Quiz 3A, MTH 2010 - No Calculators

Dr. Graham-Squire, Spring 2017

Name: Key

5 min → 20 min

1. (3 points) Here is a student's work on several multiplication problems:

$$\begin{array}{r} 12 \\ \times\ 38 \\ \hline 816 \\ 360 \\ \hline 1176 \end{array} \qquad \begin{array}{r} 76 \\ \times\ \ 8 \\ \hline 5648 \end{array} \qquad \begin{array}{r} 41 \\ \times\ 22 \\ \hline 82 \\ 820 \\ \hline 902 \end{array}$$

doesn't understand carrying

For which of the following problems is this student most likely to get the correct solution, even though he is using an incorrect algorithm? Explain your reasoning!

(A) 235×17 → then add have carrying!

(B) 64×46

(C) 24×12 → has no carrying!

(D) 9×13

2. (2 points) Show how to easily solve each of the following problems mentally. You can calculate them directly (i.e. using a standard method) to check your work, but if you *only* do a direct calculation you will not receive full points.

(a) 55% of 740 → 50% of 740 = 370
+ 5% of 740 = 37
55% " " = 407

(b) 16×125

$= 4 \times 4 \times 5 \times 25$

$= (4 \times 5) \times (4 \times 25)$

$= 20 \times 100$

$= 2000$

3. (2 points) There are 100 blocks in a bag, each of them a different color. If you pick 2 blocks out of the bag, how many different color combinations could you get? Explain your reasoning and/or show your work! Note that getting the blocks (red, black) is the same as getting the blocks (black, red).

$100 \cdot 99 = 9900$, but there are duplicates (red, black) = (black, red)

$\Rightarrow$ divide by 2

$\frac{100 \cdot 99}{2} = 50 \cdot 99$

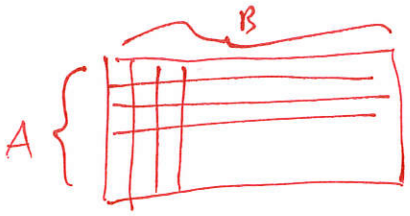
$= 4950$

99 × 50 = 00 + 4500 + 4500 = 4950

100 choices for 1st block

99 choices for 2nd block b/c 1st is gone

4. (3 points) Use a rectangular array to explain why $A \times B = B \times A$ for all numbers A and B (the commutative property). You can use an example to help your explanation, but your answer should generalize to *any* numbers and use the definition of multiplication.



The array can be viewed as A (groups) rows of B things each

$\Rightarrow A \times B$ things total

or B (groups) columns of A things each

$\Rightarrow B \times A$ things total

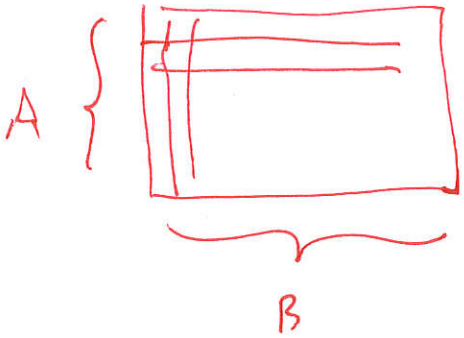
So $A \times B = B \times A$ because both are the same array.

Quiz 3B, MTH 2010 - No Calculators

Dr. Graham-Squire, Spring 2017

Name: Key

1. (3 points) Use an array to explain why $A \times B = B \times A$ for all numbers A and B (the commutative property). You can use an example to help your explanation, but your answer should generalize to *any* numbers and use the definition of multiplication.



The array has A rows and B columns. This can be thought of as A groups (rows) of B squares, which is A × B, or as B columns (groups) of A squares, which is B×A. Thus both A×B and B×A count how many squares are in the array, so must be equal.

2. (2 points) There are 200 blocks in a bag, each of them a different color. If you pick 2 blocks out of the bag, how many different color combinations could you get? Explain your reasoning and/or show your work! Note that getting the blocks (red, black) is the same as getting the blocks (black, red).

Total # of possibilities is $200 \cdot 199$ (↑ first block, ↑ 2nd block).

But, must divide by 2 to cancel repeats $(R,B) = (B,R)$

$$\Rightarrow \frac{200 \cdot 199}{2} = \frac{200}{2} \cdot 199 = 100 \cdot 199$$

$$= \boxed{19900}$$

3. (2 points) Show how to easily solve each of the following problems mentally. You can calculate them directly (i.e. using a standard method) to check your work, but if you *only* do a direct calculation you will not receive full points.

(a) 24×75 → $(6\times4)\times(25)\times3 = (6\times3)\times(4\times25)$
$= 18 \times 100 = 1800$

(b) 55% of 380

100% → 380
50% → 190
+ 5% → 19
55% = 209

4. (3 points) Here is a student's work on several multiplication problems:

Student does NOT know how to carry!

$$\begin{array}{r} 12 \\ \times\ 38 \\ \hline 816 \\ 360 \\ \hline 1176 \end{array} \qquad \begin{array}{r} 76 \\ \times\ 8 \\ \hline 5648 \end{array} \qquad \begin{array}{r} 41 \\ \times\ 22 \\ \hline 82 \\ 820 \\ \hline 902 \end{array}$$

76 × 8 = 48, 56, 608

For which of the following problems is this student most likely to get the correct solution, even though he is using an incorrect algorithm? Explain your reasoning!

(A) 21×13 → This involves no carrying!

(B) 35×148

(C) 24×7

(D) 54×45