Addition of Fractions

denominator; then the sum of the numerators written and

Addition of Valgar fractions

the common denominal Presentation by sum of the fractions

Arthur Howard

Add 7 4, 7 Providence Classical School 74-39 5 18 Spring, TX . 39 15 and 7

at the Conference for the Advancement of What is Mathematics Teaching 12 29 and another

Addition of Vulgar fractions A Little Pretest

Reduce compound fractions to single ones; mixed

numbers to improped fractions; fractions of different in-



required.

the common denominator will be the sum of the fractions

What is the sum of to of 45, 4 f 3 and 94 19 80 Inswer

39 15 and 7

 $39 \times 56 \times 1 = 2184$ $15 \times 5 \times 1 = 75$ $7 \times 5 \times 56 = 1960$

5×56×1= 200

100) 4219 -15230

Examples.

Add 7 4, 4 of 3 - 1 + to then?

A Little Pretest

Addition of Vilgar fractions

Reduce compound fractions to single ones; mixed

numbers to improper fractions; gractions of different in

Question 2: and all of them to a common

A family travels from Houston to San Antonio. Because of traffic, they only average 40 mph going there. I sand y together On the return trip the traffic is much better, so they average 50 mph. 15280 What is their average speed for the entire trip? 12 Dac Insover

A Little Pretest

Addition of Vulgar fractions

Aduce compound fractions to single ones; mixed

numbers to improped fractions; fractions of different in



required ,

the common denominator will be the sum of the fractions

What is the sum of to of 45, 34 of 3 and 94 19 59 commen

 $39 \times 56 \times 1 = 2184$ $15 \times 5 \times 1 = 75$ $7 \times 5 \times 56 = 1960$

5×56×1= 200

100) 4219 -15280

Add 1/4, 4 of 3 and 1 to Jeck -74 - 39 5 18 26 - 3 39 15 and 7 39×56×1-21

Addition of Vulgar fractions Answer: Reduce compound fractions to single ones; mixed numbers to improper fractions; fractions of different in-Question the same; and all of them to a common mominator; then the sum of the numerators written over the common denominator will be the sum of the fractions required, Examples. 2 Add 7 4, 4 of 3 and 1 tog the -7 4 - 39 5 + 256 and 3 - 7 - 35 + 5 and 7 7 5 - 3 7 + 256 and 3 - 7 - 35 + 5 and 7 39× 56×1-2104 7× 5×56=1960 100 4219 100) 4219 -15280 5×56×1= 200 What is the sum of to of 45, 4 of 3 and 94 19 59 commen

Addition of Vilgar fractions Rule. Reduce compound fractions to siggle ones; mixed numbers to improper fractions; fractions of different intagen to those of the same; and all of them to a common denominator; then the sum of the numerators written over the common denoming or will be the sum of the fractions required, Example. Add 1/4, for gan y together. 7 4 - 39 5 13 15 and 7 7 . 39 15 and 7 $\begin{array}{c} 56 \times 1 = 2184 \\ 5 \times 1 = 960 \\ 7 \times 5 \times 56 = 1960 \\ 100 & 4219 \\ 100 & 4219 \\ 100 & 200 \\ \end{array}$ 5×56×1= 200 What is the sum of to of 45, 4 f 3 and 94 19 80 Inswer

Addition of Vulgar fractions Mule. Reduce compound fractions to single ones; mixed numbers to improper fractions; fractions of different integers to those of the same; and all of them to a common denominator; then the sum of the numerators written over the common denominger will be the sum of the fractions required, Example. Add 7 4, 5 of 2 and 7 together.) 74-39 5 13 15 and 7 7. 29 15 and 7 56×1-2104 5×1=2104 7×5×56=1960 100) 4219-15180 5×56×1= 200 What is the sum of to of 45, 4 f 3 and 94 19 80 Inswer

Addition of Vulgar fractions Reduce comparing the mixed numbers to interpret practices of different in to a common denominator; then the sum of the numerators written over the common denominator will be the sum of the fractions required, What is the sum of to of 45, 34 f 3 and 94 12 59 comments

Addition of Vulgar fractions 1 1 3. 2e. 5 Reduce compound grace 6006 to Grafe ones; mixed numbers to impropet gractions; grace of different in regens to those of the ame; and + bet them to a common denominator; then the sum of the nu ators noritten over the common denominator will be he sum of the fractions required. We add the parts, but the whole is the same. Add 1 4, Fof 3 and 7 together. 7 4 - 39 5 7 0 5 15 and 7 and you 4 4 × 56 = 19 60 100) 4219 -15/80 5×56×1= 200 What is the sum of to and frand gt 12 59 and gt 19 80 to sover

Addition of Vulgar fractions Reduce compound fractions & single ones; mixed numbers to improper gractions; gractions of different in tagens to those of the same can a + c 7 them to a common denominator; then the the the common denomindor dilbet de sum of the fractions required. Parts and wholes are both added. Add 17 4, Fof 3 and y together. Parts are the same, but the whole is larger. 5 ×56 =1960 100) 4219 -15280 ×56×1= 200 What is the sur and gt 12 Dave Insover

"Crazy" Addition

Addition of Valgar fractions

Reduce compound fractions to single ones; mixed

Makes sense when sets of things are combined.

Operation must be done with original data.

Jamples. 3

Add 7 4, 4 of 3 and $3 = 10^{-1}$ 7 4 39 5 6 2 8 29 15 and 7 Key concept is accumulation. $39\times 56\times 1 = 2194$

required,

What is the sum of to of 45, 4 of 3 and 94 12 80 tosover

200) 4219 -15280

5×56×1= 280

Farey Fractions

Addition of Vulgar fractions

1 2 1 2 5x56×1=

What is the sum of to of 45, 4 f 3 and 94 12 59 Answer 4773 5 2

Reduce compound fractions to single ones; m numbers to impropet fractions; grad John Farey, Sr. (1766 – 1826) denominator; then the sum of the me British geologistinator will be the Sequence of reduced fractions Called this "sum" the mediant Rational Mean to found your.



1 4219 -15,80

Addition of Vulgar fractions Jose Altuve 0.303 hits/at bat and at 0.299 hits/at bat Examples. Add 1 4, Fof 3 and 7 together. 7 4 - 39 5 - 13 15 and 7 - 7. 5×56×96 hits 96 hits 0 hits What is th 4 at bats 321 at bats 317 at bats

Mixtures

Addition of Vilgar fractions

5 liters of a 40% acid solution.

 $\frac{2 \text{ L of acid}}{5 \text{ L of solution}} \oplus \frac{10 \text{ L of acid}}{20 \text{ L of solution}} = \frac{12 \text{ L of acid}}{25 \text{ L of solution}}$

What is the s48% 5 Solution 4 12 39 - Inswer

Add 1 4, Fof 3 and 7 together.

Answer:

Vulgar fractio

Addition of

Reduce compound fractions to single ones; mixed Question 2: open fractions; fractions of different in A family travels from Houston to San Antonio. sum of the practions They average 40 mph going there. They average 50 mph coming back. What is their average speed for the entire trip? Assume the distance each way to be 200 miles. 200mi @ 40 mph is $\frac{200 \text{ mi}}{5 \text{ hr}}$ 200mi @ 50 mph is $\frac{3 \text{ hr}}{200 \text{ mi}} = \frac{400 \text{ mi}}{4 \text{ hr}} = 44.4 \text{ mph}$ Reshart is the 200 mi 5 hr

A More Likely Scenario

Addition of Vulgar fractions

Reduce compound fractions to single ones; mixed

numbers to improper quactions; fractions of dif



What is the sum of To of 45, 4 f 3 and 94 19 Black Inswer

5×56×1= 280

Addition of halgar fractions A More Likely Scenario

Reduce compound fractions to single ones; mixed

- Leave San Antonio. , and all of them to a common
- Stop in Schulenburg for pie and coffee.
- Drive to Beltway 8.
- Take Beltway 8 to I-45.
- Take I-45 to home. and 7=7. 29 16 and 7

 $39 \times 56 \times 1 = 2184$ $15 \times 5 \times 1 = 75$ $7 \times 5 \times 56 = 1960$ 100) 4219 -15280 5×56×1= 200

What is the sum of to of 45, 3 of 3 and 94 12 80 Answer

A More Likely Scenario

Vulgar &

Reduce compound fractions to single ones; mixed 100 miles from San Antonio to Schulenburg. Average speed 60 mph. to a common all of them

Stop for pie and coffee. Average speed 0 mph. 200 miles

60 minutes

70 miles to Beltway 8 (West). Average speed 70 mph.

100 miles

100 minutes

Addition of

20 miles from Beltway 8 to I-45. 39 15 and 7 Average speed 80 mph.

What is the sum of To of 45, 2 f 3 and 94

10 miles on I-45 to neighborhood. Average speed 60 mph. 5×56×1

40 minutes

 \oplus <u>0 miles</u> \oplus <u>70 miles</u> \oplus <u>20 miles</u> 15 minutes

3.75 hours

ictions

53.3 mph

Puzzler:

Addition of Vilgar fractions

A car is to travel two miles on a straight track. It averages 30 mph for the first mile. How fast will it need to go in the second mile to average 60 mph for the entire length?

 $30 \text{ mph} = \frac{30 \text{ mi}}{60 \text{ min}} = \frac{1 \text{ mi}}{2 \text{ min}}$

 $\frac{2 \text{ mi}}{2 \text{ min}} = \frac{1 \text{ mi}}{2 \text{ min}} \frac{1 \text{ mi}}{0 \text{ min}}$



Addition of Vilgar fractions Does Anybody Else Know This Stuff? Reduce compound fractions to single ones; mixed numbers to improper fractions; fractions of different in-• Mathematicians and all of them to a common

• Science Teachers Examples. Accumulated Average Average "builds" throughout term Weights grades based on size What is the sum of to of 45, 4 f 3 and 94 12 80 Answer

the sum of the

numerators novitten over

Addition of Vulgar fractions Accumulated Average Reduce compound fractions to single ones; mixed Each assignment has its own total point value. $\Delta verage = \frac{\text{total points accumulated}}{2}$ Average = total points possible

F and y -

What is the sum of to of 45, 3 of 3 and 9 4 12-

 $\oplus \frac{45}{45} \oplus \frac{56}{60} \oplus \frac{10}{15} = \frac{185}{200} = 92$

Rational Mean of the scores and

 $\mathbf{28}$

30

The Answers:

Addition of Valgar fractions

Reduce compound fractions to single ones; mixed

numbers to improped fractions; fractions of different in-



required,

the common denominator will be the sum of the fractions.

Are you sure 200 15290 15290

 $39 \times 56 \times 1 = 2184$ $15 \times 5 \times 1 = 75$ $7 \times 5 \times 56 = 1960$

Ecamples.

Add 7 4, 4 of 3 and 7 to the 3 2 45 and 7 7 4 39 5 7 8 26 3 39 × 56 × 1 - 21

Addition of Vulgar fractions Mule. Reduce compound fractions to single ones; mixed numbers to improper fractions; fractions of different in tagen to those of the same; and all of them to a common denominator; then the sam of the numerators written over the common denominator will be the sum of the fractions Examples. Add 1/4, 5 of 3 a 7 together 7 4-39 5-13-15 and 7-7 . 39 15 and 7 5×56×1= 200 What is the sum of to of 45, 4 of 3 and 94 19 80 Inswer

Addition of Vulgar fractions Mule. Reduce compound fractions to single ones; mixed numbers to improper fractions; fractions of different in tegen to that the to the to the the terminent denominator; then the sum of the numerators written over the common denominator will be the sum of the fractions required. Examples. Add 7 4, 5 of 3 and 7 Hogethes 7 3 8 8 6 0 7 . 0 9 0 6 0 7 What is the sum of to of 45, 4 of 3 and 94 19 59 commen

Additionof gar fractions Mule. Reduc mixed number event integens lo common denomin ritten over the comm actions required. Add y 15280 What is the sum of to of 45, 4 of 3 and 94 12 80 Insover

Addition of Valgar fractions Answer: Reduce compound fractions to single ones; mixed numbers to improper fractions; fractions of different in-Question 3: and all of them to a common the common denominator will be the sum of the fractions required. Add 1/4, fof 3 and 7 to Jeth 74-39 5 13 25 - 3 39 15 and 7 39×56×1-21 $39 \times 56 \times 1 = 2184$ $15 \times 5 \times 1 = 75$ $7 \times 5 \times 56 = 1960$ 100) 4219 -15280 5×56×1= 200 What is the sum of to of 45, 34 f 3 and 94 19 59 Answer

What We've Learned So Far

Addition of Vilgar fractions

- Reduce compound fractions to single ones; mixed
- Fractions always represent parts of a whole.
- Two entirely different ways of combining them.
 - the One is the SUMinator will be the sum of the fractions
 - Other is the RATIONAL MEAN.
- Rational Means correctly calculate:
 - Sports averages not y together
 - Average of two rates and 7=7. 39 15 and 7
 - Combinations of sets or solutions
 - Accumulated Grading
- 4219-15280 • When comparing fractions, we have to have 200 CONTEXT. sum of 70 of 45,34 of 3 and 94 19 80 tosmen

Why Weren't We Taught This?

- Reduce compound fractions to single ones; mixed numbers to improper fractions; fractions of different in
- Curriculum largely fixed by 15th Century.
- Rational Mean is recent. be the sum of the fractions
- Pythagorean Means:
 - Arithmetic Mean (Statistics) $\frac{a+b}{2}$
 - Geometric Mean (Finance) $\sqrt{ab^2}$
 - Harmonic Mean (Statistics, Electronics, Music)

2dab

• Rational Mean (Finance) $\frac{a+c}{b+d} = \frac{a+c}{200} = \frac{a+b}{a-b}$ What is the sum of to of 45,3 f 3 and 94 12 39 chosen

Are They Related?

Addition of Valgar fractions

Reduce compound fractions to single ones; mixed numbers to improper fractions; fractions of different in **Rational vs Harmonic** and 2(40)(50) 4000 4000 denominator; then the sum of 2(40)(50) 4000 - 44.4 When distances are equal. 1/40+50m of 190 fractions

Rational vs Arithmetic $50 \text{ mi} \oplus 40 \text{ mi} = 90 \text{ mi} \\ 1 \text{ hr} \oplus 1 \text{ hr} = 2 \text{ hr}$ When *times* are equal. When *denominators* are equal. $3 \oplus 8 = 81 \\ 3 \oplus 8 = 2 \text{ mi} \\ 3 \oplus$

What is the sum of to of 45, 4 of 3 and 94 12 59 to sover

The Big Picture

Reduce compound fractions to single ones; mixed

Addition of Vilgar fractions

Combining fractions is more complicated than

We imagined. The common denominator will be the sum of the fractions

required.

What – Now I have to teach **TWO** procedures for adding fractions?

What is the sum of to of 45, 3 of 3 and 94 12 80 consover

 $39 \times 56 \times 1 = 2184$ $15 \times 5 \times 1 = 75$ $7 \times 5 \times 56 = 1960$ 100) 4219 -15280 5×56×1= 200

NO!

Procedures

Reduce compound fractions to sing Prof. Richard R. Skemp

15240

5×56×1= 200

• Memorized without understanding

numbers to improper fractions; fraction

- Don't know when to use them
- Misremember rule together.

Addition of Vin

• Rules that get the answer

- No idea of error found 7=7. 29 15 and 7
- Don't know what to do about it

The Psychology of Learning Mathematics

Teaching for Understanding

Addition of Valgar fractions

Reduce compound fractions to single ones; mixed numbers to improper fractions; gractions of different in • Two types of understanding of them to a common - Habit Learning (Procedural Learning) "Rules without reason" Intelligent Learning (Conceptual Learning)
 "Knowing what to do, and why" 1 15 and 7 - Most math instruction based on procedures

What is the sum of to of 45, 4 f 3 and 94 19 Bout mover

7X 5X56=1960

5×56×1= 200

100) 4219 -15180



Addition of Valgar fractions

Often much easier to teach
Immediate rewards
Less knowledge involved, so answer comes more quickly
Requires a new rule for each situation

39×56×1=2184 15× 5×1= 75 7× 5×56=1960 100) 4219 -15280 5×56×1= 200

What is the sum of to of 45, 3 of 3 and 94 19 80 tosover

Conceptual Learning

Addition of Vilgar fractions

Reduce compound fractions to single ones; mixed

ag- Takes longer to teach. and all of them to a common

- Students sometimes resist it.

Add 7 4, Fof 3 and 7 together.

– Sometimes involves more content.

7 4 - 39 5 13 15 and 7 7 . 39 15 and 7

Examples.

 $39 \times 56 \times 1 - 2184$ $15 \times 5 \times 1 = 75$ $7 \times 5 \times 56 = 1960$ 200) 4219 -15280 5×56×1= 200

What is the sum of to of 45, 4 of 3 and 94 12 Black mover

Addition of Vilgar fractions Example Reduce compound fractions to single ones; mixed numbers to impropet fractions; fractions of different in denominator; then the sum of the numerators written over the common denominator will be the sum of the fractions required, Add 7 4, 7 of -7 4 - 39 15 and 7 XI = 2104 XI = 75 X56 = 1960100) 4219 -15280 5×56×1= 200 What is the sum of to of 45, 4 of 3 and 94 19 80 Inswer

Addition of Vilgar fractions Extension Reduce compound fractions to single ones; mixed numbers to improper fractions; gractions of different in tegens to those of the same; and all of them to a common denominator; the tors noritten over the common des of the fractions required. Add 7 4 Fof 3 and 7 together. 74-39 15 and 7 $\begin{array}{l} \chi_1 = 2185 \\ \chi_1 = 75 \end{array}$ X56 =1960 200) H219 -15180 1= 280 What is the sum of to of 45, 4 of 3 and 94 19 80 Insover

Addition of Vulgar fractions Further Extension Reduce compound fractions to single ones; mixed numbers to improper fractions; fractions of different intagen to those of the same; and all of them to a common discourse in a ton i the second star and a second the commendation we be the most fractions Add 1 4, Fof 3 and 7 togethe 7 4 39 5 13 56 and 1 7 37 F6 and 7 $39 \times 56 \times 1 = 2184$ $15 \times 5 \times 1 = 75$ 1 X 5 X56 = 1960 100) 4219 -15280 5×56×1= 200 What is the sum of to of 45, 4 f 3 and 94 12 80 consover

Conceptual Learning

Reduce compound fractions to single ones; mixed

Addition of Vulgar fractions

- ag- Takes longer to teach. and all of them to a common
- Students sometimes resist it.
- Sometimes involves more content.
 - Easier to remember.
- More adaptable to new tasks.
 - Is effective as a goal in itself. $39 + 56 \times 1 = 219$
 - Leads to willingness to study further.

What is the sum of to of 45, 4 f 3 and 94 12 80 consover

Failure to teach Conceptually

Addition of Valgar fractions

Reduce compound fractions to single ones; mixed

- Use procedures inappropriately them to a common
- . Can't transfer inator will be the sum of the fractions

7 4 - 39 5 13 15 and 7 7 . 39 15 and 7

 $39 \times 56 \times 1 = 2184$ $15 \times 5 \times 1 = 75$ $7 \times 5 \times 56 = 1960$

- Baffled by word problems
- · Math phobia and y together.

"I never could do math."

"The negative attitude to mathematics, unhappily so common, even among otherwise highly-educated people, is surely the greatest measure for our failure and a real danger to our society. 39 5 13 15 and 7=7. 39 15 and 7

Addition of Vulgar fractions

Sir Herman Bondi, Sir Herman Bondi, Austian/British Mathematician and Cosmologist

What is the sum of to of 45, 4 f 3 and 94 12 80 chosmen

A public unable to reason with figures is an electorate unable to discriminate between rational and reckless claims in public policy.

Addition of Vilgar fractions Rule.

Lynn Arthur Steen: Numeracy

 $39 \times 56 \times 1 = 2184$ $15 \times 5 \times 1 = 75$ $7 \times 5 \times 56 = 1960$ 100) 4219 -15280 5×56×1= 200

What is the sum of to of 45, 4 f 3 and 94 12 80 mover

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Improving teaching and learning in mathematics

Case studies

Autumn 2008

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Teacher Comments

Reduce compound fractions to single ones; mixed

Addition of Vulgar fractions

• The more they listened and spoke, the more they contributed. ... This was the best classroom atmosphere we have had so far this year.

• I've become much better at dealing with misconceptions. I now use them as great teaching opportunities.

quined,

• I am really pleased with how much more actively these pupils engage. They are much more prepared to volunteer for tasks, to develop their own methods, to listen and question.

Pupil Comments

Reduce compound fractions to single ones; mixed

Addition of Kulgar fractions

the common denominator will be the sum of the fractions required.

- I think I'm much better at sharing my ideas now. Everyone listens to each other's ideas, even the teacher!
- I liked being able to explain my ideas. I didn't expect everyone to want to know what I thought.

Addition of Valgar fractions What Should We Do?

- Reduce compound fractions to single ones; mixed numbers to improper fractions; fractions of different in
- Start with real-world situations. dem to a common
- Use manipulatives to teach concepts. // fractions
- Ask students to explain their thinking.
- Connect physical, pictorial and abstract.
- Different contexts, but the same concepts. 39×56×1-2187 15× 5×1= 75 7× 5×56=1960 100) 4219-15280

What is the sum of to of 45, 3 of 3 and 94 12 80 tosover

5×56×1= 280

Not a New Idea

Addition of Kulgar fractions

GENERAL VIEW OF THE PLAN. .

Every combination commences with practical examples. Care has been taken to select such as will aptly illustrate the combination, and assist the imagination of the pupil in performing it. In most instances, immediately after the practical, abstract examples are placed, containing the same numbers and the same operations, that the pupil may the more easily observe the connexion. The instructer should be careful to make the pupil observe the connexion. After these are a few abstract examples, and then practical questions again.

First Lessons in Arithmetic

What is the sum of to 1822 4 f 3 and 94 19 59 comment

A. 1. If you give $\frac{1}{2}$ of an orange to one boy, and $\frac{1}{4}$ to another, how much more do you give the first, than the second?

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itten over

actions

245

9-15280

5 g Inswer

2. $\frac{1}{4}$ of an orange is how many $\frac{1}{4}$ of an orange?

3. If you give $\frac{1}{2}$ of an orange to one boy, and $\frac{1}{4}$ to another, how many $\frac{1}{4}$ would you give away? How many $\frac{1}{4}$ would you have left?

4. $\frac{1}{2}$ and $\frac{1}{4}$ are how many $\frac{1}{4}$?

Redu

numbe

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required

Add ..

What

5. A man gave to one labourer $\frac{1}{2}$ of a bushel of wheat, and $\frac{3}{4}$ to another; how many $\frac{1}{4}$ of a bushel did he give to both? How many bushels?

6. $\frac{1}{2}$ and $\frac{3}{4}$ are how many $\frac{1}{4}$? How many times 1?

7. A man gave $\frac{1}{2}$ of a barrel of flour to one man, and $\frac{3}{6}$ of a barrel to another; to which did he give the most?

8. $\frac{1}{2}$ is how many $\frac{1}{6}$?

9. A man bought $\frac{1}{3}$ of a bushel of wheat at one time, and $\frac{2}{3}$ of a bushel at another; at which time did he buy the most?

10. $\frac{1}{3}$ is how many $\frac{1}{6}$?

11. A man bought $\frac{2}{3}$ of a yard of cloth at one time, and $\frac{4}{6}$ of a yard at another; at which time did he buy the most?

12. $\frac{2}{3}$ are how many $\frac{1}{6}$?

13. A man wished to give $\frac{1}{2}$ of a bushel of wheat



Enavaahcine the see problem is, the first number shore sents the minut The tronstofun bechethats intaithed fraction defya Eage of found les nitatris is the Thracticop of an inter its the frantionofTanestheyr. bag of marbles Howismedy inches of rain fell in thetewowdays go gethoo ured into a bowl, what fraction of the marbles in the bowl will be red? 5×56×1

ulgar fractions

15, 4 f 3 and 94 19 Blackmover

Asking Questions

Reduce compound fractions to single ones; mixed

Vulgar fractio

Addition of

What "action" do you see in this problem?

Does it sound like something we've done before?

Can you use objects or draw me a picture? Is this sometimes/always/never true? - 15 and T How do you know that? Do you see a pattern? 15240 Can you explain that in your own words? 2 5 gue Inso What kind of answer should we expect? Is this answer reasonable?

Data Analysis

Addition of Vulgar fractions

Reduce compound Aractions to single ones; mixed									
numl	Object	Circumference	Diameter	Ratio	nent in-				
tegens 1	Jar Lid	32.6	10.2	3.20	common				
denom	Bicycle Wheel	210	66	3.18	tten over				
the cor	Coffee Lid	68.6	20.2	3.40	actions				
	Mixing Bowl	94.1	30	3.14					
Ada	Saucer	57.5	17.9	3.21	×				
	Dinner Plate	82	26.5	3.09					
What kind of "average" should we use here? Median? 3.19									
AITIIIIeuc Mean? 5.09									
Past	· · Ca	omotio Ma	2.2	20	59 .				

Harmonic Mean? 3.20 Rational Mean? 3.20

What is

12 59

Fostering Analytic Thinking

Reduce compound fractions to single ones; mixed

denominator; then the sum of the numerators

Addition of Vulgar fractions

numbers to improped fractions; fractions of different in Let students struggle with novel problems.

Sketch the graph of $f(x) = e^{\sin(10x)}$ over a reasonable interval. Examples.

the common denominator will be the sum of the fractions



15240

Fostering Analytic Thinking

Addition of Vulgar fractions

Reduce compound fractions to single ones; mixed

numbers to improper fractions; fractions of different in

tagen to those of the same; and all of them to a common

denominator; then the sum of the numerators written over the common denominator will be the sum of the fractions.

Sketch the graph of $f(x) = e^{\sin(10x)}$ over a reasonable interval.

X	<u>sin(10x)</u>	<u>f(x)</u>		
0	0	1	26 3	
0.3142	0	1	2.5	
0.6283	0	1	2	
0.1571	1	2.7183		
0.4712	-1	0.3679		.0
				5290
			0.5	
310	-1	<u> </u>		e Ins
20		е	0 0.1 0.2 0.3 0.4 0.5 0.6 0.7	

Tomorrow

Addition of Vilgar fractions

Reduce compound fractions to single ones; mixed

9:45 -011:15 ame same; and all of them to a common

Basic Student Understanding Through Effective Questioning

Karen Hardin Right here in this room. dr. 7. 29 45 and 7

 $39 \times 56 \times 1 = 2184$ $15 \times 5 \times 1 = 75$ $7 \times 5 \times 56 = 1960$ 100) 4219 -15280 5×56×1= 200

What is the sum of to of 45, 4 f 3 and 94 12 80 towner

NCTM Principles and Standards Reasonableness and Sense Making

- Explain their thinking. , and all of them to a common
- Believe that mathematics makes sense.
 Make and evaluate mathematical conjectures and arguments.
- Appreciate the power of reasoning as a major part of mathematics.
- Construct proofs of mathematical assertions.

What is the sum of to of 45, 4 f 5 and 94 12 80 Answer

5×56×1=

Common Core State Standards

Reduce compound fractions to single ones; mixed

Clear understanding of what students are a common

expected to learn. All be the sum of the fractions

required.

Robust and relevant to the real world.

Fully prepare students for the future.

7 3 39 5 7 8 56 and 7 7 . 39 15 and 7

Examples.

What is the sum of to of 45, 4 f 3 and 9 # 19 80 Inswer

CCSS Mathematical Tasks

Reduce compound fractions to single ones; mixed

Addition of Vulgar fractions

Make sense of problems and persevere in solving them. **Reason abstractly and quantitatively. Construct viable arguments and critique the reasoning** of others. Model with mathematics. Use appropriate tools strategically. Attend to precision. Look for and make use of structure. Look for and express regularity in repeated reasoning.

Addition of Vilgar fractions Our Task Adduce compound fractions to single ones; mixed numbers to improper fractions of different in agen To create a classroom where mon denominator; then the sum of the memorators written over the common denominator will be the sum of the fractions rowing spatial provide the sum of the fractions a spatial provide the sum of the sum of the fractions Campiles.

Give an education that will last a lifetime!

 $39 \times 56 \times 1 = 2184 \\ 15 \times 5 \times 1 = 75 \\ 7 \times 5 \times 56 = 1960 \\ 180) 4219 = 15280 \\ 5 \times 56 \times 1 = 280$

What is the sum of to of 45, 4 of 3 and 94 12 80 Answer

Selected Resources

Addition of Vulgar fractions

Reduce compound fractions to single ones; mixed
 Rice University School Mathematics Project - rusmp.rice.edu
 – rusmp.rice.edu

- Relational and Instrumental Understanding

 Prof. Richard R. Skemp
 <u>http://www.blog.republicofmath.com/archives/654</u>
- The Psychology of Learning Mathematics
 Prof. Richard R. Skemp, Amazon.com

What is the sum of to of 45, 4 f 3 and 94 12 80 commen

Selected Resources

Addition of Vulgar fractions

- Reduce compound fractions to single ones; mixed
- Knowing and Teaching Elementary
 - Mathematics then the sum of the numerators written over Mathematics
 - Liping Ma, Amazon.com
- First Lessons in Arithmetic
 Warren Colburn, Amazon.com
- Why Johnny Can't Add: The Failure of the New Math

Roth Morris Kline, Amazon.com f 5 and 94 12 39 commen

Addition of Vilgar fractions Mule. Reduce compound fractions to single ones; mixed numbers to improper fractions; fractions of different intagen to those of the same; and all of them to a common denominator; then the sum of the numerators written over Thank you for your time. Add 1/4, Fof 3 and 7 together. 7 4 - 39 5 13 15 and 7 7 . 39 15 and 7 $39 \times 56 \times 1 = 2184$ $15 \times 5 \times 1 = 75$ 7X 5X56=1960 200) 4219 -15280 5×56×1= 200 What is the sum of to of 45, 3 of 3 and 9 4 19 80 Insover