


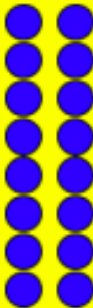


Fact Fluency +, -, x, ÷



Deep Run Elementary

Which One Does Not Belong?

2×8 	$8 + 8$ 
4×4 	8×2 

Building a Growth Mindset



PRAISE

<https://www.youtube.com/watch?v=NWv1VdDeoRY>

Mental Math and Fluency Expectations

GRADE	END-OF-YEAR EXPECTATION	EXAMPLES
K	fluently + and – within 5	$4 + 1$ $5 - 2$ $3 + 2$

Mental Math and 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	$26 + 10$ $84 - 10$

Mental Math and 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	$473 - 10$ $816 + 10$ $352 - 100$ $709 + 100$

Mental Math and 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• add within 100• subtract two-digit multiples of 10
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

+	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

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

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 #	$7 + 1 \rightarrow 7, \underline{8}$ $16 + 2 \rightarrow 16, 17, \underline{18}$
variation start with larger addend	used when the first addend is 1 or 2	$1 + 13 \rightarrow 13, \underline{14}$ $2 + 25 \rightarrow 25, 26, \underline{27}$
doubles	adding two of the same	$8 + 8$ $7 + 7$ $6 + 6$ $15 + 15$
make the next ten	adding 8 or 9 to a #	$\rightarrow 10 + 3$ $37 + 9 \rightarrow 36 + 1 + 9$ $\rightarrow 36 + 10$
variation use ten & adjust	used when adding 9 to a #	$4 + 9 \rightarrow 4 + 10 - 1$ $\rightarrow 14 - 1$ $46 + 9 \rightarrow 46 + 10 - 1$ $\rightarrow 56 - 1$

strategies

FLUENCY WITH + & -

SUBTRACTION STRATEGIES

STRATEGY	DESCRIPTION	EXAMPLE
counting back	used when subtracting 1 or 2 from a #	$7 - 1 \rightarrow 7, \underline{6}$ $16 - 2 \rightarrow 16, 15, \underline{14}$
use addition	think of the unknown difference as a missing addend	$13 - 7 \rightarrow 7 + ? = 13$ $50 - 18 \rightarrow 18 + ? = 50$ $101 - 85 \rightarrow 85 + ? = 101$
use ten (or nearest ten)	used when subtracting across a decade	$14 - 6 \rightarrow 14 - 4 - 2$ $\rightarrow 10 - 2$ $53 - 7 \rightarrow 53 - 3 - 4$ $\rightarrow 50 - 4$

NOTE

This strategy is especially useful when the minuend and subtrahend are close together, as in $1 - 87$, or if the minuend is a multiple of 10, 100, 1,000, etc., as in $400 - 352$.

The term **decade** is often used in math for a multiple of ten, just as a decade is 10 years. Counting up from 38 to 45 or back from 45 to 38 is considered "crossing a decade."

Operation & 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 #	$7 + 1 \rightarrow 7, \underline{8}$ $16 + 2 \rightarrow 16, 17, \underline{18}$
variation start with larger addend	used when the first addend is 1 or 2	$1 + 13 \rightarrow 13, \underline{14}$ $2 + 25 \rightarrow 25, 26, \underline{27}$
doubles	adding two of the same	$8 + 8$ $7 + 7$ $6 + 6$ $15 + 15$
make the next ten	adding 8 or 9 to a #	$\rightarrow 10 + 3$ $37 + 9 \rightarrow 36 + 1 + 9$ $\rightarrow 36 + 10$
variation use ten & adjust	used when adding 9 to a #	$4 + 9 \rightarrow 4 + 10 - 1$ $\rightarrow 14 - 1$ $46 + 9 \rightarrow 46 + 10 - 1$ $\rightarrow 56 - 1$

strategies

FLUENCY WITH + & -

SUBTRACTION STRATEGIES

STRATEGY	DESCRIPTION	EXAMPLE
counting back	used when subtracting 1 or 2 from a #	$7 - 1 \rightarrow 7, \underline{6}$ $16 - 2 \rightarrow 16, 15, \underline{14}$
use addition	think of the unknown difference as a missing addend	$13 - 7 \rightarrow 7 + ? = 13$ $50 - 18 \rightarrow 18 + ? = 50$ $101 - 85 \rightarrow 85 + ? = 101$
use compensation (or least ten)	used when subtracting across a decade	$14 - 6 \rightarrow 14 - 4 - 2$ $\rightarrow 10 - 2$ $53 - 7 \rightarrow 53 - 3 - 4$ $\rightarrow 50 - 4$

This strategy is especially useful when the minuend and subtrahend are close together, as in $1 - 87$, or if the minuend is a multiple of 10, 100, 1,000, etc., as in $400 - 352$.

NOTE
The term **decade** is often used in math for a multiple of ten, just as a decade is 10 years. Counting up from 38 to 45 or back from 45 to 38 is considered "crossing a decade."

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

$$8 \times 3 = 24$$

factor \times factor = product

dividend – a number that is divided into equal groups

divisor – the number of equal groups (or the number of objects in equal groups) created when dividing

quotient – the result of dividing two numbers

$$42 \div 6 = 7$$

dividend \div divisor = quotient

multiple – a number that results from skip-counting a particular number

– a number that results from multiplying a particular factor by any whole number

28 is a multiple of 4 – you can count by 4s to get to 28
– you can multiply 4 by a # to get 28

fact family – a set of equations that shows the relationship among three numbers

$$3 \times 9 = 27 \quad 9 \times 3 = 27 \quad 27 \div 3 = 9 \quad 27 \div 9 = 3$$

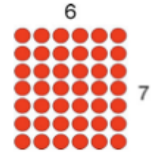
MATHEMATICALLY

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 or dividend and the # of rows and columns are the factors of divisor and quotient.



vocabulary

whole and a set of smaller bars combine to make an equal length to the whole.

27	9
	9

Dice & Card Games



Building Fluency with Facts

STRATEGIES TO BUILD

ADDITION STRATEGIES

strategies

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	$8 + 8$ $7 + 7$ $6 + 6$ $15 + 15$
variation	near double	used when one addend is 1 more than the other	$6 + 7 \rightarrow 6 + 6 + 1$ $9 + 8 \rightarrow 9 + 9 - 1$ $5 + 4 \rightarrow 1 + 4 + 4$
	make ten (or make the next ten)	used when adding 8 or 9 to a #	$8 + 5 \rightarrow 8 + 2 + 3$ $\rightarrow 10 + 3$ $37 + 9 \rightarrow 36 + 1 + 9$ $\rightarrow 36 + 10$
variation	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 row to make a two-digit number that can be evenly divided by the two-digit number 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 can use when talking about multiplication:
factor – a number that is multiplied by other numbers to create a product
product – the result of multiplying two numbers

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

MATHEMATICALLY

MATHEMATICAL MODELS

vocabulary

equal sized-rows and columns. The total # of objects is the product or dividend and the # of rows and columns are the factors of divisor and quotient.



BAR MODEL

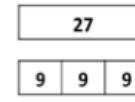
Bar models can show how a whole (product or dividend) can be made up of equal sized groups. One large bar shows the whole and a set of smaller bars combine to make an equal length to the whole.



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).



- 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?

game directions

Building Fluency with Facts

STRATEGIES TO BUILD

FLUENCY WITH + & -

COMMUNICATING

MATHEMATICALLY

strategies

variation		DESCRIPTION	EXAMPLE
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	$8 + 8$ $7 + 7$ $6 + 6$ $15 + 15$	
variation	near double	used when one addend is 1 more than the other	$6 + 7 \rightarrow 6 + 6 + 1$ $9 + 8 \rightarrow 9 + 9 - 1$ $5 + 4 \rightarrow 1 + 4 + 4$
make ten (or make the next ten)	used when adding 8 or 9 to a #	$8 + 5 \rightarrow 8 + 2 + 3$ $\rightarrow 10 + 3$ $37 + 9 \rightarrow 36 + 1 + 9$ $\rightarrow 36 + 10$	
variation	use ten & adjust	used when adding 9 to a #	$4 + 9 \rightarrow 4 + 10 - 1$ $\rightarrow 14 - 1$ $46 + 9 \rightarrow 46 + 10 - 1$ $\rightarrow 56 - 1$

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	$13 - 7 \rightarrow 7 + ? = 13$ $50 - 18 \rightarrow 18 + ? = 50$

MATHEMATICAL VOCABULARY

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

factor – a number that is multiplied by one or more other numbers to create a product

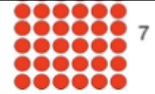
product – the result of multiplying two or more numbers

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

MATHEMATICAL MODELS

vocabulary

equal sized-rows and columns. The total # of objects is the product or dividend and the # of rows and columns are the factors of divisor and quotient.



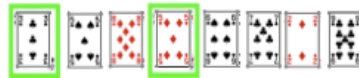
BAR MODEL

Bar models can show how a whole (product or dividend) can be made up of equal sized groups. One large bar shows the whole and a set of smaller bars combine to make an equal length to the whole.



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 that player's score.

EXAMPLE: A player might choose 3 and 7 (from the second row) groups, for a score of 35.

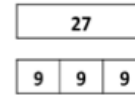
until no more two-digit combinations can be

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).



• 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 have used with the two-digit number you made? How do you know?

• Are there any numbers in the top row that you have used more frequently than others? Any that you have used less frequently than others? Why is that the case?

game directions

"thinking questions"

Building Fluency with Facts

- Have fun with the games!



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



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



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



Building Fluency with Facts

- Have fun with the games!

- Focus on understanding first, speed second

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



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



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



Building Fluency with Facts

- Have fun with the games!

- Focus on understanding first, speed second

- Praise effort, growth, struggle, and the process over “smarts”



Addition &

Subtraction Facts:

Dice & Card Games



Multiplication &

Division Facts:

Dice & Card Games



Decimal Addition &

Subtraction Facts:

Dice & Card Games



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

Let's Play!

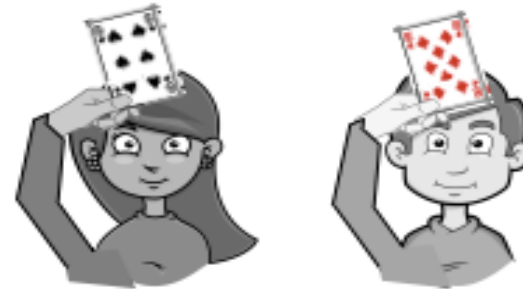
- Sum or Difference Salute
- Factor Salute!

SUM OR DIFFERENCE SALUTE

Players: 3 or more
Materials: deck of cards, face cards = 10, Ace = 1

How to Play: Player 1 shuffles the cards and gives players 2 and 3 each one card face down. Player 1 says, "Salute!", and players 2 and 3 each quickly lift up their card and hold it up to their forehead so that the number is facing out **without looking at their own card**. They should be able to see the other player's card but not their own.

Player 3 names either the sum or difference of the cards. Players 2 and 3 each need to name the card he or she is holding up. The first player to do so earns a point.



EXAMPLE: Player 3 would say, "Difference of 2." Player 1 would have to say, "6" to earn a point and Player 2 would have to say "8" to earn a point.

Repeat the process, switching roles each round, until one player has 10 points.

Let's Play!

- I Spy Sums
- I Spy Products
- I Spy Decimal Sums

I SPY PRODUCTS

Players: 2
Materials: Deck of cards, face cards worth ten, Ace worth 1 or 11

How to Play: Deal out the entire deck of cards in a 13 x 4 array. *Example does not show the entire array due to space.*



One player challenges the other player to find two cards next to each other, either vertically or horizontally, that multiply to make a number by saying, "I spy two cards with a product of 40."



The other player looks for two cards that multiply to make the product and removes them. Players swap roles. As *large gaps appear*, the size of the array may be reduced to help fill the gaps.

Let's Play!

- Add and Subtract
- Add and Multiply

ADD AND SUBTRACT

Players: 2 or more

Materials: three dice, notebook paper

How to Play: Players take turns rolling the three dice (or if only one die is available, rolling the die three times). After rolling, the player chooses two of the dice to add together, and then subtracts the number on the third die from the sum. That difference is the player's score for that round.



EXAMPLE: If player 1 rolls a 6, 3, and 4, he may add 6 and 3 for a sum of 9 and then subtract $9 - 4$ for a score of 5.

After five rounds, the player with the most points wins.

Working Together to Build Mathematical Thinkers

The school's role...

- offer rich, purposeful mathematical experiences
- provide number strategy instruction & practice

The families' role...

- ask your child to show you what he or she has learned
- look for ways to apply the learning in real-life situations

Our shared role...

- highlight and build on the students' strengths
- celebrate questions, mistakes, growth, effort, and struggle