

Parent Council Meeting

DECEMBER 7, 2020

Numeracy – Strategies to build Automaticity of Facts

Properties of Multiplication

- Zero Property
- Identity Property
- Commutative Property
- Distributive Property
- Associative Property
- Inverse Relationship
- Multiplication by Powers of 10

Numeracy – Strategies to build Automaticity of Facts

Multiplication Properties (continued)

Zero Property

Any number multiplied by 0 is 0

Identity Property

Any number multiplied by 1 is the number itself.

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Multiplication Properties (cont.)

Commutative Property

When you multiply any two numbers,
you can multiply in any order

$$a \times b = b \times a$$

$$4 \times 6 = 6 \times 4$$

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Multiplication Properties (cont.)

Distributive Property

To multiply two numbers, you can decompose the numbers, multiply the parts, and recombine.

$$\mathbf{a \times (b + c) = (a \times b) + (a \times c)}$$

e.g., $4 \times 6 = 4 \times (5 + 1)$

$$= (4 \times 5) + (4 \times 1)$$

$$= 20 + 4$$

$$= 24$$

e.g., $9 \times 52 = 9 \times (50 + 2)$

$$= (9 \times 50) + (9 \times 2)$$

$$= 450 + 18$$

$$= 468$$

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Multiplication Properties(cont.)

Associative Property

When you multiply 3 or more numbers, you can choose which two numbers to multiply first.

$$\mathbf{a \times b \times c = (a \times b) \times c = (a \times c) \times b = (b \times c) \times a}$$

$$\begin{aligned} \text{e.g., } 5 \times 18 \times 2 &= 5 \times 2 \times 18 \\ &= 10 \times 18 \\ &= 180 \end{aligned}$$

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Multiplication Properties(cont.)

Inverse Relationship

Multiplication and division are related operations. They undo each other.

Any multiplication situation suggests a division situation and vice versa.

$$\text{E.g. } 4 \times 6 = 24, 6 \times 4 = 24, 24 \div 4 = 6, 24 \div 6 = 4$$

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Multiplication Properties(cont.)

Multiplication by Powers of 10

Multiplication by powers of 10 using reasoning based on an understanding of place value.

E.g. 4200 can be renamed as 42 hundreds.

Therefore $4200 \div 100 = 42$ and $42 \times 100 = 4200$

E.g. $5.55 \times 100 = 555$

5.55 is about halfway between 5 and 6.

$5 \times 100 = 500$ and $6 \times 100 = 600$.

Therefore, 5.55×100 must be about halfway between 500 and 600.

Numeracy – Strategies to build Automaticity of Facts

- ▶ Properties of Division
 - ▶ Zero Property
 - ▶ Identity Property
 - ▶ Equality Property – whole numbers
 - ▶ Inequality Property
 - ▶ Division by Powers of 10
 - ▶ Inverse Relationship

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Division Properties(cont.)

Zero Property

Division Any Number by 0

Division by 0 is meaningless

e.g., $35 \div 0 = \text{meaningless}$

Division of 0 by any Number

Division of 0 by any number has a quotient of 0.

e.g., $0 \div 35 = 0$

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Division Properties(cont.)

Identity Property

Division Any Number by 1

Division by 1 is the number itself

$$\text{e.g., } 35 \div 1 = 35$$

Division of any Number by Itself

Division of any number by the same number

has a quotient of 1.

$$\text{e.g., } 35 \div 35 = 1$$

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Division Properties(cont.)

Equality Property

When we divide both sides of an equation by the same non-zero number,

the two sides remain equal.

Division as repeated subtraction

$$\text{e.g., } 25 \div 5 = 25 - 5-5-5-5-5$$

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Division Properties(cont.)

Inequality Property

Multiplying up or skip counting up to divide.

$$\begin{aligned} &\text{e.g., } 43 \div 6 \\ &= 7 \text{ R}1 \text{ or } 7 \frac{1}{6} \end{aligned}$$

6 'goes into' or 'lives in' or 'scales into' the number 43
7 times with 1 remaining that don't scale in
OR.....with $\frac{1}{6}$ of a group of 6 remaining.

Numeracy – Strategies to build Automaticity of Facts

Division Properties(cont.)

Division by Powers of 10

Division by powers of 10 using reasoning based on an understanding of place value.

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Therefore $4200 \div 100 = 42$ and $42 \times 100 = 4200$

E.g. $5.55 \times 100 = 555$

5.55 is about halfway between 5 and 6.

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Numeracy – Strategies to build Automaticity of Facts

Division Properties(cont.)

Inverse Relationship

Multiplication and division are related operations. They undo each other.

Any multiplication situation suggests a division situation and vice versa.

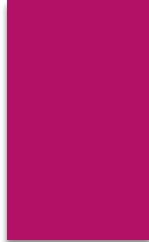
$$\text{E.g. } 4 \times 6 = 24, 6 \times 4 = 24, 24 \div 4 = 6, 24 \div 6 = 4$$

1-12 Multiplication Chart

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

The 28 Multiplication Facts

X	1	2	3	4	5	6	7	8	9	10
1										
2										
3			9	12	15	18	21	24	27	
4				16	20	24	28	32	36	
5					25	30	35	40	45	
6						36	42	48	54	
7							49	56	63	
8								64	72	
9									81	
10										



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The Properties of Multiplication

Zero Property

Any number multiplied by zero is zero.

Identity Property

Any number multiplied by 1 is the number.

The Commutative Property

When I multiply two numbers, I can multiply in any order.

$$a \times b = b \times a$$

E.g. $4 \times 6 = 6 \times 4$

Inverse Relationship

Multiplication and division are related operations. They undo each other. Any multiplication situation suggests a division situation and visa versa.

E.g. $4 \times 6 = 24$, $6 \times 4 = 24$, $24 \div 4 = 6$, $24 \div 6 = 4$

The Distributive Property

To multiply two numbers, I can decompose the numbers, multiply the parts and recompose.

$$a \times (b + c) = (a \times b) + (a \times c)$$

E.g. $4 \times 6 = 4(5 + 1)$
 $= (4 \times 5) + (4 \times 1)$
 $= 20 + 4$

E.g. $9 \times 52 = 9(50 + 2)$
 $= 450 + 18$
 $= 468$

The Associative Property

When you multiply 3 or more numbers, you can choose which 2 numbers to multiply first.

$$\begin{aligned} a \times b \times c &= (a \times b) \times c \\ &= (a \times c) \times b \\ &= a \times (b \times c) \end{aligned}$$

E.g. $2 \times 3 \times 4 = (2 \times 3) \times 4$
 $= (2 \times 4) \times 3$
 $= 2 \times (3 \times 4)$

E.g. $5 \times 18 \times 2 = 5 \times 2 \times 18$
 $= 10 \times 18$
 $= 180$

E.g. $20 \times 40 = (2 \times 10) \times (4 \times 10)$
 $= 2 \times 4 \times 10 \times 10$
 $= 8 \times 100$
 $= 800$

Multiplication and Division by Powers of 10

Multiplication and division by powers of 10 using reasoning based on an understanding of place value.

E.g. 4200 can be renamed as 42 hundreds.
Therefore $4200 \div 100 = 42$ and $42 \times 100 = 4200$

E.g. $5.55 \times 100 = 555$
5.55 is about halfway between 5 and 6.
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Therefore, 5.55×100 must be about halfway between 500 and 600.