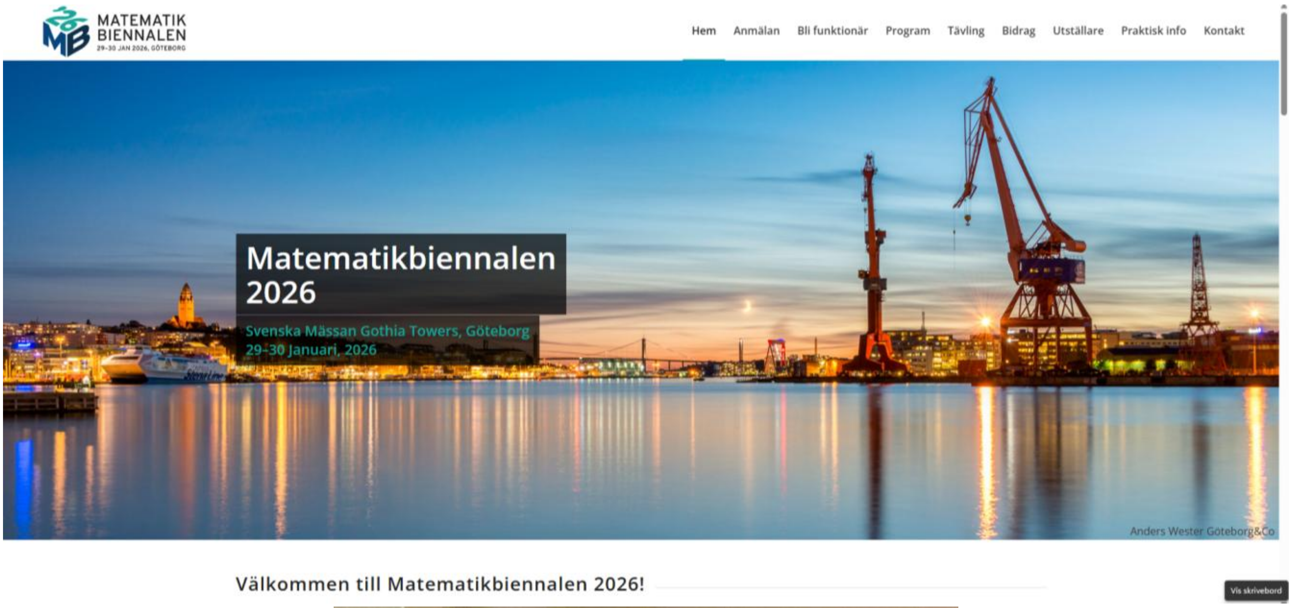
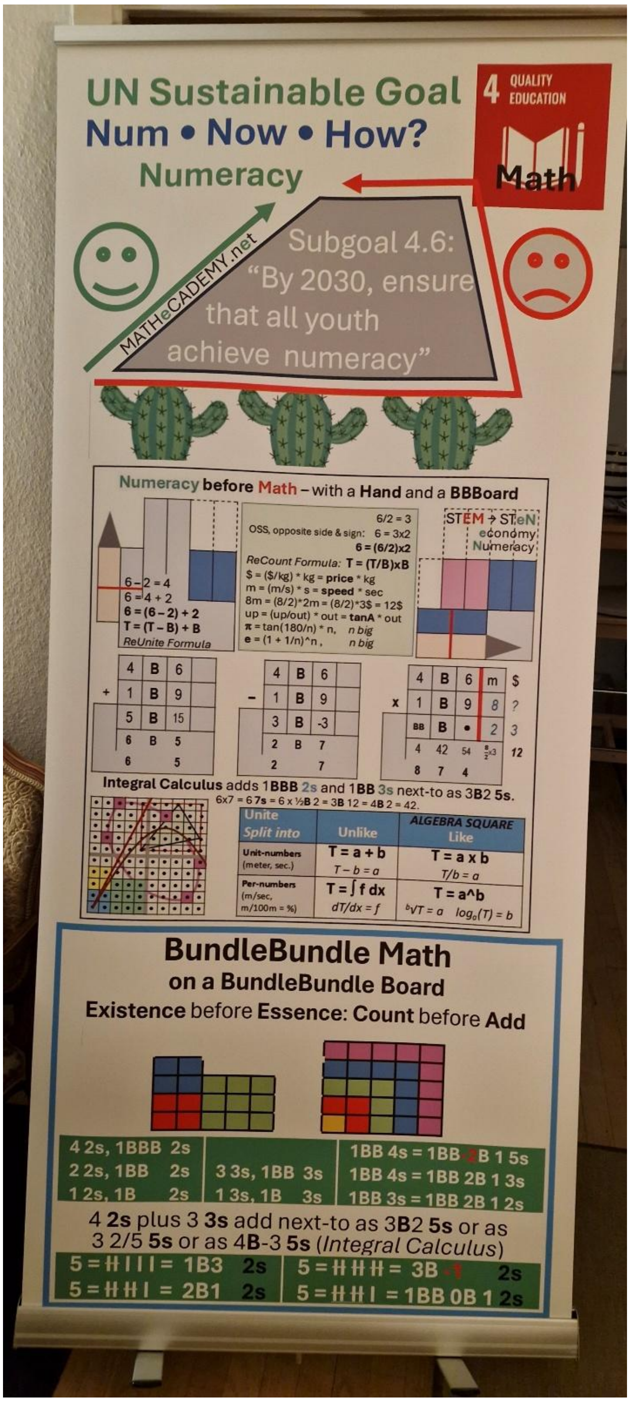
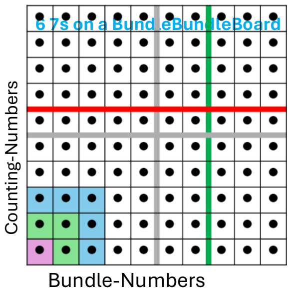

MATEMATIK BIENNALEN
29–30 JAN 2026, GÖTEBORG
Hem
Anmälan
Bli funktionär
Program
Tävling
Bidrag
Utställare
Praktisk info
Kontakt
Matematikbiennalen 2026
Svenska Mässan Gothia Towers, Göteborg
29-30 Januari, 2026
Anders Wester Göteborg&Co
Välkommen till Matematikbiennalen 2026!


UN Sustainable Goal
Num • Now • How?
Numeracy
4 QUALITY EDUCATION
Math
Subgoal 4.6:
"By 2030, ensure that all youth achieve numeracy"
MATHeCADEMY.net
Numeracy before Math – with a Hand and a BBBoard
STEM → STeN economy Numeracy
ReCount Formula: T = (T/B)xB
ReUnite Formula
Integral Calculus adds 1BBB 2s and 1BB 3s next-to as 3B2 5s.
ALGEBRA SQUARE
BundleBundle Math
on a BundleBundle Board
Existence before Essence: Count before Add
4 2s plus 3 3s add next-to as 3B2 5s or as
3 2/5 5s or as 4B-3 5s (Integral Calculus)

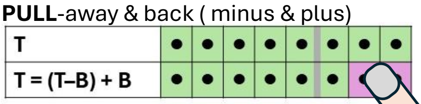
STe**N solves Problems on a BundleBundleBoard to make all Youth Numerate by 2030**

NUMERACY

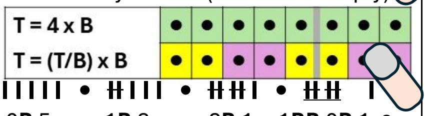
BBM • BundleBundleMath with units *(Kids: II II "Not 4, but 2 2s")*



PULL-away & back (minus & plus)



PUSH-away & back (divide & multiply)



IIIII • ~~IIII~~ III • ~~IIII~~ ~~IIII~~ I • ~~IIII~~ ~~IIII~~ I

0**B** 5 1**B** 3 2**B** 1 1**BB** 0**B** 1 **2s**

Ten = 2**BB** 0**B** 2 = 1**BBB** 0**BB** 1**B** 0 **2s**

• **ReUnite formula:** **T = (T–B) + B**

$u + 3 = 5$. But, $5 = (5-3) + 3$, so $u = 5-3 = 2$

$u - 3 = 5$. But, $u = (u-3) + 3 = 5 + 3 = 8$

$5 - u = 3$. But, $5 = (5-u) + u = 3 + u$, so, $u + 3 = 5$

• **ReCount formula:** (changes units in **STEM**) **T = (T/B) x B**

$u * 3 = 12$. But $12 = (12/3) * 3$, so $u = 12/3 = 4$

$u/3 = 5$. But $u = (u/3) * 3 = 5 * 3 = 15$

$12/u = 3$. But $12 = (12/u) * u = 3 * u$, so $u*3 = 12$

Next **B**undle**B**undle: 1**BB** 2**B** 1

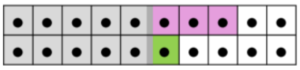
Before **BB-square:** 1**BB** -2**B** 1

7 = 0**B** 7 = 1**B** -3 = ½**B** 2 **tens**

Squares:	01	04	09	16	25
	81	64	49	36	

$\Delta B^2 = 2B+1$ Later, $(x^2)' = 2*x$

Add & Subtract etc.



8 + 6 = (½**B** 3) + (½**B** 1) = 1**B** 4 = 14

28+36 = 2**B** 8+3**B** 6 = 5**B** 14 = 6**B** 4 = 7**B** -6

8 x 46 = 8 x 4**B** 6 = 32**B** 48 = 36**B** 8 = 368

368 / 8 = 36**B** 8 / 8 = 32**B** 48 / 8 = 4**B** 6 = 46

T = 8 – 6 = (½**B** 3) – (½**B** 1) = 0**B** (3 – 1) = 0**B** 2 = 2

T = (1**B** -2) – (1**B** -4) = 0**B** (-2 + 4) = 0**B** 2 = 2

(notice - - is +)

Place value & carry & borrow unneeded

Video: Many before Math

T = 6*7 = 6*(½**B** 2) = 3**B** 12 = 42 (Overload)

T = 6 * 7 = (**B** - 4) *(**B** - 3) **BBM FOIL** Down & Cross

= **BB** - 3**B** - 4**B** - - 12 (notice - - is +)

= (10 - 3 - 4)**B** + 12 = 3**B** 12 = 4**B** 2 = 42

6 * 7 = (**B**-4) * (**B**-3) = (½**B** 1) * (½**B** 2)

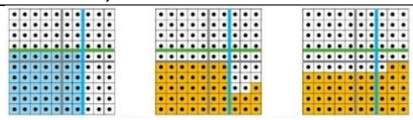
With fingers :

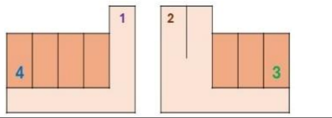
T = (1+2+5) * ½**B** + (1*2) = 8 * ½**B** 2 = 4**B** 2

T = (1+2)**B** (4*3) = 3**B** 12 = 4**B** 2 = 42

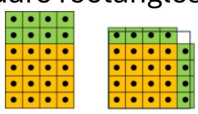
T = 6 * 7 = 6 * (6+1) = 6^2+ 6 = 36+6 = 42

ReCount 6 **7s** into 5**B** -8 **tens** and 4**B** 2 **tens**





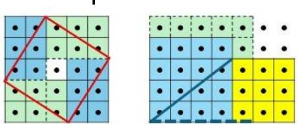
Square rectangles



To square the total T = 6 **4s**, half of the (6-4) **4s** move from the top to the side to get a 5 x 5 square, and an unfilled square in the upper corner.

This we fill with a 4****u*** slice of the top and the side. Here ***u*** is found by the equation 2****u****4 = 1, or 8****u*** = 1, or ***u*** = 1/8 = 0.125, So, 5-0.125 = 4.88. Calculator: √24=4.90

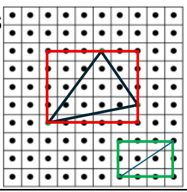
Add Squares



On a **BBB**oard four 2 **3s** arranged as a 5-by-5 square contains 2 squares (3 **3s** and 2 **2s**) as well as 2 stacks. But it also contains one square formed by the stacks' diagonals as well as four half stacks.

So, a 4- and a 3-square add as the square formed by the mutual **B**ottom-**T**op **BT** line thus having the length as the square-root of the sum, i.e., $\sqrt{(4^2 + 3^2)} = 5$. Pythagoras or Gougu rule.

Triangles



A triangle has the points **A**(3,4) and **B**(6,8) and **C**(8,5) packed inside at 4 **5s** stack. We find its angles and sides. **Ar** is **A**'s right angle.

• $\pi = n*\tan(180/n)$ for n large

In a stack with a diagonal, up = (up/out)*out = TanAngle*out.

In a 2 **3s** stack, Tan**A** = 2/3. A calculator shows **A** = 33.7

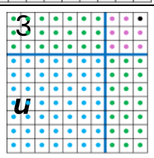
Tan**Ar** = 1/5 gives **Ar**= 11.3 and **AC** = √(1+25) = 5.1

Tan**Br** = 4/3 gives **Br**= 53.1 and **AB** = √(16+9) = 5.0

Tan**Cr** = 2/3 gives **Cr** = 33.7 and **BC** = √(4+9) = 3.6

A = 90 - 11.3 - (90 - 53.1) = 41.8 & **B** = 70.6 & **C** = 67.6

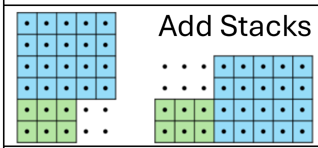
Solve quadratic equations



On a **BBB**oard, $(u+3)*(u+3)$ is a square with four parts, two squares (u^2 and 3^2), and two stacks, $2*3*u$, so that $T = u^2 + 6*u + 9$.

The quadratic equation $u^2 + 6*u + 8 = 0$ then makes the whole square go away except for 9-8 = 1. So $(u+3)^2 = 1$. This gives two solutions, $u = -2$ and $u = -4$.

Add Stacks



OnTop: **Proportionality** makes units like

2 **3s** + 4 **5s** = 1**B** 1 **5s** + 4 **5s** = 5**B** 1 **5s**

2 **3s** + 4 **5s** = 2 **3s** + 6**B** 2 **3s** = 8**B** 2 **3s**

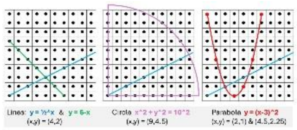
NexTo: **Calculus** adds or splits areas

2 **3s** + 4 **5s** = 4**B** -6 **8s** = 3**B** 2 **8s**

2 3s + ? **5s** = 4 **8s**

? = (4 **8s**–2 **3s**)/5 = 5**B** 1 **5s** = (T2-T1)/5 = ΔT/5

A BBBoard as a trip-board



On a 2/4 trip from the (0,0)-dot to the (x,y)-dot we have that $y/x = 2/4$, or $y = 2/4*x = ½*x$. Another line has $y = 6-x$. Where the two lines meet, we have $y = 1/2*x = 6-x$. This gives $x = 12-2*x$, or $3x = 12$, or $x = 4$. Here, $y = 6 – 4 = 2$. So, they meet in point (4,2).

On a circle with radius 10 and center in the (0,0)-dot, $x^2 + y^2 = 10^2$. On its way the $y = 1/2*x$ line meets the circle. Here $y = ½x$ makes $x^2 + y^2 = x^2 + (½x)^2 = 100$, or $x^2 + 1/4x^2 = 100$. This gives $x = 2*4.5 = 9$. Here $y = 2/4*9 = 4.5$. So, they meet in point (9,4.5).

A trip where $y = (x-3)^2$ is a bent line called a parabola. It meets the $y = 1/2*x$ line in point (x,y). Here $y = ½x$ makes $½*x = x^2 – 6*x + 9$, or $x^2 – 6.5*x + 9 = 0$. There are two solutions, $x = 2$ and $x = 4.5$. This gives $y = 1$ and $y = 5.25$. So, they meet in points (2,1) and (4.5, 5.25).

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Math DISLIKE CURED

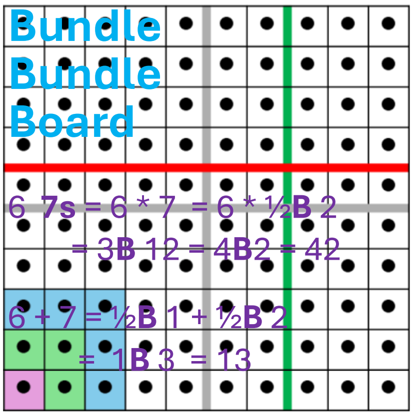
by BBM, BundleBundleMath

Counting-Numbers with Bundle-Units

*My Many Tears will not Stay – if I **Bundle** the Stray Away*

BundleCOUNT before you ADD

T = 5 = ǂ I I I = 1B 3 2s	
T = 5 = ǂ ǂ I = 2B 1 2s	
T = 5 = ǂ ǂ ǂ = 3B -1 2s	
T = 5 = <u>ǂ ǂ</u> I = 1BB 0B 1 2s	



3 ways to BundleCount: Overload, Normal, Underload

***BundleCount in 3s*: Ti** = 1B7 = 2B4 = 3B1 = 4B-2 **3s** = 1**BundtBundle** 0**Bundle** 1 = 101 **3s**

BundleCount 47 in **tens**: T = 47 = 4B 7 = 3B 17 = 5B -3 **tens**

4x7 is not 28, it is 4 **7s** = 2B 8 = 1B 18 = 3B -2 **tens**
/ can **count: 8s/2s = 4**, so 8s = 4 **2s** • / can **split: 8s/2 = 4s**, so 8s = 2 **4s**

BundleWriting tells **Bundles** from **Unbundled**

• **65 + 27**	= 6B 5 + 2B 7 = 8B 12		= 9B 2	=	**92**
• **65 – 27**	= 6B 5 – 2B 7 = 4B -2		= 3B 8	=	**38**
• **7x 48**	= 7x 4B 8	= 28B 56	= 33B 6	=	**336**
• **336 /7**	= 33B 6 /7	= 28B 56 /7	= 4B 8	=	**48**
• **336 /7**	= 33B 6 /7	= 35B -14 /7	= 5B -2	=	**48**

Math as ManyMath - A Natural Science of Many

Develops the child's natural Many-mastery and numeracy

Allan.Tarp@MATHeCADEMY.net

CHILDREN'S OWN BUNDLE-NUMBERS WITH UNITS
may Reach the UN Development Goal: All are Numerate by 2030

Allan Tarp, MATHeCADEMY.net, Allan.Tarp@gmail

A01. Understanding & using NUMbers, Children are NUMERATE before school using BBM, BundleBundleMath

II II "No, that is not 4, that is 2 twos". Said a 3year old child when asked "How many years next time?" As educated, we only see the **essence**. As uneducated, the child sees the **existence**, bundles of **twos** in **space**, and 2 of them when counted in **time**.
The number 'two' exists both in **space** and in **time**. In **space**, 2 exists as **twos**, a **space-number**, a **B**undle-number of **twos**, a two-**B**undle.
In **time**, 2 exists together with the unit that was counted, as 2 units, **a time-number**, or a counting-number.
V II : Bundle-numbers falsify '1+1 = 2' with 2 V-signs showing that 1 **1s** + 1 **1s** = 1 **2s** and 2 **1s** + 1 **2s** = 1 **4s**, and not 3 **3s** as expected if **1+1 = 2**.

A02. Counting fingers in space

Space-count five fingers in **2s**, **3s** and **4s** using 'flexible **B**undle-numbers'. 5 = 1**B**3 = 2**B**1 = 3**B**-1 = 1**BB** 0**B** 1 **2s**.
Ten = 2**BB** 0**B** 2 = 1**BBB** 0**BB** 1**B** 0 **2s**. T = 38 = 3**B** 8 = 2**B** 18 = 4**B** -2. **Demodel**: 35+46 = 3**B** 5 +4**B** 6 = 7**B** 11 = 8**B** 1 = 81
6*28 = 6*2**B** 8 = 12**B** 48 = 16**B** 8 = 168. And T = 4567 = 4**BBB** 5**BB** 6**B** 7, T = 4*B^3 + 5*B^2 + 6*B + 7*1. **No carry or place values.**

A03. Add and subtract 1digit numbers counted in half-bundles

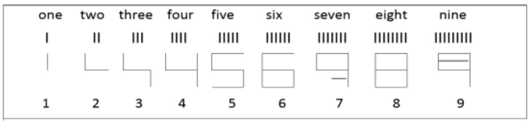
T = 6 + 7 = ½**B** 1 + ½**B** 2 = 1**B** 3 = 13. T = 4 + 7 = ½**B** -1 + ½**B** 2 = 1**B** 1 = 11. T = 3 + 4 = ½**B** -2 + ½**B** -1 = 1**B** -3 = 7
T = 8 - 6 = ½**B** 3 - ½**B** 1 = 3 - 1 = 2. T = 6 - 4 = ½**B**1 - ½**B** -1 = 1 - - 1 = 2 (- - = +). T = 6 - 8 = ½**B** 1 - ½**B** 3 = 1 - 3 = - 2

A04. Time-counting fingers

Time-count fingers in ½**B**, "1,2,3,4,5,6" no, "0**B** 1, 0**B** 2, 0**B** 3, 0**B** 4, 0**B** 5, or ½**B** 0, ½**B** 1". Time-count from 88 to 102: "8**B** 8, 8**B** 9, 8**B** ten or 9**B** 0, …, 9**B** 9, 9**B** ten or ten**B** 0 or ten-ten 0ten 0 or 1**BB** 0**B** 0, 1**BB** 0**B** 1, 1**BB** 0**B** 2".

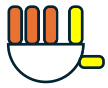
A05. Digits are icons

Four sticks in the 4-icon: IIII -> IIII -> 4 Etc.

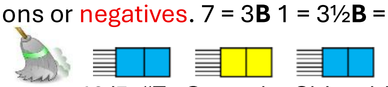


A06. Operations are icons, ReCount & ReUnite formulas

Push-away & -back to stack, (division-broom & multiplication-lift), 6 = 3x2 = (6/2) x 2, **T = (T/B) x B** (**ReCount formula**)
Pull-away & -back (minus-rope and plus up-or-on cross), 5 = (5-2) + 2, **T = (T-B) + B** (**ReUnite formula**)
On-top of a stack, the unbundled become decimals, fractions or negatives. 7 = 3**B** 1 = 3½**B** = 4**B** -1 **2s**.

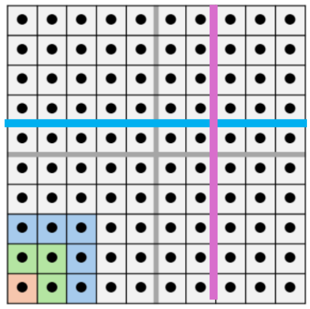


A07. Recounting between from icon and tens



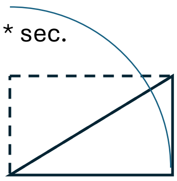
How many **5s** in 40. ReCount 40 in **5s**: *u**5 = 40 = (40/5)*5, so *u* = 40/5, "To Opposite Side with Opposite Sign".
6 **7s** = ?tens. 6*7 = 6*½**B** 2 = 3**B** 12 = 4**B** 2 = 42. Or, 6*7 = (**B**-4)*(**B**-3) = From **BB**, pull-away 4**B** & 3**B** & pull-back the 4*3 pulled-away twice = 3**B** 12 = 4**B** 2 = 42. So (**B**-4)*(**B**-3) = **BB** - 4**B** - 3**B** + 4*3, and - * - is +.

***B**undle**B**undle**B**oard*



A08. The recount-formula gives per-numbers as 2$/5kg

20kg = (20/5) * 5kg = (20/5) * 2$ = 8$. Meter = (meter/sec) * sec = speed * sec.
Fractions with like units: 2$/5$ = 2/5. Trigonometry in a stack:
up = (up/out) * out = tan(Angle) * out. π = *n* * tan(180/*n*) for *n* large.

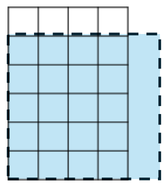


A09. Bundle-bundles are squares

2 **2s** = 1**BB** 0**B** 0 **2s**. 3 **3s** = 1**BB** 0**B** 0 **3s**, etc.
T = 1**BB** 2**B** 1 = next **BB**, T = 1**BB** -2**B** 1 = before **BB**.

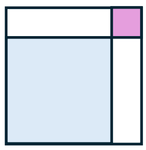
A10. Squaring stacks

T = 6 **4s** = 1**BB** what? (where **B**=√(6*4)). Guess 1: '(6-1) **(4+1)s**' or '5 **5s'**, since ½(6-4) = 1. The empty 1-corner needs two 't **4s**' stacks, and t*4 = ½ gives t = 1/8. Guess 2: '4.9 **4.9s**'. **B**ingo, so √(6*4) = √24 = 4.9

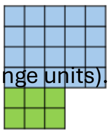


A11. Solving quadratics

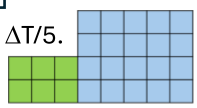
A (*u*+3) square has two squares and two stacks: (*u*+3)^2 = *u*^2 + 3^2 + 2*3**u* = *u*^2 + 6**u* + 9.
If *u*^2 + 6**u* + 8 = 0, all disappears but 1, so, (*u*+3)^2 = 1, so *u* = -4 or u = -2.



A12. Adding next-to and on-top, and reversed



2 **3s** + 4 **5s** = ? **8s or 5s**. (Integral calculus add areas, recounting change units). 2 **3s** + ? **5s** = 3 **8s**, ? =(T2-T1)/5 = ΔT/5.



A13. Adding per-numbers and fractions, and reversed

2kg at 3$/kg + 4kg at 5$/kg = (2+4)kg at (3*2 + 5*4)/(2+4) $/kg. Integral calculus adds (locally constant) per-numbers.

A14. The Algebra Square

ReUnites Unlike and Like Unit- & Per-numbers

Unite/ *Split Totals in*	**Unlike**	**Like**
Unit-numbers m, s, kg, $	**T = a + n** *T – n = a*	**T = a * n** *T/n = a*
Per-numbers m/s, $/100$ = %	**T = ∫ f dx** *dT/dx = f*	**T = a^b** *^{b}√T = a* *$log_a(T) = b$*

A15. Fact, Fiction & Fake Models

MrAlTarp Videos:

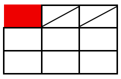
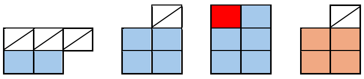
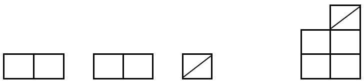
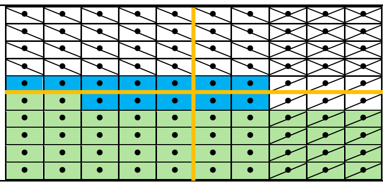
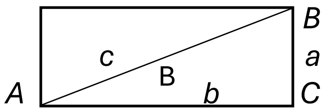
Fact models are 'since-then' stories that quantify & predict predictable quantities by using factual numbers and formulas. Typically, they model the past and the present. They need to be checked for correctness and units.

Fiction models are 'if-then' stories that quantify and predict unpredictable quantities by using assumed numbers and formulas. Typically, they model the future. They need to be supplied with scenarios, built on alternative assumptions.

Fake models are 'what-then' stories that quantify and predict unpredictable qualities, using fake numbers & formulas. Typically, they add without units, or they hide alternatives. Here, number-stories need to be replaced by word-stories.

Bundle-Numbers with Units

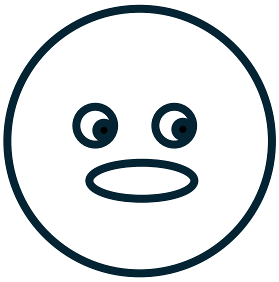
Respect & Develop **Kid's Own BundleBundle-Math**

	Outside &	***Inside Math***
Digits as ICONS III IIII IIIII	ㄣ 4 5	3 4 5
Operations as ICONS	Push-away & back Pull-away & back	/ X – +
Count 5 Fingers in **4s** & **3s** & **2s** using BundleCounting & BundleNumbers	I, II, III, IIII, IIII I (4s) I, II, III, III I, III II (3s) I, II, II I, II II, II II I (2s)	T = 0B 1 = 0B 1 = 0B 1 T = 0B 2 = 0B 2 = 1B 0 T = 0B 3 = 1B 0 = 1B 1 T = 1B 0 = 1B 1 = 2B 0 = 1BB 0B 0 T = 1B 1 = 1B 2 = 1BB 0B 1
Unbundled creates Decimals & Fractions & Negative Numbers	8: IIIIIIII → III III II 	T = 2B 2 **3s** T = 2 2/3 **3s** T = 3B -1 **3s** T = 1BB 0B -1 (**T = *p*x^2 + q*x + r***)
ReCount in Same Unit creates flexible BundleNumbers IIIII III → 53	5: II III II II I II II II 	T = 1B 3 *Overload* T = 2B 1 *Standard* T = 3B -1 *Underload* T = 1BB 0B 1 *BundleBundle* T = 53 = 5**B** 3 = 4**B** 13 = 6**B** -7 **tens**
Flexible BundleNumbers ease Operations	65 + 27 = ? = 65 – 27 = ? = 7 * 48 = ? = 336 /7 = ? =	6**B** 5 + 2**B** 7 = 8**B** 12 = 9**B** 2 = 92 6**B** 5 – 2**B** 7 = 4**B** -2 = 3**B** 8 = 38 7 * 4**B** 8 = 28**B** 56 = 33**B** 6 = 336 33**B** 6 /7 = 28**B** 56 /7 = 4**B** 8= 48
ReCount in New Unit 5 = ? **2s** *ReCount-Formula:*	 T = (5/2) * 2 T = (T/**B**) * **B**	T = 5 = (5/2)*2 = ? = 2**B** 1 **2s** more: 5/2 2.more 5 - 2*2 1
ReCount: Tens to Icons 35 = III IIIII = ? **7s**	3**B**5 **tens** = *u**7	*u**7 = 35 = (35/7)*7 so, *u* = 35/7
ReCount: Icons to Tens 6 **7s** = ? **tens** 		T = 6 **7s** = 6*7 (= 6*½**B**2 = 3**B**12 = 4**B**2) = (**B** – 4) * (**B** – 3) = **BB** – 4**B** – 3**B** - - 4*3 = 10**B** – 7**B** +12 (pulled-away twice) = 3**B**12 = 4**B**2 **tens** = 42
ReCount units gives PerNumbers	2$ per 3kg = 2$/3kg	T = 6$ = (6/2) * 2$ = (6/2) * 3kg = 9kg
Like Units: Fractions 5% of 40	5$/100$ of 40$	T = 40$ = (40/100)*100$ gives (40/100)*5$ = 2$
ReCount a Block halved by its diagonal		*a* = (*a/c*)**c* = sin *A***c* *a* = (*a/b*)**b* = tan *A***b* π = *n* * tan(180/*n*) *for n large* *c*c = a*a + b*b*

Allan.Tarp@MATHeCADEMY.net  MrAlTarp YouTube:

Add NextTo OnTop	T = 2 **3s** + 4 **5s** = 3**B**2 **8s** T = 2 **3s** + 4 **5s** = 1**B**1 **5s** + 4 **5s** = 5**B**1 **5s**	 *Integration* *Proportionality*
Add PerNumbers	2kg at 3$/kg + 4kg at 5$/kg = (2+4) kg at (2*3+4*5)/6 $/kg *(calculus adds areas)*	
MatheMatism	ADDING WITHOUT UNITS Digits or Fractions or Per-numbers	

Booth Poster at ICME 15 in 2024 in Sidney Australia



Can we Math?
No, we can't!

Math is not an action word.
But we can Count & Add in Time & Space.

So let's teach, not how to **Math**, but how to **CATS** as the MATHeCADEMY.net does. Therefore, forget about place values and carrying. Use **EXISTENCE**, not **essence**. And children just love to Bundle-count and BundleBundle-count. Why? Because with **one hand with five fingers** they can learn core math. *(published on **LinkedIn**)*

COUNT

Five fingers in Bundles of **3s** gives a total of

I I I I I ● III I I ● III IIX

T = 0B5 = 1B2 = 2B-1 **3s**

Bundle-counting in 2s gives

I I I I I ● II I I I ● II I I ● II I IX ● II I I

T = 0B5 = 1B3 = 2B1 = 3B-1 = 1BB 0B 1 **2s**

With 2 hands we get:

T = 2BB 0B 2 = 1BBB 0BB 1B 0 **2S**

So, counting in **2s**, 2*(101) = 1010

REUNITE

Two fingers pulled-away (-) & pulled-back (+) gives 5 = (5-2)+2, or as a **reunite-formula**,

T = (T-B)+B with unspecified numbers.

It solves addition and subtraction equations:

u+3 = 5 = (5-3)+3, so *u* = 5-3 = 2.

u-3 = 5, *u* = (*u*-3)+3 = 5+3 = 8.

5-*u* = 3, but, 5 = (5-*u*)+*u* = 3+*u*, so, *u*+3 = 5.

4 fingers have 3 parts, where 1 finger has 2 parts.

RECOUNT

Four three parts fingers pushed-away (/) and pushed-back (×) gives the **recount-formula**

T = (T/3)×3, or

T = (T/B)×B with unspecified numbers.

It solves multiplication and division equations:

*u**3 = 12 = (12/3)*3, so *u* = 12/3 = 4.

u/3 = 5, so *u* = (*u*/3)*3 = 5*3 = 15.

12/*u* = 3, but 12 = (12/*u*)**u* = 3**u*, so *u**3= 12.

RECOUNT

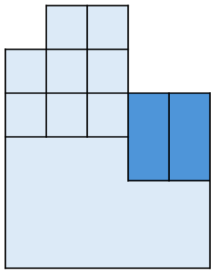
The parts of two fingers:

T = 3B 0 = 1BB 1B 0 **2s**, or

T = 2B 0 = 1BB -1B 0 **3s**, or

T = 1B 2 = 2B -2 **4s**, or

T = 1B 1 = 2B -4 **5s**



ADD

One **2s** plus two **3s** as **3s** never gives three **5s**. Instead, it gives

T = 2B 2 = 3B -1 = 1BB 0B -1 **3s**.

Adding them as **2s** gives

T = 4B0 = 3B2 = 2B4 = 1B6 = 0B8 = 5B-2

= 1BB 2B0 = 2BB 0B 0 = 1BBB 0BB 0B 0 **2s**.

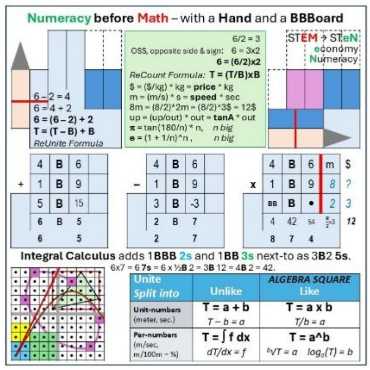
Adding them next-to as **5s** gives

T = 1B3 = 2B -2 **5s**.

SQUARE

BundleBundles are squares.

1 **1s** gives	1
1 **2s** gives	4
1 **3s** gives	9
1 **4s** gives	16
1 **5s** gives	25
1 **6s** gives	2B 16
1 **7s** gives	4B 9
1 **8s** gives	6B 4
1 **9s** gives	8B 1
And as 1B0,	
1 **tens** gives	
1BB=1B^2	



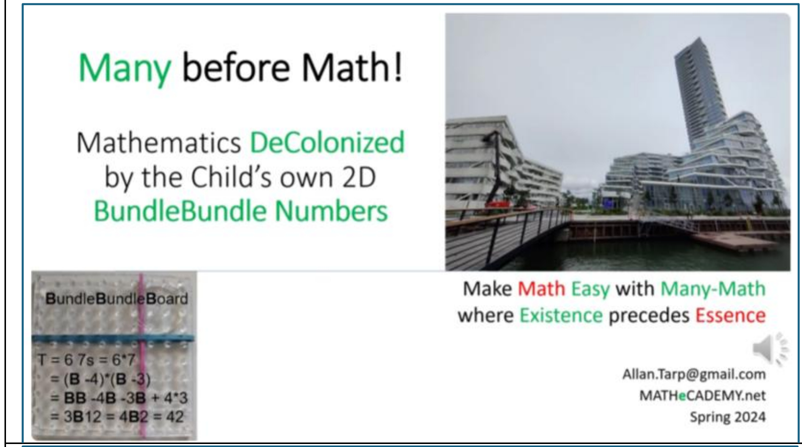
More about BBM-Numeracy Counting and Adding with units in Time and Space, the **CATS** method, on

- linkedin.com/in/allantarp/
- **MrAlTarp YouTube** videos
- MATHeCADEMY.net, that also offers free online teacher education.

References

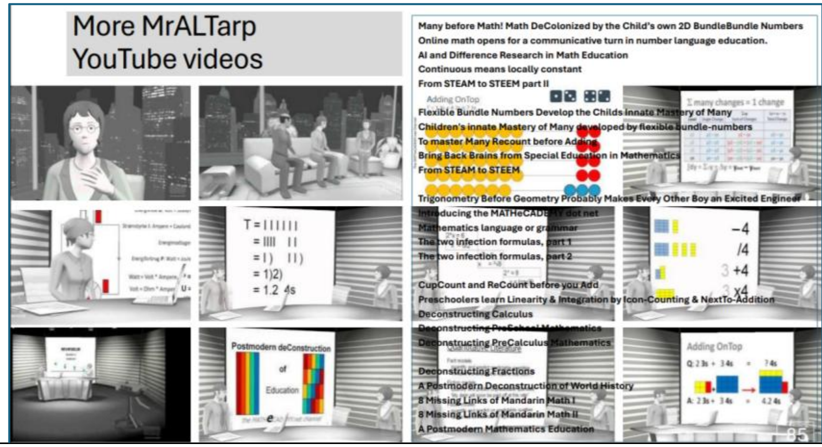
Tarp, A. (2018). Mastering Many by counting and re-counting before adding on-top and next-to. *Journal of Mathematics Education, 11*(1), 103-117.

Study Groups in Numeracy Now but How? Online conference with Allan Tarp, MATHeCADEMY.net, and/or



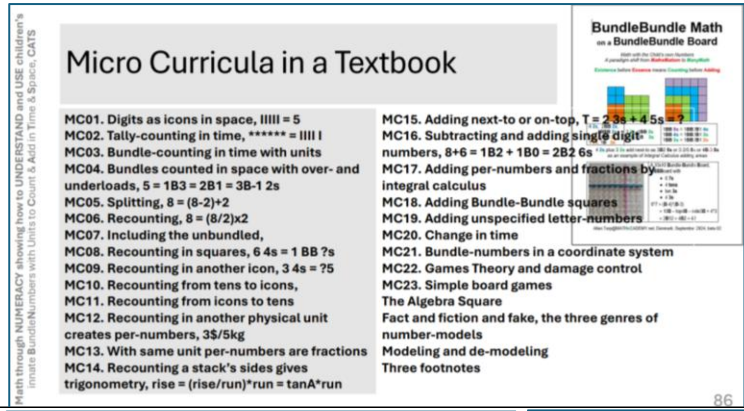
01. YouTube Video: https://youtu.be/uV_SW5JPWGs

04. More MrALTarp Videos

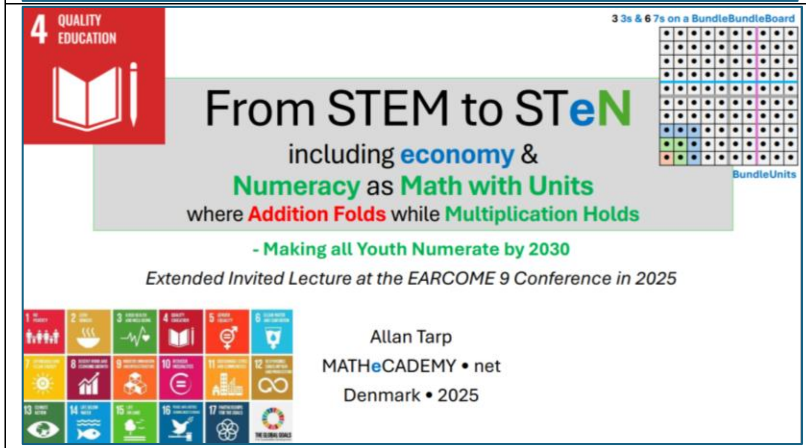


02. Workshop and folder

05. Micro Curricula in Textbook

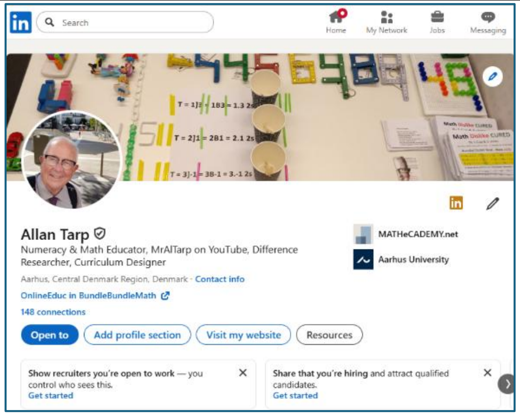


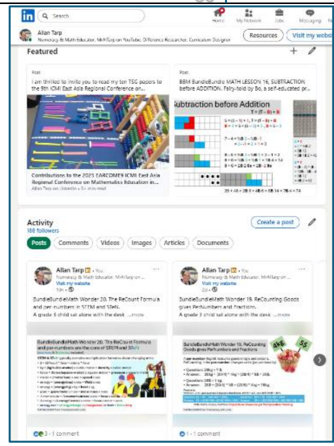
http://mathecademy.net/bundlebundlemath-on-a-bboard/



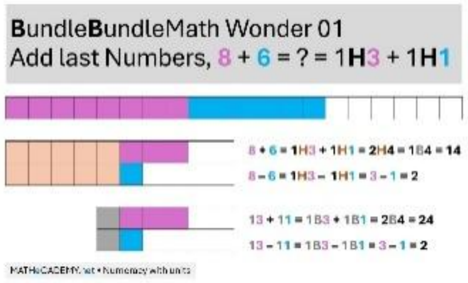
03. PP Presentation, http://mathecademy.net/from-stem-to-sten/

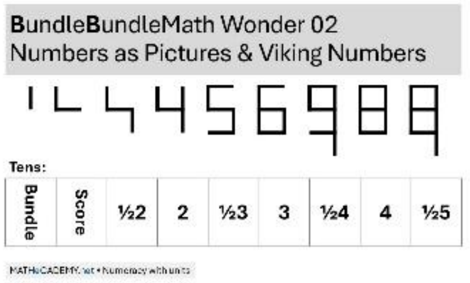
06. Follow www.linkedin.com/in/allantarp/

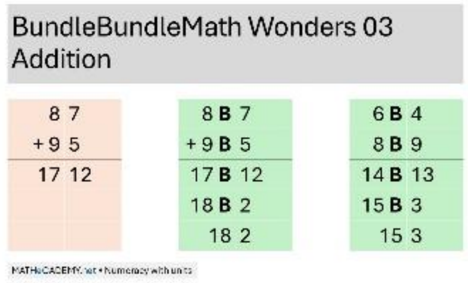


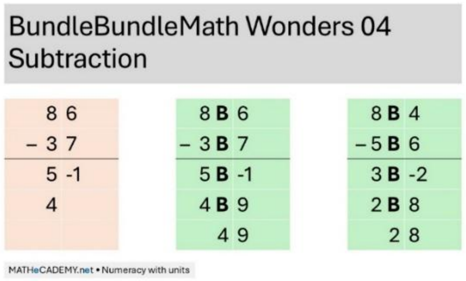


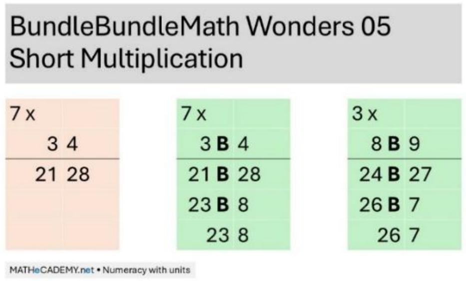
Bundle**B**undleMath Wonders: **B**undleUnits make Losers Users

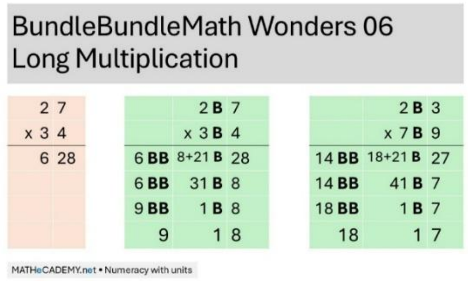


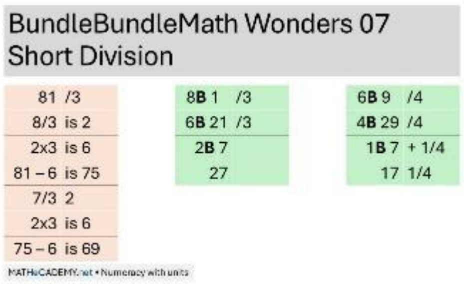


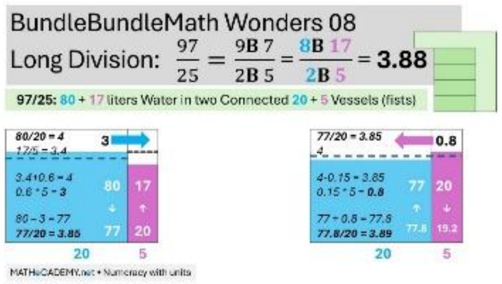


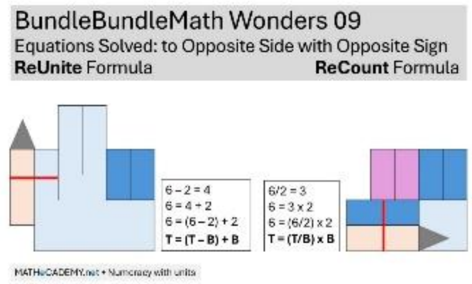


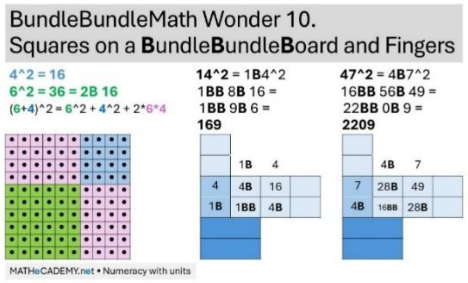


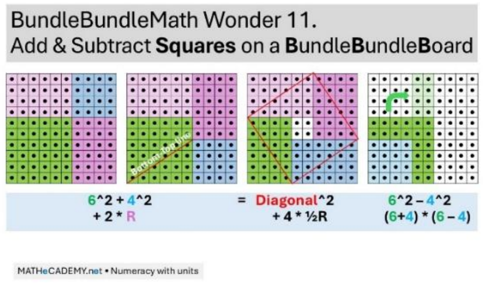


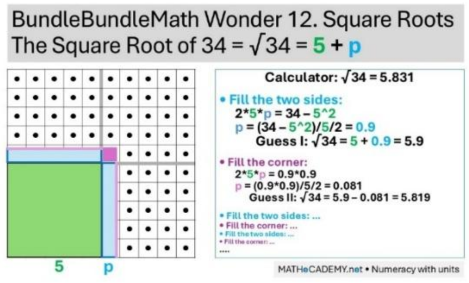


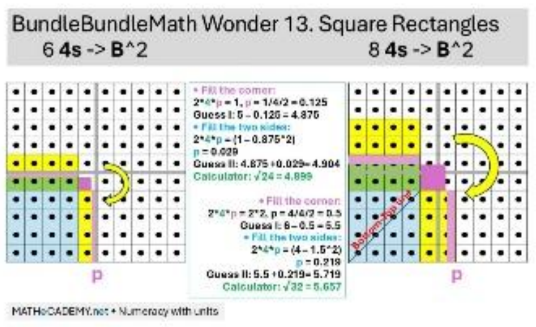











BundleBundleMath Wonder 13. Square Rectangles
6 4s -> B^2
8 4s -> B^2
• Fill the corner:
2*4*p = 1, p = 1/4/2 = 0.125
Guess I: 5 – 0.125 = 4.875
• Fill the two sides:
2*4*p = (1 – 0.875*2)
p = 0.029
Guess II: 4.875 + 0.029 = 4.904
Calculator: √24 = 4.899
• Fill the corner:
2*4*p = 2*2, p = 4/4/2 = 0.5
Guess I: 6 – 0.5 = 5.5
• Fill the two sides:
2*4*p = (4 – 1.5^2)
p = 0.219
Guess II: 5.5 + 0.219 = 5.719
Calculator: √32 = 5.657
p
p
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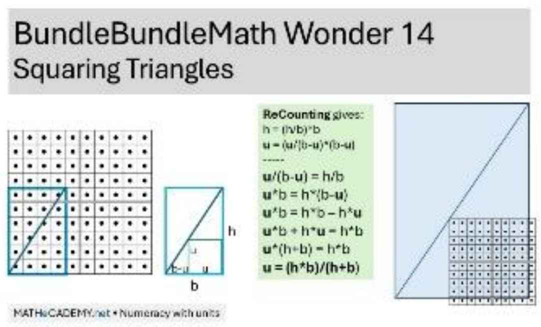
BundleBundleMath Wonder 14
Squaring Triangles
ReCounting gives:
h = (h/b)*b
u = (u/(b-u))*(b-u)
-----
u/(b-u) = h/b
u*b = h*(b-u)
u*b = h*b – h*u
u*b + h*u = h*b
u*(h+b) = h*b
u = (h*b)/(h+b)
h
b
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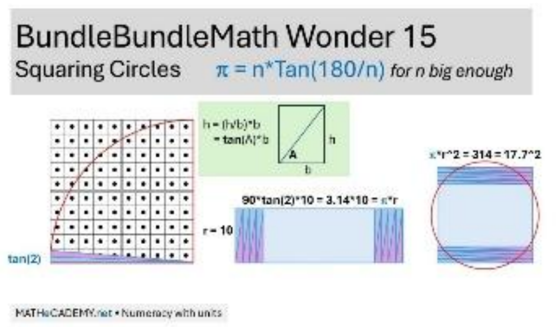
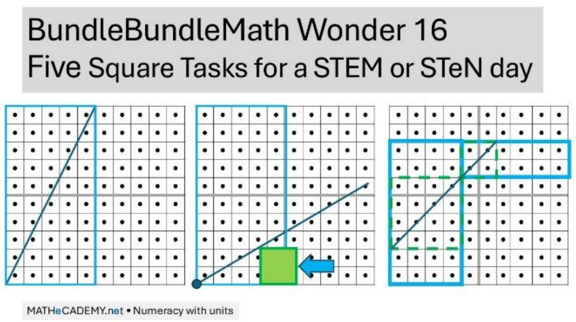

BundleBundleMath Wonder 15
Squaring Circles π = n*Tan(180/n) for n big enough
h = (h/b)*b
= tan(A)*b
A
h
b
π*r^2 = 314 = 17.7^2
90*tan(2)*10 = 3.14*10 = π*r
r = 10
tan(2)
MATHeCADEMY.net • Numeracy with units


BundleBundleMath Wonder 16
Five Square Tasks for a STEM or STeN day
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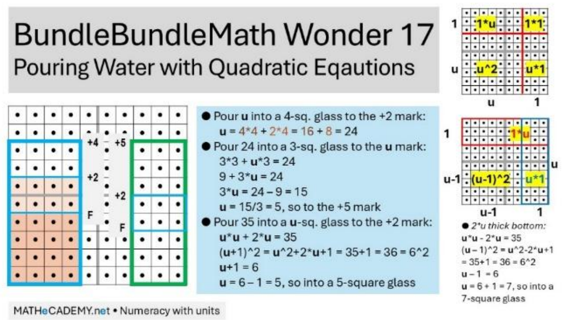
BundleBundleMath Wonder 17
Pouring Water with Quadratic Eqautions
● Pour u into a 4-sq. glass to the +2 mark:
u = 4*4 + 2*4 = 16 + 8 = 24
● Pour 24 into a 3-sq. glass to the u mark:
3*3 + u*3 = 24
9 + 3*u = 24
3*u = 24 – 9 = 15
u = 15/3 = 5, so to the +5 mark
● Pour 35 into a u-sq. glass to the +2 mark:
u*u + 2*u = 35
(u+1)^2 = u^2+2*u+1 = 35+1 = 36 = 6^2
u+1 = 6
u = 6 – 1 = 5, so into a 5-square glass
u^2
u*1
u
1
1*u
(u-1)^2
u-1
● 2*u thick bottom:
u*u - 2*u = 35
(u – 1)^2 = u^2-2*u+1
= 35+1 = 36 = 6^2
u – 1 = 6
u = 6 + 1 = 7, so into a 7-square glass
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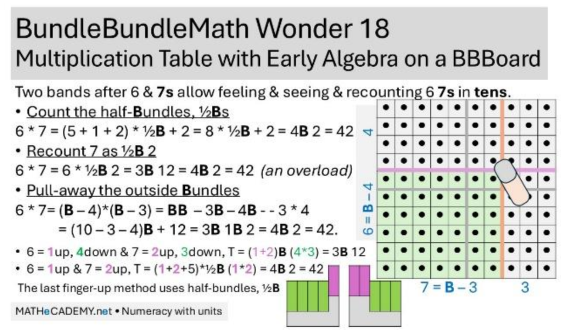
BundleBundleMath Wonder 18
Multiplication Table with Early Algebra on a BBBoard
Two bands after 6 & 7s allow feeling & seeing & recounting 6 7s in tens.
• Count the half-Bundles, ½Bs
6 * 7 = (5 + 1 + 2) * ½B + 2 = 8 * ½B + 2 = 4B 2 = 42
• Recount 7 as ½B 2
6 * 7 = 6 * ½B 2 = 3B 12 = 4B 2 = 42 (an overload)
• Pull-away the outside Bundles
6 * 7 = (B – 4)*(B – 3) = BB – 3B – 4B - - 3 * 4
= (10 – 3 – 4)B + 12 = 3B 1B 2 = 4B 2 = 42.
• 6 = 1up, 4down & 7 = 2up, 3down, T = (1+2)B (4*3) = 3B 12
• 6 = 1up & 7 = 2up, T = (1+2+5)*½B (1*2) = 4B 2 = 42
The last finger-up method uses half-bundles, ½B
6 = B – 4
4
7 = B – 3
3
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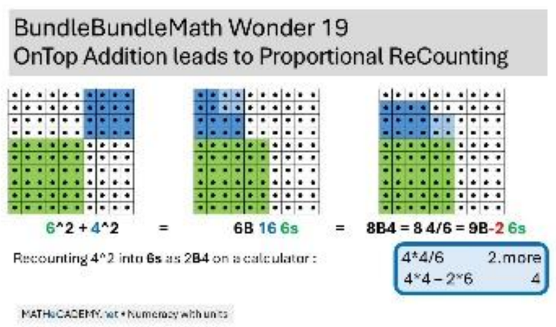
BundleBundleMath Wonder 19
OnTop Addition leads to Proportional ReCounting
6^2 + 4^2 = 6B 16 6s = 8B4 = 8 4/6 = 9B-2 6s
Recounting 4^2 into 6s as 2B4 on a calculator:
4*4/6 2.more
4*4 – 2*6 4
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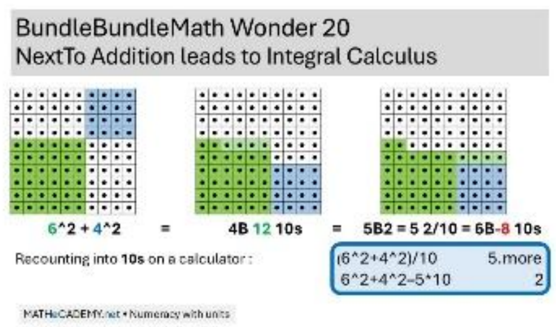
BundleBundleMath Wonder 20
NextTo Addition leads to Integral Calculus
6^2 + 4^2 = 4B 12 10s = 5B2 = 5 2/10 = 6B-8 10s
Recounting into 10s on a calculator:
(6^2+4^2)/10 5.more
6^2+4^2–5*10 2
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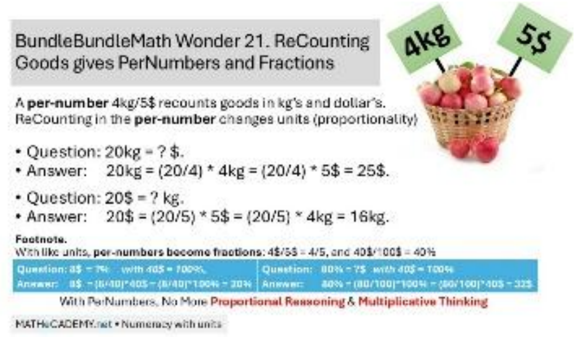
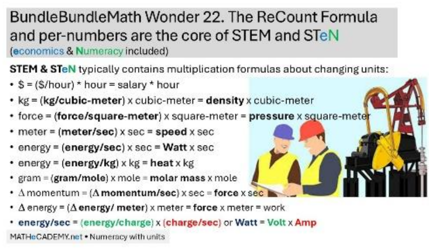
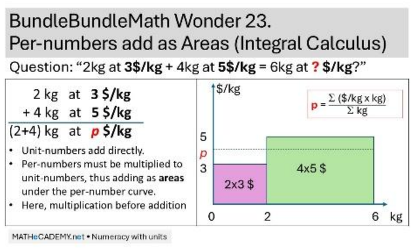

BundleBundleMath Wonder 21. ReCounting
Goods gives PerNumbers and Fractions
4kg
5$
A per-number 4kg/5$ recounts goods in kg's and dollar's.
ReCounting in the per-number changes units (proportionality)
• Question: 20kg = ? $.
• Answer: 20kg = (20/4) * 4kg = (20/4) * 5$ = 25$.
• Question: 20$ = ? kg.
• Answer: 20$ = (20/5) * 5$ = (20/5) * 4kg = 16kg.
Footnote.
With like units, per-numbers become fractions: 4$/5$ = 4/5, and 40$/100$ = 40%
With PerNumbers, No More Proportional Reasoning & Multiplicative Thinking
MATHeCADEMY.net • Numeracy with units


BundleBundleMath Wonder 22. The ReCount Formula
and per-numbers are the core of STEM and STeN
(economics & Numeracy included)
STEM & STeN typically contains multiplication formulas about changing units:
• $ = ($/hour) * hour = salary * hour
• kg = (kg/cubic-meter) x cubic-meter = density x cubic-meter
• force = (force/square-meter) x square-meter = pressure x square-meter
• meter = (meter/sec) x sec = speed x sec
• energy = (energy/sec) x sec = Watt x sec
• energy = (energy/kg) x kg = heat x kg
• gram = (gram/mole) x mole = molar mass x mole
• Δ momentum = (Δ momentum/sec) x sec = force x sec
• Δ energy = (Δ energy/ meter) x meter = force x meter = work
• energy/sec = (energy/charge) x (charge/sec) or Watt = Volt x Amp
MATHeCADEMY.net • Numeracy with units


BundleBundleMath Wonder 23.
Per-numbers add as Areas (Integral Calculus)
Question: "2kg at 3$/kg + 4kg at 5$/kg = 6kg at ? $/kg?"
2 kg at 3 $/kg
+ 4 kg at 5 $/kg
(2+4) kg at p $/kg
• Unit-numbers add directly.
• Per-numbers must be multiplied to unit-numbers, thus adding as areas under the per-number curve.
• Here, multiplication before addition
$/kg
p = Σ ($/kg x kg) / Σ kg
5
p
3
2x3 $
4x5 $
0
2
6
kg
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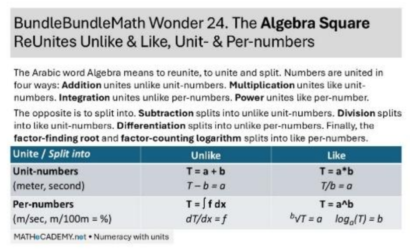
BundleBundleMath Wonder 24. The Algebra Square
ReUnites Unlike & Like, Unit- & Per-numbers
The Arabic word Algebra means to reunite, to unite and split. Numbers are united in four ways: Addition unites unlike unit-numbers. Multiplication unites like unit-numbers. Integration unites unlike per-numbers. Power unites like per-number.
The opposite is to split into. Subtraction splits into unlike unit-numbers. Division splits into like unit-numbers. Differentiation splits into unlike per-numbers. Finally, the factor-finding root and factor-counting logarithm splits into like per-numbers.
Unite / Split into | Unlike | Like
Unit-numbers (meter, second) | T = a + b, T – b = a | T = a*b, T/b = a
Per-numbers (m/sec, m/100m = %) | T = ∫ f dx, dT/dx = f | T = a^b, b√T = a, log_a(T) = b
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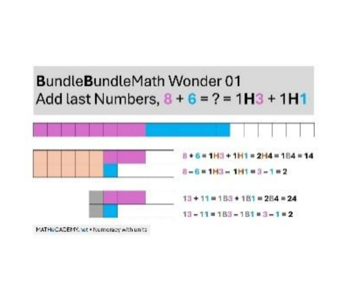
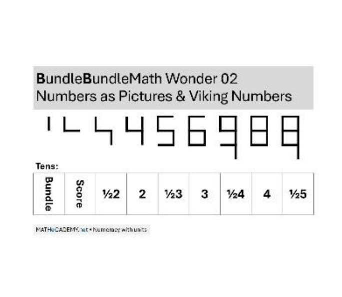
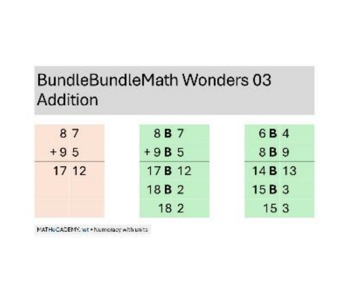
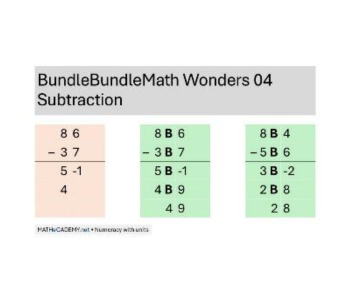
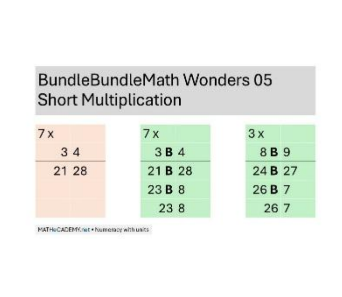
BundleBundleMath Wonders: Bundle-units make Losers Users

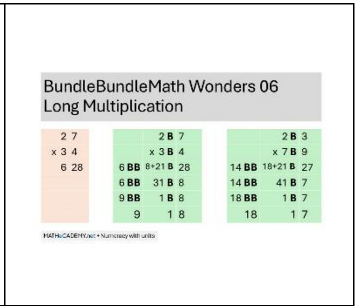


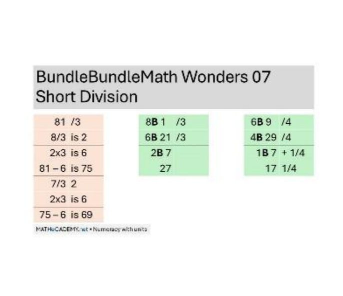


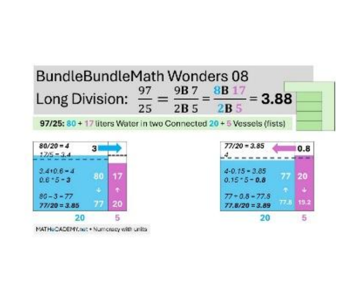


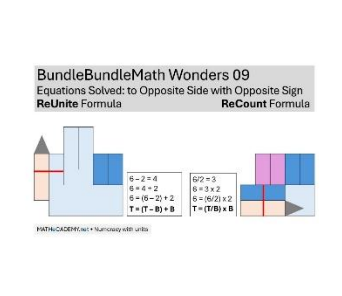


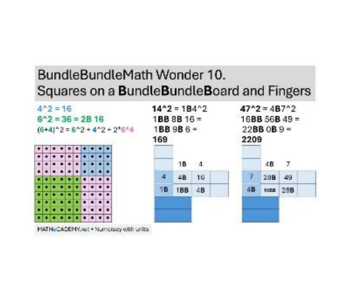


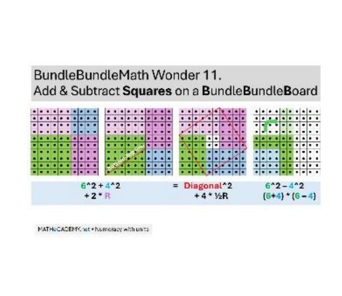


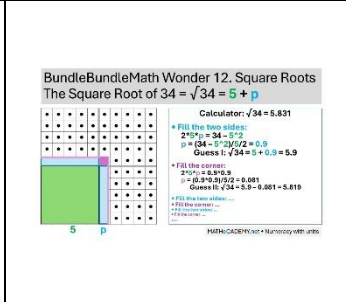


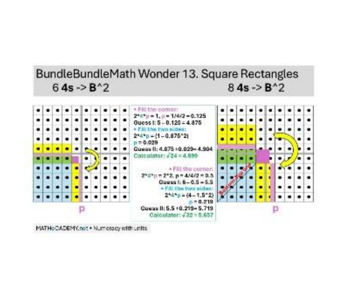


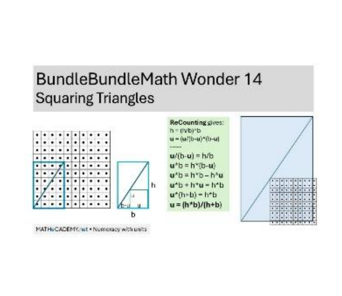


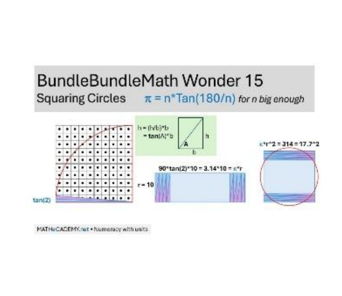


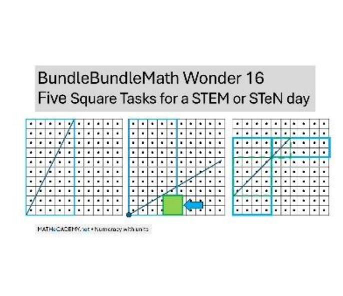


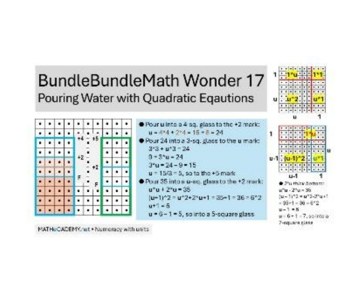


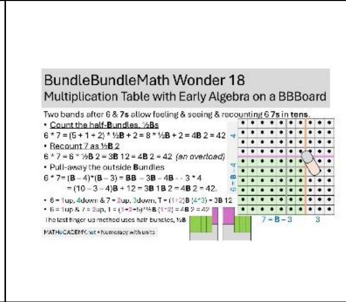


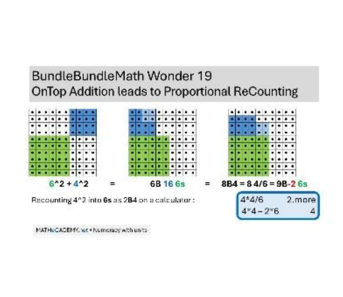


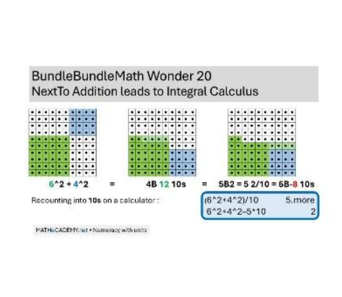


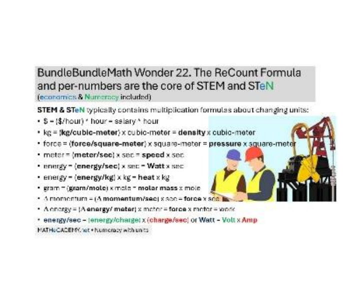


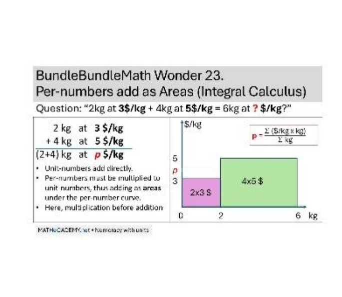


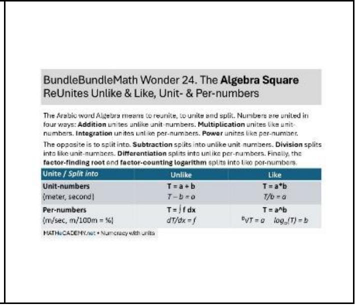












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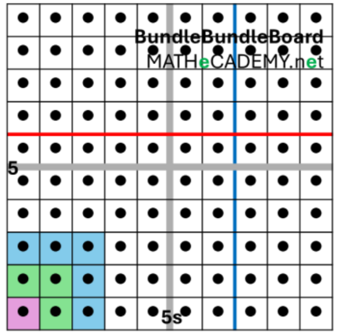
Numeracy for All by 2030

Numeracy as BundleBundleMath

on a BundleBundleBoard



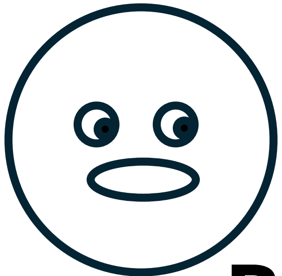
5 = 0B5 = 1B3 = 2B1 = 3B-1 = 1BB0B1 **2s**

Math learned by **ReCounting** in **BundleNumbers** with **Units**

From STEM to STeN

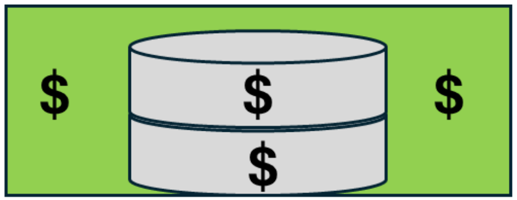
Economy & Numeracy included

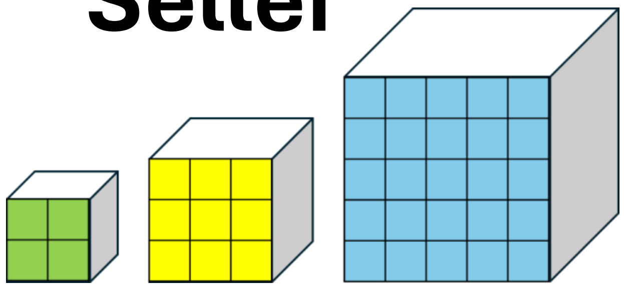
The Marketplace



Buyer

Seller





10$
100$
1000$

B
BB
BBB

2s	3s	5s
4s	9s	25s
8s	27s	125s