

GRADE 8

MATHEMATICS

TOPIC: COMMON FRACTIONS

Introduction

Common fractions are numbers in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$.

Addition and subtraction of common fractions

The rules to add and subtract fractions are as follows:

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c} \quad \text{and} \quad \frac{a}{c} - \frac{b}{c} = \frac{a-b}{c}$$

In both cases, the denominators must be the same. Then you simply add/subtract the numerators, leaving the denominator the same. These rules can be extended to more than two fractions

Activity 1

Calculate:

a) $\frac{2}{7} + \frac{3}{7}$

b) $\frac{2}{11} - \frac{3}{11} + \frac{5}{11}$

c) $\frac{2}{3} + \frac{5}{6}$

d) $\frac{3}{4} + \frac{1}{6} - \frac{2}{3}$

e) $3\frac{1}{2} + 2\frac{1}{3}$

GRADE 8

MATHEMATICS

Multiplication of common fractions

The rule to multiply fractions is as follows $\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$

Simply multiply the numerators together and multiply the denominators together. This rule can be extended to more than two fractions.

Activity 2

a) $\frac{2}{3} \times \frac{4}{7}$

b) $\frac{3}{4} \times 8$

c) $-\frac{2}{3} \times 2\frac{1}{2} - \frac{3}{5}$

Division of common fractions

To divide by a fraction is the same as to multiply by its reciprocal, so the rule for division is:

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{a \times d}{b \times c}$$

This principle is sometimes described as “tip and times”. Please note, however, that it is the fraction after the division sign that is changed to its reciprocal.

Activity 3

a) $\frac{3}{5} \div \frac{2}{7}$

b) $\frac{4}{3} \div -\frac{2}{9}$

c) $\frac{2}{3} \div 4$

d) $1 \div 3\frac{1}{2} \div \frac{1}{3}$

GRADE 8

MATHEMATICS

Squares and cubes of common fractions

The rules for determining squares and cubes of fractions are: $\left(\frac{a}{b}\right)^2 = \frac{a^2}{b^2}$ and $\left(\frac{a}{b}\right)^3 = \frac{a^3}{b^3}$

To square/cube a fraction, we square/cube both the numerator and the denominator of the fraction.

Square roots and cube roots of common fractions

The rules for determining square roots and cube roots of fractions are:

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}} \text{ and } \sqrt[3]{\frac{a}{b}} = \frac{\sqrt[3]{a}}{\sqrt[3]{b}}$$

Activity 4

a) $\left(\frac{5}{7}\right)^2$

b) $\left(2\frac{1}{3}\right)^3$

c) $\sqrt{\frac{16}{25}}$

d) $\sqrt[3]{\frac{-8}{27}}$

GRADE 8
MATHEMATICS

Answers

Activity 1

Calculate:

a) $\frac{2}{7} + \frac{3}{7}$

$$= \frac{2+3}{7}$$

$$= \frac{5}{7}$$

b) $\frac{2}{11} - \frac{3}{11} + \frac{5}{11}$

$$= \frac{2-3+5}{11}$$

$$= \frac{4}{11}$$

c) $\frac{2}{3} + \frac{5}{6}$

$$= \frac{2 \times 2}{3 \times 2} + \frac{5}{6}$$

$$= \frac{4}{6} + \frac{5}{6}$$

$$= \frac{4+5}{6}$$

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

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

GRADE 8

MATHEMATICS

$$\begin{aligned} \text{d)} \quad & \frac{3}{4} + \frac{1}{6} - \frac{2}{3} \\ &= \frac{3 \times 3}{4 \times 3} + \frac{1 \times 2}{6 \times 2} - \frac{2 \times 4}{3 \times 4} \\ &= \frac{9}{12} + \frac{2}{12} - \frac{8}{12} \\ &= \frac{9+2-8}{12} \\ &= \frac{3}{12} \\ &= \frac{1}{4} \end{aligned}$$

$$\begin{aligned} \text{e)} \quad & 3\frac{1}{2} + 2\frac{1}{3} \\ &= \frac{7}{2} + \frac{7}{3} \\ &= \frac{21}{6} + \frac{14}{6} \\ &= \frac{35}{6} \\ &= 5\frac{5}{6} \end{aligned}$$

Activity 2

$$\begin{aligned} \text{a)} \quad & \frac{2}{3} \times \frac{4}{7} \\ &= \frac{2 \times 4}{3 \times 7} \\ &= \frac{8}{21} \end{aligned}$$

$$\begin{aligned} \text{b)} \quad & \frac{3}{4} \times 8 \\ &= \frac{3}{4} \times \frac{8}{1} \\ &= \frac{3 \times 8}{4 \times 1} \\ &= \frac{24}{4} \\ &= 6 \end{aligned}$$

GRADE 8

MATHEMATICS

c) $-\frac{2}{3} \times 2\frac{1}{2} \times -\frac{3}{5}$

$$= -\frac{2}{3} \times \frac{5}{2} - \frac{3}{5}$$

$$= -\frac{2 \times 5}{3 \times 2} - \frac{3}{5}$$

$$= -\frac{10}{6} - \frac{3}{5}$$

$$= -\frac{5}{3} - \frac{3}{5}$$

$$= -\frac{25}{15} - \frac{9}{15}$$

$$= -\frac{34}{15}$$

$$= -2\frac{4}{15}$$

Activity 3

a) $\frac{3}{5} \div \frac{2}{7}$

$$= \frac{3}{5} \times \frac{7}{2}$$

$$= \frac{3 \times 7}{5 \times 2}$$

$$= \frac{21}{10}$$

$$= 2\frac{1}{10}$$

b) $\frac{4}{3} \div -\frac{2}{9}$

$$= \frac{4}{3} \times -\frac{9}{2}$$

$$= \frac{4 \times -9}{3 \times -2}$$

$$= \frac{-36}{-6}$$

$$= 6$$

GRADE 8
MATHEMATICS

c) $\frac{2}{3} \div 4$

$$= \frac{2}{3} \div \frac{4}{1}$$

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

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

$$= \frac{2}{12}$$

$$= \frac{1}{6}$$

d) $1 \div 3\frac{1}{2} \div \frac{1}{3}$

$$= 1 \div \frac{7}{2} \div \frac{1}{3}$$

$$= 1 \times \frac{2}{7} \times \frac{3}{1}$$

$$= \frac{1 \times 2 \times 3}{1 \times 7 \times 1}$$

$$= \frac{6}{7}$$

Activity 4

a) $\left(\frac{5}{7}\right)^2$

$$= \frac{5^2}{7^2}$$

$$= \frac{25}{49}$$

GRADE 8
MATHEMATICS

b) $\left(2\frac{1}{3}\right)^3$

$$\begin{aligned}&\left(\frac{7}{3}\right)^3 \\&= \frac{7^3}{3^3} \\&= \frac{343}{27} \\&= 12\frac{19}{27}\end{aligned}$$

c) $\sqrt{\frac{16}{25}}$

$$\begin{aligned}&= \frac{\sqrt{16}}{\sqrt{25}} \\&= \frac{4}{5}\end{aligned}$$

d) $\sqrt[3]{\frac{-8}{27}}$

$$\begin{aligned}&= \frac{\sqrt[3]{-8}}{\sqrt[3]{27}} \\&= \frac{-2}{3}\end{aligned}$$