NAME KEY

EXAM 1 – Part 1 – Monday, Feb. 7, 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. $833 - 381 =$ 452

2. $89 + 113 =$ 202

3. Average $154, 152, 153, 149 =$ 152

4. $(11)_{10} = (1011)_2$

5. $(1111)_2 = (\ 15\ )_{10}$

6. $(2B)_{16} = (43)_{10}$

7. $1340 \div 5 =$ 268

8. $25 \times 88 =$ 2200

9. $150 \div 6 =$ 25

10. The tip on 24\$ = 3\$ 60¢

NAME KEY

EXAM 1 – Part 2 – Monday, Feb. 7, 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) TAKE-AWAY, PART-WHOLE, and COMPARISON, are the three interpretations of subtraction, and they can be illustrated using SET models or MEASUREMENT models

(b) "How many segments of a fixed size are there in another larger segment?" This question illustrates the MEASUREMENT interpretation of division.

(c) The commutative and ASSOCIATIVE properties of addition together imply the ANY-ORDER property.

(d) Operations inside parenthesis are done FIRST.

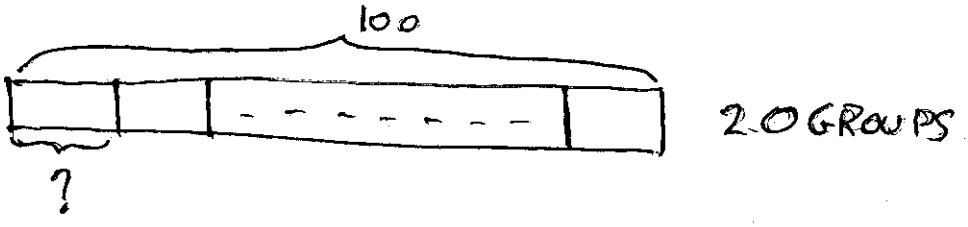
(e) *Division* is defined by THE MISSING FACTOR IN MULTIPLICATION, as in the following example:

$24 \div 3$ IS THE MISSING FACTOR IN $3 \times \underline{?} = 24$

2. **(5pts)** Write a word problem for $100 \div 20$ division using the partitive interpretation and illustrate your problem by using an appropriate diagram.

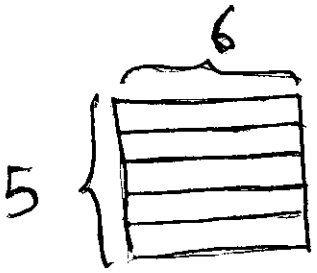
Q: 20 FRIENDS SHARE THE COST OF RENTING A SOCCER FIELD, EQUALLY. IF THE TOTAL COST OF RENTING THE FIELD IS 100 $, HOW MUCH DID EACH ONE HAVE TO PAY ?

A: $100 \div 20 = 5$, EACH ONE PAYS 5 $



3. (5pts) Give a full "teacher's solution" for the following word problems:

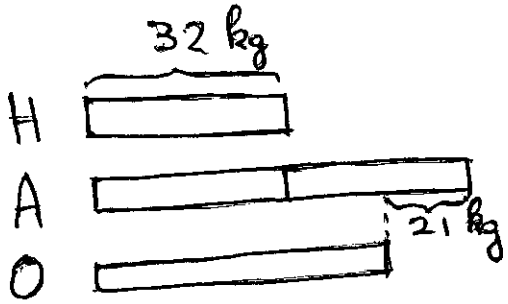
(a) 5 children shared the cost of a present equally. Each of them paid $ 6. What was the cost of the present?



1 UNIT = 6 $

5 UNITS = 6×5 = 30 $

(b) Heather weighs 32 kg. Alexi is twice as heavy as Heather. Olga weighs 21 kg less than Alexi. What is Olga's weight?



ALEXI WEIGHS 2×32 = 64 kg

⇒ OLGA WEIGHS 64 − 21 = 43 kg

4. (5pts) State the Quotient-Remainder Theorem and explain it using a set model.

FOR ANY TWO WHOLE NUMBERS a AND b, WITH $b \neq 0$, THERE ARE UNIQUE WHOLE NUMBERS q (THE QUOTIENT) AND r (THE REMAINDER) SUCH THAT:

1) $a = b \times q + r$

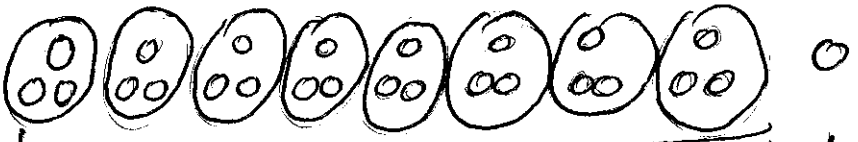
2) $0 \leq r < b$

FOR INSTANCE, $25 \div 3 = 8$ R1

OR $25 = 3 \times 8 + 1$

8 ↑ QUOTIENT, 1 ↑ REMAINDER

GROUP 25 APPLES IN BAGS OF 3

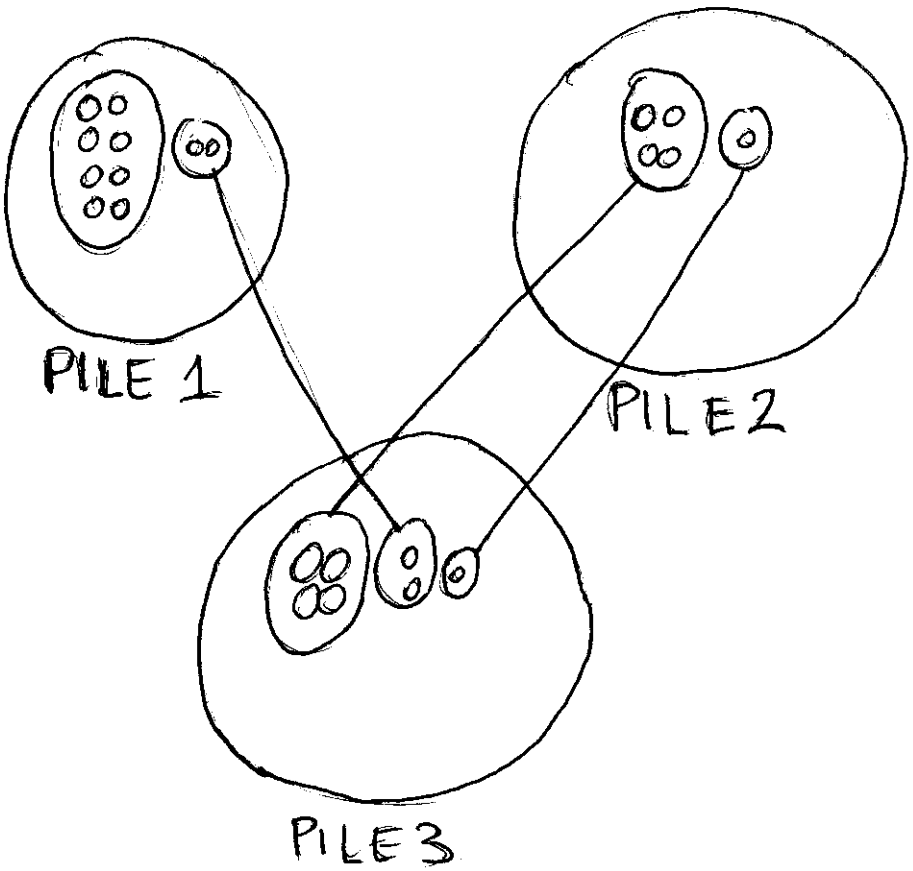


$24 = 3 \times 8$ + 1

CAN MAKE 8 BAGS, BUT ONE APPLE IS LEFTOVER

5. (5pts) Pile 1 has 10 pennies, Pile 2 has 5 pennies, Pile 3 has 7 pennies. In the "pennies game" the first player should remove 8 pennies from Pile 1

Justify your answer and show your work below. Draw a picture.



6. (5 pts) Compute the expression below without using the algorithms, but using the mental math strategies we have learned instead. Write all the steps you have taken and show the strategies you have used.

$$[(654 \div 109) \times 43 \times (652 \div 326)] \div 12 - (34 \times 5 - 127) =$$

$6 \times 109 = 6 \times (100 + 9) = 600 + 54 = 654$

$2 \times 326 = 2 \times (300 + 26) = 600 + 52 = 652$

$6 \times 43 \times 2 = 43 \times 12$ (COMMUTATIVITY)

$(43 \times 12) \div 12 = 43$

$34 \times 5 = 340 \div 2 = 150 + 20 = 170$

$170 - 127 = 70 - 27 = 50 - 7 = 43$

$43 - 43 = 0$

THE ANSWER IS $\boxed{0}$