# 1.3 – Rational Numbers in Fraction Form
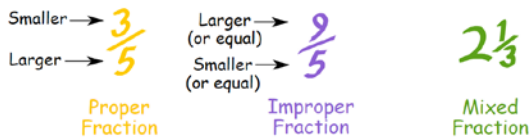
Name:_____                                                                 Block_____

**REMEMBER:**          …and you need to be able to  $+$   $-$   $\times$   $and$  $\div$ any type of fraction +/-

### Three Types of Fractions

There are three types of fraction:

Smaller → / Larger → $\dfrac{3}{5}$  **Proper Fraction**

Larger → / Smaller → $\dfrac{9}{5}$  **Improper Fraction**

$2\frac{1}{3}$  **Mixed Fraction**

| **Improper fractions ⇒ Mixed Fraction** | **Mixed fractions ⇒ Improper Fraction** |
|---|---|
| Example: Convert $\dfrac{11}{4}$ to a mixed fraction. | 1.  Multiply the whole number by the fraction's denominator. |
| | 2.  Add that to the numerator |
| | 3.  Then write the result on top of the denominator. |
| Example: Convert $\dfrac{10}{3}$ to a mixed fraction. | Example: Convert $3\dfrac{2}{5}$ to an improper fraction. |

## PRACTICE

Write each improper fraction as a mixed number.

| 269. $\dfrac{9}{4}$ | 270. $\dfrac{19}{5} =$ | 271. $-\dfrac{23}{7} =$ | 272. $\dfrac{17}{2} =$ | 273. $-\dfrac{57}{10} =$ |
|---|---|---|---|---|
| Solution: 4 goes into 9 two times with one left over. $\dfrac{9}{4} = 2\dfrac{1}{4}$ | 274. $-\dfrac{31}{7} =$ | 275. $\dfrac{46}{5} =$ | 276. Which number is larger? $-\dfrac{34}{11}$ or $-3\dfrac{2}{11}$ | |

Write each mixed number as an improper fraction.

| 277. $-3\dfrac{2}{5}$ | 278. $-1\dfrac{1}{5} =$ | 279. $4\dfrac{1}{3} =$ | 280. $-2\dfrac{5}{6} =$ | 281. $2\dfrac{2}{7} =$ |
|---|---|---|---|---|
| Solution: 5 times 3 plus 2 is 17. $-3\dfrac{2}{5} = -\dfrac{17}{5}$ | 282. $1\dfrac{1}{8} =$ | 283. $-4\dfrac{2}{5} =$ | 284. Which number is smaller? $1\dfrac{2}{3}$ or $\dfrac{4}{3}$ | |

For mathematics ***improper fractions*** are better than mixed fractions.
Because mixed fractions can be confusing when we write them in a formula.

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## A) ADDING FRACTIONS

Step 1: Convert Mixed Fractions to improper fractions

Step 2: Make sure the bottom numbers *(the denominators)* are the same

Step 3: ADD the **_top numbers_** *(the numerators),* put that answer over the denominator

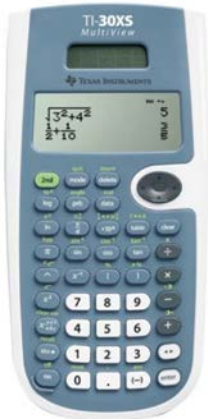Step 4: Divide to show the fraction in ***simplest form*** *(if needed)*

**Example #1:** Find the **lowest common denominator** for each pair.

| a) 3 and 5 | b) 4 and 5 | c) 8 and 2 | d) 4 and 6 | e) 3 and 6 |
|---|---|---|---|---|

**Example #2:** Add the following Fractions:

| a) | b) | c) | d) | e) |
|---|---|---|---|---|
| $\dfrac{2}{3}+\dfrac{1}{5}$ | $\dfrac{3}{4}+\left(\dfrac{-2}{5}\right)$ | $-\dfrac{5}{8}+\left(-\dfrac{7}{2}\right)$ | $-\dfrac{1}{4}+2\dfrac{1}{6}$ | $-3\dfrac{1}{3}+2\dfrac{5}{6}$ |

**\* Calculator input – how to enter/add fractions in a calculator \***



## PRACTICE

364. $\dfrac{1}{5}+\dfrac{3}{5}=$

366. $\dfrac{-4}{5}+\dfrac{-3}{5}=$

370. $-\dfrac{4}{3}+\dfrac{3}{4}=$

380. $\dfrac{-4}{5}+\dfrac{3}{-2}=$

383. $-5+\dfrac{3}{4}=$

384. $2\dfrac{1}{2}+1\dfrac{3}{5}=$

389. Sasha has 24 feet of baseboard material. He has measured his bedroom and needs the following lengths to finish the room: $5\dfrac{1}{2}$ feet, $11\dfrac{3}{16}$ feet and $12\dfrac{1}{8}$ feet. How much more baseboard material does he need to buy?

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# B.) SUBTRACTING FRACTIONS

Step 1: Convert _Mixed Fractions to improper fractions_

Step 2: Make sure the **bottom numbers** (the denominators) are the **same**

Step 3: SUBTRACT the top numbers ONLY (the numerators), put that answer over the denominator

Step 4: Divide to show the fraction in **simplest form** (if needed)

**Example #3:** Subtract

_* Calc input – how to enter/sub fractions in a calc *_

a)
$$\frac{5}{6}-\frac{4}{3}$$

b)
$$\frac{5}{4}-\left(-3\frac{1}{5}\right)$$

c)
$$1\frac{1}{2}-\left(-\frac{1}{4}\right)$$

d)
$$2\frac{1}{2}-4\frac{7}{8}$$

## PRACTICE

365. $\frac{1}{5}-\frac{3}{5}=$

367. $-\frac{2}{5}-\frac{-3}{5}=$

371. $-\frac{2}{3}-\frac{-3}{5}=$

381. $\frac{9}{2}-\left(-0.6\right)=$

382. $3-\frac{3}{4}=$

385. $-2\frac{1}{5}-1.75=$

388. Jayda is sitting in her tree fort $2\frac{1}{5}$ meters above the ground. Bilinter is sitting in his tree fort $3\frac{1}{3}$ m above the ground. How much higher in the air is Bilinter?

## C) MULTIPLYING FRACTIONS

There are 3 simple steps to multiply fractions:

*In order to multiply fractions, they **CANNOT** be in mixed fraction form – **must change** to an improper fraction first.*

1. Multiply the **top numbers** *(the numerators).*
2. Multiply the **bottom numbers** *(the denominators).*
3. **Simplify** the fraction if needed.

### Example #4:

a)
$$\left(\frac{5}{6}\right)\left(\frac{4}{3}\right)$$

b)
$$\left(\frac{-2}{3}\right)\left(\frac{9}{4}\right)$$

c)
$$\left(\frac{-1}{5}\right)\left(-2\frac{1}{3}\right)$$

### PRACTICE

Find the product and leave your answer in lowest terms.

403. $\dfrac{10}{6} \times \dfrac{8}{5}$

Solution #1.

$$\frac{10}{6} \times \frac{8}{5} = \frac{80}{30} = \frac{8}{3}$$

Solution #2.

$$\frac{\cancel{10}}{6} \times \frac{8}{\cancel{5}} \to \frac{2}{\cancel{6}} \times \frac{\cancel{8}}{1} \to$$

$$\to \frac{2}{3} \times \frac{4}{1} = \frac{8}{3}$$

404. $\dfrac{2}{3} \times \dfrac{6}{8} =$

405. $-\dfrac{12}{9} \times \dfrac{-6}{10} =$

406. $-\left(\dfrac{3}{5} \times -\dfrac{10}{15}\right) =$

Find the product and leave your answer in lowest terms.

411. $2\dfrac{1}{4} \times \dfrac{8}{3} =$

Solution:

$$\frac{9}{4} \times \frac{8}{3} =$$

$$\frac{9}{4} \times \frac{8}{\cancel{3}} = \frac{3}{4} \times \frac{8}{1}$$

$$\frac{3}{\cancel{4}} \times \frac{\cancel{8}}{1} = \frac{3}{1} \times \frac{2}{1} = 6$$

412. $3\dfrac{3}{4} \times \dfrac{2}{5} =$

413. $-\dfrac{2}{11} \times \left(-5\dfrac{1}{2}\right) =$

Right or wrong? Fix it.

414. $4\dfrac{4}{3} \times 0.6 =$

$$= \frac{16}{3} \times \frac{6}{10}$$

$$= \frac{16}{1} \times \frac{3}{10}$$

$$= \frac{8}{1} \times \frac{3}{5}$$

$$= \frac{24}{5}$$

# D) DIVIDING FRACTIONS

*\* In order to divide fractions, they **CANNOT** be in mixed fraction form – **must change** to an improper fraction first.*

1. Turn the second fraction *(the one you want to divide by)* upside down…this is called **the reciprocal *(I call it "flipped")***

2. Multiply the fractions *as normal (following multiplication rules)*

3. **Simplify** the fraction *(if needed)*

**Example #4:**
*\*Remember… cannot be in mixed number form – must change to improper fraction.*

a)
$$\left(\frac{5}{6}\right) \div \left(\frac{4}{3}\right)$$

b)
$$\left(1\frac{2}{3}\right) \div \left(-\frac{1}{5}\right)$$

c)
$$\left(-4\frac{1}{5}\right) \div \left(-3\frac{1}{3}\right)$$

## PRACTICE

Find the quotient and leave your answer in lowest terms.

| | | | |
|---|---|---|---|
| 431. $\frac{1}{4} \div \frac{5}{8} =$ | 432. $\frac{3}{4} \div \frac{5}{6} =$ | 433. $\frac{2}{3} \div 1\frac{2}{6} =$ | 434. $\frac{12}{9} \div \frac{10}{6} =$ |

Solution.

$\frac{1}{4} \div \frac{5}{8} \rightarrow$

Multiply the first fraction by the reciprocal of the second.

$\frac{1}{4} \times \frac{8}{5} = \frac{8}{20} = \frac{2}{5}$

| | | | |
|---|---|---|---|
| 435. $-\frac{21}{40} \times \frac{80}{7} =$ | 436. $\frac{-2}{3} \times \frac{8}{-6} =$ | 437. $5\frac{5}{4} \div \frac{-5}{8} =$ | 438. $-\frac{30}{50} \div 15 =$ |

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**Example #5:** Determine the missing number in the division statement.

a) $\left(-\dfrac{5}{8}\right) \div \boxed{\phantom{xx}} = -\dfrac{15}{56}$

# E) WORD PROBLEMS

439. At birth a puppy is $\dfrac{2}{3}$ of a foot from nose to tail. Three years later the same puppy is $4\dfrac{2}{3}$ feet from nose to tail. How many times longer is at after three years of life?

440. Weh Tueold was 180cm tall when he was a young man. Due to poor posture, he is now $\dfrac{4}{5}$ of his younger height. How tall is he now?

## Summary of Fraction Rules

| | Addition | Subtraction | Multiplication | Division |
|---|---|---|---|---|
| | $3\dfrac{1}{2}+\dfrac{6}{7}$ | $3\dfrac{1}{2}-\dfrac{6}{7}$ | $3\dfrac{1}{2}\times\dfrac{6}{7}$ | $3\dfrac{1}{2}\div\dfrac{6}{7}$ |
| Step 1 | Convert mixed number to improper fractions. | | | |
| | $\dfrac{7}{2}+\dfrac{6}{7}$ | $\dfrac{7}{2}-\dfrac{6}{7}$ | $\dfrac{7}{2}\times\dfrac{6}{7}$ | $\dfrac{7}{2}\div\dfrac{6}{7}$ |
| Step 2 | Create equivalent fractions with common denominators. | | Numerator times numerator and denominator times denominator. | Multiply the first fraction by the reciprocal of the second fraction. |
| | $\dfrac{7\times7}{2\times7}+\dfrac{6\times2}{7\times2}$ $=\dfrac{49}{14}+\dfrac{12}{14}$ | $\dfrac{7\times7}{2\times7}-\dfrac{6\times2}{7\times2}$ $=\dfrac{49}{14}-\dfrac{12}{14}$ | $\dfrac{7\times6}{2\times7}$ | $\dfrac{7}{2}\times\dfrac{7}{6}$ |
| Step 3 | Add numerators. | Subtract numerators. | Reduce numerator and denominator. | Reduce numerator and denominator. |
| | $\dfrac{61}{14}$ | $\dfrac{37}{14}$ | $\dfrac{\cancel{7}\times6}{2\times\cancel{7}}=\dfrac{6}{2}=3$ | $\dfrac{49}{12}$ |

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**Homework**  Complete all *"practice"* questions in this booklet
Section 1.3 pg 24-27
Questions #1-12,