FRACTIONS

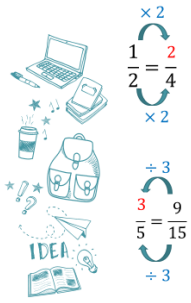
NOTES & ACTIVITIES

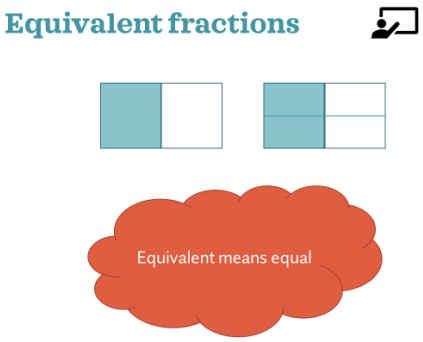
GRADE 8

Name and surname : _____

Terminology

$\frac{numerator}{denominator} = \frac{7}{8}$





Proper fractions

Numerator is smaller than the denominator e.g. $\frac{4}{9}$

Improper fractions

Numerator is bigger than the denominator e.g. $\frac{9}{4}$

Example 1

To compare fractions the denominators, need to be the same.

Which fraction is bigger:

$\frac{3}{5}$ *or* $\frac{10}{15}$

Example 2

Fill in $<,\ >\ or\ =$

a) $\frac{4}{6}$ *or* $\frac{12}{18}$

b) $\frac{2}{3}$ *or* $\frac{6}{10}$

Example 3

Mixed number $3\frac{4}{9}$. Converting the mixed number to an improper fraction.

Addition and Subtraction of fractions

Example 4

$\frac{1}{8} + \frac{3}{8}$



Example 5

$\frac{1}{8} + \frac{1}{3}$

Steps:

1. Determine the LCM of the denominators.
2. Add/subtract the numerators.

Example 6

$\frac{3}{8} + \frac{1}{4}$

Example 7

$3\frac{2}{5} - 1\frac{5}{6}$

Convert to an improper fraction

Exercise 1

Simplify each of the following expressions as far as possible:

1. $\frac{2}{5} + \frac{2}{5}$
2. $\frac{3}{4} - \frac{2}{3}$
3. $2\frac{1}{3} - \frac{2}{5} + 2$
4. $3\frac{1}{2} + \frac{1}{4} - 2\frac{2}{3}$

Multiplication and Division of Fractions

Example 8.1

$\frac{2}{15} \times \frac{3}{4}$

Steps:

1. Determine the LCM of the denominators.
2. Add/subtract the numerators.

Example 8.2

$\frac{2}{15} + \frac{3}{4}$

Example 9

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

Convert to an improper fraction

Example 10

$\frac{6}{15} \div \frac{3}{5}$

Reciprocal

$\frac{3}{5} \rightarrow \frac{5}{3}$

Steps

1. Division means the multiplication with the reciprocal. (Change into a × by flipping second fraction)
2. Multiply numerators and multiply denominators.
3. Simplify.

Example 11.1

$2\frac{1}{6} \div 4\frac{1}{3} \times \frac{1}{15}$

Example 11.2

$2\frac{1}{6} \div \left(4\frac{1}{3} \times \frac{1}{15}\right)$

Example 12

a) $4 \div \frac{1}{2}$

b) $\frac{1}{2} \div 4$

Example 13

$\frac{\frac{3}{8}}{\frac{1}{4}}$

Exercise 2

Calculate each of the following:

1. $\frac{4}{9} \times \frac{3}{8}$
2. $\frac{4}{9} \div \frac{3}{8}$
3. $4\frac{7}{8} \div \frac{2}{3} \times \frac{1}{3}$
4. $20 \times \frac{4}{5}$
5. $20 \div \frac{4}{5}$

Exercise 3

Calculate each of the following:

1. $\frac{1}{6} - \frac{1}{2} \times \frac{1}{3}$
2. $\frac{4}{15} + \frac{1}{5} \times \frac{2}{3} - \frac{2}{5}$
3. $\frac{1}{4} \div \frac{1}{5} - \frac{1}{3} \times \frac{1}{2}$

BODMAS

Square, Square roots, Cubes and Cube roots

Example 14

Square

14.1 3^2

14.2 $\left(\frac{1}{3}\right)^2$

14.3 $\left(\frac{2}{5}\right)^2$

Square roots

14.4 $\sqrt{9}$

14.5 $\sqrt{\frac{1}{9}}$

14.6 $\sqrt{\frac{4}{25}}$

Example 14

14.7 $\left(\frac{-7}{10}\right)^2$

14.8 $\sqrt{\frac{64}{81}}$

Example 15

Cubes

15.1 3^3

15.2 $\left(\frac{1}{3}\right)^3$

15.3 $\left(-\frac{2}{5}\right)^3$

Cube roots

15.4 $\sqrt[3]{27}$

15.5 $\sqrt[3]{\frac{1}{27}}$

15.6 $\sqrt[3]{-\frac{8}{125}}$

Example 15

15.7 $\left(-\frac{7}{10}\right)^3$

15.8 $\sqrt[3]{\frac{64}{27}}$

Exercise 4

Calculate each of the following:

1. $\frac{3}{10} \times \frac{3}{10}$
2. $\left(\frac{5}{7}\right)^2$
3. $\left(\frac{2}{3}\right)^3$
4. $\left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right)^3$
5. $\left(3\frac{1}{3}\right)^2$
6. $3\left(\frac{1}{3}\right)^2$
7. $\left(\frac{1}{3} + \frac{1}{4}\right)^2$

Exercise 5

Calculate each of the following:

1. $\sqrt{\frac{25}{81}}$
2. $\sqrt{\frac{36}{100}}$
3. $\sqrt[3]{\frac{27}{64}}$
4. $\sqrt[3]{3\frac{3}{8}}$
5. $\sqrt{\frac{8}{50}}$
6. $\sqrt{\frac{9}{100} + \frac{16}{100}}$
7. $\sqrt{\frac{9}{100}} + \sqrt{\frac{16}{100}}$
8. $\sqrt{\frac{1}{64}} - \sqrt{2\frac{1}{4}} \times \sqrt[3]{\frac{1}{64}}$

Percentages, percentage increase and decrease

Conversion of percentages to fractions

Percentage means out of 100

$$25\% = \frac{25}{100}$$

$$14\% = \frac{14}{100}$$

Example 16

Convert the following percentages to common fractions

a) 36%

b) 58%

c) 80%

d) 12,5%

Example 17

Convert the following common fractions to percentages

a) $\frac{7}{10}$

b) $\frac{32}{50}$

c) $\frac{12}{15}$

d) $\frac{102}{200}$

Example 18

Calculate 20% of 50

Example 19

Calculate 40% of 80

Example 20

Increase R60 by 20%

Example 21

Decrease R60 by 20%

Exercise 6

1. Calculate 15% of 80.
2. Increase R50 by 12%
3. Decrease R200 by 15%.
4. Asiya obtained $\frac{160}{400}$ for her final exam. What percentage did Asiya obtain for the exam?

Exercise 7

1. Calculate:

1.1 $11\frac{1}{9} - 2\frac{1}{3} + 5\frac{5}{6}$

1.2 $\frac{1}{4} \div \frac{1}{5} - \frac{1}{2} \times \frac{1}{3}$

1.3 $\left(1\frac{2}{3}\right)^2 \div \frac{\sqrt{9}}{2}$

2. Jamie has 16 bottles of juice and needs half of a bottle to fill one glass. How many full glasses of juice can he fill in total with the 16 bottles?
3. Jack has 16 bottles of juice and needs three quarters of a bottle to fill one glass. How many full glasses of juice can he fill in total with the 16 bottles?
4. How much is $\frac{3}{4}\ of\ \frac{2}{5}\ of\ R80$?
5. Mpho spends $\frac{1}{3}$ of his pocket money on airtime and $\frac{1}{4}$ on snacks at the shop. He saves $\frac{1}{5}$ of the money he has left to buy himself a new pair of sneakers. If he saves R100 every month, what is his pocket money per month?

Revision Exercise

1. <u>Simplify: Show all calculations (Without using a calculator)</u>

a) $\frac{3}{4} - \frac{5}{7}$

b) $\sqrt{\frac{16}{36}} + \sqrt{\frac{9}{36}}$

c) $\left(5\frac{1}{6} - 2\frac{7}{8}\right) \div \left(\frac{1}{3}\ of\ 4\frac{1}{8}\right)$

d) $\sqrt{11\frac{1}{9}}$

e) $\sqrt[3]{\frac{-27}{125}}$

f) $\sqrt{\frac{49}{81}} \times \left(\frac{2}{3}\right)^2$

g) $\sqrt{-\frac{1}{4}}$