

Unit 2

Fraction Operations



There's a fine line between a numerator and a denominator.

Only a fraction of people will find this funny.

**3 OUT OF 2
PEOPLE
HAVE
TROUBLE
WITH
FRACTIONS**

Parts of a Fraction

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

← numerator

← denominator

Equivalent Fractions

Fractions that mean the EXACT SAME thing.



Finding Equivalent Fractions

What I do to the top, I do to the bottom!!

I can multiply OR divide....

... As long as I do the SAME to the numerator and denominator!

Give it a Try!

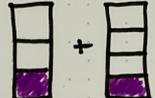
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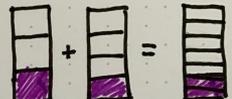
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Finding Common Denominators - But WHHYYYY

Why we Need: Common Denominators

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

Without ☹️ -BAD! - Do NOT do!

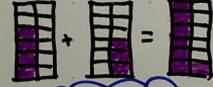
$\frac{1}{3} + \frac{1}{4} = \frac{2}{7}$ means 

With 😊😊 -AWESOME!

$\frac{1}{3} + \frac{1}{4}$ 3: 3, 6, 9, 12, 15
4: 4, 8, 12, 16

They have 12 in common

$\frac{1 \times 4}{3 \times 4} \rightarrow \frac{4}{12}$ $\frac{1 \times 3}{4 \times 3} \rightarrow \frac{3}{12}$ What I do to the top, I do to the bottom. Equivalent!

So, $\frac{4}{12} + \frac{3}{12} = \frac{7}{12}$ means 

Denominator STAYS the same!

I can only add pieces of the same size!

Logic Problem!

On front table :)

Adding and Subtracting Fractions

To add or subtract fractions we follow four steps;

- 1) Determine a common denominator.
- 2) Write equivalent fractions
- 3) Add or subtract the fractions accordingly.
- 4) Write the fraction in lowest terms.

The moment you realize the division symbol (\div) is just a blank fraction with the dots replacing the numbers.



Adding and Subtracting Fractions

$$\frac{2}{3} + \frac{1}{4} = ?$$

Multiples of 3;

Multiples of 4;

The common denominator is;

Adding and Subtracting Fractions

$$\frac{3}{4} - \frac{1}{8} = ?$$

Multiples of 4;

Multiples of 8;

The common denominator is;

Examples

$$a) \frac{4}{5} - \frac{2}{10} = ?$$

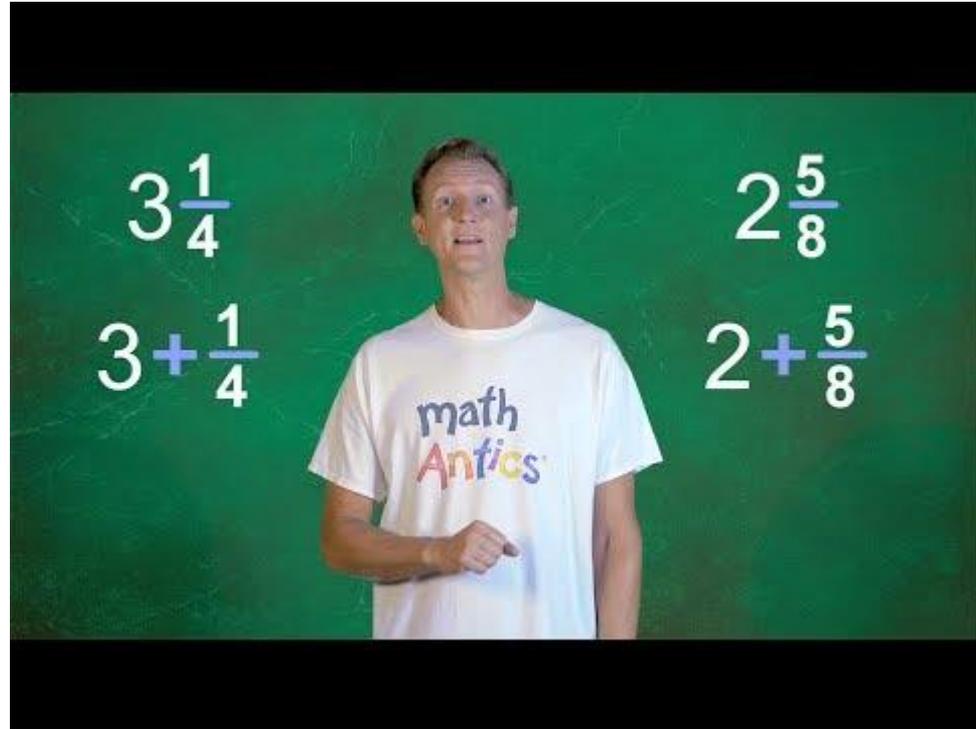
$$b) \frac{1}{6} + \frac{1}{4} = ?$$

Examples

$$c) \frac{3}{6} - \frac{2}{9} = ?$$

$$d) \frac{2}{7} + \frac{2}{3} = ?$$

Adding/Subtracting Mixed Numbers



A man wearing a white t-shirt with the text "math Antics" stands in front of a green chalkboard. The chalkboard displays two sets of math problems. On the left, the mixed number $3\frac{1}{4}$ is written above the equation $3 + \frac{1}{4}$. On the right, the mixed number $2\frac{5}{8}$ is written above the equation $2 + \frac{5}{8}$.

$3\frac{1}{4}$

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

$2\frac{5}{8}$

$2 + \frac{5}{8}$

Examples

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

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

Examples

$$a) 2\frac{3}{4} + \frac{1}{8} = ?$$

$$b) 1\frac{2}{3} + 2\frac{1}{5} = ?$$

Examples

$$c) 4\frac{1}{4} - \frac{2}{5} = ?$$

$$d) 3\frac{3}{8} - 1\frac{1}{2} = ?$$

Review!

What are the steps to calculating $\frac{2}{3} + \frac{1}{4} = ?$

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"To show you how well I understand fractions,
I only did half of my homework."

DO NOW!

Discuss with your partner:

- What does $8 \times \frac{1}{2}$ mean?
- How do I say this in a sentence?
- What does $8 \times \frac{1}{2} = ?$

So,

What does $\frac{1}{3} \times \frac{1}{2}$ mean and equal?

Could you draw this?

DO NOW x2!!

*Ms. Placa made a tray of brownies. She put icing on two-thirds of the pan. She then put sprinkles on four-fifths of the brownies that had icing on them. What fraction of the pan of brownies have sprinkles **and** icing on them?*

Estimate whether the answer is going to be bigger or smaller than two-thirds?

Then, try to solve.

Multiplying Fractions - Area Model

Step 1 - Draw two rectangles

Step 2 - Divide your rectangles according to their fraction in OPPOSITE directions

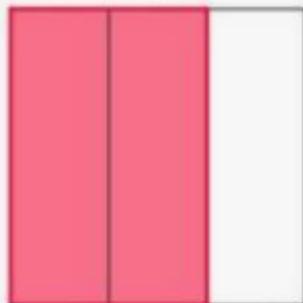
Step 3 - Combine your pictures

Step 4 - Numerator = how many boxes overlap

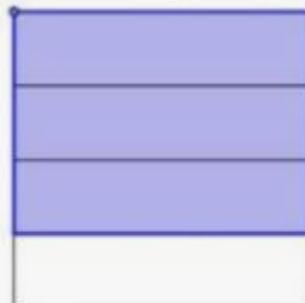
Denominator = how many boxes are there

Multiplying Fractions with an Area Model

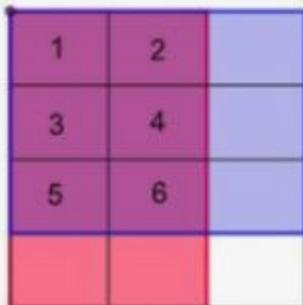
$\frac{2}{3}$



$\frac{3}{4}$



Combine the
drawings

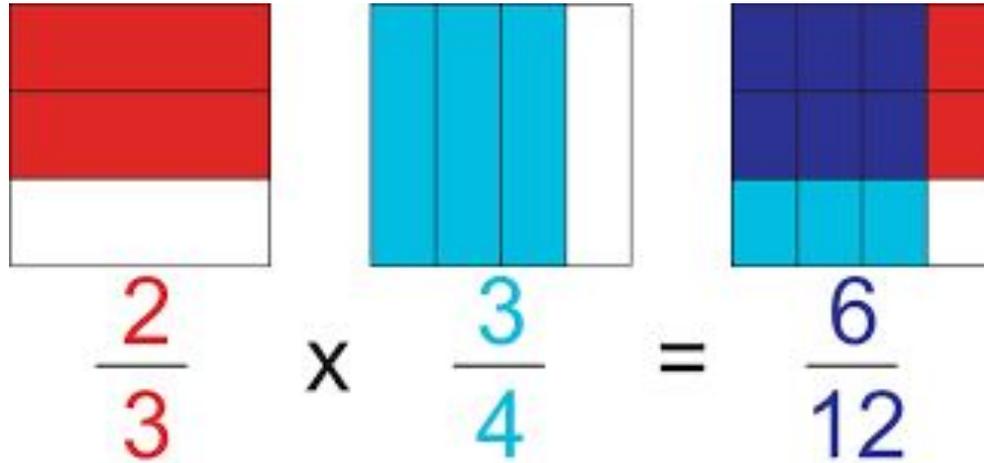


How many
boxes have both
colors? **6**

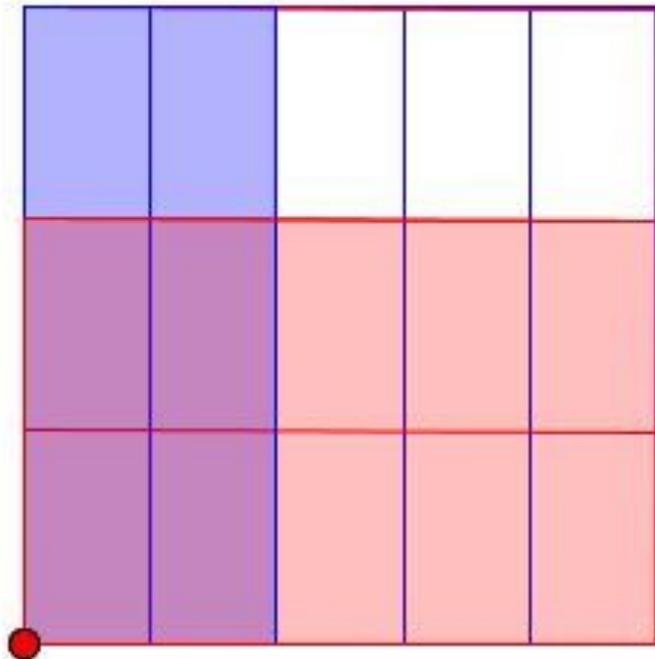
$$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12}$$

How many boxes
are there? **12**

What it Means

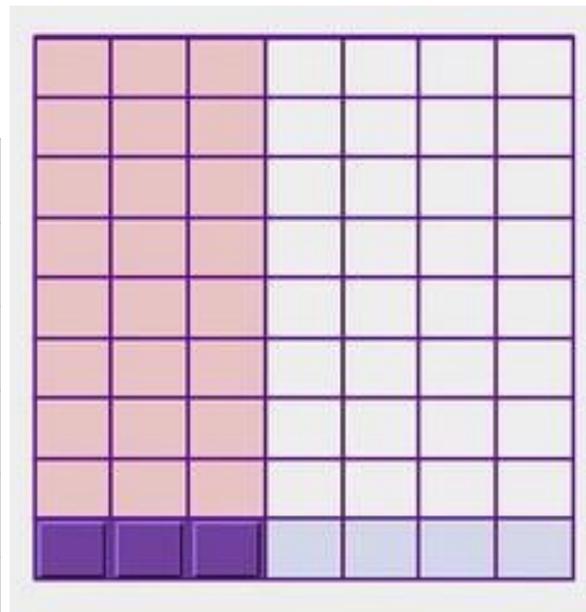
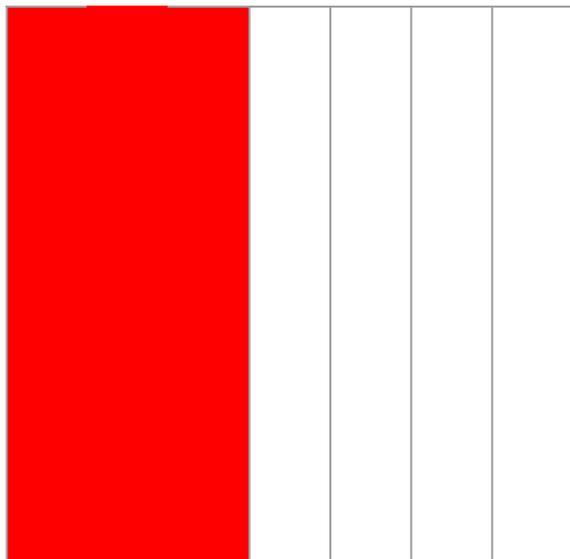


$$\frac{2}{5} \times \frac{2}{3} = ?$$



Multiply the two fractions

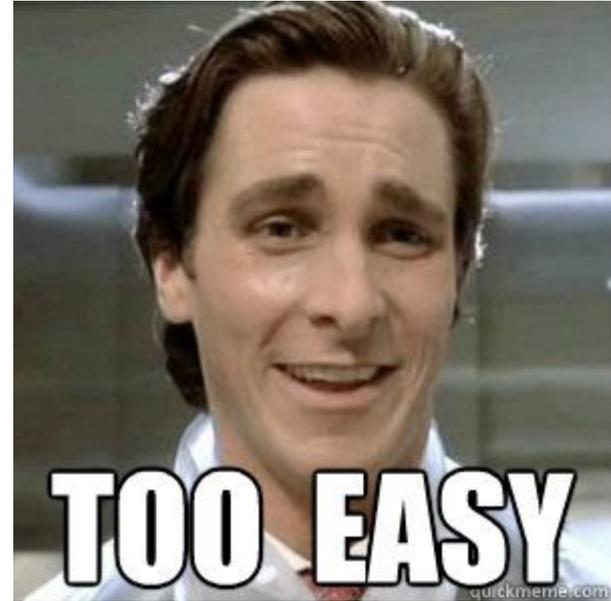
$$\frac{3}{7} \cdot \frac{1}{9} =$$



Multiplying Fractions

To multiply fractions

1. Multiply the numerators of the fractions to get the new numerator.
2. Multiply the denominators of the fractions to get the new denominator.
3. Simplify the fractions if not in lowest terms.



Example

$$\frac{3}{4} \times \frac{4}{7}$$

To multiply fractions

1. Multiply the numerators of the fractions to get the new numerator.
2. Multiply the denominators of the fractions to get the new denominator.
3. Simplify the fractions if not in lowest terms.

Example

$$\frac{7}{10} \times \frac{5}{6}$$

To multiply fractions

1. Multiply the numerators of the fractions to get the new numerator.
2. Multiply the denominators of the fractions to get the new denominator.
3. Simplify the fractions if not in lowest terms.

Example

$$5 \times \frac{3}{20}$$

To multiply fractions

1. Multiply the numerators of the fractions to get the new numerator.
2. Multiply the denominators of the fractions to get the new denominator.
3. Simplify the fractions if not in lowest terms.

Calculate

$$a) \frac{3}{5} \times \frac{3}{7}$$

$$b) \frac{4}{5} \times \frac{13}{14}$$

Calculate

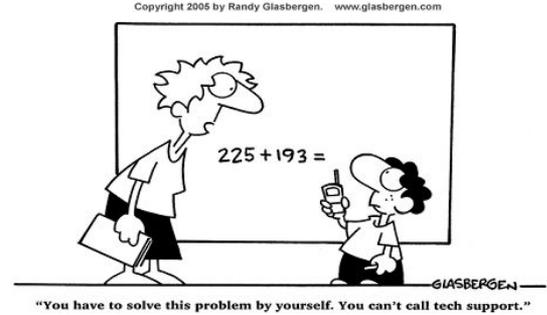
$$c) \frac{12}{15} \times \frac{3}{4}$$

$$d) \frac{10}{20} \times \frac{5}{6}$$

Determine $\frac{2}{3}$ of $\frac{4}{7}$.

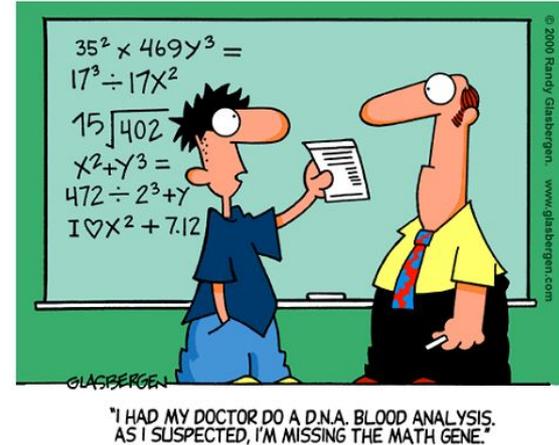
Review

a) What does the word 'of' mean in math?



b) How do you multiply fractions?

c) What is an improper fraction?



Remember!

To create an improper fraction:

1. Multiply the whole number by the denominator
2. Add the answer to the numerator
3. Write the summed answer over the denominator



Remember!

To create an improper fraction:

1. Multiply the whole number by the denominator
2. Add the answer to the numerator
3. Write the summed answer over the denominator

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

Multiplying Mixed Numbers

To multiply mixed numbers

1. Put the mixed number into an improper fraction
2. Multiply the numerators of the fractions to get the new numerator.
3. Multiply the denominators of the fractions to get the new denominator.
4. Simplify the fractions if not in lowest terms.



Example

$$5\frac{3}{5} \times \frac{1}{2}$$

To multiply mixed numbers

1. Put the mixed number into an improper fraction
2. Multiply the numerators of the fractions to get the new numerator.
3. Multiply the denominators of the fractions to get the new denominator.
4. Simplify the fractions if not in lowest terms.

Example

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

To multiply mixed numbers

1. Put the mixed number into an improper fraction
2. Multiply the numerators of the fractions to get the new numerator.
3. Multiply the denominators of the fractions to get the new denominator.
4. Simplify the fractions if not in lowest terms.

Examples

$$a) 3\frac{4}{5} \times 2\frac{1}{2}$$

$$b) 4\frac{10}{11} \times 1\frac{2}{6}$$

Examples

$$c) 2\frac{2}{3} \times 3\frac{1}{4}$$

$$d) 5\frac{3}{5} \times 3\frac{3}{7}$$

Review

- a) How do you multiply fractions?

- b) How do you convert a mixed number to a fraction?



Two and a half laps of a running track equal 1 km.
How many laps equal 3 km?

There are 30 students in a class. Four fifths of them have brown eyes. How many students have brown eyes?

Kiera has $\frac{5}{8}$ of a cup of powdered sugar. She sprinkles $\frac{1}{2}$ of the sugar onto a plate of brownies and sprinkles the rest onto a plate of lemon cookies. How much sugar does Kiera sprinkle on the brownies?

A minibus that seats 12 people is $\frac{3}{4}$ full. How many people are seated on the mini bus?

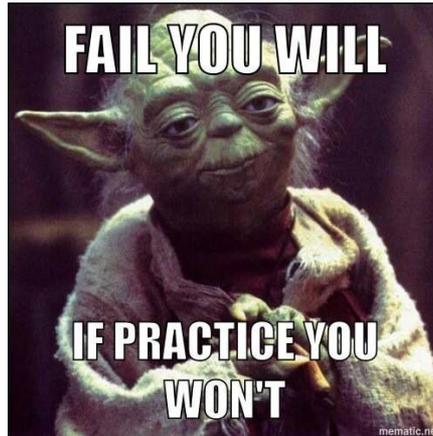
Ron earns \$15/h as a security guard. For time worked above 35 h in a week, he earns time-and-a-half. How much does Ron earn for working 41 h in a week?

Practice!

Pages 49-50 Questions # 1, 3, 4, 5, 7, 15

Pages 55-56 Questions # 3, 5, 6, 8, 9, 10, 11, 12, 15

Pages 61-62 Questions # 3, 4, 7, 8, 11



Review

How do you solve $3\frac{4}{5} \times 2\frac{1}{2}$

Question 38 (1 point)

What is a Microphone?

True

False



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Dividing Fractions

To divide fractions;

1. Flip the second fraction to create the reciprocal
2. Multiply by the reciprocal of the second fraction
3. Simplify the fractions if not in lowest terms.



Dividing Fractions

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

To divide fractions;

1. Flip the second fraction to create the reciprocal
2. Change the divide symbol to the multiplication symbol
3. Multiply by the reciprocal of the second fraction
4. Simplify the fractions if not in lowest terms.

Dividing Fractions

$$\frac{3}{8} \div \frac{4}{10}$$

To divide fractions;

1. Flip the second fraction to create the reciprocal
2. Change the divide symbol to the multiplication symbol
3. Multiply by the reciprocal of the second fraction
4. Simplify the fractions if not in lowest terms.

Examples

$$a) \frac{17}{20} \div \frac{1}{2}$$

$$b) \frac{4}{15} \div \frac{3}{4}$$

Examples

$$c) \frac{15}{7} \div \frac{2}{5}$$

$$d) \frac{17}{20} \div \frac{1}{6}$$

Examples

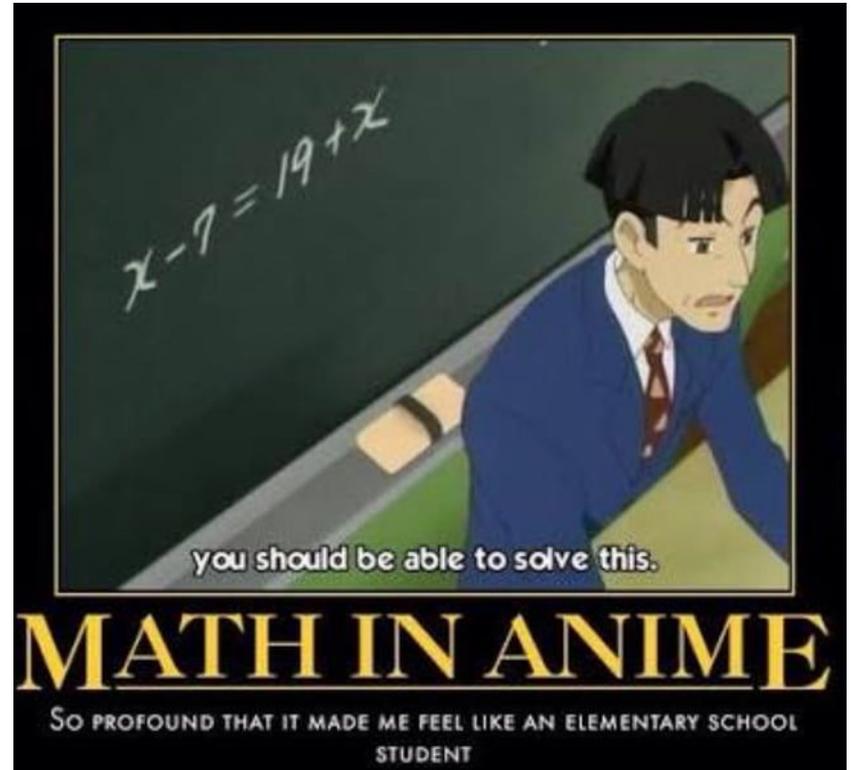
$$e) 3\frac{4}{5} \div 2\frac{1}{4}$$

$$f) 6\frac{2}{3} \div 4\frac{5}{8}$$

Variables

Whenever we do not know a value in math we depict the unknown value with a variable.

Variables can be any letter, but the most commonly used variable is 'x'.



Remember!

To solve one-step equations of the form $ax = b$, $\frac{x}{a} = b$ we must get the variable alone by performing opposite operations on the constants.

Solve the equation;

$$5g = 15$$

Examples

$$\text{a) } \frac{2}{3}x = 14$$

$$\text{b) } \frac{5}{14}x = 3$$

Three quarters of a can of apple juice fills six glasses. How many glasses will a whole can of apple juice fill?

Chase has only a quarter-cup measuring cup. How many times would Chase have to fill his measuring cup to measure 2 and a half cups of flour?

Five sevenths of the 28 students in a grade 8 class visited a science museum on a field trip. How many students did not go on the trip?

One week, Marjorie spent one half of her allowance on a dvd, one quarter of her allowance on a T-shirt, and one eighth of her allowance on bus fares. She had \$5 of her allowance left at the end of the week. How much was her allowance that week?

The average wind speed in Calgary is four fifths of the average wind speed in Regina. The average wind speed in Calgary is 16 km/h. What is the average wind speed in Regina?

The advertising space in a hockey team's yearbook is sold in fractions of a page. The advertising space sold in one edition of the yearbook is shown in the table.

a) Calculate the number of pages of advertising sold

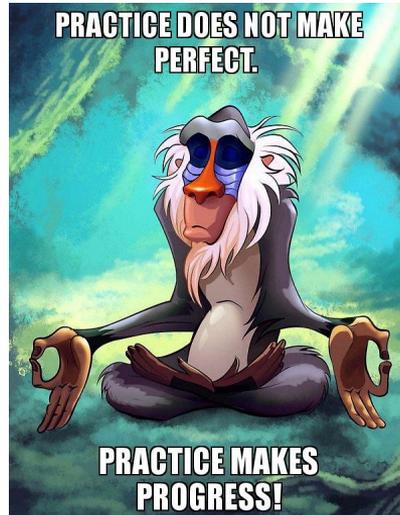
Size of Advertisement	Price	Number Sold
$\frac{1}{2}$ page	\$110	3
$\frac{1}{4}$ page	\$60	5
$\frac{1}{8}$ page	\$35	12

Practice!

Page 71 Questions #3-7

Pages 79-80 Questions #3, 4, 6, 7, 11, 13

Pages 85-86 Questions #1, 2, 3, 6, 8, 12, 14

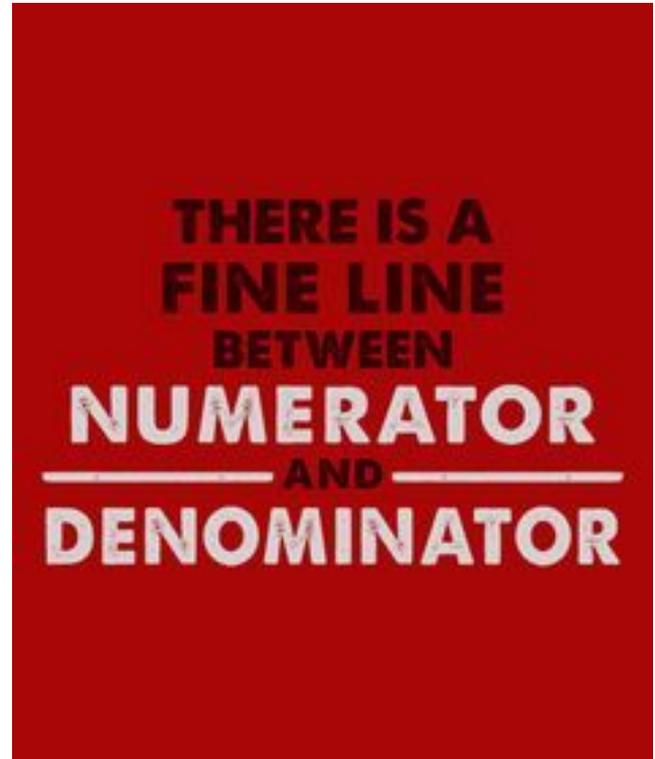


Review!

- a) How do you add fractions?

- b) What is an exponent?

- c) What is BEDMAS?



Remember!

BEDMAS is an acronym to help remember the order of operations in algebra. It stands for;

Brackets

Exponents

Division

Multiplication

Addition

Subtraction



Examples

$$a) 6 \div 2 (1 + 2)$$

$$b) 6 \div 2 \left(\frac{6}{3} \right)^2$$

Examples

$$\text{c) } \frac{1}{2} \div \frac{1}{5} \times \frac{3}{4} \div 5$$

$$\text{d) } \frac{11}{12} - \frac{2}{3} \times \left(\frac{3}{4} + \frac{4}{8} \right)$$

Place the brackets to make the following statement true;

$$\frac{3}{4} + \frac{1}{3} \times \frac{3}{7} - \frac{1}{2} = \frac{11}{28}$$

Calculate $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$

The mean of 3 numbers is $\frac{2}{3}$. Two of the fractions are $\frac{1}{3}$ and $\frac{3}{4}$. What is the third fraction?

Practice!

Pages 90-91 Questions # 3, 5, 6, 7, 11

Pages 96-100 All questions



Examples

$$e) 3\frac{4}{5} \div 2\frac{1}{4}$$

$$f) 6\frac{2}{3} \div 4\frac{5}{8}$$

Calculate $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$

Examples

$$c) 2\frac{2}{3} \times 3\frac{1}{4}$$

$$d) 5\frac{3}{5} \times 3\frac{3}{7}$$

Examples

$$\text{c) } \frac{1}{2} \div \frac{1}{5} \times \frac{3}{4} \div 5$$

$$\text{d) } \frac{11}{12} - \frac{2}{3} \times \left(\frac{3}{4} + \frac{4}{8} \right)$$

$$\left(\frac{2}{3} + \frac{2}{9}\right) \div \frac{5}{8} - \frac{5}{9} \times \left(\frac{1}{6} + \frac{5}{6}\right)$$

There are 30 students in a class. Four fifths of them have brown eyes. How many students have brown eyes?

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