

Talbott Springs At Home Learning Family Math Series



Fact Fluency:

$+$, $-$, \times , $\&$ \div

October 21, 2015

Science/Math Prodigy?

**Jack
Andraka**

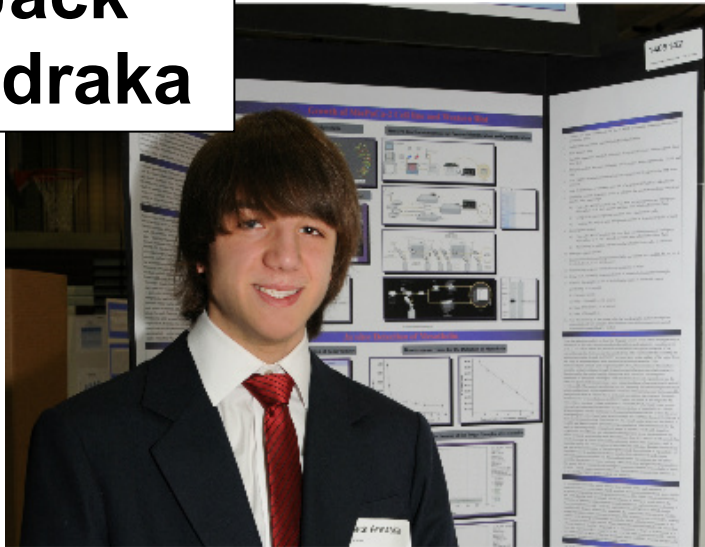


**\$75,000
scholarship**



Science/Math Prodigy?

**Jack
Andraka**



- **contacted 200 scientists and laboratories for time and space**
- **was rejected by the first 199 scientists and laboratories he contacted**

Mental Math & Fluency Expectations

GRADE	END-OF-YEAR EXPECTATION	EXAMPLES
K	fluently + and – within 5	$4 + 1$ $5 - 2$ $3 + 2$
1	fluently + and – within 10	$7 - 5$ $4 + 3$ $9 - 6$
	± 10 for any two-digit number	$26 + 10$ $84 - 10$
2	know from memory all sums of two one-digit addends	$6 + 7$ $8 + 3$ $7 + 8$ $2 + 7$ $9 + 5$ $4 + 9$
	± 10 and ± 100 for any three-digit number	$473 - 10$ $816 + 10$ $352 - 100$ $709 + 100$
3	know from memory all products of one-digit factors	4×9 8×6 5×7 7×3 2×9 4×8

Computation Expectations by Grade

GRADE	END-OF-YEAR EXPECTATION
K	<ul style="list-style-type: none">• add and subtract within 10
1	<ul style="list-style-type: none">• add and subtract within 20• subtract two-digit multiples of 10• add within 100
2	<ul style="list-style-type: none">• add and subtract within 1,000
3	<ul style="list-style-type: none">• add and subtract within 1,000• multiply two one-digit factors• multiply one-digit factors by a multiple of 10
4	<ul style="list-style-type: none">• add and subtract within 1,000,000• multiply: 1 by 4 and 2 by 2• divide: up 4 by 1
5	<ul style="list-style-type: none">• multiply multi-digit numbers• divide: up to 4 by 2• perform all operations on decimals

How Hard Are Basic Facts?

+	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

The Mysteries of Basic Facts

+	A	B	C	D	E	F
A	A	B	C	D	E	F
B	B	C	D	E	F	G
C	C	D	E	F	G	H
D	D	E	F	G	H	I
E	E	F	G	H	I	J
F	F	G	H	I	J	K

The Mysteries of Basic Facts

Let's Practice

Work with
a partner
to practice
your facts
with the
flash cards.

+	A	B	C	D	E	F
A	A	B	C	D	E	F
B	B	C	D	E	F	G
C	C	D	E	F	G	H
D	D	E	F	G	H	I
E	E	F	G	H	I	J
F	F	G	H	I	J	K

The Mysteries of Basic Facts

Let's Debrief

+	A	B	C	D	E	F
A	A	B	C	D	E	F
B	B	C	D	E	F	G
C	C	D	E	F	G	H
D	D	E	F	G	H	I
E	E	F	G	H	I	J
F	F	G	H	I	J	K

- What was the experience like? How did you feel when you were working with the flash cards?
- In what ways would constant practice with the flash cards *help* you?
- In what ways would it not help you?

Facts and More Facts

+	A	B	C	D	E	F
A	A	B	C	D	E	F
B	B	C	D	E	F	G
C	C	D	E	F	G	H
D	D	E	F	G	H	I
E	E	F	G	H	I	J
F	F	G	H	I	J	K

+	A	B	C	D	E	F	G	H	I	J
A	A	B	C	D	E	F	G	H	I	J
B	B	C	D	E	F	G	H	I	J	K
C	C	D	E	F	G	H	I	J	K	L
D	D	E	F	G	H	I	J	K	L	M
E	E	F	G	H	I	J	K	L	M	N
F	F	G	H	I	J	K	L	M	N	O
G	G	H	I	J	K	L	M	N	O	P
H	H	I	J	K	L	M	N	O	P	Q
I	I	J	K	L	M	N	O	P	Q	R
J	J	K	L	M	N	O	P	Q	R	S

Facts and More Facts

Addition Relationships

+	A	B	C	D	E	F
A	A	B	C	D	E	F
B	B	C	D	E	F	G
C	C	D	E	F	G	H
D	D	E	F	G	H	I
E	E	F	G	H	I	J
F	F	G	H	I	J	K

Multiplication Relationships

x	A	B	C	D	E	F
A	A	A	A	A	A	A
B	A	B	C	D	E	F
C	A	C	E	G	I	K
D	A	D	G	J	M	P
E	A	E	I	M	Q	U
F	A	F	K	P	U	Z

Facts and More Facts

If you
memorized this...

+	A	B	C	D	E	F
A	A	B	C	D	E	F
B	B	C	D	E	F	G
C	C	D	E	F	G	H
D	D	E	F	G	H	I
E	E	F	G	H	I	J
F	F	G	H	I	J	K

could you
solve these?

$$C + ? = J$$

$$D + B = ? + F$$

$$? - D < C$$

$$B + F + C = ?$$

Building Fluency with Facts



**Addition &
Subtraction Facts:
Dice & Card Games**



**Multiplication &
Division Facts:
Dice & Card Games**



**Decimal Addition &
Subtraction Facts:
Dice & Card Games**



Building Fluency with Facts

STRATEGIES TO BUILD

ADDITION STRATEGIES

STRATEGY	DESCRIPTION	EXAMPLE
counting on	used when adding 1 or 2 to a #	$7 + 1 \rightarrow 7, 8$ $16 + 2 \rightarrow 16, 17, 18$
variation start with larger addend	used when the first addend is 1 or 2	$1 + 13 \rightarrow 13, 14$ $2 + 25 \rightarrow 25, 26, 27$
doubles	adding two of the same addend	$8 + 8$ $7 + 7$ $6 + 6$ $15 + 15$

strategies

STRATEGY	DESCRIPTION	EXAMPLE
use ten & adjust	used when adding 9 to a #	$4 + 9 \rightarrow 4 + 10 - 1 \rightarrow 14 - 1$ $46 + 9 \rightarrow 46 + 10 - 1 \rightarrow 56 - 1$

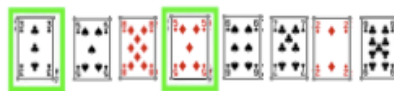
FLUENCY WITH + & -

SUBTRACTION STRATEGIES

STRATEGY	DESCRIPTION	EXAMPLE
counting back	used when subtracting 1 or 2 from a #	$7 - 1 \rightarrow 7, 6$ $16 - 2 \rightarrow 16, 15, 14$
use unknown	think of the unknown	$13 - 7 \rightarrow 7 + ? = 13$ $50 - 18 \rightarrow 18 + ? = 50$

DIVIDE IT OUT!

Players: 2 or more
Materials: deck of cards, 10s and face cards removed, Ace = 1
How to Play: Take out all of one suit (e.g. hearts) and lay them out in a row from least to greatest – Ace through 9. Shuffle the remaining cards and lay them out in 3 rows of 9.



Players take turns choosing 2 cards from the bottom rows to make a two-digit number that can be evenly divided by the cards in the top row. The two-digit number must be greater than that player's score.

EXAMPLE: A player might choose 3 and 5 to make 35, which can be evenly divided by 7 (from the second row) groups, for a score of 35.

When no more two-digit combinations can be

COMMUNICATING

MATHEMATICAL VOCABULARY

Here are words and phrases that you and your child can use when talking about multiplication and division.

factor – a number that is multiplied by one or more other numbers to create a product
product – the result of multiplying two or more factors

$$\begin{array}{r} 8 \times 3 = 24 \\ \text{factor} \times \text{factor} = \text{product} \end{array}$$

DIVIDE IT OUT! THINKING QUESTIONS

- What division equation could you create using the two-digit number you made and the one-digit number from the top row? What is a related multiplication equation?
- What is a model you could create to show the relationship between the two-digit number and the one-digit number?

EX: If you had the numbers "27 and "3", you could create a number line or bar model (shown).

$$\boxed{27}$$

$$\begin{array}{|c|c|c|} \hline 9 & 9 & 9 \\ \hline \end{array}$$

- How can you use the word "factor", "multiple", and or "divisible" to describe the relationship between the two-digit number and the one-digit number?
- Is there any other card from the top row that you could have used with the two-digit number you made? Which one(s)? How do you know?
- Are there any numbers in the top row that we used more frequently than others? Any that we used less frequently than others? Why is that the case?

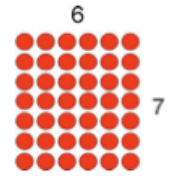
MATHEMATICALLY

MATHEMATICAL MODELS

Here are a couple of models that you and your child can use when representing multiplication and division.

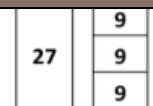
ARRAY

An array is an ordered arrangement that has equal sized-rows and columns. The total # of objects is the product of rows and columns are the factors of divisor and quotient.



vocabulary

One large bar shows the whole and a set of smaller bars combine to make an equal length to the whole.



"thinking questions"

game directions

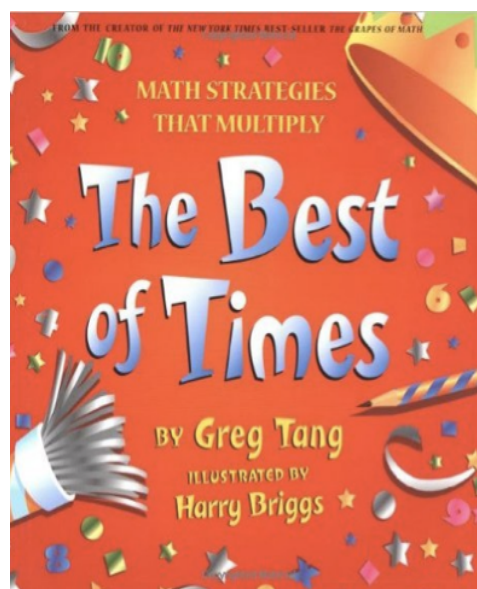
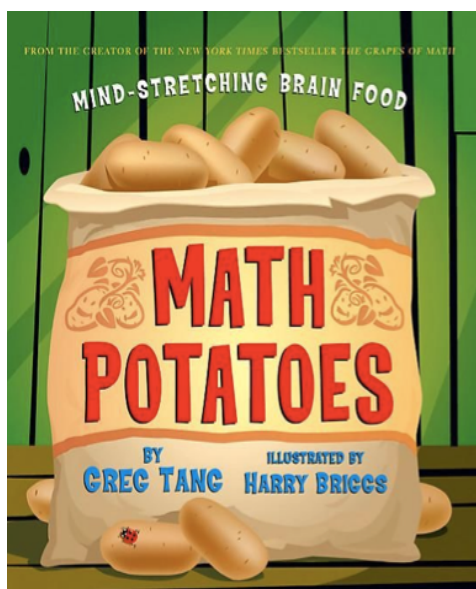
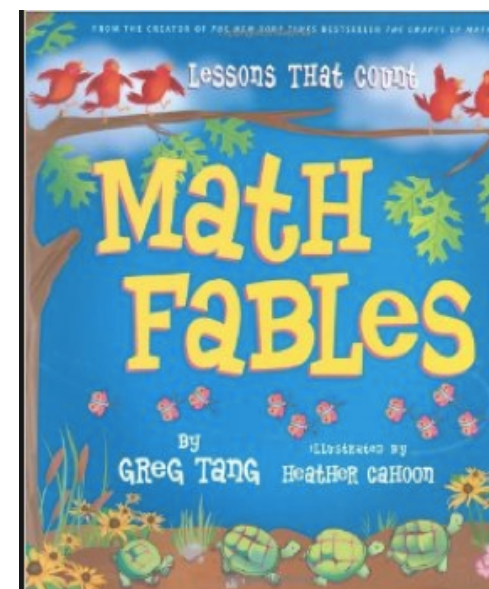
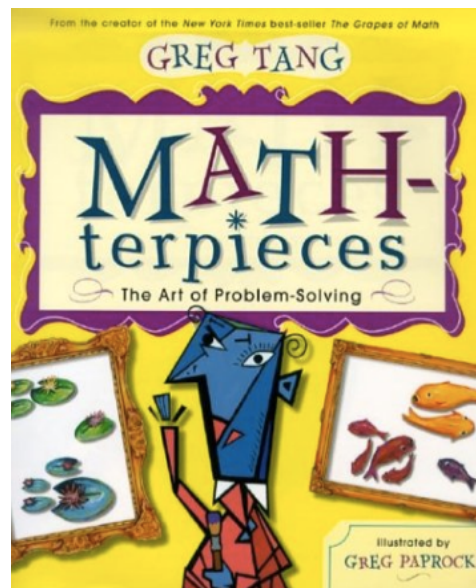
Building Fluency with Facts

- Have fun with the games!
- Focus on understanding first, speed second
- Praise effort, growth, struggle, and the process over “smarts”
- Acknowledge your own struggles

Greg Tang books

PRIMARY

- Math-terpieces
- Math Fables



INTERMEDIATE

- Math Potatoes
- The Best of Times

Greg Tang books

Peruse the books.
Choose one for
your family.

Fill out one of the
book labels.

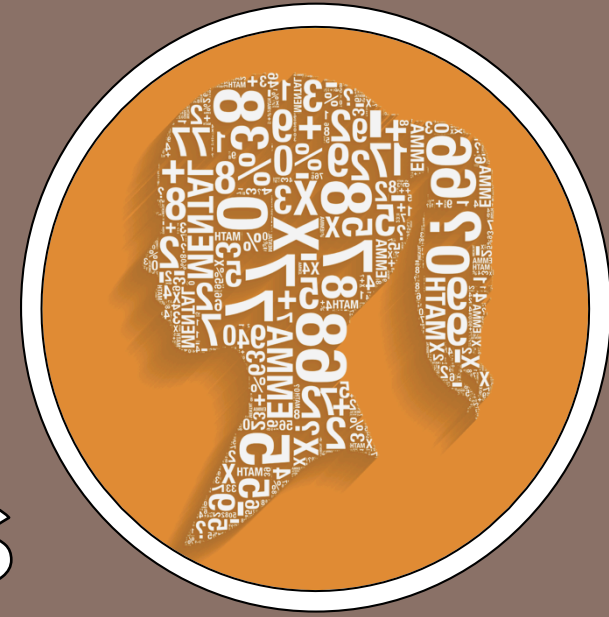
Put it in the
container.



This book belongs to _____
the _____ family
(family's last name)
children in grade(s) _____



Talbott Springs At Home Learning Family Math Series



11/4

**Night 3: Strategies
for Multi-Digit
Addition &
Subtraction**

11/18

**Night 4: Strategies
for Multi-Digit
Multiplication &
Division**