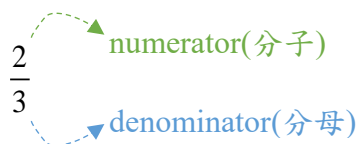


分數的四則運算 1

Operations with Fractions 1

Class: _____ Name: _____

1. Fractions



How do we read fractions?

$\frac{2}{3}$ two over three $3\frac{2}{5}$ three and two over five

2. Three kinds of fractions

proper fraction(真分數): $\frac{1}{2}$, $-\frac{4}{9}$, $\frac{23}{58}$, ...

improper fraction(假分數): $-\frac{11}{3}$, $\frac{4}{4}$, $\frac{101}{37}$, ...

mixed fraction(帶分數): $4\frac{1}{2}$, $-2\frac{3}{8}$, $-23\frac{5}{41}$, ...

Example:

Change $-2\frac{3}{7}$ to an improper fraction.

Exercise:

Change $-6\frac{4}{5}$ to an improper fraction.

3. Equivalent fractions(等值分數)

expansion of fraction(擴分)

$$\frac{2}{3} = \frac{2 \times 3}{3 \times 3} = \frac{6}{9}$$

reduction of fraction(約分)

$$\frac{6}{9} = \frac{6 \div 3}{9 \div 3} = \frac{2}{3}$$

Example: Write $-\frac{12}{20}$ in simplest form.

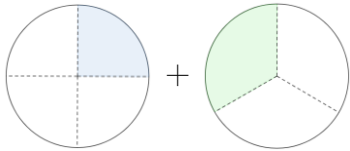

Exercise: Write $\frac{48}{72}$ in simplest form

4. Comparing fractions

<p>Example 1:</p> <p>Which fraction is larger? $\frac{5}{8}$, $\frac{2}{3}$</p>	<p>Exercise 1:</p> <p>Which fraction is larger? $\frac{4}{5}$, $\frac{5}{6}$</p>
<p>Example 2:</p> <p>Which fraction is larger? $-\frac{7}{9}$, $-\frac{3}{4}$</p>	<p>Exercise 2:</p> <p>Which fraction is larger? $-\frac{2}{7}$, $-\frac{4}{9}$</p>

5. Adding and subtracting fractions

Which of the following methods is correct?

 <p><input type="checkbox"/> $\frac{1}{4} + \frac{1}{3} = \frac{2}{7}$</p>	 <p><input type="checkbox"/> $\frac{1}{4} + \frac{1}{3} = \frac{3}{12} + \frac{4}{12} = \frac{7}{12}$</p>
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<p>Example 1: $\frac{3}{11} - \frac{9}{11} =$</p>	<p>Exercise 1: $(-\frac{11}{15}) + \frac{4}{15} =$</p>
<p>Example 2: $\frac{3}{4} + (-\frac{3}{5}) =$</p>	<p>Exercise 2: $\frac{1}{4} - \frac{5}{6} =$</p>

一、設計理念：

1. 學生在國小時曾經學過正分數的概念及四則運算，在國中時僅增加負分數的部分。
2. 語言部分考量學生國小可能未受過雙語數學的教育，故分數的英文用法皆從頭教學。
3. 國教院樂詞網公告最簡分數的英文為 fraction in lowest term 或 irreducible fraction，亦有 fraction in simplest form、simplest form of a fraction、simplest fraction 及 reduced fraction 的用法。在國外實際使用時亦會直接寫 simplify the fraction，而不強調最簡分數一詞。本份教案使用 fraction in simplest form 的用法。
4. 帶分數的英文可使用 mixed fraction 或 mixed number，為求與真分數、假分數的一致性此處採用 mixed fraction。
5. 分數的唸法有兩種，以 $\frac{2}{3}$ 為例，可使用 two-thirds 或 two over three，但由於七年級學生尚未學習序數的英文，故本文統一使用 a over b 的用法。但無論何種唸法，英文習慣上分數由分子唸到分母，與中文從分母唸到分子的習慣顛倒。
6. 二分之一的英文為 one half，並無 one-second 這種用法。二分之五的英文為 five halves。
7. 四分之一的英文為 one-fourth，又可使用 one-quarter。
8. 國外分數的加減會透過 common denominator 及 least common denominator (LCD)來教學，中文可直譯為公分母及最小公分母。但由於國內的教材僅強調要化為分母相同，直接以 the denominators of two fractions should be the same 表示即可，故不另外介紹上述的兩個名詞。
9. 此處擴分及約分使用國教院樂詞網所公告的 expansion of fraction 及 reduction of fraction 的用法，但英文並無約分及擴分相對應的英文詞彙。

二、英文詞彙：

中文	英文
等值分數	equivalent fraction
擴分	expansion of fraction
約分	reduction of fraction
最簡分數	fraction in simplest form
通分	reduction to common denominator
真分數	proper fraction
假分數	improper fraction
帶分數	mixed fraction
分子	numerator
分母	denominator

三、數學英文用法：

數學表示法	英文
$\frac{1}{5}$	one over five
$-\frac{7}{5}$	negative seven over five
$2\frac{3}{4}$	two and three over four
$\frac{1}{2} + \frac{1}{3} = \frac{5}{6}$	one over two plus one over three equals five over six
$\frac{2}{3} - \frac{1}{2} = \frac{1}{6}$	two over three minus one over two equals one over six

四、教學參考範例：

1	<p>【分數的介紹】</p> <p>We read a fraction from the top to the bottom. $\frac{2}{3}$ is read two over three. The top number is the numerator, and the bottom number is the denominator. The numerator of 2 over 3 is 2, and the denominator is 3. Let's try some examples. $\frac{3}{7}$ is 3 over 7, and $\frac{11}{6}$ is 11 over 6. How about this fraction? $3\frac{2}{5}$ is 3 and 2 over 5.</p>
2	<p>【分數的分類】</p> <p>We have learned 3 kinds of fractions before. If a numerator of a fraction is less than the denominator, like $\frac{1}{2}$, $-\frac{4}{9}$, or $\frac{23}{58}$, it is a proper fraction. If a numerator of a fraction is larger than or equal to the denominator, like $-\frac{11}{3}$, $\frac{4}{4}$, or $\frac{101}{37}$, it is an improper fraction. We can write $-\frac{11}{3}$ as $-3\frac{2}{3}$, and $-3\frac{2}{3}$ is a mixed fraction.</p>
3	<p>【最簡分數】</p> <p>We want to find the fraction that is equivalent to $\frac{2}{3}$. We can multiply a number to the numerator and the denominator together. For example, we multiply the numerator and the denominator by 3, and we get $\frac{6}{9}$. Then, $\frac{2}{3}$ is equal to $\frac{6}{9}$. This way is the expansion of fraction. On the other hand, we can divide a number to the numerator and denominator by 3, and we get $\frac{2}{3}$. Then, $\frac{6}{9}$ is equal to $\frac{2}{3}$. This way is the reduction of fraction. To get an easy answer, we simplify the fraction when we get the answer. We can simplify a fraction</p>

	<p>until it cannot be simplified any more. A fraction that cannot be simplified is said the fraction in simplest form.</p>
4	<p>【分數的化簡過程】</p> <p>Let's look at the following example. We want to write $-\frac{12}{20}$ in simplest form. Dividing both the numerator and the denominator by 2, we get $-\frac{6}{10}$. We can keep simplifying the fraction. Divided both the numerator and denominator by 2 again, we get $-\frac{3}{5}$. $-\frac{3}{5}$ cannot be simplified anymore, so this is the simplest form of $-\frac{12}{20}$.</p>
5	<p>【分數的加減法】</p> <p>Next, we need to learn how to add or subtract fractions. Take a look at the following two figures. When we calculate $\frac{1}{4}$ plus $\frac{1}{3}$, which is correct? In the left figures, $\frac{1}{4}$ is one of the four pieces of the circle. $\frac{1}{3}$ is one of the three pieces of the circle. After adding them up, there are seven pieces of the circles, and we get two of them, so the result is $\frac{2}{7}$. Is this correct? No. Because the pieces of the circles have different sizes. We have to make the circles equal in size first. In the right figure, $\frac{1}{4}$ equals $\frac{3}{12}$, and $\frac{1}{3}$ equals $\frac{4}{12}$. After adding them up, we have seven pieces in total. Each piece is one of twelve pieces of the circle, so the result is $\frac{7}{12}$.</p>

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