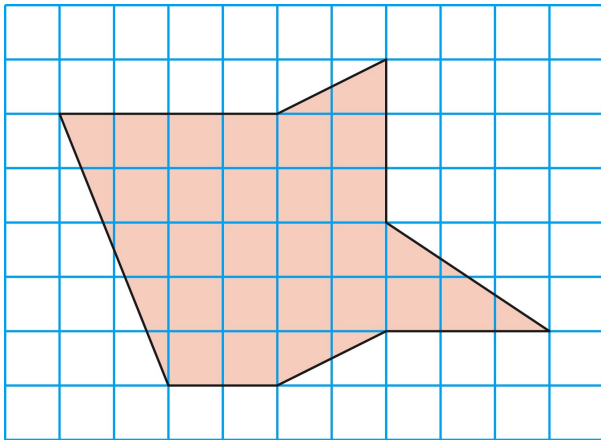
14. Explain how you can derive the formula for the area of a trapezoid based on the area of a parallelogram.
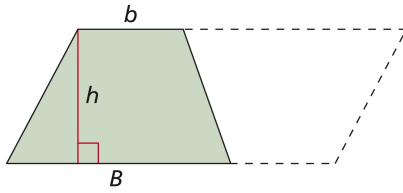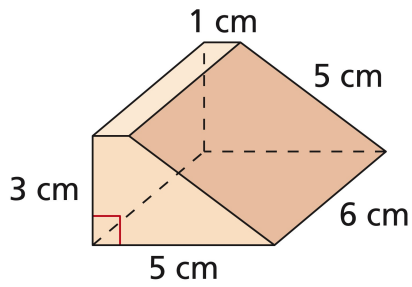

15. (a) Find the area of the figure.

    (b) Assuming the triangle is isosceles, find the perimeter of the figure.

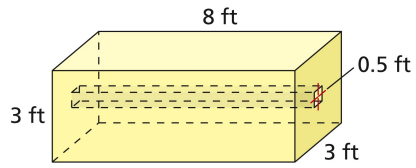16. You are given the following figure:

    (a) Sketch the net of the figure. Make sure to label all dimensions.

    (b) Find the surface area of the figure.

    (c) Find the volume of the figure.

17. A smaller rectangular prism is cut out of a larger rectangular prism as shown:


8 ft

0.5 ft

3 ft

3 ft

   (a) What is the surface area of the original prism? What is the surface area of the new solid?

   (b) What is the volume of the original prism? What is the volume of the new solid?

18. Explain how to change the side lengths of the base of a square pyramid so that the volume of the square pyramid doubles.

19. Give the formula for the area A and arc length L of the sector of the circle with central angle $a°$:


$a°$

r
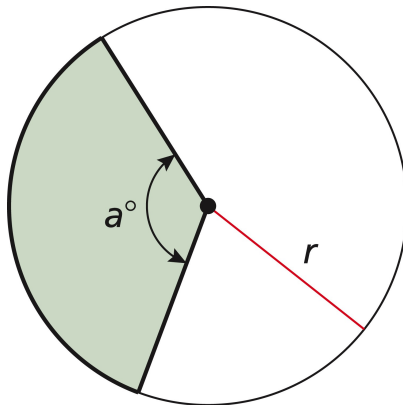
20. A log that is 6 feet long is rotated on a lathe to slice off a thin, rectangular sheet of wood called a veneer. Compare the areas of the veneer produced from one rotation of the log when its diameter is $d = 8$ inches and when its diameter is $d = 4$ inches.

21. The eraser of the pencil shown is a hemisphere. The sharpened end of the pencil is a cone. Find the total volume of the pencil and its eraser in cubic centimeters.
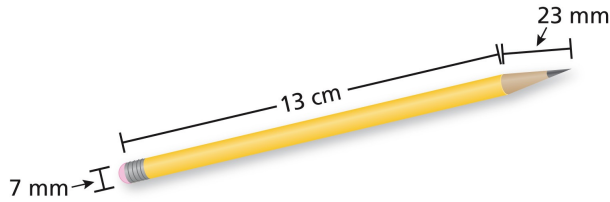
22. State the triangle congruence and similarity theorems.

23. Determine whether the two triangles are congruent or similar. Explain your reasoning. Write the congruence or similarity statements if possible.
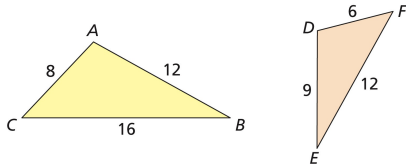
24. Consider the triangle T with vertices $(-1, 2), (-2, 5), (-5, 1)$.

   (a) Translate the triangle 7 units to the right.

   (b) Rotate the triangle $90°$ counterclockwise around the origin.

   (c) Reflect the triangle across the line $y = x$.

25. Find the distance between the points $A = (4, 8)$ and $B = (-1, -4)$. Find the coordinates of the midpoint of the line segment AB.

26. A line contains the points $(3, 2)$ and $(4, 5)$. Draw a line parallel to the given line that passes through the point $(0, 5)$. Draw a line perpendicular to the given line that passes through the point $(-4, 2)$.

27. Consider the equation $-3y + 4x = 9$. Find the slope, x-intercept, and y-intercept. Sketch the graph of the equation. Does this line meet the line $-3y + 4x = 12$?

28. Determine whether each of the following relations is a function. If it is a function, determine if it is possible for the function to be linear.

    (a) $(9, 7), (8, 5), (7, 3), (9, 1)$

    (b) All pairs (letter, number of lines of symmetry of the letter).

    (c) The values of the table below:

Input, x	1	2	3	4	5
Output, y	5	8	11	14	17

    (d) $(0, 1), (2, 5), (-4, -7), (10, 21)$

    (e) The graph of the points on a circle of radius 1 centered at the origin.

29. Draw the mapping diagram of the following relation and determine if it is a function.

$$(1, 1), (2, 1), (3, 2), (4, 2), (5, 3), (6, 3).$$