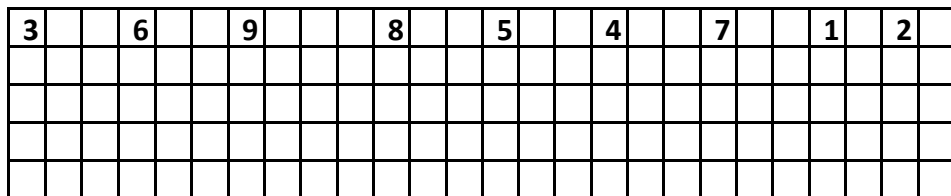
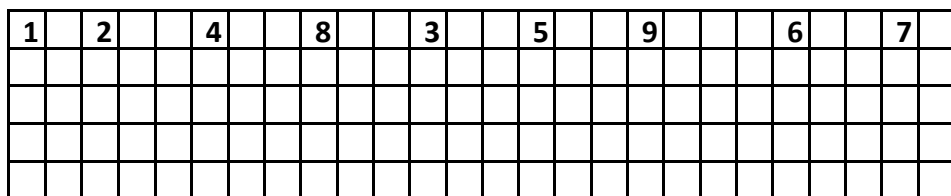
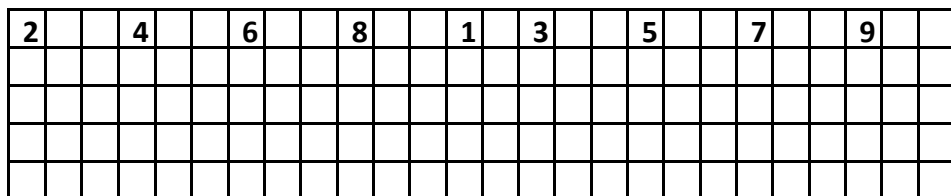
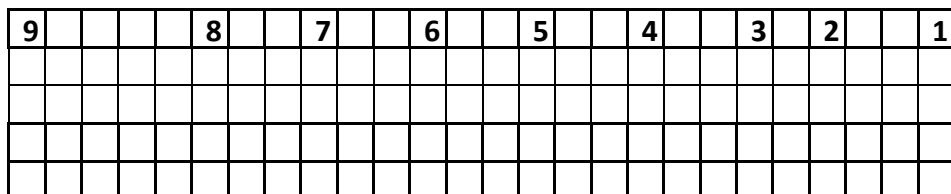
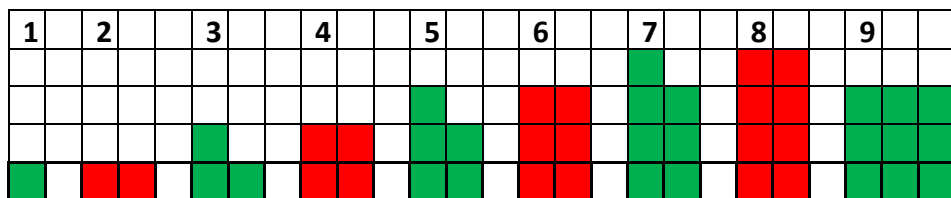


## Count & Color Squares, **Odd & Even**



# Migrant Math 01

## From Sticks to Icons

IIII → 4 → 4 → FOUR

Many sticks can be arranged in a row of for example four ones.

Four ones can be rearranged to 1 icon with four sticks.

Written sloppy, the icon becomes a digit.

Icons are created for all numbers until ten.

Ten, eleven, twelve etc. has no icon because we count in tens.

Ten is counted as 1 bundle and no unbundles, ten = 10

Eleven is counted as 1 bundle and 1 unbundled, eleven = 11

Twelve is counted as 1 bundle and 2 unbundled, twelve = 12

In Danish, eleven and twelve means one left and two left, understood that a bundle has already been counted.

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# Migrant Math 03

## CupCount in Icons

$$T = 9 = \text{IIIIIIII} = \text{IIII IIII I} = 2]1 \text{ 4s} = 2.1 \text{ 4s}$$

A total T is counted in icon-bundles that are stacked.

A total of nine sticks can be counted in fours by a counting sequence.

Also, we can place one stick per bundle in a bundle cup that can be written as a bracket (cup-writing) and reported as a decimal-number with a unit where the decimal point separates the bundles from the unbundled singles,

$$T = 9 = 2]1 \text{ 4s} = 2.1 \text{ 4s}.$$

A calculator can predict the counting result.

With '9/4' we ask 'from 9, taking away 4s how many times?'

The answer is '2.some'

With '9 - 2x4' we ask 'from 9, taking away 2 4s leaves what?'

The answer '1' gives the calculator prediction  $T = 9 = 2.1 \text{ 4s}$ .

Moving 1 stick outside the bundle cup gives an overload,  $T = 1]5 \text{ 4s}$ .

Moving 1 stick inside gives an underload, a deficit,  $T = 3]-3 \text{ 4s}$ .

Thus a total T of nine can be recounted in 4 different ways:

$$T = \text{nine} = 9 \text{ 1s} = 2]1 \text{ 4s} = 1]5 \text{ 4s} = 3]-3 \text{ 4s}.$$

This is handy when totals are added, subtracted, multiplied or divided.

A good calculator says  $2+3*4 = 14$ ; a bad calculator says  $2+3*4 = 20$ .

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


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Job		Do	Calculator
<b>7</b> in <b>4s</b>	Line Count Bundle Cup Stack Answer		7 7
<b>6</b> in <b>5s</b>	Line Count Bundle Cup Stack Answer		6 6
<b>5</b> in <b>4s</b>	Line Count Bundle Cup Stack Answer		5 5
<b>4</b> in <b>5s</b>	Line Count Bundle Cup Stack Answer		4 4
<b>3</b> in <b>5s</b>	Line Count Bundle Cup Stack Answer		3 3

### 03. CupCount in Icons

Job		Do	Calculator
<b>9 in 5s</b>	Line	T =	
	Count	1, 2, 3, 4, B, 1B1, 1B2, 1B3, <b>1B4</b>	9/5      1.some
	Bundle	T =	9 - 1*5      4
	Stack		9 - 0*5      9
	Cup	T = 1]4 5s = 0]9 5s = 2]-1 5s	9 - 2*5      -1
	Answer	<u>T = 9 = 1.4 5s</u>	
<b>9 in 4s</b>	Line	T =	
	Count	1, 2, 3, B, 1B1, 1B2, 1B3, 2B, <b>2B1</b>	9/4      2.some
	Bundle	T =	9 - 2*4      1
	Cup	T = 2]1 4s = 1]5 4s = 3]-3 4s	9 - 1*4      5
	Stack		9 - 3*4      -3
	Answer	<u>T = 9 = 2.1 4s</u>	
<b>9 in 3s</b>	Line		
	Count		
	Bundle		9/
	Cup		9 -
	Stack		
	Answer		
<b>8 in 4s</b>	Line		
	Count		
	Bundle		8
	Cup		8
	Stack		
	Answer		
<b>8 in 3s</b>	Line		
	Count		
	Bundle		8
	Cup		8
	Stack		
	Answer		

Job		Do	Calculator
     	Line Count Bundle Cup Stack Answer		
	Line Count Bundle Cup Stack Answer		
	Line Count Bundle Cup Stack Answer		
	Line Count Bundle Cup Stack Answer		
	Line Count Bundle Cup Stack Answer		

# Migrant Math 04

## CupCount with Dices



A total T can be recounted in icon-bundles.

The total is shown by two like dices.

The bundle-number is on a third dice where 1 counts as 7.

Calculator prediction:

$9/4$	2.some
$9 - 2*4$	1

Answer:  $T = 9 = 2.1 \text{ } 4s$

















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## 04. CupCount with Dices

Job		Do	Calculator
   9 i 4s	Line Count Bundle Cup Stack Answer	$T =                  $ 1, 2, 3, B, 1B1, 1B2, 1B3, 2B, <u>2B1</u> $T =                  $ $T = 2]1 \ 4s = 1]5 \ 4s = 3]-3 \ 4s$  $T = 9 = 2.1 \ 4s$	$9/4$ 2.some $9 - 2*4$ 1 $9 - 1*4$ 5 $9 - 3*4$ -3
  	Line Count Bundle Cup Stack Answer		$9/$ $9 -$
  	Line Count Bundle Cup Stack Answer		9 9
  	Line Count Bundle Cup Stack Answer		7 7
  	Line Count Bundle Cup Stack Answer		7 7

Job		Do	Cup	Answer
4.3 6s in 6s	Line UnBundle Borrow			
4.3 5s in 5s	Line UnBundle Borrow			
4.3 4s in 4s	Line UnBundle Borrow			
5 7s in 7s	Line UnBundle Borrow			
5 6s in 6s	Line UnBundle Borrow			
5 4s in 4s	Line UnBundle Borrow			
3 7s in 7s	Line UnBundle Borrow			
3 5s in 5s	Line UnBundle Borrow			
1.3 6s in 6s	Line UnBundle Borrow			
1.3 5s in 5s	Line UnBundle Borrow			

# Migrant Math 05

## ReCount in the same Unit

$$T = 2]1 \text{ 5s} = 1]6 \text{ 5s} = 3]-4 \text{ 5s}$$

$$T = 2.1 \text{ 5s} = 1.6 \text{ 5s} = 3.-4 \text{ 5s}$$

A total T is recounted in the same unit in two ways:

- create an overload: unbundle a bundle to singles
- create an underload:

borrow extra singles that becomes a deficit

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## 05. ReCount in the Same Unit

Job		Do	Cup	Answer
<b>2.1 5s in 5s</b>	Line	T = IIIII IIIII I	2]1	T = 2.1 5s
	UnBundle	T = IIIII IIIII I	1]6	T = 1.6 5s
	Borrow	T = IIIII IIIII IIIII	3]-4	T = 3.-4 5s
<b>2.1 4s in 4s</b>	Line			
	UnBundle			
	Borrow			
<b>2.1 3s in 3s</b>	Line			
	UnBundle			
	Borrow			
<b>2.1 6s in 6s</b>	Line			
	UnBundle			
	Borrow			
<b>2.1 7s in 7s</b>	Line			
	UnBundle			
	Borrow			
<b>3.2 7s in 7s</b>	Line			
	UnBundle			
	Borrow			
<b>3.2 6s in 6s</b>	Line			
	UnBundle			
	Borrow			
<b>3.2 5s in 5s</b>	Line			
	UnBundle			
	Borrow			
<b>3.2 4s in 4s</b>	Line			
	UnBundle			
	Borrow			
<b>3.2 3s in 3s</b>	Line			
	UnBundle			
	Borrow			

# Migrant Math 06

## ReCount in a new Unit

$$T = 3 \text{ 5s} = ? \text{ 6s}$$

Once counted in one unit, a total T can be recounted in another unit.

A total of 3 5s can be recounted in 6s as in chapter 04

- by lining, counting, bundling, stacking, cup-writing and answering
- by asking a calculator to predict the result using two formulas:

The ReCount formula  $T = (T/B)*B$  saying that  
 ‘from T, T/B times Bs can be taken away’  
 The ReStack formula  $T = (T-B)+B$  saying that  
 ‘from T, T-B is left when B is placed next to’.

To change a unit is also called **proportionality**.

Calculator prediction:

$3*5/6$	2.some
$3*5 - 2*6$	3

Answer:  $T = 3 \text{ 5s} = 2.3 \text{ 6s}$

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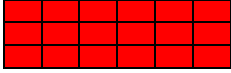
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Job		Do	Calculator
<b>2 7s in 5s</b>	Line Count Bundle Stack Cup Answer		$2*7$ $2*7$
<b>2 6s in 5s</b>	Line Count Bundle Stack Cup Answer		$2*6$ $2*6$
<b>2 6s in 4s</b>	Line Count Bundle Stack Cup Answer		$2*6$ $2*6$
<b>2 6s in 3s</b>	Line Count Bundle Stack Cup Answer		$2*6$ $2*6$
<b>2 5s in 4s</b>	Line Count Bundle Stack Cup Answer		5 5

## 06. ReCount in a New Unit

Job		Do	Calculator
<b>2 9s in 6s</b>	Line	T =	
	Count	1, 2, 3, 4, B, 1B1, 1B2, 1B3, 1B4, ..., <b><u>3B</u></b>	
	Bundle	T =	$2*9/6$ 3
	Stack		$2*9 - 3*6$ 0
	Cup	T = 3]	
	Answer	<u>T = 2 9s = 3 6s</u>	
<b>2 9s in 5s</b>	Line		
	Count		
	Bundle		$2*9/$
	Stack		$2*9 -$
	Cup		
	Answer		
<b>2 8s in 6s</b>	Line		
	Count		
	Bundle		$2*8$
	Stack		$2*8$
	Cup		
	Answer		
<b>2 8s in 5s</b>	Line		
	Count		
	Bundle		$2*8$
	Stack		$2*8$
	Cup		
	Answer		
<b>2 7s in 6s</b>	Line		
	Count		
	Bundle		$2*7$
	Stack		$2*7$
	Cup		
	Answer		

# Migrant Math 07

## ReCount in BundleBundles

$$T = 9.3 \text{ 5s} = 9]3 \text{ 5s} = B4]3 \text{ 5s} = 1]4]3 \text{ 5s} = 14.3 \text{ 5s}$$

An overload in a bundle-cup can be removed by an extra cup for bundles-of-bundles. Counting a total T of 6 8s in 5s gives  $T = 9.3 \text{ 5s}$ . However, with 5 as the bundle-size, 5 bundles can be recounted as 1 bundle-of-bundles of 5s so that  $T = 6 \text{ 8s} = 9.3 \text{ 5s} = 14.3 \text{ 5s}$ .

Calculator prediction:

$6*8/5$	9.some	$9/5$	1.some
$6*8 - 9*5$	3	$9 - 1*5$	4

Answer:  $T = 6 \text{ 8s} = 9.3 \text{ 5s} = 14.3 \text{ 5s}$

Job		Do	Calculator
7 in 2s	Cup Ans.	$T = 7 = 3]1 = B+1]1 = 1]1]1$ <u><math>T = 7 = 3.1 \text{ 2s} = 11.1 \text{ 2s}</math></u>	$7/2$ 3.some $7 - 3*2$ 1
9 in 2s	Cup Ans.	$T = 9 = 4]1 = B+B]1 = B]0]1 = 1]0]0]1$ <u><math>T = 9 = 4.1 \text{ 2s} = 20.1 \text{ 2s} = 100.1 \text{ 2s}</math></u>	$9/2$ 4.some $9 - 4*2$ 1
3 4s in 2s	Cup Ans.		
3 5s in 2s	Cup Ans.		
5 4s in 2s	Cup Ans.		
4 7s in 3s	Cup Ans.		
4 8s in 3s	Cup Ans.		
4 9s in 3s	Cup Ans.		
5 7s in 3s	Cup Ans.		
5 8s in 3s	Cup Ans.		
5 9s in 3s	Cup Ans.		
6 8s in 3s	Cup Ans.		
7 8s in 3s	Cup Ans.		

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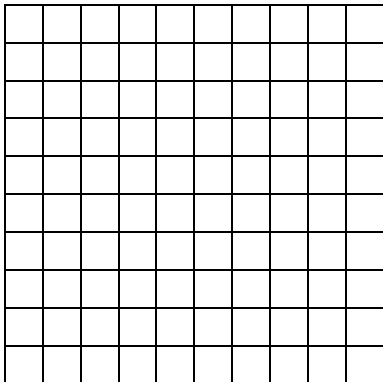
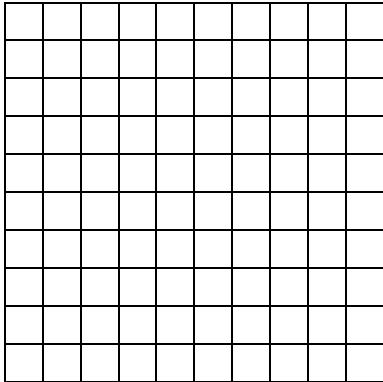
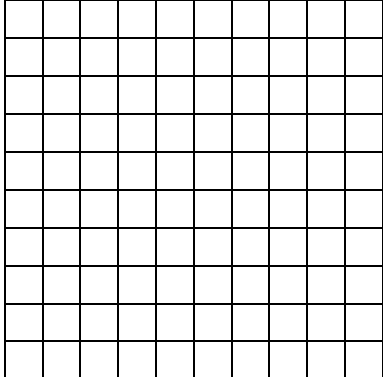
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## 07. Recount in BundleBundles

Job		Do	Calculator
<b>4 8s</b> <b>in 5s</b>	Cup Answer	$T = 4 \text{ 8s} = 6]2 = B1]2 \text{ 5s} = 1]1]2$ <u><math>T = 4 \text{ 8s} = 6.2 \text{ 5s} = 11.2 \text{ 5s} = 12.-3 \text{ 5s}</math></u>	$4*8/5$ 6.some $4*8 - 6*5$ 2
<b>5 8s</b> <b>in 6s</b>	Cup Answer		
<b>6 9s</b> <b>in 7s</b>	Cup Answer		
<b>9 9s</b> <b>in 8s</b>	Cup Answer		
<b>3 9s</b> <b>in 4s</b>	Cup Answer		
<b>4 5s</b> <b>in 3s</b>	Cup Answer		
<b>6 8s</b> <b>in 5s</b>	Cup Answer		
<b>6 8s</b> <b>in 4s</b>	Cup Answer		
<b>7 8s</b> <b>in 5s</b>	Cup Answer		
<b>7 8s</b> <b>in 4s</b>	Cup Answer		
<b>8 8s</b> <b>in 5s</b>	Cup Answer		
<b>8 8s</b> <b>in 4s</b>	Cup Answer		

Job	Do	Calculator
5s in tens		$10 * 5 =$ $9 * 5 =$ $8 * 5 =$ $7 * 5 =$ $6 * 5 =$ $5 * 5 =$ $4 * 5 =$ $3 * 5 =$ $2 * 5 =$ $1 * 5 =$
4s in tens		$10 * 4 =$ $9 * 4 =$ $8 * 4 =$ $7 * 4 =$ $6 * 4 =$ $5 * 4 =$ $4 * 4 =$ $3 * 4 =$ $2 * 4 =$ $1 * 4 =$
3s in tens		$10 * 3 =$ $9 * 3 =$ $8 * 3 =$ $7 * 3 =$ $6 * 3 =$ $5 * 3 =$ $4 * 3 =$ $3 * 3 =$ $2 * 3 =$ $1 * 3 =$

# Migrant Math 08

## ReCount in Tens on Squared Paper or an Abacus

$$T = 3 \text{ 8s} = ? \text{ tens} \quad T = 3 \text{ 8s} = 3 * 8 = 24 = 2.4 \text{ tens}$$

Totals counted in icon-bundles can easily be recounted in tens.

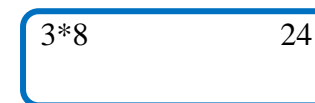
A calculator gives the answer directly in its sloppy version.

To recount 3 8s in tens, we enter 3\*8 and get the answer 24.

So  $T = 3 \text{ 8s} = 24 = 2.4 \text{ tens}$ .

Recounting icon-numbers in tens systematically gives the **multiplication tables**, showing individual patterns in a ten by ten square or on an abacus.

Calculator prediction:



Answer:  $T = 3 \text{ 8s} = 24 = 2.4 \text{ tens}$

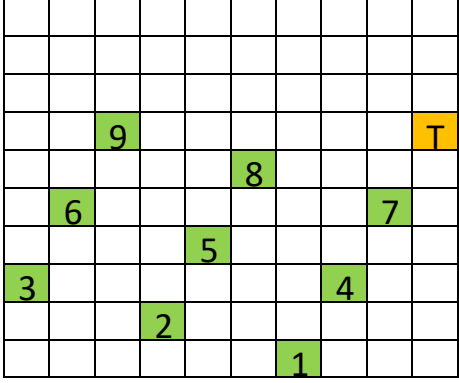
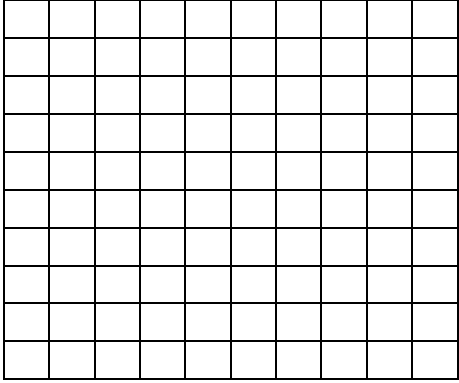
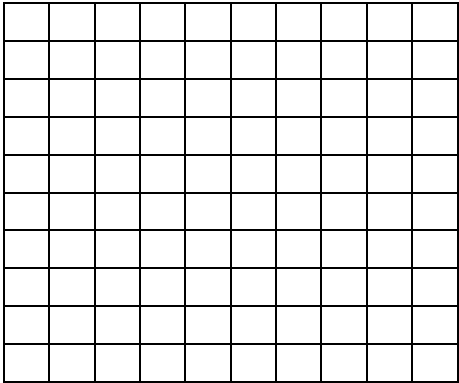
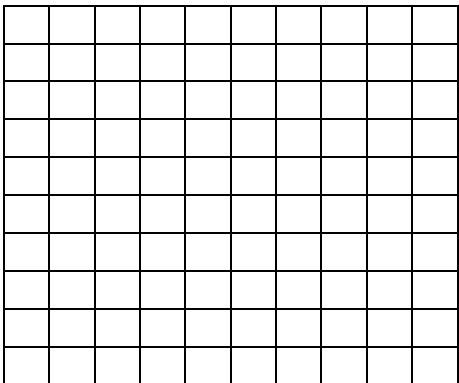
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## 08. ReCount in Tens on Squared Paper or an Abacus

Job		Do	Calculator
7s in tens			$10 * 7 = 70$ $9 * 7 = 63$ $8 * 7 = 56$ $7 * 7 = 49$ $6 * 7 = 42$ $5 * 7 = 35$ $4 * 7 = 28$ $3 * 7 = 21$ $2 * 7 = 14$ $1 * 7 = 7$
8s in tens			$10 * 8 =$ $9 * 8 =$ $8 * 8 =$ $7 * 8 =$ $6 * 8 =$ $5 * 8 =$ $4 * 8 =$ $3 * 8 =$ $2 * 8 =$ $1 * 8 =$
9s in tens			$10 * 9 =$ $9 * 9 =$ $8 * 9 =$ $7 * 9 =$ $6 * 9 =$ $5 * 9 =$ $4 * 9 =$ $3 * 9 =$ $2 * 9 =$ $1 * 9 =$
6s in tens			$10 * 6 =$ $9 * 6 =$ $8 * 6 =$ $7 * 6 =$ $6 * 6 =$ $5 * 6 =$ $4 * 6 =$ $3 * 6 =$ $2 * 6 =$ $1 * 6 =$

Job		Do	Calculator
253 in 7s	Cup Ans.	$T = 2]5]3 = 25]3 = 21]43 = 21]42 + 1$ $T = 3]6 * 7 + 1 = 36 * 7 + 1 = \underline{36 \ 1/7 \ 7s}$	253/7      36.some 253 - 36*7      1
253 in 9s	Cup Ans.		
253 in 5s	Cup Ans.		
253 in 3s	Cup Ans.		
842 in 7s	Cup Ans.		
842 in 5s	Cup Ans.		
842 in 4s	Cup Ans.		
842 in 2s	Cup Ans.		
904 in 8s	Cup Ans.		
904 in 7s	Cup Ans.		
904 in 5s	Cup Ans.		
904 in 3s	Cup Ans.		
789 in 8s	Cup Ans.		
789 in 5s	Cup Ans.		
789 in 4s	Cup Ans.		

# Migrant Math 09

## ReCount from Tens

$$T = 3 \text{ tens} = ? \ 7s$$

A total of 3 **tens** can be recounted in **7s** as in chapter 06

- by lining (we shorten with Roman numbers as icons), counting, bundling, stacking, cup-writing and answering

- by asking a calculator to predict the result using the two formulas

Calculator prediction:

30/7	4.some
30 - 4*7	2

Answer:  $T = 3 \text{ tens} = 4.2 \ 7s = \underline{4 \ 2/7 \ 7s}$  (fraction form)

Recounting large numbers from tens, we save time using a multiplication table. So to recount a total T of 253 in 7s we use cup-writing to create an overload guided by the table:

$$T = 253 = 25]3 = 21]43 = 21] \ 42 + 1 = 3]6 * 7 + 1$$

$$T = 253 = 36 \ 7s + 1 = 36 \ 1/7 \ 7s.$$

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## 09. Recount From Tens

Job		Do	Calculator
<b>37</b> <b>in 9s</b>	Line	X X X V II	
	ReBundle	9I 9I 9I V II -> 9 9 9 X -> 9 9 9 9 1	37/9      4.some
	Cup	3] 7 = ]37 = ]36 + 1 = ]4*9 + 1	37 - 4*9      1
	Answer	<u>T = 37 = 4*9 + 1 = 4.1 9s = 4 1/9 9s</u>	
<b>37</b> <b>in 7s</b>	Line		
	ReBundle		
	Cup		
	Answer		
<b>37</b> <b>in 5s</b>	Line		
	ReBundle		
	Cup		
	Answer		
<b>42</b> <b>in 7s</b>	Line		
	ReBundle		
	Cup		
	Answer		
<b>42</b> <b>in 5s</b>	Line		
	ReBundle		
	Cup		
	Answer		
<b>26</b> <b>in 7s</b>	Line		
	ReBundle		
	Cup		
	Answer		
<b>26</b> <b>in 5s</b>	Line		
	ReBundle		
	Cup		
	Answer		

Job		Do	Calculator
17 43s	Cup Ans.	$T = 17 * 4]3 = 68]51 = 73]1 = 731$ $T = 17 \mathbf{43s} = 73.1 \mathbf{tens} = 731$	$17*43$ 731
27 43s	Cup Ans.		
37 43s	Cup Ans.		
47 43s	Cup Ans.		
57 43s	Cup Ans.		
67 43s	Cup Ans.		
77 43s	Cup Ans.		
87 43s	Cup Ans.		
32 243s	Cup Ans.	$T = 32 * 2]4]3 = 64]128]96 = 64]137]6$ $= 77]7]6 = 777.6 \mathbf{tens} = 7776$	$32*243$ 7776
35 413s	Cup Ans.		
43 343s	Cup Ans.		
56 453s	Cup Ans.		
62 637s	Cup Ans.		
74 843s	Cup Ans.		
87 543s	Cup Ans.		
92 493s	Cup Ans.		

# Migrant Math 10

## ReCount Large Numbers in Tens

$$T = 7 \mathbf{43s} = 7*43 = 7*4]3 = 28]21 = 30]1 = 301$$

To reCount large numbers in Tens, cup-writing is used to create an overload, later to be removed to get the final answer.

To recount 7 **43s** in tens gives a total

$$T = 7 \mathbf{43s} = 7*43 = 7*4]3 = 28]21 = 30]1 = 301 = 30.1 \mathbf{tens}$$

This makes sense: Shrinking the width of the stack from 43 to ten means increasing the height to keep the same total.

Calculator prediction:

$$7*43 \quad 301$$

$$\text{Answer: } T = 3 \mathbf{8s} = 24 = 2.4 \mathbf{tens}$$

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## 10. Recount Large Numbers in Tens

Job		Do	Calculator
<b>7 43s</b>	Cup Answer	$T = 7 * 43 = 2821 = 301$ <u><math>T = 7 \text{ 43s} = 30.1 \text{ tens} = 301</math></u>	$7 * 43$ 301
<b>8 43s</b>	Cup Answer		
<b>9 43s</b>	Cup Answer		
<b>6 43s</b>	Cup Answer		
<b>5 62s</b>	Cup Answer		
<b>4 62s</b>	Cup Answer		
<b>3 62s</b>	Cup Answer		
<b>2 62s</b>	Cup Answer		
<b>27 436s</b>	Cup Answer		
<b>3 436s</b>	Cup Answer		
<b>4 436s</b>	Cup Answer		
<b>5 436s</b>	Cup Answer		
<b>6 436s</b>	Cup Answer		
<b>7 436s</b>	Cup Answer		
<b>8 436s</b>	Cup Answer		

# Migrant Math 11

## DoubleCount with PerNumbers

With 4\$/5kg, T = 8\$ =  $(8/4)*4$ =  $(8/4)*5kg = 10kg$$

Counting a quantity in two different physical units provides a **per-number** to be used as a bridge connecting the two units.

Thus counting a quantity as 4\$ and as 5 kg gives the per-number 4\$/5kg or 4/5 \$/kg.

Asking '8\$ = ? kg', the answer comes from recounting the 8s in 4s to be able to use the per-number as a bridge between the two units:

$$T = 8$ =  $(8/4)*4$ =  $(8/4)*5kg = 10kg.$$$$

Likewise when asking e.g. '? \$ = 12kg'

$$T = 12kg =  $(12/5)*5kg =  $(12/5)*4$ = 9.6$$$$$

Job	Do	Formula
With 4 \$ per 5 kg 8\$ = ?kg ? \$ = 12 kg	8\$ = $(8/4)*4$ = (8/4)*5kg = 10kg12kg = (12/5)*5kg = (12/5)*4$ = 9.6$$	$Kg = (kg/\$)*\$$ $Kg = (5/4)*8 = 10$ $\$ = (\$/kg)*kg$ $\$ = (4/5)*12 = 9.6$
With 3 \$ per 5 kg 8\$ = ?kg ? \$ = 12 kg		
With 4 \$ per 6 kg 8\$ = ?kg ? \$ = 12 kg		
With 4 \$ per 8 kg 8\$ = ?kg ? \$ = 12 kg		
With 4 \$ per 5 kg 8\$ = ?kg ? \$ = 12 kg		
With 3 \$ per 5 kg 8\$ = ?kg ? \$ = 12 kg		
With 4 \$ per 6 kg 8\$ = ?kg ? \$ = 12 kg		
With 4 \$ per 8 kg 8\$ = ?kg ? \$ = 12 kg		
With 2 \$ per 5 kg 8\$ = ?kg ? \$ = 12 kg		
With 2 \$ per 7 kg 8\$ = ?kg ? \$ = 12 kg		

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## 11. DoubleCount with PerNumbers

Job	Do	Formula
With 4 \$ per 5 kg 8\$ = ?kg ?\$ = 12 kg	$8\$ = (8/4)*4\$ = (8/4)*5\text{kg} = 10\text{kg}$ $12\text{kg} = (12/5)*5\text{kg} = (12/5)*4\$ = 9.6\$$	$\text{Kg} = (\text{kg}/\$)*\$$ $\text{Kg} = (5/4)*8 = 10$ $\$ = (\$/\text{kg})*\text{kg}$ $\$ = (4/5)*12 = 9.6$
With 3 \$ per 5 kg 8\$ = ?kg ?\$ = 12 kg		
With 4 \$ per 6 kg 8\$ = ?kg ?\$ = 12 kg		
With 4 \$ per 8 kg 8\$ = ?kg ?\$ = 12 kg		
With 4 \$ per 5 kg 8\$ = ?kg ?\$ = 12 kg		
With 3 \$ per 5 kg 8\$ = ?kg ?\$ = 12 kg		
With 4 \$ per 6 kg 8\$ = ?kg ?\$ = 12 kg		
With 4 \$ per 8 kg 8\$ = ?kg ?\$ = 12 kg		
With 2 \$ per 5 kg 8\$ = ?kg ?\$ = 12 kg		
With 2 \$ per 7 kg 8\$ = ?kg ?\$ = 12 kg		

# Migrant Math 12

## DoubleCount with Fractions & Percentages

With  $\frac{4}{5}$ ,  $T = 30\$ = (\frac{30}{5}) * 5\$$  gives  $(\frac{30}{5}) * 4\$ = 24\$$

Fractions and percentages can be treated as per-numbers.

Asking '3/5 of 200\$' is the same as asking '3 per 5 of 200\$ gives ?'.

So we recount the 200 in 5s to get the answer:

$T = 200\$ = (\frac{200}{5}) * 5\$$  giving  $(\frac{200}{5}) * 3\$ = 120\$$ .

Asking '3% of 250\$' is the same as asking '3 per 100 of 250\$'.

So we recount the 250 in 100s to get the answer:

$T = 250\$ = (\frac{250}{100}) * 100\$$  gives  $(\frac{250}{100}) * 3\$ = 7.5\$$

as confirmed by writing '3/100\*250' on a calculator.

Job	Do	Calculator
3 per 5 of 200\$	$200\$ = (\frac{200}{5}) * 5\$$ Giving $(\frac{200}{5}) * 3\$ = 120\$$	$\frac{3}{5} * 200$ 120
3 per 5 of 400\$		
2 per 5 of 200\$		
1 per 5 of 200\$		
3 per 6 of 240\$		
2 per 6 of 240\$		
5 per 6 of 300\$		
3 per 100 of 250\$ or 3% of 250\$	$250\$ = (\frac{250}{100}) * 100\$$ Giving $(\frac{250}{100}) * 3\$ = 7.5\$$	$\frac{3}{100} * 250$ 7.5
8 per 100 of 200\$ or 8% of 200\$		
20 per 100 of 200\$ or 20% of 200\$		
3 per 100 of 560\$ or 3% of 560\$		
8 per 100 of 560\$ or 8% of 560\$		
12 per 100 of 560\$ or 12% of 560\$		
20 per 100 of 560\$ or 20% of 560\$		
60 per 100 of 560\$ or 60% of 560\$		

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## 12. DoubleCount with Fractions & Percentages

Job	Do	Calculator
3 per 5 of 200\$	$200\$ = (200/5)*5\$$ Giving $(200/5)*3\$ = 120\$$	$3/5*200$ 120
3 per 5 of 400\$		
2 per 5 of 200\$		
1 per 5 of 200\$		
3 per 6 of 240\$		
2 per 6 of 240\$		
5 per 6 of 300\$		
3 per 100 of 250\$ or 3% of 250\$	$250\$ = (250/100)*100\$$ Giving $(250/100)*3\$ = 7.5\$$	$3/100*250$ 7.5
8 per 100 of 200\$ or 8% of 200\$		
20 per 100 of 200\$ or 20% of 200\$		
3 per 100 of 560\$ or 3% of 560\$		
8 per 100 of 560\$ or 8% of 560\$		
12 per 100 of 560\$ or 12% of 560\$		
20 per 100 of 560\$ or 20% of 560\$		
60 per 100 of 560\$ or 60% of 560\$		

# Migrant Math 13

## ReCount PerNumbers & Fractions

$$\frac{2}{3} = \frac{2 \text{ 2s}}{3 \text{ 2s}} = \frac{2*2}{3*2} = \frac{4}{6}$$

Changing unit transforms per-numbers.

With 2 per 3, the per-number does not depend of the unit.

So we can always change unit to the same unit on both numbers.

$$2 \text{ per } 3 = \frac{2}{3} = \frac{2 \text{ 2s}}{3 \text{ 2s}} = \frac{2*2}{3*2} = \frac{4}{6} = 4 \text{ per } 6$$

Or we can remove the same unit from both numbers

$$4 \text{ per } 6 = \frac{4}{6} = \frac{2*2}{3*2} = \frac{2 \text{ 2s}}{3 \text{ 2s}} = \frac{2}{3} = 2 \text{ per } 3$$

Job	Do	Do	Calculator	Calculator
2/3 = ?	2/3 = 2 2s / 3 2s = 4/6 2/3 = 2 3s / 3 3s = 6/9	2/3 = 2 4s / 3 4s = 8/12 2/3 = 2 5s / 3 5s = 10/15	2/3 = 0.66.. 4/6 = 0.66..	8/12 = 0.66.. 10/15 = 0.66..
1/3 = ?				
1/5 = ?				
2/5 = ?				
3/5 = ?				
4/5 = ?				
4/6 2/6 6/8 2/8	4/6 = 2 2s / 3 2s = 2/3 2/6 = 1 2s / 3 2s = 1/3	6/8 = 3 2s / 4 2s = 3/4 2/8 = 1 2s / 4 2s = 1/4	4/6 = 0.66.. 2/3 = 0.66.. 2/6 = 0.33.. 1/3 = 0.33..	6/8 = 0.75 3/4 = 0.75 2/8 = 0.25 1/4 = 0.25
2/10 4/10 6/10 8/10				
2/12 4/12 6/12 8/12 10/12				
2/14 4/14 6/14 8/14 10/14 12/14				
2/16 4/16 6/16 8/16 10/16 12/16 14/16				

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### 13. ReCount PerNumbers & Fractions

Job	Do	Do	Calculator	Calculator
<b>2/3</b> = ?	$2/3 = 2 \cdot 2s / 3 \cdot 2s = 4/6$ $2/3 = 2 \cdot 3s / 3 \cdot 3s = 6/9$	$2/3 = 2 \cdot 4s / 3 \cdot 4s = 8/12$ $2/3 = 2 \cdot 5s / 3 \cdot 5s = 10/15$	$2/3 = 0.66..$ $4/6 = 0.66..$	$8/12 = 0.66..$ $10/15 = 0.66..$
<b>1/3</b> = ?				
<b>1/5</b> = ?				
<b>2/5</b> = ?				
<b>3/5</b> = ?				
<b>4/5</b> = ?				
<b>4/6</b> <b>2/6</b> <b>6/8</b> <b>2/8</b>	$4/6 = 2 \cdot 2s / 3 \cdot 2s = 2/3$ $2/6 = 1 \cdot 2s / 3 \cdot 2s = 1/3$	$6/8 = 3 \cdot 2s / 4 \cdot 2s = 3/4$ $2/8 = 1 \cdot 2s / 4 \cdot 2s = 1/4$	$4/6 = 0.66..$ $2/3 = 0.66..$ $2/6 = 0.33..$ $1/3 = 0.33..$	$6/8 = 0.75$ $3/4 = 0.75$ $2/8 = 0.25$ $1/4 = 0.25$
<b>2/10</b> <b>4/10</b> <b>6/10</b> <b>8/10</b>				
<b>2/12</b> <b>4/12</b> <b>6/12</b> <b>8/12</b> <b>10/12</b>				
<b>2/14</b> <b>4/14</b> <b>6/14</b> <b>8/14</b> <b>10/14</b> <b>12/14</b>				
<b>2/16</b> <b>4/16</b> <b>6/16</b> <b>8/16</b> <b>10/16</b> <b>12/16</b> <b>14/16</b>				

# Migrant Math 14

## Add OnTop

$$T = 2 \text{ } 3s + 4 \text{ } 5s = ? \text{ } 5s$$

$$T = (2*3 + 4*5)/5 \text{ } 5s = 5.1 \text{ } 5s$$

To add two totals T1 and T2 OnTop, the units must be the same.

so recounting may be needed to change a unit.

To add 2 3s and 4 5s as 5s,

the 2 3s must be recounted as 5s as  $(2*3)/5 \text{ } 5s = 1.1 \text{ } 5s$ .

$$T = 2 \text{ } 3s + 4 \text{ } 5s = 1.1 \text{ } 5s + 4 \text{ } 5s = 5.1 \text{ } 5s$$

as confirmed by a calculator.

Calculator prediction:

$$\begin{array}{r} (2*3+4*5)/5 \quad 5.\text{some} \\ (2*3+4*5) - 5*5 \quad 1 \end{array}$$

$$\text{Answer: } T = 2 \text{ } 3s + 4 \text{ } 5s = 5.1 \text{ } 5s$$

Job	Do	Calculator
2 3s + 4 5s = ? 3s ? 5s		$(2*3+4*5)/3 \quad 8.\text{some}$ $(2*3+4*5) - 8*3 \quad 2$ $2 \text{ } 3s + 4 \text{ } 5s = 8.2 \text{ } 3s$  $(2*3+4*5)/5 \quad 5.\text{some}$ $(2*3+4*5) - 5*5 \quad 1$ $2 \text{ } 3s + 4 \text{ } 5s = 5.1 \text{ } 5s$
2 4s + 3 5s = ? 4s ? 5s		
3 2s + 4 6s = ? 2s ? 6s		
2 5s + 4 3s = ? 5s ? 3s		
5 2s + 3 4s = ? 2s ? 4s		

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# 14. Add OnTop

Job	Do	Calculator
$2\ 3s$ $+$ $4\ 5s$ $=$ $?\ 3s$ $? \ 5s$		$(2*3+4*5)/3 = 8.\text{some}$ $(2*3+4*5) - 8*3 = 2$ $2\ 3s + 4\ 5s = 8.2\ 3s$  $(2*3+4*5)/5 = 5.\text{some}$ $(2*3+4*5) - 5*5 = 1$ $2\ 3s + 4\ 5s = 5.1\ 5s$
$2\ 4s$ $+$ $3\ 5s$ $=$ $? \ 4s$ $? \ 5s$		
$3\ 2s$ $+$ $4\ 6s$ $=$ $? \ 2s$ $? \ 6s$		
$2\ 5s$ $+$ $4\ 3s$ $=$ $? \ 5s$ $? \ 3s$		
$5\ 2s$ $+$ $3\ 4s$ $=$ $? \ 2s$ $? \ 4s$		

# Migrant Math 15

## Reversed Adding OnTop

$$T = 2 \mathbf{5s} + ? \mathbf{3s} = 6 \mathbf{3s}$$

$$T = (6*3 - 2*5)/3 \mathbf{3s} = 2.2 \mathbf{3s}$$

To reverse OnTop addition, the known total must be taken away before counting the rest in the unit of the second total.

Asking '2 5s + ? 3s total 6 3s, we take away the 2 5s from the 6 3s before recounting the rest, T - T1, in 3s by saying

$(T-T1)/3 \mathbf{3s} = \Delta T/3 \mathbf{3s} = 2.2 \mathbf{3s}$  as confirmed by a calculator.

Subtraction followed by division is differentiation, part of calculus.

Calculator prediction:

$$\begin{array}{r} (6*3 - 2*5)/3 \quad 2.\text{some} \\ (6*3 - 2*5) - 1*3 \quad 2 \end{array}$$

$$\text{Answer: } T = 2 \mathbf{5s} + 2.2 \mathbf{3s} = 6 \mathbf{3s}$$

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2 3s + ? 5s = 5 3s		$(5*3-2*3)/5$ <u>1.some</u> $(5*3-2*3) - 1*5$ 4 <u><math>2 \mathbf{3s} + 1.4 \mathbf{5s} = 5 \mathbf{3s}</math></u>
2 4s + ? 5s = 5 4s		
2 6s + ? 5s = 4 6s		
2 7s + ? 5s = 6 5s		
2 6s + ? 5s = 4 5s		

# 15. Reversed Adding OnTop

<p>2 3s + ? 5s = 5 3s</p>		<p><math>(5 \cdot 3 - 2 \cdot 3) / 5</math> 1.some  <math>(5 \cdot 3 - 2 \cdot 3) - 1 \cdot 5</math> 4  <u><math>2 \cdot 3s + 1.4 \cdot 5s = 5 \cdot 3s</math></u></p>
<p>2 4s + ? 5s = 5 4s</p>		
<p>2 6s + ? 5s = 4 6s</p>		
<p>2 7s + ? 5s = 6 5s</p>		
<p>2 6s + ? 5s = 4 5s</p>		

Job	Do	Calculator
$2\ 3s$ $+$ $4\ 5s$ $=$ $?\ 8s$		$(2*3+4*5)/8$ <u>3.some</u> $(2*3+4*5) - 8*3$ 2  $2\ 3s + 4\ 5s = 3.2\ 8s$
$3\ 2s$ $+$ $4\ 5s$ $=$ $?\ 7s$		
$2\ 3s$ $+$ $4\ 6s$ $=$ $?\ 9s$		
$2\ 4s$ $+$ $4\ 5s$ $=$ $?\ 9s$		
$4\ 3s$ $+$ $2\ 4s$ $=$ $?\ 6s$		

# Migrant Math 16

Add NextTo

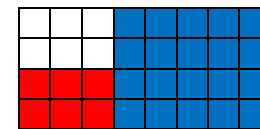
$$T = 2\ 3s + 4\ 5s = ?\ 8s$$

$$T = (2*3 + 4*5)/8\ 8s = 3.2\ 8s$$

To add two totals T1 and T2 NextTo means adding their areas.

Adding areas is called integration, a part of calculus.

To add  $2\ 3s$  and  $4\ 5s$  next to each other as  $8s$  on a ten by ten square or on an abacus gives  $3.2\ 8s$  as confirmed by a calculator.



Calculator prediction:

$$(2*3+4*5)/8 \quad 3.some$$

$$(2*3+4*5) - 3*8 \quad 2$$

Answer:  $T = 2\ 3s + 4\ 5s = 3.2\ 8s$

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## 16. Add NextTo

Job	Do	Calculator
<p>2 3s + 4 5s = ? 8s</p>		<p><math>(2*3+4*5)/8</math>    3.some  <math>(2*3+4*5) - 8*3</math>    2</p> <p><u><math>2\ 3s + 4\ 5s = 3.2\ 8s</math></u></p>
<p>3 2s + 4 5s = ? 7s</p>		
<p>2 3s + 4 6s = ? 9s</p>		
<p>2 4s + 4 5s = ? 9s</p>		
<p>4 3s + 2 4s = ? 6s</p>		

# Migrant Math 17

## Reversed Adding NextTo

$$T = 2 \text{ 3s} + ? \text{ 5s} = 3 \text{ 8s}$$

$$T = (3*8 - 2*3)/5 \text{ 5s} = 3.3 \text{ 5s}$$

To reverse NextTo addition, the known total must be taken away before counting the rest in the unit of the second total.

Asking '2 3s + ? 5s total 3 8s, we take away the 2 3s from the 3 8s before recounting the rest, T - T1, in 5s:

$(T-T1)/5 \text{ 5s} = \Delta T/5 \text{ 5s} = 3.3 \text{ 5s}$  as confirmed by a calculator.

Subtraction followed by division is differentiation, part of calculus.

Calculator prediction:

$(3*8 - 2*3)/5$	3.some
$(3*8 - 2*3) - 3*5$	3

Answer:  $T = 2 \text{ 3s} + 3.3 \text{ 5s} = 3 \text{ 8s}$

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2 3s + ? 5s = 3 8s		$(3*8-2*3)/5$ 3.some $(3*8-2*3) - 3*5$ 3 <u><math>2 \text{ 3s} + 3.3 \text{ 5s} = 3 \text{ 8s}</math></u>
2 4s + ? 5s = 3 9s		
2 3s + ? 4s = 3 7s		
4 3s + ? 5s = 3 8s		
5 2s + ? 5s = 3 7s		

# 17. Reversed Adding NextTo

<p>2 3s + ? 5s = 3 8s</p>		<p><math>(3*8-2*3)/5</math> 3.some  <math>(3*8-2*3) - 3*5</math> 3  <u><math>2\ 3s + 3\ 3\ 5s = 3\ 8s</math></u></p>
<p>2 4s + ? 5s = 3 9s</p>		
<p>2 3s + ? 4s = 3 7s</p>		
<p>4 3s + ? 5s = 3 8s</p>		
<p>5 2s + ? 5s = 3 7s</p>		

# Migrant Math 18

## Add tens

$$T = 27 + 85 = 2]7 + 8]5 = 10]12 = 11]2 = 112$$

Adding tens might create an overload in a bundle-cup or outside.

Cup-writing is used to remove overloads.

Adding 27 and 85 creates an overload outside the bundle-cup.

The overload is removed by cup-writing moving bundles inside.

$$T = 27 + 85 = 2]7 + 8]5 = 10]12 = 11]2 = 112$$

as confirmed by a calculator.

Calculator prediction:

27+85	112
-------	-----

Answer:  $T = 27 + 85 = 112$

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Job		Do	Calculator
27 + 85	Cup Answer	$T = 2]7 + 8]5 = 10]12 = 11]2 = 112$ <u><math>T = 27 + 85 = 11.2 \text{ tens} = 112</math></u>	27+85      112
27 + 85	Cup Answer		
33 + 78	Cup Answer		
39 + 71	Cup Answer		
45 + 67	Cup Answer		
58 + 57	Cup Answer		
57 + 49	Cup Answer		
27 + 205	Cup Answer		
33 + 198	Cup Answer		
39 + 191	Cup Answer		
45 + 187	Cup Answer		
58 + 177	Cup Answer		
57 + 169	Cup Answer		
127 + 385	Cup Answer		
433 + 578	Cup Answer		

## 18. Add Tens

Job		Do	Calculator
<b>27 + 85</b>	Cup Answer	$T = 2]7 + 8]5 = 10]12 = 11]2 = 112$ <u><math>T = 27 + 85 = 11.2 \text{ tens} = 112</math></u>	27+85      112
<b>27 + 85</b>	Cup Answer		
<b>33 + 78</b>	Cup Answer		
<b>39 + 71</b>	Cup Answer		
<b>45 + 67</b>	Cup Answer		
<b>58 + 57</b>	Cup Answer		
<b>57 + 49</b>	Cup Answer		
<b>27 + 205</b>	Cup Answer		
<b>33 + 198</b>	Cup Answer		
<b>39 + 191</b>	Cup Answer		
<b>45 + 187</b>	Cup Answer		
<b>58 + 177</b>	Cup Answer		
<b>57 + 169</b>	Cup Answer		
<b>127 + 385</b>	Cup Answer		
<b>433 + 578</b>	Cup Answer		

# Migrant Math 19

## Reversed adding tens

$$T = 85 - 27 = 8]5 - 2]7 = 6]-2 = 5]8 = 58$$

Reversing adding tens, the known number must be taken away.

This might give a deficit calling for unbundling a bundle.

Unless this is done first to create an overload that allows taking the number away without creating a deficit.

Thus asking ‘? + 27 = 85’ or ‘85 - 27’, cup-writing is used to remove the deficit, or to create an overload

$$T = 85 - 27 = 8]5 - 2]7 = 6]-2 = 5]8 = 58$$

$$T = 85 - 27 = 8]5 - 2]7 = 7]15 - 2]7 = 5]8 = 58$$

both confirmed by a calculator.

Calculator prediction:

$$85 - 27 = 58$$

Answer:  $T = 85 - 27 = 58$

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Job		Do	Calculator
27 + ? = 85 85 - 27	Cup Answer	D = 8]5 - 2]7 = 6]-2 = 5]8 = 58 D = 8]5 - 2]7 = 7]15 - 2]7 = 5]8 = 58 T = 85 - 27 = 5.8 tens = 58	85 - 27 = 58
63 - 17	Cup Answer		
55 - 36	Cup Answer		
35 - 17	Cup Answer		
185 - 27	Cup Answer		
235 - 128	Cup Answer		
242 - 128	Cup Answer		
245 - 167	Cup Answer		
312 - 159	Cup Answer		
421 - 268	Cup Answer		

## 19. Reversed Adding Tens

Job		Do	Calculator
$27 + ? = 85$ $85 - 27$	Cup  Answer	$D = 8 \mid 5 - 2 \mid 7 = 6 \mid -2 = 5 \mid 8 = 58$ $D = 8 \mid 5 - 2 \mid 7 = 7 \mid 15 - 2 \mid 7 = 5 \mid 8 = 58$ <u><math>T = 85 - 27 = 5.8 \text{ tens} = 58</math></u>	$85 - 27$ $58$
$63 - 17$	Cup  Answer		
$55 - 36$	Cup  Answer		
$35 - 17$	Cup  Answer		
$185 - 27$	Cup  Answer		
$235 - 128$	Cup  Answer		
$242 - 128$	Cup  Answer		
$245 - 167$	Cup  Answer		
$312 - 159$	Cup  Answer		
$421 - 268$	Cup  Answer		

# Migrant Math 20

## Recounting Solves Equations

$$u*2 = 8 = (8/2)*2 \quad \text{so } u = 8/2 = 4$$

A reversed calculation is called an equation.

An equation can be solved by recounting and restacking.

In both cases an equation is solved by a moving-method:

*Move to the opposite side with the opposite sign*

In the end, the solution is tested.

To solve the equation $u*2 = 8$ 8 is recounted as $8 = (8/2)*2$	To solve the equation $u+2 = 8$ 8 is restacked as $8 = (8-2)+2$
$u*2 = 8 = (8/2)*2$ $u = 8/2 = 4$ Test: $4*2 = 8$ ☺	$u + 2 = 8 = (8-2)+2$ $u = 8-2 = 6$ Test: $6+2 = 8$ ☺

A calculator with a solver will confirm the answer:

Solve( $u*2 = 8$ )      4

Answer:  $u*2 = 8$  is solved by  $u = 4$

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Do	Equation	Calculator
ReCount ReCount Answer	<b><math>2*u+3 = 15</math></b> = $(15-3)+3 = 12 + 3$ $2*u = 12 = (12/2)*2 = 6*2$ $u = 6$	$2*6+3$ 15
ReCount ReCount Answer	<b><math>3*u+4 = 19</math></b>	
ReCount ReCount Answer	<b><math>4*u+6 = 38</math></b>	
ReCount ReCount Answer	<b><math>2*u-3 = 15</math></b> = $(15-3)+3 = 15+3-3 = 18 - 3$ $2*u = 18 = (18/2)*2 = 9*2$ $u = 9$	$2*9-3$ 15
ReCount ReCount Answer	<b><math>3*u-4 = 8</math></b>	
ReCount ReCount Answer	<b><math>4*u-5 = 23</math></b>	
ReCount ReCount Answer	<b><math>u/2+3 = 15</math></b> = $(15-3)+3 = 12 + 3$ $u/2 = 12 = (12/2)*2 = (12*2)/2 = 24/2$ $u = 24$	$24/2+3$ 15
ReCount ReCount Answer	<b><math>u/3+4 = 12</math></b>	
ReCount ReCount Answer	<b><math>u/2-3 = 15</math></b> = $(15-3)+3 = (15+3)-3 = 18 - 3$ $u/2 = 18 = (18/2)*2 = (18*2)/2 = 36*2$ $u = 36$	$36/2-3$ 15
ReCount ReCount Answer	<b><math>u/4-7 = 5</math></b>	
ReCount ReCount Answer	<b><math>u/5-8 = 2</math></b>	

## 20. ReCounting solves Equations

Do	Equation	Calculator
ReCount Answer	$u * 2 = 30 = (30/2) * 2 = 15 * 2$ $u = 15$	$15 * 2$ 30
ReCount Answer	$u * 3 = 15$	
ReCount Answer	$u * 4 = 32$	
ReCount Answer	$u * 5 = 40$	
ReCount Answer	$u / 3 = 12 = (12/3) * 3 = 12 * 3 / 3 = 36 / 3$ $u = 36$	$36 / 3$ 12
ReCount Answer	$u / 3 = 10$	
ReCount Answer	$u / 4 = 8$	
ReCount Answer	$u / 5 = 6$	
ReCount Answer	$u + 2 = 30 = (30 - 2) + 2 = 28 + 2$ $u = 28$	$28 + 2$ 30
ReCount Answer	$u + 3 = 24$	
ReCount Answer	$u + 4 = 20$	
ReCount Answer	$u + 5 = 12$	
ReCount Answer	$u - 2 = 30 = (30 - 2) + 2 = 30 + 2 - 2 = 32 - 2$ $u = 32$	$32 - 2$ 30
ReCount Answer	$u - 3 = 20$	
ReCount Answer	$u - 5 = 10$	