Test 2A - MTH 2010
Dr. Graham-Squire, Spring 2015

Name: _____

I pledge that I have neither given nor received any unauthorized assistance on this exam.

_____
(signature)

DIRECTIONS

1. Show all of your work and use correct notation. A correct answer with insufficient work or incorrect notation will lose points.

2. Clearly indicate your answer by putting a box around it.

3. Calculators, cell phones and computers are <u>not</u> allowed on this test.

4. Make sure you sign the pledge.

5. Number of questions = 14. Total Points = 70.

1. (5 points)

   (a) Solve the subtraction problem: $\$10.00 - \$3.99$

   (b) Calculate $5 \times 10^4 + 0.324 \times 10^2$

   (c) Multiply: $3\frac{1}{4} \times 2\frac{3}{5}$

   (d) (2 points) Explain how to use a "mental math" strategy to calculate 9×99.

2. (5 points) Which of the following problems could be solved by using the expression $4.5 \div 0.5$? Show your work and/or explain your answer to receive full credit!

   (A) A concert last four and a half hours and you missed a half hour. How much of the concert did you see?

   (B) The base of a triangle is 0.5 cm and the height is 4.5 cm. What is the triangle's area?

   (C) The length of a wooden plank is four and a half feet and you need pieces that are half a foot long. How many pieces can you get from the plank?

   (D) Billy's house is 5 miles from Jenny's. If Billy can run 4.5 miles per hour, how long will it take him to reach Jenny's house?

3. (5 points) Use one of the following diagrams to explain why $5 \times (2+4) = 5 \times 2 + 5 \times 4$, then generalize your argument to explain why the distributive property is true for *any* numbers, not just 5, 2 and 4.
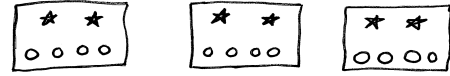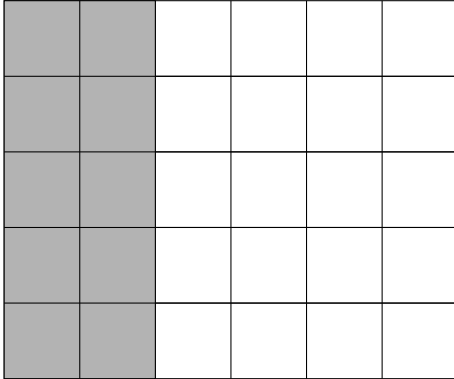
OR

4. (5 points) Your class is trying to approximate how many blades of grass are in a 30-inch by 14 foot rectangular plot of land that is covered with grass. The students approximate that there are an average of 26 blades of grass in one square inch of the plot. Use that to approximate how many blades of grass there are in the total 30-inch by 14-foot plot of land.

5. (5 points) Adam pours $\frac{7}{8}$ of a cubic foot of gravel into an empty box. He then scoops out $\frac{1}{5}$ of the gravel in the box. How much gravel is left in the box?

Which of the following expressions represent a means of finding a solution to this problem? Show your work and/or explain your answer to receive full credit!

(A) $\dfrac{7}{8} - \dfrac{1}{5}$

(B) $\dfrac{7}{8} \times \dfrac{1}{5}$

(C) Some other expression involving fractions (if you choose this answer, you should indicate what the correct expression should be)

(D) A solution cannot be calculated (if you choose this answer, you should indicate why a solution cannot be calculated)

6. (5 points) In the Kavango, it is tradition to tip your bartender with an amount that is approximately one-fourth of what you purchase (<u>before</u> sales tax is added). If you buy drinks costing $29.42, after the 6% tax is added the total is $31.19. Explain how you can use the tax to quickly approximate how much tip you should give. You should give an *approximation*, not the exact amount!

7. (5 points) Multiply 63×48 using whatever multiplication algorithm you choose. Then use an array or the distributive property to explain <u>why</u> your algorithm gives the correct answer to the problem.

8. (5 points) In the figure below, the distance from B to C is twice the distance from A to B, and the distance from C to D is equal to half the distance from A to C. If the distance from B to C is x, what is the distance from A to D? Show your work and/or explain your answer to receive full credit! Note: the diagram may not be completely to scale.

A   B   C   D
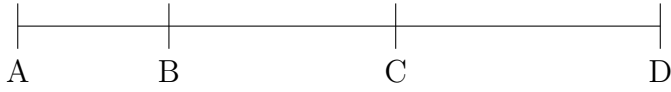
(A) $\left(\frac{1}{2}\right) x$

(B) $\left(\frac{3}{4}\right) x$

(C) $\left(2\frac{1}{4}\right) x$

(D) $\left(2\frac{1}{2}\right) x$

9. (5 points) Here is a method that a student used for subtraction:

$$
\begin{array}{r}
\overset{15}{} \\
7 \quad \cancel{5} \quad 8 \\
- \quad {}_3\cancel{2} \quad 8 \quad 6 \\
\hline
4 \quad 7 \quad 2
\end{array}
$$

Which of the following is correct?

(A) The student used a method that worked for this problem and can be generalized to any subtraction problem.

(B) The student used a method that worked for this problem and that will work for any subtraction problem that only requires one regrouping; it will not work if more regrouping is required.

(C) The student used a method that worked for this problem and will work for all three-digit subtraction problems, but will not work for larger problems.

(D) The student used a method that does not work. The student made two mistakes that cancelled each other out and was lucky to get the right answer for this problem.

10. (5 points) A student cannot remember how to multiply decimal numbers such as 1.24×8.7, but they can calculate that $124 \times 87 = 10788$.

(a) Using either a "multiply by tens, then divide by tens" or a "fraction" argument, explain to the student why the standard method for multiplying decimal numbers works.

(b) Explain to the student how to use approximation to figure out where to place the decimal in your answer.

11. (5 points) One astronomical unit (AU) is approximately 9×10^7 miles. Earth is approximately 2.7 trillion miles from the outer reaches of the Milky Way galaxy. Using the approximations above, how many AU is it from Earth to the outer reaches of the Milky Way galaxy? Write your answer in scientific notation.

12. (5 points) A crab scuttles at a pace of 70 feet per minute. You ask your students to calculate how long it will take the crab to cross the length of a football field (300 feet). One student quickly does the calculation and says "it will take the crab 4 minutes and 20 seconds"! Does the student have the correct answer? If so, explain how the student came to their answer. If not, explain what is wrong with the student's calculation, and use their work to explain to them how to do it correctly–you do not have to calculate the exact answer, just explain what the correct calculation would be.

13. (5 points) Explain in two different ways why division by zero is undefined. It is fine to use an example problem like $4 \div 0$.

(a) Use a word problem to illustrate how division by zero does not make sense.

(b) Use the fact that division is the same as multiplication by an unknown to explain why division by zero is not defined.

14. (5 points) If n is a <u>positive</u> number, which of the following could be *negative*? Show your work and/or explain your answer to receive full credit!

(A) $(n+1)(n-1)$

(B) $(n+1)(n+2)$

(C) $n(n-2)$

(D) $n(n)$

Extra Credit(2 points) A student solves a mixed-fraction calculation as follows:

$$5\frac{1}{6} - 2\frac{5}{6} = 2\frac{6}{6}$$

Where did the student go wrong, and how would you explain to them how to fix it? Try to use the student's thought process as much as possible.