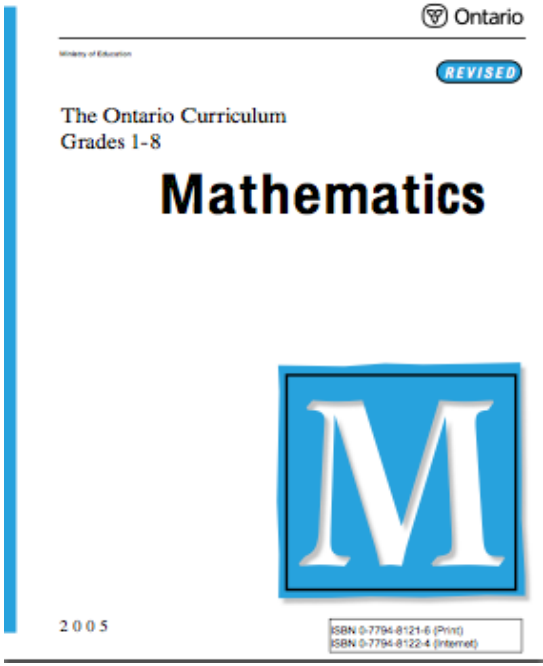
Related Junior Resources

Scaling Up or Down

- Mathies Tools Demonstrations:
  - Rekenrek: Multiplication Strategies
  - Set Tool: Multiplicative Relationships & Ratios
- Multiplying and Dividing Whole Numbers and Decimals by Multiples of 10

Mathies Tools Demonstrations Curriculum Expectations



Rekenrek Multiplication Strategies

Grade 4: Multiply to 9 X 9, using a variety of materials

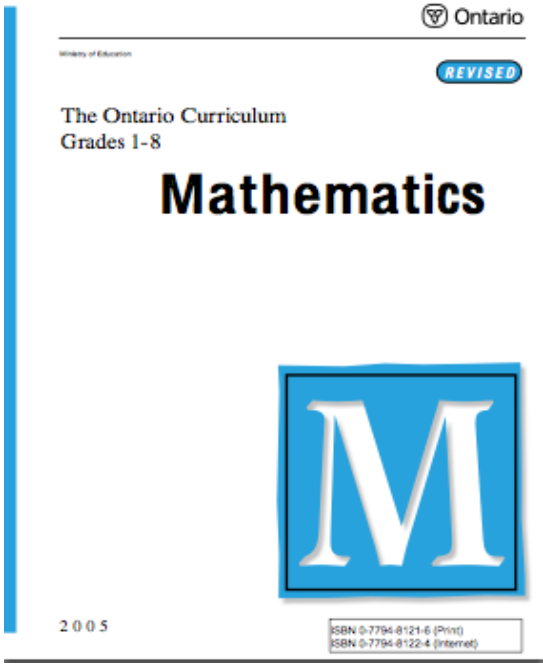
Set Tool: Multiplicative Relationships

Grade 5: Describe multiplicative relationships between quantities by using simple fractions

Set Tool: Ratios

Grade 6: Represent ratios found in real-life contexts, using concrete materials, drawings, and standard fractional notation

X and ÷ by Multiples of 10



Grade 4

Multiply whole numbers by 10, 100, and 1000, and divide by 10 and 100

Grade 5

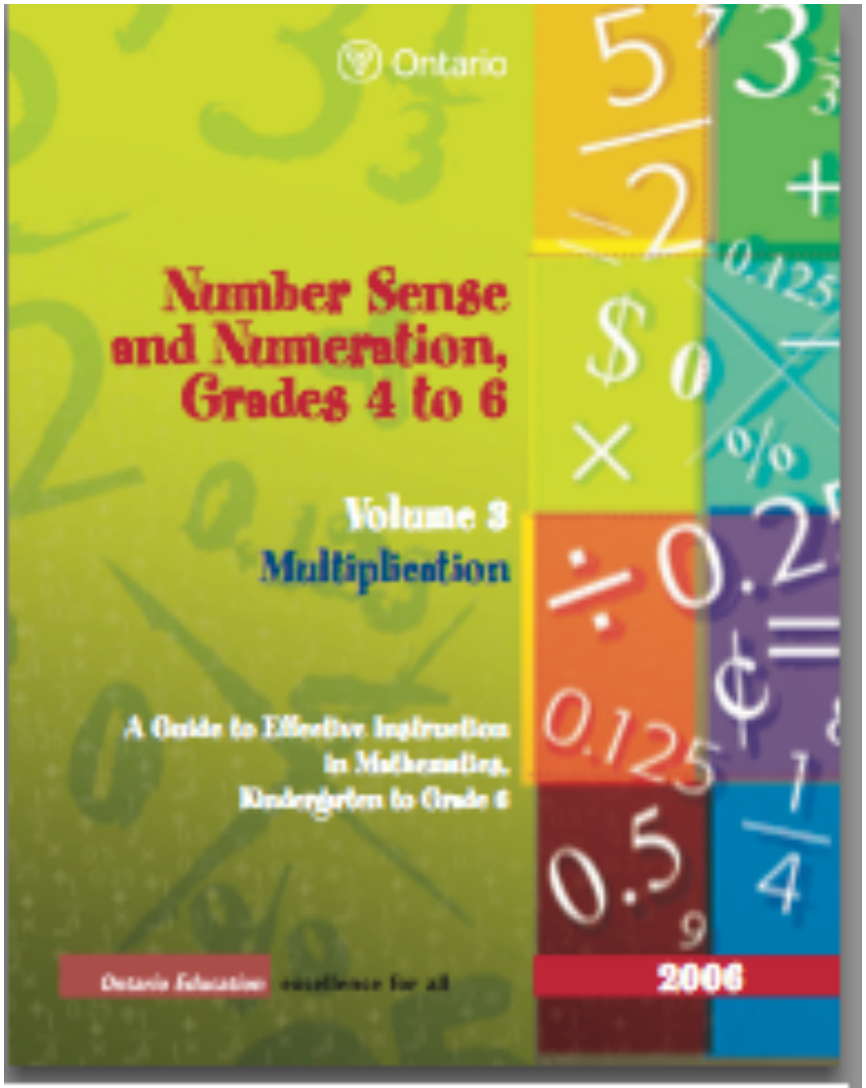
Multiply decimal numbers by 10, 100, 1000, and 10 000

Grade 6

Multiply and divide decimal numbers by 10, 100, 1000, and 10 000

using mental strategies

Highlights of Spatial Reasoning in Junior Multiplication Resource

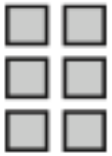


Why is mentally multiplying and dividing by multiples of ten so important?

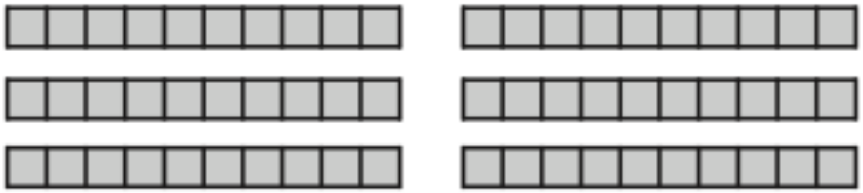
- Positions in the place value system scale up or down by a factor of ten
- Many multiplication and division strategies depend on decomposing numbers to hundreds, tens, and ones

What can we do to encourage mental strategies?

- Using concrete materials to represent scaling up or down by multiples of ten can help to develop mental images for multiplying and dividing without pencil and paper
- This is more powerful than teaching a procedure since students can ‘see’ how the quantity is actually changing

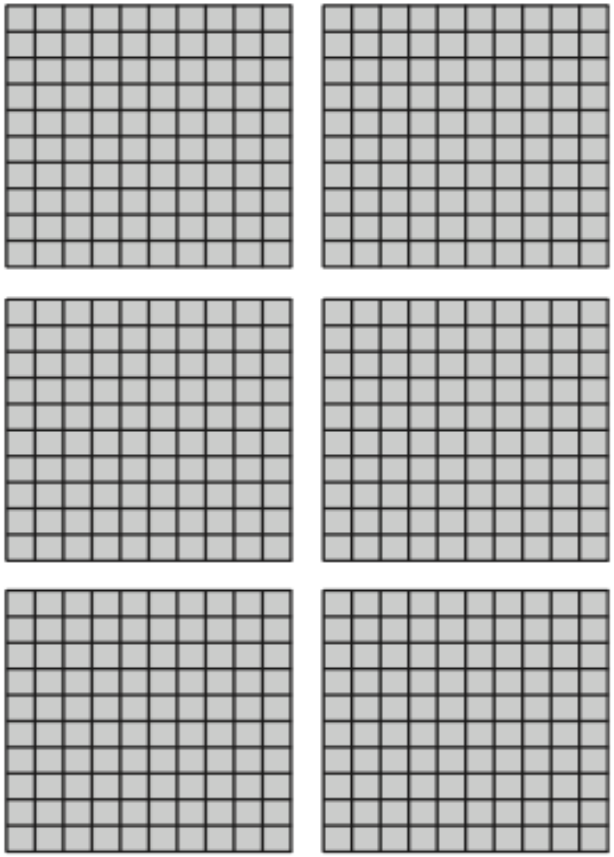


$3 \times 2 = 6$



3 X 2 = 6 tens
= 60

$3 \times 20 = 60$



3 X 2 = 6 hundreds
= 600

$3 \times 200 = 600$

Using Base Ten Materials

Number String

3 X 4 = 12

3 X 40 = 120

30 X 40 = 1 200

300 X 40 = 12 000

The effects of multiplying by multiples of ten.
Each product is scaled up by a factor of 10

Number String

$6.5 \div 1 = 6.5$

$65 \div 10 = 6.5$

$6.5 \div 10 = 0.65$

$653 \div 10 = 65.3$

$6.53 \div 10 = 0.653$

Scaled down by a factor of 10, or one- tenth of the original number

$653 \div 100 = 6.53$

$6.53 \div 100 = 0.0653$

Scaled down by a factor of 100, or one-hundredth of the original number

Visually Looking for Patterns

3.7 X 1 = 3.7

3.7 X 10 = 37

3.7 X 100 = 370

3.7 X 1000 = 3700

3.7 X 10 000 = 37 000

Each product is ten times greater than the previous one

8.2 ÷ 1 = 8.2

8.2 ÷ 10 = 0.82

8.2 ÷ 100 = 0.082

Each quotient is one-tenth of the previous one

Note that the decimal point does not move, but rather the numbers are being scaled up or down by a factor of 10, so the position of each digit changes.

Estimation Strategies

Knowing how to multiply by multiples of ten can be applied when using estimation strategies

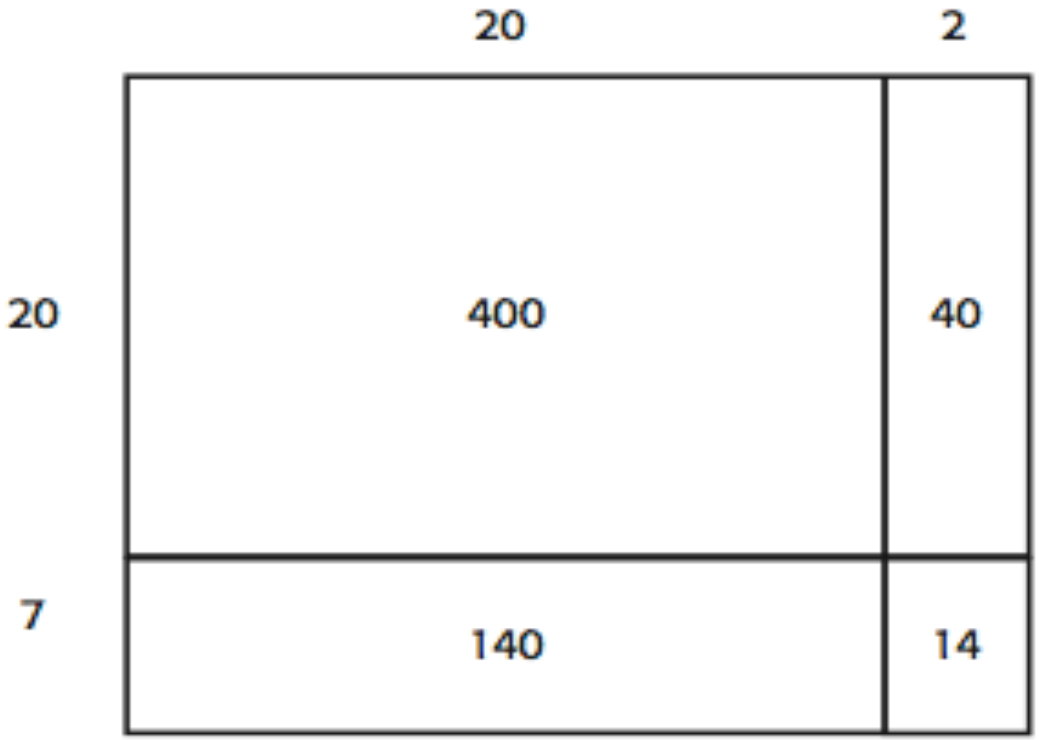
Strategy	Example
Rounding one or both numbers to the nearest multiple of 10, 100, 1000, …	15×32 is about $15 \times 30 = 450$ 28×49 is about $30 \times 50 = 1500$
Finding friendly numbers	5×27 is about $5 \times 25 = 125$
Rounding one factor up and the other factor down	43×18 is about $40 \times 20 = 800$
Using front-end estimation (Note that this strategy is less accurate with multiplication than with addition.)	125×46 is about $100 \times 40 = 4000$ (actual 5750)
Finding a range (by rounding one or both factors down, then up)	26×8 is about $20 \times 8 = 160$ 26×8 is about $30 \times 8 = 240$ The product is between 160 and 240.

Multiplying by Multiples of 10

- Many strategies for multi-digit multiplication rely on decomposing numbers into hundreds, tens, and ones
- Being able to mentally multiply by multiples of 10 can help simplify multiplication tasks

Partial Products

27 X 22 =



400 + 140 + 40 + 14 = 594

Decomposing into tens and ones

Grade 4
Learning Connection 2: Splitting Arrays (p. 42)

Grade 5
Learning Connection 2: What Would the Array Look Like? (p. 55)

Grade 6
Learning Connection 4: Using the Associative Property to Simplify Multiplication (p. 67)