

NAME KEY

EXAM 2 – Part 1 – Wednesday, Mar. 2, 2005.  
Math 320: Math for Elementary School Teachers

20-MINUTES MENTAL DRILL

INSTRUCTIONS: ONLY WRITE THE FINAL ANSWER, NO SCRATCH PAPER, NO SCRIBBLING ON THIS SHEET, NO CALCULATORS, USE INK PEN ONLY. EXERCISE THE COMPUTATIONAL TRICKS (THINKING STRATEGIES) WE HAVE BEEN LEARNING. EACH QUESTION IS WORTH 2 POINTS.

1.  $16 \times 18 =$

2. Overestimate  $2523 - 437$

3. Average 6154, 6142, 6153, 6151 =

4.  $51^2 =$

5.  $38 \times 42 =$

6. If  $3x + 1 + 4x = 15$ ,  $x =$

7.  $25 \times 99 =$

8.  $64 \times 32 =$

9.  $132 \div 12 =$

10. The tip on 36.20\$ =

NAME KEY

**EXAM 2 – Part 2 – Wednesday, Mar. 2, 2005.**  
**Math 320: Math for Elementary School Teachers**

**PART 2: 30-MINUTES TEST**

INSTRUCTIONS: USE SCRATCH PAPER, WRITE COMPLETE AND FINAL ANSWERS USING INK PEN, NO SCRIBBLING, NO CALCULATORS. PARTIAL CREDIT WILL BE GIVEN IF DESERVED, SO JUSTIFY AND SHOW ALL YOUR WORK.

1. (5pts) Fill in the blanks:

(a) In the division  $44 \div 11 = 4$ , the number 44 is called the DIVIDEND  
and the number 11 is called the DIVISOR.

(b) After estimating the quotient and calculating the remainder in long division, it is necessary to check  $0 \leq \text{remainder} < \text{DIVISOR}$ .

(c) Jane put 14 dolls equally into 4 dollhouses. There were then 3  
dolls in each dollhouse, a total of 12 dolls distributed  
into the dollhouses, and 2 left over.

(d) The most complicated case in learning the subtraction algorithm is  
REGROUPING ACROSS A ZERO.

(e) The multiplication algorithm hinges on the following arithmetic property:  
DISTRIBUTIVE PROPERTY

2. (5pts) Find  $4370 \div 47$  by long division. Show your estimates at each step.

$$\begin{array}{r} 92 \text{ R}46 \\ 47 \overline{)4370} \\ - 423 \\ \hline 140 \\ - 94 \\ \hline 46 \end{array}$$

ESTIMATES: \*  $437 \div 47 \approx 450 \div 50 = 9$

$$\begin{aligned} 9 \times 47 &= 9 \times 50 - 27 = \\ &= 450 - 27 = 423. \end{aligned}$$

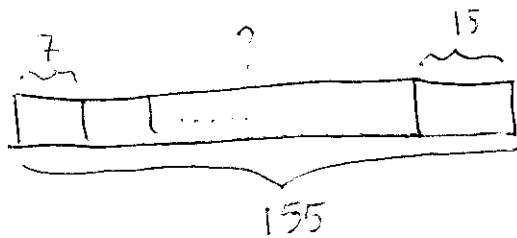
\*  $140 \div 47 \approx 150 \div 50 = 3$ .

$$\begin{aligned} 3 \times 47 &= 3 \times 50 - 9 = \\ &= 150 - 9 = \underline{\underline{141}} \\ &\quad \text{Too BIG!} \end{aligned}$$

$$\Rightarrow 2 \times 47 = 94.$$

3. (5pts) Give a full "teacher's solution" for the following word problem. Draw a bar diagram and also show the algebra.

"Harry bought 155 oranges for 35\$. He found that 15 of them were rotten. He sold all the remaining oranges at 7 for 2\$. How much money did he make?"



$P = \text{MONEY MADE IN \$}$

$X = \text{NUMBER OF BAGS SOLD}$

$$P = 2X - 35$$

FROM DIAGRAM:  $7x + 15 = 155$

$$\Rightarrow 7x = 155 - 15 = 140$$

$$\Rightarrow x = 140 \div 7 = 20$$

$$\text{So } P = 2 \times (20) - 35 = 40 - 35 = 5$$

HARRY MADE 5 \$

4. (5pts) Simplify as much as possible. Write out every step neatly.

$$\frac{2^5 \cdot 6^2 \cdot 18^2}{3^4 \cdot 4^2} =$$

$$= \frac{2^5 \cdot 2^2 \cdot 3^2 \cdot (2 \cdot 3^2)^2}{3^4 \cdot (2^2)^2} = \frac{2^5 \cdot 2^2 \cdot 3^2 \cdot 2^2 \cdot 3^4}{3^4 \cdot 2^4}$$

$$= \frac{2^9 \cdot 3^6}{2^4 \cdot 3^4} = 2^{9-4} \cdot 3^{6-4} = \boxed{2^5 \cdot 3^2}$$

$$\parallel$$
$$9 \times 32$$

$\parallel$

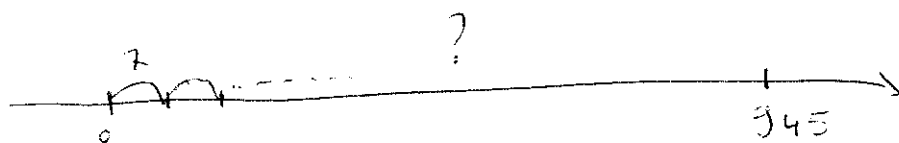
$$320 - 32$$

$\parallel$

$$\boxed{288}$$

5. (5pts) Explain with the measurement approach how the division algorithm works for  $945 \div 7$ .

HOW MANY SEGMENTS OF LENGTH 7 GO INTO A BAR OF LENGTH 945?



100 SEGMENTS GET YOU TO 700 AND  $945 - 700 = 245$  IS LEFT TO GO

30 SEGMENTS GET YOU TO 210 AND  $245 - 210 = 35$  IS LEFT TO GO.

5 SEGMENTS GET YOU TO 35 EVENTUALLY

$$\begin{array}{r}
 135 \\
 7 \overline{) 945} \\
 \underline{700} \quad \leftarrow 100 \text{ SEGMENTS} \\
 245 \\
 \underline{210} \quad \leftarrow 30 \text{ SEGMENTS} \\
 35 \\
 \underline{35} \quad \leftarrow 5 \text{ SEGMENTS} \\
 0
 \end{array}$$

6. (5 pts) Compute the expression below without using the algorithms, but using the arithmetic properties to your advantage. Write all the steps you have taken and show the strategies you have used.

$$\begin{aligned}
 & [2^3 \times 7 + (3^2 \times 2^3 - 2 \times 5^2 + 2^9 \div 2^2) \div 15 - 2] \div 2^6 = \\
 & = [2^3 \times 7 + (3^2 \times 2^3 - 2 \times 5^2 + 2^7) \div 15 - 2] \div 2^6 \\
 & = [2^3 \times 7 + 2 \times (3^2 \times 2^2 - 5^2 + 2^6) \div 15 - 2] \div 2^6 \\
 & = 2 \times [2^2 \times 7 + (9 \times 4 - 25 + 64) \div 15 - 1] \div 2^6 \\
 & = [2^2 \times 7 + (11 + 64) \div 15 - 1] \div 2^5 \\
 & = [2^2 \times 7 + 75 \div 15 - 1] \div 2^5 \\
 & = [2^2 \times 7 + 5 - 1] \div 2^5 \\
 & = [2^2 \times 7 + 4] \div 2^5 \\
 & = [2^2 \times 7 + 2^2] \div 2^5 \\
 & = 2^2 [7 + 1] \div 2^5 \\
 & = 2^2 \times 8 \div 2^5 \\
 & = 2^2 \times 2^3 \div 2^5 \\
 & = 2^5 \div 2^5 = \boxed{1}
 \end{aligned}$$