

# Quiz 2A, MTH 2010 - No Calculators

Dr. Graham-Squire, Fall 2014

Name: Key

11:21

$\frac{11-26}{5}$

1. (1 point) Can the question below be solved by calculating  $\frac{1}{4} + \frac{1}{7}$ ? Explain why or why not:

$\frac{1}{4}$  of the land in Guilford County is covered with forest.  $\frac{1}{7}$  of the adjacent county (Alamance) is covered with forest. What fraction of the land in the two-county Guilford-Alamance region is covered with forest?

No. The wholes will not be the same, even if the land areas were the same. Since we don't know the land areas, it totally won't work.

2. (1 point) Calculate  $8\frac{1}{5} - 5\frac{1}{3}$ . Write your answer as a mixed number.

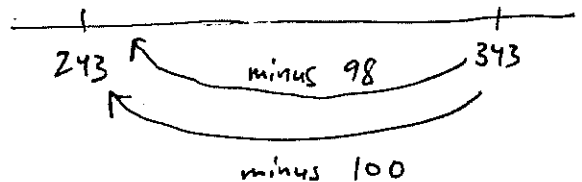
$$\frac{3}{3} \cdot \frac{41}{5} - \frac{16}{3} \cdot \frac{5}{5}$$

$$\frac{123}{15} - \frac{80}{15} = \frac{43}{15} = 2\frac{13}{15}$$

$$\begin{aligned} 8\frac{1}{5} - 5\frac{1}{3} &= (7 + \frac{6}{5}) - (5 + \frac{1}{3}) \\ &= (7-5) + (\frac{6}{5} - \frac{1}{3}) \\ &= 2 + \frac{18}{15} - \frac{5}{15} \\ &= 2\frac{13}{15} \end{aligned}$$

3. (2 points) Bob and Janice want to calculate  $343-98$  by first calculating  $343-100=243$ . Bob says that they must now *subtract* 2 from 243, but Janice says that they must *add* 2 to 243. Who is right? Use either a diagram, number line, or mathematical notation to help explain who is right and why.

$$\begin{aligned} 343 - 98 \\ = 343 - (100 - 2) \\ = 343 - 100 + 2 \quad \text{or} \\ = 243 + 2 \Rightarrow \text{Janice is right.} \\ = 245 \end{aligned}$$



So  $343-98$  is a bigger #, must add 2.

4. (3 points) In January 2014, the national debt was about 17 trillion dollars and the US population was about 300 million people. Someone reading these figures estimated that the national debt was about \$6,000 per person. Which of these statements best describes the reasonableness of this estimate? Show your work!

(a) It is too low by a factor of 10

(b) It is too low by a factor of 100

(c) It is too high by a factor of 10

(d) It is too high by a factor of 100

$$\frac{17,000,000,000,000^{0.5}}{300,000,000^{0.5}} = \frac{170,000}{3} \approx \frac{180,000}{3} = 60,000^{0.5}$$

✓ So 6,000 is too low by a factor of ten.

5. (2 points) A bag contains 11 marbles, each a different color. Suppose you reach into the bag and pick out a pair of marbles (and then put the marbles back in the bag). How many different pairs of marbles can you get this way? Note that getting the blue marble and the green marble is the same as getting the green marble and the blue marble (that is, order does not matter).

$$\checkmark \quad \begin{array}{c} \text{1st marble} \\ \hline 11 \end{array} \cdot \begin{array}{c} \text{2nd marble} \\ \hline 10 \end{array} = 110 \quad \text{different combos,} \quad 0.5$$

but since order doesn't matter, do  $\frac{110}{2} = \boxed{55}$  0.5

6. (1 point) Describe a way of doing the multiplication  $6 \times 98$  that makes it easier to do mentally (cannot use the standard multiplication algorithm).

$$\begin{aligned} 6 \times 98 &= 6 \times (100 - 2) \\ &= 6 \times 100 - 6 \times 2 \\ &= 600 - 12 \\ &= \boxed{588} \end{aligned}$$

→ think of  $98 = 100 - 2$

# Quiz 2B, MTH 2010 - No Calculators

Dr. Graham-Squire, Fall 2014

Name: Key

1. (3 points) In January 2014, the national debt was about 16 trillion dollars and the US population was about 300 million people. Someone reading these figures estimated that the national debt was about \$500,000 per person. Which of these statements best describes the reasonableness of this estimate? Show your work!

(a) It is too low by a factor of 10

(b) It is too low by a factor of 100

(c) It is too high by a factor of 10

(d) It is too high by a factor of 100

$$\frac{16,000,000,000,000}{300,000,000}$$

$$\frac{160,000}{3} \approx 50,000 \text{ per person}$$

so 500,000 is too big.

2. (1 point) Describe a way of doing the multiplication  $12 \times 25$  that makes it easier to do mentally (cannot use the standard multiplication algorithm).

$$\begin{aligned} 12 \times 25 \\ &= (3 \times 4) \times 25 \\ &= 3 \times (4 \times 25) \\ &= 3 \times 100 = \boxed{300} \end{aligned}$$

3. (1 point) Calculate  $7\frac{1}{4} - 2\frac{1}{3}$ . Write your answer as a mixed number.

$$= \frac{3}{3} \cdot \frac{29}{4} - \frac{7}{3} \cdot \frac{4}{4}$$

$$= \frac{87}{12} - \frac{28}{12} = \frac{59}{12} = \boxed{4\frac{11}{12}}$$

$$\begin{aligned} \text{or } 7\frac{1}{4} - 2\frac{1}{3} \\ &= 6 + \frac{5}{4} - 2 - \frac{1}{3} \\ &= 4 - 2 + \frac{5}{4} - \frac{1}{3} \\ &= 2 + \frac{15}{12} - \frac{4}{12} \\ &= 2 + \frac{11}{12} = 4\frac{11}{12} \end{aligned}$$

4. (2 points) A bag contains 10 marbles, each a different color. Suppose you reach into the bag and pick out a pair of marbles (and then put the marbles back in the bag). How many different pairs of marbles can you get this way? Note that getting the blue marble and the green marble is the same as getting the green marble and the blue marble (that is, order does not matter).

$$\begin{array}{l} \underbrace{\hspace{2cm}}_{\text{color \#1}} \quad \underbrace{\hspace{2cm}}_{\text{color \#2}} \\ 10 \quad \quad \quad 9 \quad \quad \quad \text{(b/c one marble is gone)} \\ \text{possibilities} \quad \text{possibilities} \\ = 10 \cdot 9 = 90. \quad \text{But, blue/green is same} \\ \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \text{as green/blue, so must} \\ \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \text{divide by 2.} \\ 90 / 2 = \boxed{45} \end{array}$$

5. (2 points) Bob and Janice want to calculate  $472 - 98$  by first calculating  $472 - 100 = 372$ . Bob says that they must now subtract 2 from 372, but Janice says that they must add 2 to 372. Who is right? Use either a diagram, number line, or mathematical notation to help explain who is right and why.

$$\begin{aligned} & 472 - 98 \\ = & 472 - (100 - 2) \\ = & 472 - 100 + 2 \\ = & 372 + 2 \quad \leftarrow \text{Janice is right} \\ = & 374 \end{aligned}$$

6. (1 point) Can the question below be solved by calculating  $\frac{1}{5} + \frac{1}{3}$ ? Explain why or why not:

$\frac{1}{5}$  of the land in Guilford County is covered with forest.  $\frac{1}{3}$  of the adjacent county (Alamance) is covered with forest. What fraction of the land in the two-county Guilford-Alamance region is covered with forest?

No. For 2 reasons. First, you don't know that the two counties are the same size, so the fractions may not be equal parts. 2nd, the wholes are different.  $\frac{1}{5}$  is of one county, and the question wants the fraction of both counties together.