Mental Math Strategies

Distributive Property
(appropriate for ALL FOUR operations)

Purpose: to partition one (or both) of the numbers involved into friendlier parts with which to work

When to use: when other strategies don't immediately appear more efficient, and when there is minimal regrouping

****CAUTION: It is common, following the partitioning, that parts of the number get forgotten

Grade 3	123 + 146 (think 120 + 140 and 3 + 6) = 269 123 + 146 (think 123 + 100 + 40 + 6) = 269 146 — 33 (think 146 — 30 — 3 OR 140 — 30 and 6 — 3 = 113) 3 x 4 (think of 3 as 2 and 1): 2 x 4 + 1 x 4 = 8 + 4= 12
Grade 4	2.3 + 4.6 (think 2 + 4 and 0.3 + 0.6) = 6.9 4.64 - 3.33 (think 4 - 3 and 0.64 - 0.33) = 1.31 No regrouping 6 x 8 (think of 6 as 5 and 1): 5 x 8 + 1 x 8 = 40 + 8 =48 5 x 23 (think 5 x 20 and 5 x 3) = 115 36 ÷ 5 (think of 36 as 30 and 5 and 1: 30 ÷ 5, 5 ÷ 5, 1 ÷ 5) = 7 R1
Grade 5	8 x 53 (think of 53 as 50 and 3): 8 x 50 and 3 x 3: 400 + 9 = 409 636 ÷ 6 (think of 636 as 600 +36: 600 ÷ 6 and 36 ÷ 6): 100 + 6 = 106 **Continue practicing this strategy with adding and subtracting whole numbers and decimals.

Front End
(appropriate for ALL FOUR operations)

Purpose: to mentally determine the answer by working from the highest place value to the lowest place value

When to use: for adding and subtracting; strategy is appropriate when there is minimal or no regrouping

****KEY: DO NOT think of single digits; keep the value of the digits in mind

Grade 3	23 + 46 (20 + 40 = 60) (3 + 6 = 9) = 69 236 + 162 (200 + 100 = 300) (30 + 60 = 90) (6 + 2 = 8) = 398	76 — 45 (70 — 40 = 30) (6 — 5 = 1) = 31 346 - 25 (40 — 20 = 20) (6 — 5 = 1) = 321		
Grade 4	2.3 + 4.6 (2 + 4 = 6) (0.3 + 0.6 = 0.9) = 6.9 2.36 + 4.62 (2 + 4 = 6) (0.3 + 0.6 = 0.9) (0.06 + 0.02) = 6.92	24.6 — 3.4 (24 + 3 = 27) (0.6 + 0.4 = 1.0) = 28 24.36 - 3.24 (24 - 3 = 21) (0.3 - 0.2 = 0.1) (0.06 - 0.04 = 0.02) = 21.12	4 x 36 (4 x 30 = 120) (4 x 6 = 24) = 144	45 ÷ 6 (think of 45 as 30 +12+3) (30 ÷ 6 = 5) (12 ÷ 6 = 2) remainder 3 =7R3
Grade 5	2.368 + 15.431 (2 + 15, 0.3 +0.4, 0.06+0.03, 0.008+ 0.001) = 17.799	82.897 - 61.542 (82-61, 0.8-0.5, 0.09 — 0.04, 0.007 — 0.002) = 21.355	37 x 8 (30 x 8 = 240) (7 x 8 = 56) = 296	636 ÷ 6 (600 ÷ 6 = 100) (36 ÷ 6 = 6) =106

Compensation
ADDITION, SUBTRACTION, and MULTIPLICATION

Purpose: to turn ONE of the numbers involved into an easier/friendlier number to work with

When to use: when one of the numbers is very near an 'easy/friendly' number.

****KEY: MUST remember to adjust final answer to compensate for initial change made to question

Grade 3	36 + 28 (add on 30 not 28): 36 + 30 = 66 (now subtract 2):66 - 2 = 64 36 — 28 (subtract 30 instead):36 — 30 = 6 (now add 2 'back on'): 6 + 2 = 8 198 + 236 (use 200 instead): 200 + 236 = 436 (now remove 2): 436 — 2 = 434 236 — 197 (use 200 instead): 236 — 200 = 36 (add 3 'back on'): 36 + 3 = 39
Grade 4	9 x 4 (think 10 groups of 4): 10 x 4 = 40 (less 1 group of 4): 40 — 4 = 36 4 x 39 (think 4 groups of 40): 4 x 40 = 160 (less the extra 4): 160 — 4 = 156 1.98 + 2.99 (add 0.02 to 1.98): 2 + 2.99 = 4.99 (less 0.02): 4.99— 0.02 = 4.97 3.00 — 1.98 (add 0.02 to 1.98): 3.00 — 2 = 1 (add 'back' 0.02): 1 + 0.02 = 1.02 *continue to practice this strategy with addition and subtraction of whole numbers.
Grade 5	29 x 15 (think 30 sets of 15): 30 x 15 = 450 (less one set): 450 — 15 = 435 3.564 — 1.998 (add 0.002 to 1.998): 3.564 — 2 = 1.564 (add 0.002 to compensate for initial change made to subtrahend): 1.564 + 0.002 = 1.566 *continue to practice this strategy with addition and subtraction of whole numbers.

Bridging Through Tens/ Making Ten
Counting up/down Through Tens
ADDITION and SUBTRACTION ONLY

Purpose: to utilize familiar benchmarks to support mental computations
When to use: when no other addition or subtraction strategy immediately appears more efficient

Grade 3	Say the number sequence forward and backward from 0-1000 by: 5s, 10s, or 100s... –Continue to use this mental math strategy for basic facts
	
	84 − 28 Think: 84 − 4 = 80, less 20 is 60, less 4 is 56
	34 + 28 Think: 28 + 2 is 30, plus 30 is 60, and 2 more is 62
	    OR: think of the question as 40 + 22 = 62
	693 + 248 Think: 7 more is 700, 200 more is 900, 41 more is 941.
	    OR: think of the question as: 700 + 241

Grade 4	**4.6 + 7. 9** Think: 7.9 + 0.1 = 8, add on 4.5 to get 12.5
	    OR: think of the question as 4.5 + 8 = 12.5
	16.99 − 5.03 Think: 5.03 plus 0.97 equals 6, plus 11 more is 17, less 0.01)
	    = 0.97 + 11 − 0.01 = 11.96

Grade 5	**56. 99 + 32.8** Think of the question as: 57 + 32.79 = 89.79 OR: 33 + 56.79 = 89.79

Constant Difference/ Balancing Strategy
SUBTRACTION ONLY

Purpose: 1) to turn the subtrahend into an easier/"friendlier" number OR
2) to change the minuend so that 'regrouping' is avoided.

When to use: 1) when the subtrahend is <u>very near</u> a 'friendly ten' or a whole number (when working with decimals and fractions) OR 2) when regrouping is <u>required</u> and the minuend can easily be changed so that regrouping is no longer necessary

Grade 3	**333 − 199** (add 1 to each number) **334 − 200 =134** **500 − 285** (subtract 1 from each number): **499 − 284 = 215**
Grade 4	**4.2 − 1.8** (add 0.2 to each number) **4.4 − 2 = 2.4** **5.63 − 3.99** (add 0.01 to each number) **5.64 − 4.00 = 1.64** **6 − 2.38** (subtract 0.01 from each number) **5.99 − 2.37 = 3.62** **4.2 − 1.8** (subtract 0.3 from each number) **3.9 − 1.5 = 2.4**
Grade 5	**4.358 − 2.999** (add 0.001 to each number) **4.359 − 3 = 1.359** **8.004 − 3.785** (subtract 0.005 from each number) **7.999 − 3.780 = 4.219**

Thinking Addition —
SUBTRACTION ONLY

Purpose: to use more familiar addition facts/strategies to solve subtraction questions

When to use: when no other strategy appears more efficient for the numbers involved

Grade 3	**333- 129** (+1) (+200) (+3) = 204 129 130 330 333
Grade 4	**4.2 − 1.8** (+0.2) (+2) (+0.2) = 2.4 OR: (+0.4) (+2) 1.8 2.0 4.0 4.2 1.8 2.2 4.2 **$6.00 - $2.38** (+0.62) (+3.00) = $3.62 $2.38 $3.00 $6.00
Grade 5	Continue to practice strategy with whole numbers and decimals to thousandths.

Doubling/Halving
Repeated Doubling/Halving
MULTIPLICATION ONLY

Double/Double
Halving/Halving
DIVISION ONLY

Purpose: to change the numbers in a question to those which can be dealt with mentally (ie: make one number a 'decade number', or turn the numbers into those of a known fact)

When to use: particularly useful when one number has a 5 in the ones place, and doubling will create a decade number, or when working with fractions and decimals and one number has one half or five tenths as part of it. (doubling this will create a whole number...much easier to work with)
**NOTE: these strategies can be generalized to tripling, etc.

Grades 1 to 3	Describe and apply mental math strategies such as doubles for the basic addition and subtraction facts to 18.	
Grade 4	Describe and apply mental math strategies such as using doubling or halving; using repeated doubling to determine basic multiplication facts to 9 x 9 and related division facts. 6 x 35 (half the 6, double the 35) 3 x 70 = 210	48 ÷ 8 (half each number): 24 ÷ 4 (half each again): 12 ÷ 2 = 6
Grade 5	15 x 16 (double the 15, half the 16) 30 x 8 = 240 25 x 32 (double the 25, half the 32) 50 x 16 (repeat doubling/halving) 100 x 8 = 800	

Numbers 1-120

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120