

Test 2A - MTH 2010

Dr. Graham-Squire, Fall 2014

9:31

Name: Key

⇒ 24 min.

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 not allowed on this test.
4. Make sure you sign the pledge.
5. Number of questions = 14. Total Points = 65.

1. (4 points)

(a) Add:

$$\overbrace{26 + 43 + 57 + 74 + 18} =$$

$$(26 + 74) + (43 + 57) + 18$$
$$100 + 100 + 18 = \boxed{218}$$

(b) Calculate:

$$591.6 - 37.146 =$$
$$\begin{array}{r} 8 \text{ k } 5 \text{ q } 10 \\ 591.600 \\ - 37.146 \\ \hline 554.454 \end{array}$$

(c) Calculate:

$$\frac{3 \cdot 9}{3 \cdot 12} - \frac{4 \cdot 2}{18 \cdot 2}$$
$$\frac{27}{36} - \frac{8}{36} = \boxed{\frac{19}{36}}$$

(d) Calculate

$$-58 - (-49) =$$
$$-58 + 49 = \boxed{-9}$$

2. (3 points)

(a) Multiply

$$48.93 \times 1000 = \boxed{48,930}$$

(b) Multiply

$$241 \times 88 =$$

$$\begin{array}{r} 241 \\ \times 88 \\ \hline 1928 \\ 19280 \\ \hline 21208 \end{array}$$

$$\boxed{21,208}$$

(c) Compute the product and express the answer in lowest terms:

$$\frac{3}{7} \times \frac{15}{20} = \frac{3}{7} \cdot \frac{\cancel{5} \cdot 3}{\cancel{5} \cdot 4}$$

$$= \boxed{\frac{9}{28}}$$

3. (3 points)

(a) Multiply

$$0.45 \times 4.05 =$$

$$\boxed{1.8225}$$

$$\begin{array}{r} 4.05 \\ 0.45 \\ \hline 2000 \\ 2000 \\ 0 \\ \hline 16000 \\ \hline 1.8225 \end{array}$$

(b) Write 0.00000503 in Scientific Notation.

$$5.03 \times 10^{-6}$$

(c) Do the division and get an exact decimal answer: $37 \div 8$

$$\begin{array}{r} 4.625 \\ 8 \overline{) 37.000} \\ \underline{32} \\ 50 \\ \underline{48} \\ 20 \\ \underline{16} \\ 40 \\ \underline{40} \\ 0 \\ = \end{array}$$

$$\boxed{4.625}$$

$$\begin{array}{r} 9.36 \\ 4131 \\ \hline 5 \text{ units} \end{array}$$

4. (5 points) Below are several expressions:

9:41

~~I.~~ $\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$ II. $0.400000 = 0.4 = \frac{4}{10} = \frac{2}{5}$ III. $\frac{1}{5} + \frac{1}{5} = \frac{2}{5}$

IV. $40\% = \frac{40}{100} = \frac{2}{5}$ ~~V.~~ $0.25 = \frac{25}{100} = \frac{1}{4}$ VI. $\frac{14}{35} = \frac{2 \cdot 7}{5 \cdot 7} = \frac{2}{5}$

Which of the lists below includes all of the above expressions that are equivalent to $\frac{2}{5}$?

(a) I, III, V, VI

(b) III, VI

(c) II, III, VI

(d) II, III, IV, VI

5. (5 points) Can the following problems be solved by subtracting $\frac{3}{4} - \frac{1}{2}$? If so, explain why. If not, explain why not. Solve the problems if they can be solved.

(a) A bird feeder was filled with $\frac{3}{4}$ of a full bag of bird seed. The birds ate $\frac{1}{2}$ of what was in the bird feeder. What fraction of a full bag of bird seed did the birds eat?

No. The birds ate $\frac{3}{4} \cdot \frac{1}{2}$ of the full bag, not

$$\frac{3}{4} - \frac{1}{2}.$$

$$\frac{3}{4} \cdot \frac{1}{2} = \boxed{\frac{3}{8} \text{ of the bag}}$$

$$\begin{array}{r} 9:42 \\ \underline{9:41} \\ 1 \text{ min} \end{array}$$

(b) A bird feeder was filled with $\frac{3}{4}$ of a full bag of bird seed. The birds ate $\frac{1}{2}$. What fraction of bird seed did the birds eat?

$\frac{1}{2}$ of what? A full bag or $\frac{1}{2}$ of the

feeder? Question is unclear. Also,

the "What fraction..." question is unclear too.

Is it fraction of bird seed in a bag or in the feeder?

Cannot be solved because it is unclear.

9:44

6. (5 points) Which of the following points is closest to $\frac{34}{135} \times \frac{53}{86}$?



(a) A

(b) B

(c) C

(d) D

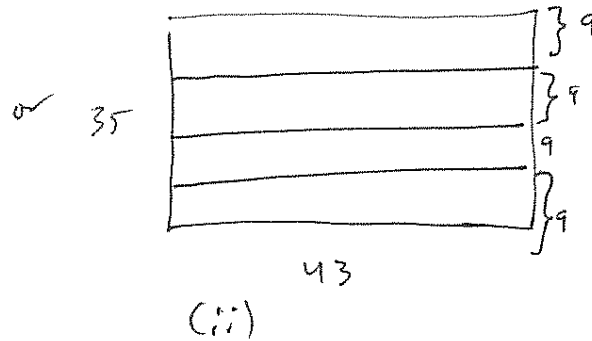
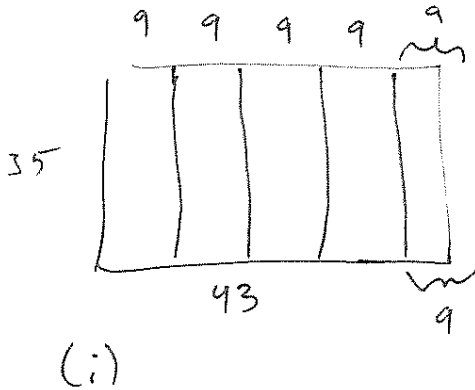
$$\frac{34}{135} \approx \frac{30}{130} = \frac{3}{13}$$

$$\frac{53}{86} \approx \frac{50}{80} = \frac{5}{8}$$

$$\frac{3}{13} \cdot \frac{5}{8} = \frac{15}{104} \text{ is less than } \frac{1}{2}.$$

A is the only option less than $\frac{1}{2}$

7. (5 points) The Browns need new carpet for a rectangular floor that is 35 feet wide and 43 feet long. The carpet comes on a large roll that is 9 feet wide. The carpet store will cut any length of carpet the Browns want, but they must buy the full 9 feet in width.
- (a) Draw clear, detailed pictures showing two different ways the Browns could lay their carpet.



- (b) For each way of laying the carpet, find how much carpet the Browns will need to buy from the carpet store. Which way is less expensive for the Browns?

for (i), they will need 5 lengths of 35 each, which is $5 \times 35 = 175$ feet in total length.

$$\begin{array}{r} 9:48 \\ - 9:44 \\ \hline 4 \end{array}$$

for (ii), they will need 4 lengths of 43, which is $4 \times 43 = 172$ feet.

So it is less expensive to do method (ii)!

9:58

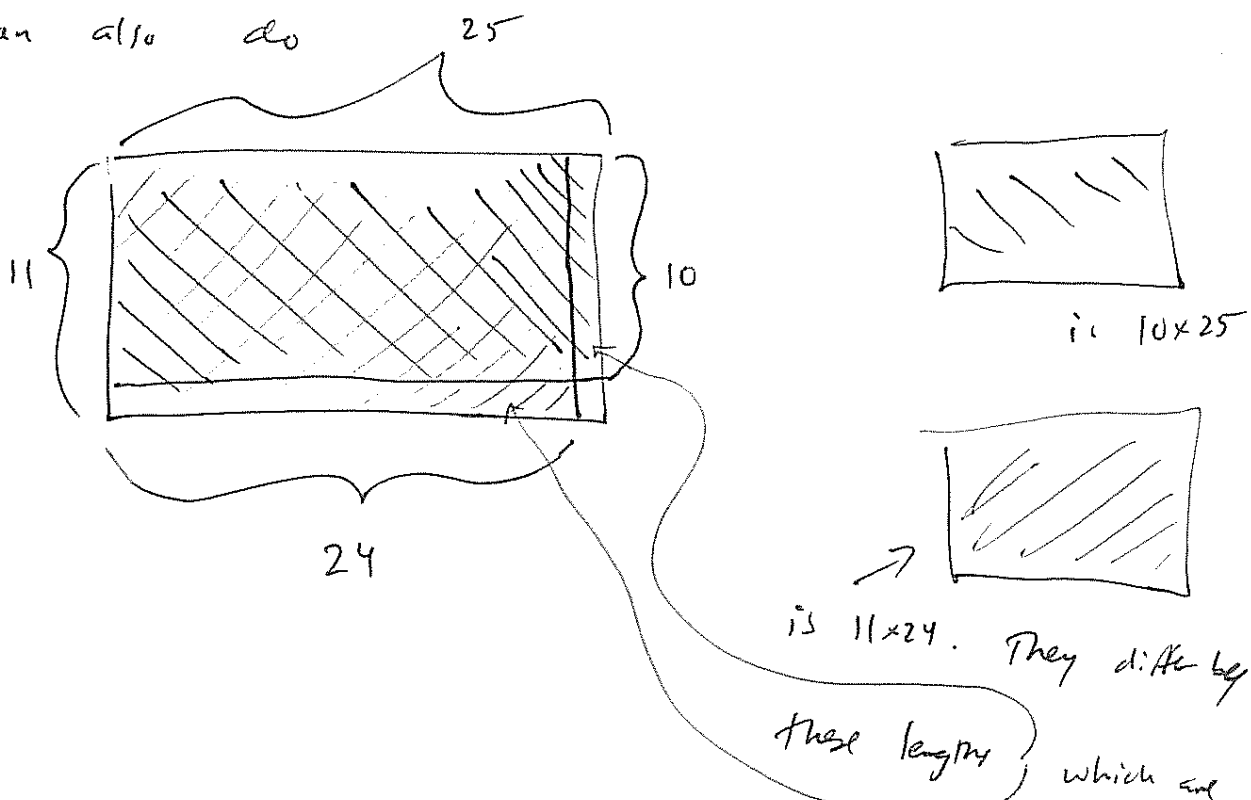
8. (5 points) Working on the problem 11×24 , Jim says he can take one from the 11 and put it with the 24, and that the new multiplication problem 10×25 will give the same answer as 11×24 . Is Jim right? If he is not, use an array or some mathematical expressions to explain to him why he is wrong. It is NOT enough just to calculate the two products and show him that they are not equal.

No, Jim is not right.

$$\begin{aligned}
 (11) \times (24) &= (10+1) \cdot (25-1) \\
 &= 10 \times 25 - 10 \cdot 1 + 1 \cdot 25 - 1 \\
 &= 10 \times 25 - 10 + 24 \\
 11 \times 24 &= 10 \times 25 + 14
 \end{aligned}$$

So Jim will be off by 14.

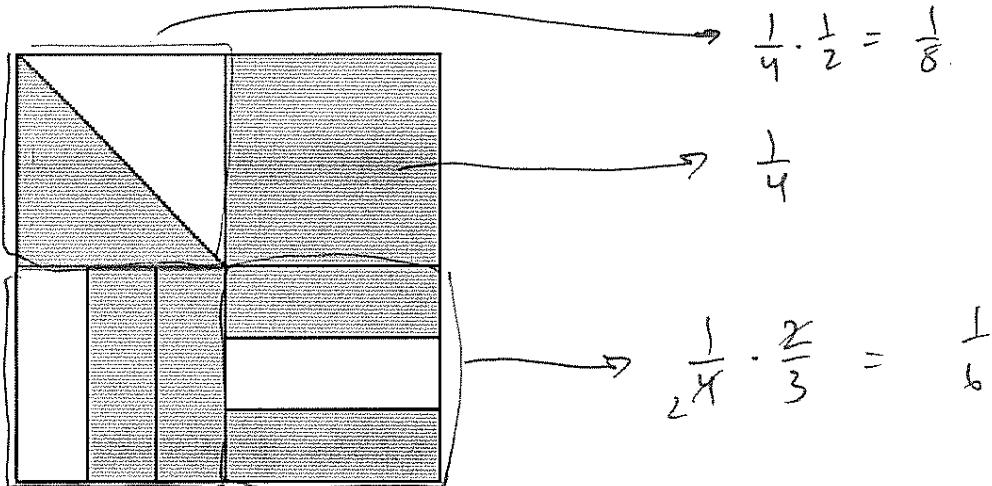
Can also do



not the same.

10:02
9:57
11

9. (5 points) What fraction of the area of the picture below is shaded?



- (a) $\frac{17}{24}$
- (b) $\frac{3}{4}$
- (c) $\frac{2}{3}$
- (d) $\frac{17}{6}$

$$\frac{1}{4} \cdot \frac{2}{3} = \frac{1}{6}$$

$$\frac{1}{6} + \frac{1}{6} + \frac{1}{4} + \frac{1}{8}$$

$$\frac{4}{24} + \frac{4}{24} + \frac{6}{24} + \frac{3}{24} = \frac{17}{24}$$

10. (5 points) Jen says that

$$2\frac{1}{3} \times 4\frac{2}{5} = 2 \times 4 + \frac{1}{3} \times \frac{2}{5}$$

Explain to Jen that while she has made a good attempt, her answer is not correct. Explain how to modify the work that Jen has already done in order to get the correct result—it is not enough just to start from scratch and show her how to do the problem, you must take what she already has and make it mathematically correct. What property of arithmetic is relevant to correcting Jen's work? (It is okay if you don't know the name as long as you show how it is relevant in your explanation.)

Jen's answer is incorrect because she did not use the distributive property:

$$2\frac{1}{3} \times 4\frac{2}{5} = \left(2 + \frac{1}{3}\right) \times \left(4 + \frac{2}{5}\right)$$
$$= 2 \times 4 + 2\left(\frac{2}{5}\right) + \frac{1}{3} \cdot 4 + \frac{1}{3} \times \frac{2}{5}$$

$$= 8 + \frac{4}{5} + \frac{4}{3} + \frac{2}{15}$$

$$= 8 + \frac{12}{15} + \frac{20}{15} + \frac{2}{15}$$

$$= 8 + \frac{34}{15}$$

$$= 8 + 2 + \frac{4}{15}$$

$$= \boxed{10\frac{4}{15}}$$

Jen only had
these parts

11. (5 points) Simplify the expression

$$\frac{(4 \times 10^3) \times (6 \times 10^5)}{12 \times 10^6}$$

as much as possible.

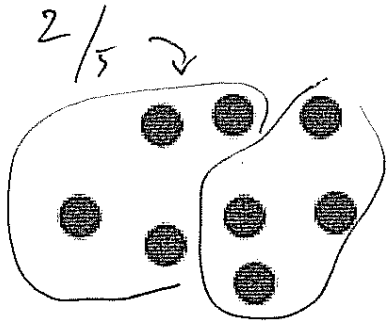
$$= \frac{4 \times 6 \times 10^3 \times 10^5}{12 \times 10^6}$$

$$= \frac{24}{12} \times \frac{10^8}{10^6}$$

$$= 2 \times 10^2$$

$$= \boxed{200}$$

12. (5 points) The picture below shows identical circles drawn on a piece of paper. The rectangle represents an index card that is blocking your view of $\frac{3}{5}$ of the circles on the paper. How many circles are covered by the rectangle?



$$1 - \frac{3}{5} = \frac{2}{5}$$

(a) 4

$$\frac{2}{5} = 8 \text{ balls}$$

(b) 5

$$\Rightarrow \frac{1}{5} = 4 \text{ balls}$$

(c) 8

$$\Rightarrow \frac{3}{5} = 12 \text{ balls}$$

(d) 12

13. (5 points) For each problem below, write the corresponding numerical division problem and solve the problem. Determine the best form (or forms) of the answer: a mixed number, a decimal, a whole number with remainder, or a whole number that is not equal to the solution from the division problem.

(a) You need to buy 57 candies to bribe your students to do well on their standardized tests. At the store, the candy only comes in bags of 15 candies to a bag. How many bags must you buy?

$$\frac{57}{15} = 3 \frac{12}{15}$$

Need to round up and buy 4 bags because you can't buy a fraction of a bag.

(b) Adam has to divide a 30 foot long piece of string equally between his 7 children. How long of a piece of string will each child get?

$$\frac{30}{7} = \boxed{4 \frac{2}{7}} \text{ or } \boxed{4.285\dots}$$

$$\begin{array}{r} 0.285 \\ 7 \overline{) 2.00} \\ \underline{14} \\ 60 \\ \underline{56} \\ 40 \end{array}$$

Can give a fraction of ~~the~~ a foot to use up all the string.

(c) Annie has 14 porcelain chinese hand-waving cat statues that she wants to give to her 4 friends. Her friends will be angry if they find out that any one of them got more statues than anyone else. How many statues should she give to each friend?

$$14 \div 4 = 3 \text{ remainder } 2.$$

She can only give 3 to each friend, and will have two left over, since she cannot break up the statues.

14. (5 points) Steve and Sarah went out to dinner and had a meal that cost \$52.36. With a 4% tax of \$2.09, the total came to \$54.45. They want to leave a tip of approximately 15% of the cost of the meal (before the tax). Describe a way that Steve and Sarah can mentally figure the tip.

They could multiply the tip by 4 to get
 $4 \times \$2.09 = \8.36 . This is 16%, though
 (4% - 4), so they could round down to
 give an \$8 tip, which approximately be 15%.

Or, do

$$\begin{array}{r} 52.36 \rightarrow 100\% \\ 5.24 \rightarrow 10\% \\ \underline{+ 2.62} \rightarrow 5\% \\ 7.86 = 15\% \end{array}$$

$$\begin{array}{r} 10:14 \\ -10:04 \\ \hline 10 \text{ min} \end{array}$$

Extra Credit(2 points) Here is a mental math strategy for computing 26×16 :

Step 1: $100 \times 16 = 1600$

Step 2: $25 \times 16 = 1600 \div 4 = 400$

Step 3: $26 \times 16 = 400 + 16 = 416$

Which property of multiplication best justifies Step 3 in this strategy? You should explain your answer by showing how the property is applied in Step 3. (Even if you don't know the name of the property, you will get full points as long as you show how it is applied in Step 3.)

Step 3 is $26 \times 16 = (25 + 1) \times 16$ } distributive property
 $= 25 \times 16 + 1 \times 16$
 $= 400 + 16$

