Key Mental Math Strategies for Grade 7

N1: Develop and apply divisibility rules for 2, 3, 4, 5, 6, 8, 9, and 10.

A number is divisible by:
2 if it is even
3 if the sum of the digits is divisible by 3
4 if the number formed by the last 2 digits is divisible by 4
5 if the number ends in 0 or 5
6 if the number is even and divisible by 3
8 if the number is divisible by 4 and the resulting quotient is even;
or if the number formed by the last 3 digits is divisible by 8
9 if the sum of the digits is divisible by 9
10 if the number ends in 0.

N2: Demonstrate an understanding of the addition, subtraction, multiplication & division of decimals to solve problems.

Front end strategy: When adding decimals, students should be encouraged to add the digits in each place value from left to right.
Ex.: 4.2 + 0.23 = 4.43

Estimation: students should develop a common sense estimate to get a sense of size of the answer.
Ex. 324.4 ÷ 0.97 (since 0.97 is close to 1 whole, the answer is close to 324).
12.3 x 3.2 (the answer is close to 36 because 12 x 3 = 36)

Special Number: To mentally divide a decimal by 5, double both the dividend and divisor.
Ex.: 324.4 ÷ 5 = 648.8 ÷ 10 = 64.88

Distributive: Multiply each place value by the other, then add the answers together. Ex.: 2.1 x 4.7; 2 x 4 = 8, 2 x 7 = 1.4, 0.1 x 4 = 0.4, 0.1 x 0.7 = 0.07, then use front-end strategy to add: 8 + 1.4 + 0.4 + 0.07 = 9.87

N3: Solve problems involving percents from 1% to 100%

Students should make immediate mental connections between common percents and their fraction and decimals equivalents.

50% = $\frac{1}{2}$ = 0.5 $33\ ^{1}/_{3}\% = {}^{1}/_{3} = 0.3333...$ 25% = $\frac{1}{4}$ = 0.25

20% = $^{1}/_{5}$ = 0.2 10% = $^{1}/_{10}$ = 0.1 75% = $\frac{3}{4}$ = 0.75 $66\ ^{2}/_{3}\% = {}^{2}/_{3} = 0.6666...$

*Students should mentally calculate 5%, 15%, 20%, 30% etc. by first determining 10% of a number. Remember "of" means multiply and when multiplying it doesn't matter which number comes first.

Ex.: If 10% X 120 = 12, then 5% of 120 would be 6 and 20% X 120 would be 24

N6: Demonstrate an understanding of addition & subtraction of integers

Front End: (-46) + (-38) -->(-40) + (-30) = (-70); then (-6) + (-8) = -14;
so (-46) + (-38) = (-84)

Compensate: (-46) + (-38) --> (-46) + (-40) = (-86), then (-86) + 2 = (-84)
Remember the reason you add 2 back on is because the integers are negative (-38 is bigger than -40; you took 2 too many off so you add it back on).

Compatible Numbers: (-28) + 63 + 37 + 33 + (-72)
[(-28) + (-72)] + [(63) + 37] + 33 = (-100) + 100 + 33 = 33

Other strategies learned in previous years should still be practiced:

Double/half - 86 x 50 = 43 x 100 = 4300

Distribution: 12 x 28 = (10 x 28) +(2 x 28) = 280 + 56 = 200 + 130 + 6 = 336
2824 ÷ 4 = (2800 ÷ 4) + (24 ÷ 4) = 700 + 6 = 706

Associative: 5 x 8 x 7 x 20 = (5 x 20) x (8 x 7) = 100 x 56 = 5600

Compensate: 500 - 297 = 500 - 300 +3 = 203

Balancing: 621 - 203 = 618 - 200 = 418

Counting on: 700 - 247->247 + 3 = 250 & 250 + 50 = 300 & 300 + 400 = 700,
so 700 - 247 = 3 + 50 + 400 = 453

Sample Questions for Grade 7

Question	Response (Score 1)	Strategy Used (Score 2)
$6.10 + $2.03	$8.13	Front End
400 - 197	203	Compensate: 400 – 200 = 200, then add 3 back on.
2 x 20 x 5 x 5	1000	Compatible Numbers: 20 x 5 = 100 2 x 5 = 10, 100 x 10 = 1000
20 % of 140	28	10% of 140 = 14, so 20% would be 28
(-23) + (-61)	(-84)	Front End: (-20) + (-60) = (-80) (-3) + (-1) = (-4)
84 ÷ 1000	0.084	Move decimal 3 places to left
80 x 20	1600	Basic fact 8 x 2 = 16, then tack on trailing zeros
184 x 5	920	Double/Half → doubled 5 to make 10 and halved 184 92 x 10
2824 ÷ 4	706	Divisibility by 4 → [2800 ÷ 4 = 700] + [24 ÷ 4 = 6]
3.6 x 2.5	9	Distributive: (3 x 2) + (3 x 0.5) + (0.6 x 2) + (0.6 x 0.5) = 6 + 1.5 + 1.2 + 0.3