

Grade 7 Math Study Guide

Chapter 6

6.1 Divisibility (pages 210-221 in textbook)

Divisibility Rules

A number is divisible by...

If...

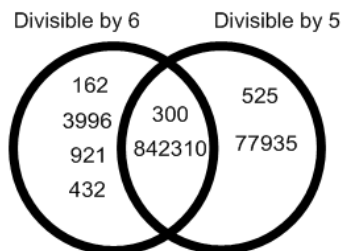
2	The last digit is even (0, 2, 4, 6, 8)
3	The sum of the digits is divisible by 3
4	The number formed by the last two digits is divisible by 2 at least twice
5	The last digit is 5 or 0
6	The number is divisible by both 2 and 3
8	The number is divisible by 2 at least three times
9	The sum of the digits is divisible by 9
10	The last digit is 0

Example: Check 162, 3996, 432, 300, 525, 921, 77935, 842310, 877

Sort using a table:

	Divisible by 5	Not divisible by 5
Divisible by 6	300 842310	162 3996 432 921
Not divisible by 6	525 77935	877

Sort using a Venn diagram:



Using divisibility to find factors:

Example: 36

36 is divisible by 1 $1 \times 36 = 36$

36 is divisible by 2 because it is even. $2 \times 18 = 36$

36 is divisible by 3 because the sum of the digits, $3 + 6 = 9$, is divisible by 3. $3 \times 12 = 36$

36 is divisible by 4 because the number formed by the two digits is divisible by 2 at least twice. $4 \times 9 = 36$

36 is divisible by 6 because 36 is divisible by 2 and 3. $6 \times 6 = 36$

The factors of 36 are 1, 2, 3, 4, 6, 9, 12, 18, 36.

18

18 is divisible by 1. $1 \times 18 = 18$

18 is divisible by 2 because it is even. $2 \times 9 = 18$

18 is divisible by 3 because the sum of its digits, $1 + 8 = 9$ is divisible by 3. $3 \times 6 = 18$

The factors of 18 are 1, 2, 3, 6, 9, 18.

The **common factors** of 36 and 18 are: 1, 2, 3, 6, 9, 18.

The **greatest common factor** of 36 and 18 is: 18.

Using divisibility to write fractions in lowest terms:

Example: $\frac{10}{16}$

10 and 16 are both divisible by 2 because they are both even.

So 10 divided by 2 is 5

And 16 divided by 2 is 8

$$\text{So } \frac{10}{16} = \frac{5}{8}$$

***To reduce fractions, you need to divide BOTH the numerator and the denominator by the SAME number. You can divide by any common factor, and then keep reducing, or you can divide by the greatest common factor.**

6.2 Add Fractions with Like Denominators (pages 222-228 in textbook)

$$\text{Examples: } \frac{9}{17} + \frac{4}{17} = \frac{13}{17}$$

$$\frac{3}{5} + \frac{1}{5} = \frac{4}{5}$$

$$\frac{12}{23} + \frac{5}{23} = \frac{17}{23}$$

***Notice that the denominator does not change.**

6.3 Subtract Fractions with Like Denominators (pages 229-233 in textbook)

$$\text{Examples: } \frac{7}{8} - \frac{3}{8} = \frac{4}{8} = \frac{1}{2}$$

$$\frac{11}{15} - \frac{7}{15} = \frac{4}{15}$$

$$\frac{19}{27} - \frac{17}{27} = \frac{2}{27}$$

***Remember to reduce answers to lowest terms.**

Chapter 6 Chapter Review Questions on page 234-235 of the textbook.

Chapter 7

7.1 Common Denominators (pages 244-250 in textbook)

Finding common denominators using diagrams (see examples page 245 or questions 4 and 5 on page 248)

Finding common denominators using **multiples**:

Example: Finding a common denominator for $\frac{3}{4}$ and $\frac{1}{3}$

Multiples of 4 are: 4, 8, 12, 16, 20, 24, ...

Multiples of 3 are: 3, 6, 9, 12, 15, 18, ...

The first multiple divisible by both 4 and 3 is 12. So a common denominator is 12.

$$\frac{3 \times 3}{4 \times 3} = \frac{9}{12} \quad \text{and} \quad \frac{1 \times 4}{3 \times 4} = \frac{4}{12}$$

***Remember you always need to do the same thing to both the numerator and the denominator. For example, if you multiply the denominator by 3 then you need to multiply the numerator by 3.**

7.2 Add and Subtract Fractions with Unlike Denominators (pages 251-258 in textbook)

Adding fractions with unlike denominators

Example: $\frac{2}{5} + \frac{3}{10}$

Find a common denominator:

Multiples of 5 are 5, 10, 15, 20, ...

Multiples of 10 are 10, 20, 30, 40

The first multiple that is divisible by both 5 and 10 is 10.

Write equivalent fractions:

$$\frac{2 \times 2}{5 \times 2} = \frac{4}{10} \quad \text{and} \quad \frac{3}{10}$$

Now the denominators are the same. We can add when the denominators are the same.

$$\frac{4}{10} + \frac{3}{10} = \frac{7}{10}$$

Example: $\frac{11}{12} - \frac{5}{8}$

Find a common denominator:

Multiples of 12 are 12, 24, 36, ...

Multiples of 8 are 8, 16, 24, 32, ...

The common denominator is 24.

Write equivalent fractions:

$$\frac{11 \times 2}{12 \times 2} = \frac{22}{24} \quad \text{and} \quad \frac{5 \times 3}{8 \times 3} = \frac{15}{24}$$

Now the denominators are the same. We can subtract when the denominators are the same.

$$\frac{22}{24} - \frac{15}{24} = \frac{7}{24}$$

***If you are having trouble finding the common denominator, remember that you can also multiply the denominators together to find the common denominator.**

7.3 Add Mixed Numbers (pages 259-265 in textbook)

To convert mixed numbers:

Example: $\frac{34}{8}$

Divide 34 by 8 and you get 4 with a remainder of 2. So you have 4

and $\frac{2}{8}$. So $\frac{34}{8} = 4\frac{2}{8} = 4\frac{1}{4}$

Example: $6\frac{3}{4}$

Multiply 4×6 to get 24 and then add 3 to get $\frac{24+3}{4} = \frac{27}{4}$

Adding mixed numbers:

Method 1: Using pattern blocks

Method 2: Using an addition statement

$$\text{Example: } 2\frac{1}{4} + 3\frac{1}{4} = 2 + 3 + \frac{1}{4} + \frac{1}{4} = 5 + \frac{2}{4} = 5\frac{2}{4} = 5\frac{1}{2}$$

Method 3: Changing to improper fractions first

$$\text{Example: } 4\frac{2}{8} + 2\frac{1}{8}$$

$$4\frac{2}{8} = \frac{34}{8} \quad \text{and} \quad 2\frac{1}{8} = \frac{17}{8}$$

$$\text{So } \frac{34}{8} + \frac{17}{8} = \frac{51}{8}$$

$$\text{Now change back to a mixed number. } \frac{51}{8} = 6\frac{3}{8}$$

$$\text{Example: } 5\frac{4}{9} + 3\frac{2}{9} = \frac{49}{9} + \frac{29}{9}$$

$$= \frac{78}{9}$$

$$= 8\frac{6}{9}$$

$$= 8\frac{2}{3}$$

Adding mixed numbers with unlike denominators:

Method 1: Using pattern blocks

Method 2: Using an addition statement

$$\begin{aligned}\text{Example: } 1\frac{1}{3} + 2\frac{1}{2} &= 1 + 2 + \frac{1}{3} + \frac{1}{2} \\ &= 3 + \frac{2}{6} + \frac{3}{6} \\ &= 3\frac{5}{6}\end{aligned}$$

Or change to improper fractions first:

$$1\frac{1}{3} = \frac{4}{3} \quad \text{and} \quad 2\frac{1}{2} = \frac{5}{2}$$

$$\text{Find a common denominator: } \frac{4}{3} = \frac{8}{6} \quad \text{and} \quad \frac{5}{2} = \frac{15}{6}$$

$$\text{So } \frac{8}{6} + \frac{15}{6} = \frac{23}{6}$$

$$\text{Now change back to a mixed number: } \frac{23}{6} = 3\frac{5}{6}$$

Method 3: Changing to improper fractions first

$$\begin{aligned}\text{Example: } 2\frac{3}{5} + 4\frac{1}{4} &= \frac{13}{5} + \frac{17}{4} \\ &= \frac{52}{20} + \frac{85}{20} \\ &= \frac{137}{20} \\ &= 6\frac{17}{20}\end{aligned}$$

7.4 Subtract Mixed Numbers (pages 266-273)

Subtracting mixed numbers:

Method 1: Using pattern blocks or fraction strips

Method 2: Changing to improper fractions first

Example: $4\frac{2}{3} - 2\frac{1}{3}$

$$4\frac{2}{3} = \frac{14}{3} \quad \text{and} \quad 2\frac{1}{3} = \frac{7}{3}$$

$$\text{So } \frac{14}{3} - \frac{7}{3} = \frac{7}{3} = 2\frac{1}{3}$$

Example: $6\frac{3}{6} - 1\frac{1}{6}$

$$6\frac{3}{6} = \frac{39}{6} \quad \text{and} \quad 1\frac{1}{6} = \frac{7}{6}$$

$$\text{So } \frac{39}{6} - \frac{7}{6} = \frac{32}{6} = 5\frac{2}{6} = 5\frac{1}{3}$$

Subtracting mixed numbers with unlike denominators:

Method 1: Using fraction strips or pattern blocks

Method 2: Changing to improper fractions first

Example: $2\frac{2}{3} - 1\frac{1}{4}$

$$2\frac{2}{3} = \frac{8}{3} \quad \text{and} \quad 1\frac{1}{4} = \frac{5}{4}$$

So $\frac{8}{3} - \frac{5}{4}$

Find a common denominator. $\frac{8}{3} - \frac{5}{4} = \frac{32}{12} - \frac{15}{12}$

$$= \frac{17}{12}$$

$$= 1\frac{5}{12}$$

Example: $3\frac{4}{7} - 1\frac{1}{2}$

$$3\frac{4}{7} = \frac{25}{7} \quad \text{and} \quad 1\frac{1}{2} = \frac{3}{2}$$

So $\frac{25}{7} - \frac{3}{2}$

Find a common denominator. $\frac{25}{7} - \frac{3}{2} = \frac{50}{14} - \frac{21}{14}$

$$= \frac{29}{14}$$

$$= 2\frac{1}{14}$$

Chapter 7 Chapter Review Questions on page 274-275 of the textbook.