

# DIFFERENTIATION

## Multiply and Divide by 9

Multiplication and Division 14 Patterns and Algebra 18

Based on your Professional Teacher Judgment and Pre-assessment data, Levels with **1** may be included in the first lesson; Based on embedded assessment data, Levels with **2** **3** may be included in these lessons. The anchor charts for this concept may look like these on a 'Wall that Teaches' over a few lessons.

MD 1, 2 Divide in 2 ways – into 'groups of 2' and '2 equal groups'

**Groups of 2**  
 $12 \div 2 = 6$   
 $2 \times 6 = 12$   
 $6 \times 2 = 12$

**2 equal groups**  
 $12 \div 6 = 2$   
 $2 \times 6 = 12$   
 $6 \times 2 = 12$

MD 5 Divide into equal rows (array) describe using 2 division and 2 multiplication number sentences

$12 \div 6 = 2$   
 $12 \div 2 = 6$   
 $2 \times 6 = 12$   
 $6 \times 2 = 12$

MD 7, 8 Divide in 4 ways – into 'groups of 2' and '2 equal groups'

**Groups of 2**  
 $8 \div 2 = 4$

**2 equal groups**  
 $8 \div 2 = 4$

MD 10 Multiply by 2 Distributive property

$2 \times 7 = 14$   
 $5 + 2$   
 $2 \times 5 = 10$   
 $2 \times 2 = 4$   
 $10 + 4 = 14$

MD 10 PA 17 Divide by 2 Related to halving

$15 \div 2 = 7 \text{ r}1$   
 $10 + 5$   
 $4 + 1$   
 $10 \div 2 = 5$   
 $4 \div 2 = 2$   
 $5 + 2 = 7$

$\frac{1}{2}$  of  $15 = 7 \text{ r}1$   
 $10 + 5$   
 $4 + 1$

$\frac{1}{2}$  of  $10 = 5$   
 $\frac{1}{2}$  of  $4 = 2$

MD 11 Multiply by 4 Distributive property

$4 \times 7 = 28$   
 $5 + 2$   
 $4 \times 5 = 20$   
 $4 \times 2 = 8$   
 $20 + 8 = 28$

MD 10 Divide by 4 Related to quartering

$37 \div 4 = 9 \text{ r}1$   
 $20 + 17$   
 $16 + 1$   
 $20 \div 4 = 5$   
 $16 \div 4 = 4$   
 $5 + 4 = 9$

$\frac{1}{4}$  of  $37 = 9 \text{ r}1$   
 $20 + 17$   
 $16 + 1$

$\frac{1}{4}$  of  $20 = 5$   
 $\frac{1}{4}$  of  $16 = 4$

MD 12 Multiply by 3 Related to tripling

$3 \times 7 = 21$   
 $5 + 2$   
 $3 \times 5 = 15$   
 $3 \times 2 = 6$   
 $15 + 6 = 21$

MD 12 Divide by 3 Related to thirding

$16 \div 3 = 5 \text{ r}1$   
 $9 + 7$   
 $6 + 1$   
 $9 \div 3 = 3$   
 $6 \div 3 = 2$   
 $3 + 2 = 5$

$\frac{1}{3}$  of  $16 = 5 \text{ r}1$   
 $9 + 7$   
 $6 + 1$

$\frac{1}{3}$  of  $9 = 3$   
 $\frac{1}{3}$  of  $6 = 2$

MD 13 Multiply by 5 Distributive property

$5 \times 7 = 35$   
 $5 + 2$   
 $5 \times 5 = 25$   
 $5 \times 2 = 10$   
 $25 + 10 = 35$

MD 13 Divide by 5 Related to fifthing

$37 \div 5 = 7 \text{ r}2$   
 $20 + 17$   
 $15 + 2$   
 $20 \div 5 = 4$   
 $15 \div 5 = 3$   
 $4 + 3 = 7$

$\frac{1}{5}$  of  $37 = 7 \text{ r}2$   
 $20 + 17$   
 $15 + 2$

$\frac{1}{5}$  of  $20 = 4$   
 $\frac{1}{5}$  of  $15 = 3$

MD 14 Multiply by 9 Distributive property

$9 \times 7 = 63$   
 $5 + 2$   
 $9 \times 5 = 45$   
 $9 \times 2 = 18$   
 $45 + 18 = 63$

MD 14 Divide by 9 Related to ninthing

$71 \div 9 = 7 \text{ r}8$   
 $27 + 44$   
 $36 + 8$   
 $27 \div 9 = 3$   
 $36 \div 9 = 4$   
 $3 + 4 = 7$

$\frac{1}{9}$  of  $71 = 7 \text{ r}8$   
 $27 + 44$   
 $36 + 8$

$\frac{1}{9}$  of  $27 = 3$   
 $\frac{1}{9}$  of  $36 = 4$

MD 15 Multiply by 6 Distributive property

$6 \times 7 = 42$   
 $5 + 2$   
 $6 \times 5 = 30$   
 $6 \times 2 = 12$   
 $30 + 12 = 42$

MD 15 Divide by 6 Related to sixthing

$23 \div 6 = 3 \text{ r}5$   
 $12 + 11$   
 $6 + 5$   
 $12 \div 6 = 2$   
 $6 \div 6 = 1$   
 $2 + 1 = 3$

$\frac{1}{6}$  of  $23 = 3 \text{ r}5$   
 $12 + 11$   
 $6 + 5$

$\frac{1}{6}$  of  $12 = 2$   
 $\frac{1}{6}$  of  $6 = 1$

MD 16 Multiply by 8 Distributive property

$8 \times 7 = 56$   
 $5 + 2$   
 $8 \times 5 = 40$   
 $8 \times 2 = 16$   
 $40 + 16 = 56$

MD 16 Divide by 8 Related to eighthing

$55 \div 8 = 6 \text{ r}7$   
 $40 + 15$   
 $8 + 7$   
 $40 \div 8 = 5$   
 $8 \div 8 = 1$   
 $5 + 1 = 6$

$\frac{1}{8}$  of  $55 = 6 \text{ r}7$   
 $40 + 15$   
 $8 + 7$

$\frac{1}{8}$  of  $40 = 5$   
 $\frac{1}{8}$  of  $8 = 1$

MD 17 Multiply by 7 Distributive property

$7 \times 6 = 42$   
 $5 + 1$   
 $7 \times 5 = 35$   
 $7 \times 1 = 7$   
 $35 + 7 = 42$

MD 17 Divide by 7 Related to seventhing

$37 \div 7 = 5 \text{ r}2$   
 $21 + 16$   
 $14 + 2$   
 $21 \div 7 = 3$   
 $14 \div 7 = 2$   
 $3 + 2 = 5$

$\frac{1}{7}$  of  $37 = 5 \text{ r}2$   
 $21 + 16$   
 $14 + 2$

$\frac{1}{7}$  of  $21 = 3$   
 $\frac{1}{7}$  of  $14 = 2$

MD 20 Highest Common Factor

12 15  
 Factors of 12 = 1, 2, 3, 4, 6, 12  
 Factors of 15 = 1, 3, 5, 15  
 Common factors of 12 and 15 = 1, 3  
 Highest common factor of 12 and 15 = 3

MD 21 Simplifying Multiplication and Division Using Factors

$144 \div 8 = 72 \div 4 = 36 \div 2 = 18$   
 $16 \times 4 = 32 \times 2$

MD 22 Divisibility Tests

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- Divisible by 2 because it's even
- Not divisible by 4 because it has an odd tens digit and the ones digit is not 2 or 6
- Not divisible by 8 because it has an odd number of hundreds and the two-digit number is not 4 less and 4 more than a two-digit number that is divisible by 8
- Not divisible by 5 because the ones digit is not 5 or 0
- Not divisible by 10 because the ones digit is not 0
- Not divisible by 3 because – because each place value is one more than a multiple of 3, so the remainders are the digits. The digits do not add up to a multiple of 3.
- Not divisible by 9 because – because each place value is one more than a multiple of 9, so the remainders are the digits. The digits do not add up to a multiple of 9.
- Not divisible by 6 because it is not divisible by both 2 and 3

MD 23 FD 21 Divide by single-digit numbers, dividing remainders to create fractions

$77 \div 6 = 12 \frac{5}{6}$   
 $60 + 17$   
 $12 + 5$   
 $60 \div 6 = 10$   
 $12 \div 6 = 2$   
 $5 \div 6 = \frac{5}{6}$   
 $10 + 2 + \frac{5}{6} = 12 \frac{5}{6}$

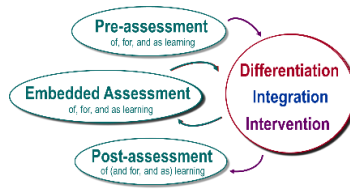
$\frac{1}{6}$  of  $77 = 12 \frac{5}{6}$   
 $60 + 17$   
 $12 + 5$

$\frac{1}{6}$  of  $60 = 10$   
 $\frac{1}{6}$  of  $12 = 2$   
 $\frac{1}{6}$  of  $5 = \frac{5}{6}$

$93 \times 74 = 6882$

	70	+	4
90	6300		360
+ 3	210		12

$90 \times 70 = 9 \times 10 \times 7 \times 10 = 63 \times 100 = 6300$   
 $90 \times 4 = 9 \times 10 \times 4 = 36 \times 10 = 360$   
 $3 \times 70 = 7 \times 10 \times 3 = 70 \times 3 = 210$   
 $3 \times 4 = 12$   
 $6300 + 360 + 210 + 12 = 6882$



Embedded assessment data may tell us we need to re-explicitly teach some Levels.

MD 25 Multiply decimals by whole numbers and powers of 10

$9.3 \times 74 = 688.2$

	70	+	4
9	630		36
+ 0.3	21		1.2

$9 \times 70 = 9 \times 7 \times 10 = 63 \times 10 = 630$   
 $0.3 \times 70 = 0.3 \times 10 \times 7 = 3 \times 7 = 21$   
 $9 \times 4 = 36$   
 $0.3 \times 4 = \frac{3}{10} \times 4 = \frac{12}{10} = 1.2$   
 $630 + 36 + 21 + 1.2 = 688.2$

MD 25 Divide decimals by whole numbers and powers of 10

$35.7 \div 4 = 8.925$   
 $32 + 3.7$   
 $3.6 + 0.1$

Change the decimal to a fraction, divide.

$32 \div 4 = 8$   
 $3.6 \div 4 = 0.9$

Multiply the decimal by 10, divide, then divide the product by 10.

$0.1 \div 4 = \frac{1}{4} \times 0.1 = \frac{1}{4} \times \frac{1}{10} = \frac{1}{4} \times \frac{10}{100} = \frac{1}{4} \times \frac{1}{100} = \frac{1}{400} = \frac{25}{1000} \div 4 = \frac{25}{1000} \times \frac{1}{4} = \frac{25}{4000} = \frac{5}{800} = \frac{1}{160} = 0.00625$

$0.1 \div 4 = \frac{1}{4} \times 0.1 = \frac{1}{4} \times \frac{1}{10} = \frac{1}{4} \times 1 \div 10 = \frac{1}{4} \times 1 \div 10 = \frac{1}{40} = 0.025$   
 $0.25 \div 10 = 0.025$   
 $0.25 \div 10 = 0.025$

$8 + 0.9 + 0.025 = 8.925$

MD 25 FD 27 Division is multiplication by a fraction

$\frac{1}{4}$  of 56 = 14  
 $\frac{1}{4} \times 56 = 14$

When we divide by 4, we are making the number a quarter times as big. When we divide by 4, we are multiplying by a quarter. We are multiplying by a fraction when we divide.

$56 \div 4 = 14$   
 $40 + 16$   
 $40 \div 4 = 10$   
 $16 \div 4 = 4$   
 $10 + 4 = 14$

$\frac{1}{4} \times 56 = 14$   
 $\frac{1}{4} \times 40 = 10$   
 $\frac{1}{4} \times 16 = 4$