

Exam 1
T101 Fall 2003

Name ANSWER KEY
PID _____

1. (2 pts) Write the number "Two thousand three hundred fifty two" in Egyptian.



2. (2 + 2 = 4 pts) The commutative property and associative property are special cases of the Any-order property of addition.
3. (5 pts) Define *algorithm*.

An algorithm is a systematic step-by-step procedure to solve a class of problems.

4. (2 + 2 = 4 pts) In the subtraction problem, $17 - 8 = 9$, the number 17 is called the minuend and the number 9 is called the difference.
5. (4 pts) (Circle all that apply.) The long division algorithm is a prerequisite for learning:

Successive Approximation

Measurement Division

Number bonds

Distributive Property

Mental Math

Converting fractions to decimals

6. (5 pts) Fill in the blank:

(a) The most useful model for teaching the commutative property is the rectangular array model.

(b) The most important arithmetic property learned in teaching the multiplication algorithm is the distributive property.

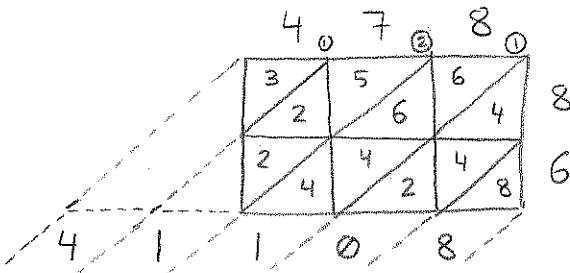
(c) After estimating the quotient and calculating the remainder in long division,

it is necessary to check that $0 \leq \text{remainder} < \text{quotient}$.

(d) When $176 \div 8$ is presented as finding the number of segments of size 8 that fit in a segment of size 176, one is using the measurement interpretation of division.

(e) The most complicated case in learning the subtraction algorithm is "regrouping across a zero".

7. (6 pts) Compute 478×86 using the Lattice method.



8. (12 pts) Use mental math to compute the following. Write down your answer in a way that clearly shows the steps involved in solving the problem mentally.

a. $38 + 39 + 1162$

$$= 39 + (38 + 1162) \quad (\text{Rearranging})$$

$$= 39 + 1200 \quad (\text{compatible numbers})$$

$$= 1239 \quad (\text{Place Value})$$

b. 127×4

$$= (125 + 2) \times 4$$

$$= (125 \times 4) + (2 \times 4) \quad (\text{Distributive Property})$$

$$= (250 \times 2) + (2 \times 4) \quad (\text{"x4" is "double twice"})$$

$$= 500 + 8 = 508 \quad (\text{Place Value})$$

c. 25×99

$$= 25 \times (100 - 1) \quad (\text{Split numbers})$$

$$= (25 \times 100) - (25 \times 1) \quad (\text{Distributive Prop.})$$

$$= 2500 - 25 \quad (\text{Place Value})$$

$$= 2475 \quad (\text{Place Value})$$

d. $132 \div 12$

$$= (120 + 12) \div 12 \quad (\text{Split numbers})$$

$$= (120 \div 12) + (12 \div 12) \quad (\text{Distributive Prop.})$$

$$= 10 + 1 = 11 \quad (\text{Place Value})$$

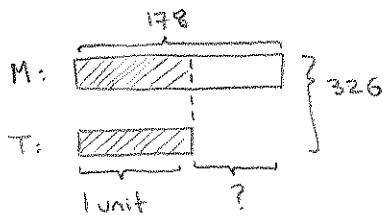
9. (3 + 3 = 6 pts) Find estimations for the following using the technique specified.

(a) Simple Estimation: $6246 \div 74 \approx 6400 \div 80 = 80$
(round up) (round up)

(b) Over Estimate: $2523 - 437 < 2537 - 437 = 2100$
(round up)

10. ($7+7+7=21$ pts) For the following word problems, give a full teacher's solution which *does not use algebra*.

- (a) A shop sold 178 cakes on Monday. It sold 326 cakes total for Monday and Tuesday. How many more cakes did it sell on Monday than on Tuesday?



$$(1 \text{ unit}) + 178 = 326$$

$$1 \text{ unit} = 148$$

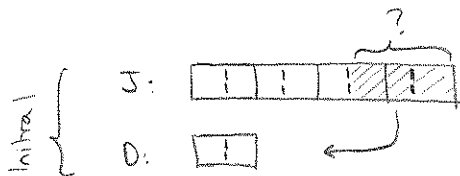
$$\text{Difference} = 178 - (1 \text{ unit})$$

$$= 178 - 148$$

$$= 30$$

It sold 30 more cakes on Monday than on Tuesday.

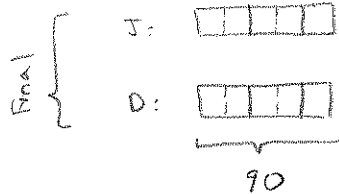
- (b) Jill has four times as many stamps as David. How many stamps must Jill give to David so that they each have 90 stamps?



$$5 \text{ units} = 90$$

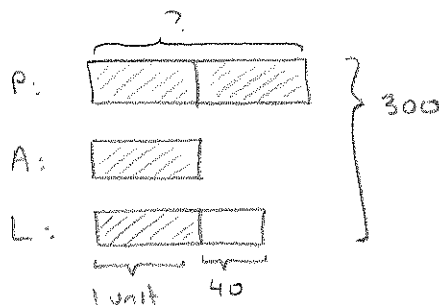
$$1 \text{ unit} = 90 \div 5 (= 180 \div 10) = 18$$

$$3 \text{ units} = 3 \times 18 = 54$$



Jill must give 54 stamps to David.

- (c) Peter has twice as many stickers as Ali. Ali has 40 less stickers than Lihua. They have 300 stickers altogether. How many stickers does Peter have?



$$(4 \text{ units}) + 40 = 300$$

$$4 \text{ units} = 260$$

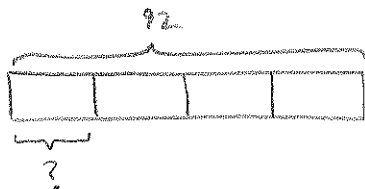
$$1 \text{ unit} = 65$$

$$2 \text{ units} = 2 \times 65 = 130$$

Peter has 130 stickers

11. (4 + 2 + 4 = 10 pts) Write a word problem using partitive division for $92 \div 4$ by following these steps:

- (a) Draw the Singapore bar diagram which corresponds to partitive division for $92 \div 4$ and use mental math to solve the problem.



$$\begin{aligned}
 92 \div 4 &= (100 - 8) \div 4 \\
 &= (100 \div 4) - (8 \div 4) \\
 &= 25 - 2 \\
 &= 23
 \end{aligned}$$

- (b) Write the interpretive question which corresponds to partitive division for $92 \div 4$.

"92 is 4 groups of what unit?"

- (c) Make up an interesting, short, realistic, one-step word problem using the partitive interpretation which corresponds to $92 \div 4$.

A teacher divides 92 coins equally among 4 kids.

How many coins does each kid get?

12. (6 pts) Explain why $0 \div 0$ is undefined.

Solving $0 \div 0 = ?$ is the same as solving $0 = 0x$?

Since any number multiplied by zero is zero, the division expression does not have a unique answer, so is undefined.

13. (7 pts) Find $4370 \div 47$ by long division. Show your estimates and use of place value to obtain the quotient of each step.

$$\begin{array}{r}
 92 \\
 47 \overline{) 4370} \\
 \underline{376} \\
 610 \\
 \underline{47} \\
 140 \\
 \underline{94} \\
 46
 \end{array}$$

Correction Step {

$$437 \div 47 < 400 \div 50 = 8$$

(v) (↑)

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

(↑) (↑)

$$\begin{array}{r}
 (5) \\
 47 \\
 \times 8 \\
 \hline
 376
 \end{array}$$

$$\begin{array}{r}
 (2) \\
 47 \\
 \times 3 \\
 \hline
 141 > 140
 \end{array}$$

so use "2"

$$\begin{array}{r}
 (1) \\
 47 \\
 \times 2 \\
 \hline
 94
 \end{array}$$

$$4370 = (82 \times 47) + 46$$

14. (4+2+2 = 8 pts) (a) Explain the place value process in detail. (b) Using 2-digit numbers, give an example of an addition problem which does not use Step (ii). (c) Using 2-digit numbers, give an example of an addition which does use Step (ii).

a) The Place Value Process:

1) Form bundles of 1, 10, 100, etc.

2) If necessary, rebundle to ensure that there are at most 9 bundles of each denomination.

3) Count the number of bundles in each denomination and record it in the appropriate position.

b)

$$\begin{array}{r}
 13 \\
 + 12 \\
 \hline
 25
 \end{array}$$

c)

$$\begin{array}{r}
 (1) \\
 13 \\
 + 18 \\
 \hline
 31
 \end{array}$$