Metro Technology Centers

PURPOSE

The purpose of this booklet is to refresh the reader's skills in basic mathematics. There are basic mathematical processes, which must be followed throughout all areas of math applications. While this is not a fully comprehensive mathematics course, it will review areas in which most students need assistance.

CONTENTS

WHOLE NUMBER REVIEW

This is one of the most basic areas, but if you don't follow correct processes, may prove to be the most frustrating. The first thing we learned how to do in mathematics was to add columns of numbers. The quickest way is to align the numbers on the right side and simply add down each column from right to left, taking care with the carrying if there is any. For example, if we add the following numbers: 452, 135, 987, 168, 325.

→

```
  452
  135
  987
  168
+ 325
 2067
```

A second method is add only 2 numbers at one time.

```
  452
 +135
  587
 + 987
 1574
 +168
 1742
 +325
 2067
```

When subtracting two numbers, simply line the numbers up on the right side and subtract the smaller number from the larger. Some times you don't have to borrow, but if the bottom number is larger than the top, you must.

```
 48762
-25641
 23121
```

```
  211 512
 2 3 1 6 2
-  21233
   1 929
```

```
  3 9  9 915
 4 0 0 0 5
-28758
 11247
```

These examples show borrowing done correctly. You must be careful.

Multiplication

When you multiply whole numbers, simply set one under the other and multiply every number in the first by every number in the second. If you are multiplying two or three digit numbers by another two or three digit number, you must multiply every number on the top by every number on the bottom. The process is more complex, so care must be given to make sure that the product is placed in the correct position.

3 4			
1405	657	579	
x 8	x47	x647	
11240	4599	4053	
	2628	2316	(positions
	30879	3474	lined to
		374613	hold the place value)

For some adding zeros is the easier way to be sure you put the numbers in the correct positions, while for others remember if you multiply by the second digit start under the second digit, third digit starts under the third digit and so on. The choice is yours.

3 4			
1405	657	579	
x 8	x47	x647	
11240	4599	4053	
	26280	23160	(zeros added
	30879	347400	to hold the
		374613	place value)

see page # 6 for multiplication problems.

DIVISION

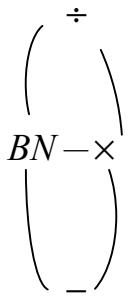
Division is probably the most misunderstood mathematical operation. It is so simple because it is just multiplication in reverse. For example the problem: 467 ÷ 5 means 467 divided by 5

$$\begin{array}{r} \textit{quotient} \\ \textit{divisor}\overline{)\textit{dividend}} \end{array}$$

It is worked as shown below.

$$5\overline{)467} \qquad \begin{array}{r} 9 \\ 5\overline{)467} \end{array} \qquad \begin{array}{r} 93 \\ 5\overline{)467} \\ \underline{-45} \\ 17 \\ \underline{-15} \\ 2 \end{array}$$

So the answer is 93 remainder 2, written 93r2. The division process is easily remembered by the simple loop:



This means: **divide, multiply, subtract**, and **bring** down the next **number**. When dividing by a two or more digit number, the process does not change.

$40\overline{)327}$ How many times can 327 be divided evenly by 40? Think (32 ÷ 4 = 8) so

$$\begin{array}{r} 8 \\ 40\overline{)327} \\ \underline{-320} \\ 7 \end{array}$$

This means that 327 can be divided evenly by 40, 8 times and have a remainder of 7, written 8r7.

$63\overline{)275}$ Think 60 instead of 63.

$$\begin{array}{r} 4 \\ 63\overline{)275} \\ -252 \\ \hline 23 \end{array}$$

The answer is 4R23.

Think!! 60 multiplied by 4 is 240 so try 4!

Think 500 $537\overline{)6732}$

$$\begin{array}{r} 12 \\ 537\overline{)6732} \\ -537 \\ \hline 1362 \\ -1074 \\ \hline 288 \end{array}$$

The remainder of 288 is large, but it can be as large as one less than the divisor or 536. Answer is 12 R288.

Work the sample problems below:

$5\overline{)213}$ $49\overline{)3265}$ $387\overline{)2865}$

Answers

42R3 $5\overline{)213}$

66R31 $49\overline{)3265}$

7R156 $387\overline{)2865}$

Whole Number Review

These problems should enable you to become familiar with the processes shown previously.

1. 335 x 387
2. 478 x 23
3. 25 x 149
4. 123 + 258 + 963
5. 231-189
6. 489 – 192
7. $25\overline{)1658}$
8. $89\overline{)26879}$
9. $196\overline{)45368}$
10. $8\overline{)2352}$
11. $9\overline{)21532}$
12. $6\overline{)25862}$
13. 2004 – 1986
14. 13598 + 25897
15. $62\overline{)18662}$
16. 25 x 426
17. 555 x 364
18. $48\overline{)88256}$

Answers to Whole Number Review

1. 335 x 387

129,645

2. 478 x 23

10,944

3. 25 x 149

3,725

4. 123 + 258 + 963

1,344

5. 231-189

42

6. 489 – 192

297

7. $25\overline{)1658}$

66R8

8. $89\overline{)26879}$

302R1

9. $196\overline{)45368}$

231R92

10. $8\overline{)2352}$

294

11. $9\overline{)21532}$

2392R4

12. $6\overline{)25862}$

4310R2

13. 2004 – 1986

18

14. 13598 + 25897

39,495

15. $62\overline{)18662}$

301

16. 25 x 426

10,650

17. 555 x 364

202,020

18. $48\overline{)88256}$

1838R32

Decimals

Decimals are worked mathematically just like whole numbers with the exception of doing **addition** and **subtraction**, where the numbers are aligned to keep place value in position.

Place value table

thousands	hundreds	tens	ones	and	tenths	hundredths	thousandths	Ten-thousandths	Hundred-thousandths
				.					

All whole numbers have an understood decimal to the right of the last digit.

Whole number	Decimal number
3	3.0 or 3.000
467	467.0 or 467.000

You may add as many zeros as necessary for the problem you are doing.

Example: 4.67+17+3.697

Line up on the decimal

4.67	4.670	add zeros
17.	17.000	to keep
+3.697	+3.697	yourself
25.367	25.367	straight.

When subtracting, you must add zero so borrowing (renaming) can be accomplished. Ex. 48 – 37.268

4 11	7 9 9 10
~~5~~.173	~~48~~.000
-4.200	-37.268
0.973	10.732

Decimal Addition:

1. 23 +55.25+.0023
2. 33.5+25.27+3.0025
3. .0025+ .5+55.01+25
4. 25 + 2.5 + .25 +.025
5. 37+3.758+ .01
6. 654 + 63.25+.025
7. .001 + .023 + .01 + 33
8. 152.87 + 87.152
9. 327.2 + 2.327 + 25
10. 0.005+253.2
11. 895.2+22 +.003
12. 237 + 23.7+2.37+.237

Decimal Subtraction:

13. 20 – 10.47
14. 23.2 - 2.375
15. 456.2 - 367.325
16. 854.925 – 796.689
17. 275.3 – 149.825
18. 253.4 – 251.695
19. 89 - 25.235
20. 125 - 97.253
21. 150 – 28.253
22. 130 - 129.925
23. 99 - 89.253
24. 17 - 10.55

Answers are given on the next page.

Answers:

Decimal Addition:

1. 23 +55.25+.0023

78.2523

2. 33.5+25.27+3.0025

61.7725

3. .0025+ .5+55.01+25

80.5125

4. 25 + 2.5 + .25 +.025

27.775

5. 37+3.758+ .01

40.768

6. 654 + 63.25+.025

717.275

7. .001 + .023 + .01 + 33

33.034

8. 152.87 + 87.152

240.022

9. 327.2 + 2.327 + 25

354.527

10. 0.005+253.2

253.205

11. 895.2+22 +.003

917.203

12. 237 + 23.7+2.37+.237

263.307

Decimal Subtraction:

13. 20 – 10.47

9.53

14. 23.2-2.375

20.825

15. 456.2 - 367.325

88.875

16. 854.925 – 796.689

58.236

17. 275.3 – 149.825

125.475

18. 253.4 – 251.695

1.705

19. 89 - 25.235

63.765

20. 125 - 97.253

27.747

21. 150 – 28.253

121.747

22. 130 - 129.925

0.075

23. 99 - 89.253

9.747

24. 17 - 10.55

6.45

Multiplying Decimals

To multiply decimals, you multiply as with whole numbers. When you get the product, go back to the original numbers being multiplied and count the number of digits to the right of the decimal point in each number. Count this number of digits to the left in the product and insert the decimal point. (Note: Whole numbers have a decimal following them so there are no numbers to the right.)

Example 1

.2 count 1
x.5 count 2
.10 move left 2 digits

Example 2

.003 count 3
x .04 count 5
.00012 move left 5 digits

3.33 x 6.87 use a short cut

Commutative property of multiplication

6.87 count 2
x 33.3 count 3
2061 same
20610 product
206100 each time
228.771 move left 3 digits

When multiplying a whole number by a decimal number, count the digits to the right of the decimal in the decimal number.

542 x .05

542 count 0
x .05 count 2
27.10 move left 2 digits

When multiplying by a power of ten (numbers with trailing zeros), multiply the non- zero digits and count the trailing zeros and place that many zeros to the right of the product. 4 x 5 = 20

So 500 x .04 = 2000 with 2 decimal places or 20.00

10000 x .005 = 50000 with 3 decimal places or 50.000

200 x 300 = 60000 with 0 decimal places or 60,000.

If you encounter a larger problem, the process is easily extended.

.25 x 3.3 x 2 x .2 ***THINK!!!*** Multiplication is an ***associative*** operation so 2 x 2 = 4 and 4 x 25 = 100 and 33 x 100 = 3300 with 4 decimal places or .3300 Thus you did this problem in you head.

.25 x 3.3 x 2 x .2=.3300

Try these: 1. .25 x 300 2. .005 x 600

3. .52 x 500 4. .02 x 4.5

Answers: 1. 75.00 2. 3.000 3. 260.00 4. 0.090

Multiplication Problems

1. 0.60 x0.30	2. 0.02 x0.202	3. 0.36 x0.91	4. 0.9 x0.3
5. 3.1 x 0.6	6. 0.08 x0.8	7. 0.45 x0.02	8. 3.1 x0.002
9. 0.01 x 0.101	10. 9.1 x 0.02	11. 0.06 x 1.4	12. 0.201 x 0.6
13. 500 x 0.05	14. 2500 x 2.5	15. 7500 x .0003	16. 30000 x 0.002

Answers to Multiplication Problems:

1. 0.60 x0.30 .1800	2. 0.02 x0.202 .00404	3. 0.36 x0.91 .3276	4. 0.9 x0.3 0.27
5. 3.1 x 0.6 1.86	6. 0.08 x0.8 .064	7. 0.45 x0.02 .0090	8. 3.1 x0.002 .0062
10. 0.01 x 0.101 .00101	10. 9.1 x 0.02 .182	11. 0.06 x 1.4 .084	12. 0.201 x 0.6 .1206
14. 500 x 0.05 25.00	14. 2500 x 2.5 6250.0	15. 7500 x .0003 2.2500	16. 30000 x 0.002 60.000

Division of Decimals

When you perform division with decimals, you ***must*** move the decimal before you start the problem. You can't divide by a decimal number so you have to move the decimal all the way to the right in the divisor (front number). **In the example below**, .05 must be made into a whole number. Move the decimal all the way to the right and count the digits from the original position (2places). Move the decimal in the dividend (inside the bracket) 2 places (digits) to the right and straight up into the quotient. Now divide as with whole numbers and your answer will have the decimal in the correct position.

$1 \div .05$ $\qquad .05\overline{)1} \qquad .05\overline{)1.00.}$ $\qquad \begin{array}{r} 20. \\ -10 \\ \hline 0 \\ -0 \\ \hline \end{array}$

Place the decimal in the correct position in these examples.

$.12\overline{)6.24} \qquad .002\overline{)12.100} \qquad .25\overline{)62.5}$

Answers: $.12\overline{)6.24}$ $\quad .002\overline{)12.100}$ $\quad .25\overline{)62.50}$

The numbers don't always come out even when performing division. In decimal division, you cannot leave a remainder so the remainder must be rounded off at or to a specific digit. Use 3 digits to the right of the decimal unless otherwise noted.

In this problem, where the numbers don't repeat or come out even, you may add another zero and get an extra digit to round off (4 digits to round to 3).

$$1.9\overline{).19300}$$ which would round to 0.102

```
  .1015
1.9).19300
 -19
   3
  -0
   30
  -19
    110     (Second method: think 11 x 2 = 22,  22 > 19 so the .101
   -95      would round up to 0.102)
```

A **second method** is to go to 3 digits, then look at the remainder. If you double the remainder and get a number larger than the number you are dividing by, you simply add one to the third digit and you are done.

$$9\overline{)1.00} \quad .\overline{11}$$ **If a problem repeats, simply put a bar over the second repeated digit.**

```
 -9
  10
 -9
  1
```

Try these:

$.005\overline{)12}$	$.02\overline{)6.25}$	$.03\overline{)9.21}$	$.2\overline{)12.4}$
$.25\overline{)6.25}$	$.05\overline{)13.2}$	$2.5\overline{)375}$	$.15\overline{).225}$
$.36\overline{)14.4}$	$2.2\overline{)1.1}$	$.42\overline{)16.8}$	$.81\overline{)24.3}$
$.9\overline{)1.91}$	$.3\overline{).1}$	$.07\overline{)2.13}$	$2.3\overline{)23.4}$

Answers

$2400.$	312.5	$307.$	$62.$
$.005\overline{)12}$	$.02\overline{)6.25}$	$.03\overline{)9.21}$	$.2\overline{)12.4}$
$25.$	$264.$	$150.$	1.5
$.25\overline{)6.25}$	$.05\overline{)13.2}$	$2.5\overline{)375}$	$.15\overline{).225}$
$90.$	0.5	$40.$	$30.$
$.36\overline{)14.4}$	$2.2\overline{)1.1}$	$.42\overline{)16.8}$	$.81\overline{)24.3}$
$2.1\overline{1}$	$0.\overline{33}$	30.4	10.1
$.9\overline{)1.91}$	$.3\overline{).1}$	$.07\overline{)2.13}$	$2.3\overline{)23.4}$

Fractions

Fractions are a different way of expressing a relationship or a ratio.

Parts	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{7}{2}$	$\frac{1}{9}$	$\frac{5}{8}$	$\frac{6}{5}$
Whole						

For instance: Trout are put into a stream at the rate of 45 brown trout to 55 brook trout for every one hundred fish put into the stream.

What fractional part of the fish were brown trout?
Reduce your answer to lowest terms.

$$\frac{\text{\# of brown}}{\text{total \# of fish}} \quad \frac{45}{100} \qquad \text{reducing : } \frac{45}{100} \div 5 = \frac{9}{20}$$

Similarly, $\frac{\text{\#of brook}}{\text{total \# of fish}} \quad \frac{55}{100} \div \frac{5}{5} = \frac{11}{20}$

The sum of any group of objects is the total or whole.

Write each of the following as a fraction.

15 pounds is what part of a ton? (1 ton = 2000 pounds)

5 inches is what part of a foot? (1 foot = 12 inches)

16 inches is what part of a yard? (36 inches = 1 yard)

Answers: $\frac{15}{2000} = \frac{3}{400}$, $\frac{5}{12}$, $\frac{16}{36} = \frac{4}{9}$

A fraction may also be referred to as a **ratio.**
If a fraction is not in lowest terms, it must be reduced. If both the **numerator** (top) and **denominator** (bottom) are even, the number may be reduced or divided by **2**. If the last digit is a five or zero, the number may be reduced by a **5**. If the number is a multiple of **3** or **9** or if the digits add to a multiple of 3 or 9 then you may reduce by 3 or 9.

$\frac{27}{51} = \frac{9}{17}$ since 2+7 = 9 and 5 + 1 =6, both numbers are multiples of 3 so reduce by 3.

A **proper fraction** is one, which has a numerator less than the denominator. An **improper fraction** is one with the numerator equal to or greater than the denominator.

$\frac{17}{19}$ is a proper fraction. $\frac{26}{15}$ is an improper fraction.

If a **proper** fraction contains common **factors** in the numerator and denominator, the fraction must be reduced to lowest terms or simplest form. This is accomplished by dividing the both the numerator and denominator by the common factor. This is illustrated below. These common factors may be any number, not just 2, 3, 4, 5, etc.

$\frac{15}{24}$ may be reduced by 3. $\frac{15 \div 3}{24 \div 3} = \frac{5}{8}$
Any fraction with even last digits, may be reduced by 2. Many times, the fraction may be reduced by a larger number.

$\frac{24}{28}$ may be reduced to $\frac{12}{14}$ which may be reduced to $\frac{6}{7}$.

Or it may be reduced by 4. $\frac{24 \div 4}{28 \div 4} = \frac{6}{7}$ giving the same result.

The important thing is to look for is similar numbers in both the numerator and denominator.

Reduce the following: $\frac{15}{25}$ $\frac{27}{36}$ $\frac{16}{24}$

$\frac{16}{32}$ $\frac{7}{21}$ $\frac{12}{16}$ $\frac{24}{28}$ $\frac{12}{32}$

Answers: $\frac{3}{5}, \frac{3}{4}, \frac{2}{3}, \frac{1}{2}, \frac{1}{3}, \frac{3}{4}, \frac{6}{7}, \frac{3}{8}$

To reduce an improper fraction, simply divide the numerator by the denominator.

$\frac{7}{3}$ = $3\overline{)7}^{\,2}$ so you write the answer as $2\frac{1}{3}$

$\underline{-6}$

$\frac{1}{3}$ (the divisor goes under the remainder to make it a fraction)

If the improper fraction comes out evenly, then the answer is just a whole number. **DON'T WRITE 0 as a numerator of a fraction!**

Try These: $\frac{7}{2}$ $\frac{5}{3}$ $\frac{15}{3}$ $\frac{9}{5}$ $\frac{16}{7}$ $\frac{25}{6}$ $\frac{18}{3}$

Answers: $3\frac{1}{2},..,1\frac{2}{3},..,5,..,1\frac{4}{5},..,2\frac{2}{7},..,4\frac{1}{6},..,6$

Fractions with the same denominator are called common fractions. For you to be able to add or subtract the denominators **must** be the same. If they are not, you must convert them to a **common denominator**.

$\frac{4}{5}+\frac{3}{5}$ and $\frac{2}{6}+\frac{5}{6}$ are **Common fractions** and may be added.

$\frac{4}{5}+\frac{3}{5}$ = $\frac{7}{5}=1\frac{2}{5}$ $\frac{2}{6}+\frac{5}{6}$ = $\frac{7}{6}=1\frac{1}{6}$

Those denominators, which are different, must be converted to a common denominator.

$\frac{2}{3}+\frac{3}{5}$ since 3 and 5 have nothing in common, the fractions must be converted a common denominator. 3 x 5 = 15 so this is the common denominator.

$$\begin{array}{r} \frac{2}{3}=\frac{10}{15} \\ +\frac{3}{5}=\frac{9}{15} \\ \hline \frac{19}{15}=1\frac{4}{15} \end{array} \qquad \begin{array}{r} \frac{1}{4}=\frac{2}{8} \\ +\frac{7}{8}=\frac{7}{8} \\ \hline \frac{9}{8}=1\frac{1}{8} \end{array}$$

When adding the denominator does not change, just add the numerator, reduce if necessary.

When adding mixed numbers, remember to treat the problem as if it were 2 small problems. The whole number portion you have done since first grade, so you already know how to do that. The fractions you treat as we did the previous examples.

$$\begin{array}{r} 4\frac{2}{3}=\frac{8}{12} \\ +3\frac{3}{4}=\frac{9}{12} \\ \hline 7\frac{17}{12}=8\frac{5}{12} \end{array} \qquad \text{Since} \frac{17}{12}=1\frac{5}{12} \text{ add to 7 = } 8\frac{5}{12}$$

When subtracting fractions, the process is precisely the same. Convert fractions to common denominators and instead of adding the numerator, you simply subtract.

$$\begin{array}{r} 4\frac{2}{3}=\frac{6}{9} \\ -3\frac{4}{9}=\frac{4}{9} \\ \hline 1\frac{2}{9} \end{array} \qquad \begin{array}{r} 6\frac{2}{5}=\frac{6}{15} \\ -2\frac{1}{3}=\frac{5}{15} \\ \hline 4\frac{1}{15} \end{array}$$

The only time you need to worry or do anything different is when the numerator of the first number is less than the bottom number (subtrahend). (ie: larger number is on the bottom)

When you borrow you must convert the 1 borrowed to the common denominator over itself or $\frac{CD}{CD}$ ie: $\frac{3}{3},\frac{4}{4},\frac{8}{8},\frac{20}{20}$

The basic example is $\begin{array}{r} 4\frac{3}{5}=\frac{9}{15} \\ -2\frac{2}{3}=\frac{10}{15} \\ \hline \end{array}$ Since you **can't** subtract 10 from 9 you

$\begin{array}{r} 3 \quad 24 \\ 4\frac{3}{5}=\frac{\cancel{9}}{15} \\ -2\frac{2}{3}=\frac{10}{15} \\ \hline \end{array}$ **must** borrow from the 4 and add to 9.

$1 \quad \frac{14}{15}$ is the answer.

$$\begin{array}{r} 3 \quad 8 \\ \cancel{4}\frac{1}{3}=\frac{\cancel{2}}{6} \\ -2\frac{1}{2}=\frac{3}{6} \\ \hline 1\frac{5}{6} \end{array}$$

Here are some addition and subtraction problems for you.

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

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

3. $8\frac{1}{4} + 16\frac{7}{9}$

4. $6\frac{4}{7} + 4\frac{3}{4}$

5. $6\frac{3}{5} + 4\frac{4}{6}$

6. $5\frac{2}{3} - 4\frac{1}{2}$

7. $8\frac{2}{7} - 3\frac{1}{2}$

8. $5\frac{2}{3} - 4\frac{7}{8}$

9. $4\frac{2}{3} + 5\frac{3}{5}$

10. $6\frac{1}{2} - 2\frac{4}{5}$

11. $4\frac{4}{7} - 3\frac{3}{5}$

12. $5\frac{1}{4} - 2\frac{2}{5}$

Answers:

1. $6\frac{7}{20}$
2. $6\frac{2}{15}$
3. $25\frac{1}{36}$
4. $11\frac{9}{28}$
5. $11\frac{4}{15}$
6. $1\frac{1}{6}$
7. $4\frac{11}{14}$
8. $\frac{19}{24}$
9. $10\frac{4}{15}$
10. $3\frac{7}{10}$
11. $\frac{34}{35}$
12. $2\frac{17}{20}$

Multiplying and dividing

To multiply a simple fraction, multiply the numerators (top) together and the denominators (bottom) together, reduce if possible.

$\frac{3}{5}\times\frac{2}{7}=\frac{6}{35}$ $\frac{1}{3}\times\frac{5}{6}=\frac{5}{18}$ $\frac{5}{12}\times\frac{7}{8}=\frac{56}{96}$ $\frac{6}{7}\times\frac{5}{11}=\frac{30}{77}$

To multiply a fraction by a whole number, a one (1) is placed under the whole number to make it a fraction. Then proceed as before.

To make any number a fraction, put a 1 under it.!!!!

$\frac{1}{2}\times 5=\frac{1}{2}\times\frac{5}{1}=\frac{5}{2}=2\frac{1}{2}$ $\frac{2}{5}\times 3=\frac{2}{5}\times\frac{3}{1}=\frac{6}{5}=1\frac{1}{5}$

Multiplying by mixed numbers requires an additional process. The **mixed number must be converted to an improper fraction** before the problem is worked.

Multiply the whole number by the denominator of the fraction and add the numerator of the fraction. Place this number over the original denominator and you are ready to proceed. Work the problem as described previously.

$\frac{2}{5}\times 1\frac{1}{3}=\frac{2}{5}\times\frac{4}{3}=\frac{8}{15}$ $4\frac{1}{2}\times\frac{2}{3}=\frac{9}{2}\times\frac{2}{3}=\frac{18}{6}=3$

Short Cut (**Cross Cancellation**)

When certain conditions exist, you may cancel out a common factor from a denominator and the opposite numerator or vice versa.

Mixed numbers must be converted to improper fractions before this process is done. The problem from the above problem is done using this process.

$4\frac{1}{2}\times\frac{2}{3}=\frac{\cancel{9}^{3}}{\cancel{2}_{1}}\times\frac{\cancel{2}^{1}}{\cancel{3}_{1}}=\frac{3}{1}=3$ since 2 and 2 are common factors, they can be cancelled out and 9 and 3 have a factor of 3 which can be cancelled out. Then multiply the numbers on top and bottom and get the same answer. This reduces the problem to lowest terms before you multiply it out and then reduce.

Dividing fractions

How do you divide this problem? $\frac{2}{5} \div \frac{3}{4}$ **YOU CAN'T!!!**

This problem must be **converted** to a multiplication problem before it can be completed.

The second number you must **invert** or make it into a **reciprocal.**

$\frac{2}{5} \div \frac{3}{4} = \frac{2}{5} \times \frac{4}{3} = \frac{8}{15}$ After the problem is made into a multiplication problem then proceed as in multiplication.

$\frac{2}{5} \div \frac{3}{4} = \frac{2}{5} \times \frac{4}{3} = \frac{8}{15}$ $\frac{1}{3} \div \frac{3}{7} = \frac{1}{3} \times \frac{7}{3} = \frac{7}{9}$

$\frac{2}{7} \div \frac{1}{4} = \frac{2}{7} \times \frac{4}{1} = \frac{8}{7} = 1\frac{1}{7}$ $\frac{4}{5} \div \frac{2}{7} = \frac{4}{5} \times \frac{7}{2} = \frac{28}{10} = 2\frac{8}{10} = 2\frac{4}{5}$

Then the problem must be converted to a multiplication problem before it can be done. Division is changed to multiplication and the second fraction is inverted. (reciprocated, flipped, etc). The problem is now a multiplication problem and you have already accomplished that task.

Note: If the problem has a mixed number, it **must be converted** to an improper fraction before you start the process.

$3\frac{1}{2} \div \frac{2}{5} = \frac{7}{2} \times \frac{5}{2} = \frac{35}{4} = 8\frac{3}{4}$ $5\frac{2}{3} \div 3\frac{1}{6} = \frac{17}{3} \div \frac{19}{6} = \frac{17}{\cancel{3}_{1}} \times \frac{\cancel{6}^{2}}{19} = \frac{34}{19} = 1\frac{15}{19}$

You try this one.

$4\frac{1}{2} \div \frac{4}{5}$ Answer: $\frac{9}{2} \times \frac{5}{4} = \frac{45}{8} = 5\frac{5}{8}$

Try these multiplication and division problems.

1. $\frac{1}{2} \times \frac{3}{4}$ 2. $\frac{6}{7} \times \frac{9}{10}$ 3. $2 \times \frac{1}{2}$ 4. $\frac{3}{5} \times 5$

5. $4\frac{1}{2} \times 3$ 6. $9 \times 3\frac{1}{3}$ 7. $18 \times \frac{2}{9}$ 8. $17 \times 4\frac{1}{4}$

9. $29\frac{1}{2} \times 3\frac{1}{3}$ 10. $7\frac{1}{2} \times 2\frac{2}{3}$ 11. $\frac{1}{2} \div 2$ 12. $2 \div \frac{1}{2}$

13. $\frac{3}{4} \div \frac{1}{3}$ 14. $8 \div 1\frac{1}{2}$ 15. $1\frac{1}{2} \div 8$ 16. $3\frac{7}{8} \div 2\frac{1}{3}$

17. $2\frac{3}{5} \div 15$ 18. $15 \div 1\frac{1}{2}$ 19. $3\frac{2}{3} \div 4\frac{1}{5}$ 20. $4\frac{2}{5} \div 2\frac{1}{5}$

Answers:

1. $\frac{1}{2}\times\frac{3}{4}$ — $\frac{3}{8}$

2. $\frac{6}{7}\times\frac{9}{10}$ — $\frac{27}{35}$

3. $2\times\frac{1}{2}$ — 1

4. $\frac{3}{5}\times 5$ — 3

5. $4\frac{1}{2}\times 3$ — $13\frac{1}{2}$

6. $9\times 3\frac{1}{3}$ — 30

7. $18\times\frac{2}{9}$ — 4

8. $17\times 4\frac{1}{4}$ — $72\frac{1}{4}$

9. $29\frac{1}{2}\times 3\frac{1}{3}$ — $98\frac{1}{3}$

10. $7\frac{1}{2}\times 2\frac{2}{3}$ — 20

11. $\frac{1}{2}\div 2$ — $\frac{1}{4}$

12. $2\div\frac{1}{2}$ — 4

13. $\frac{3}{4}\div\frac{1}{3}$ — $2\frac{1}{4}$

14. $8\div 1\frac{1}{2}$ — $5\frac{1}{3}$

15. $1\frac{1}{2}\div 8$ — $\frac{3}{16}$

16. $3\frac{7}{8}\div 2\frac{1}{3}$ — $1\frac{37}{56}$

17. $2\frac{3}{5}\div 15$ — $\frac{13}{75}$

18. $15\div 1\frac{1}{2}$ — 10

19. $3\frac{2}{3}\div 4\frac{1}{5}$ — $\frac{55}{63}$

20. $4\frac{2}{5}\div 2\frac{1}{5}$ — 2

Applications

1. Ann bought a lot of yarn. She bought 27 pink, 15 green, 37 blue, 12 red, and 14 black skeins of yarn. How many skeins did she buy in all? If each skein was $2, how much did she spend?

2. Berry had $348 on payday. If he spent $35 on shoes, $18 on a haircut, and $197 to repair his car, how much money does he have left for the week? To the nearest dollar, how much per day could he spend for the next week?

3. Charles has to fill in a 2-inch space with washers that are 0.125 inch thick. How many washers will he need? If each washer costs $0.25, how much will he spend to finish the job?

4. Darcie has 25 rock CD's, 18 country CD's, 7 jazz CD's, and 14 classical CD's. What fractional part of her total CD collection is country CD's?

5. Edward has to add the fractional areas of a complex figure. The areas are 3.725-sq. in., 47.2- sq. in., 57.25-sq. in., 10.123- sq. in., and 297- sq. in. What is the total area of the figure?

6. Francis measures a window with the following sides: $64\frac{1}{8}$ in., $27\frac{3}{4}$ in., $64\frac{1}{4}$ in., $27\frac{5}{8}$ in. How much trim would be needed to go around this window?

7. Gabriel needs to use $\frac{1}{8}$ inch washers to fill a space $2\frac{3}{4}$ inches long. How many washers does he have to use?

8. Harriett has a piece of clay, which weighs 14.2 kg. After she removes pieces which weigh 2.4 kg, 3.7 kg, and 2.23 kg, how much will she have left?

9. Ira has a board which is 84" long. If he cuts off pieces of $17\frac{3}{8}$", $15\frac{3}{4}$", and $22\frac{1}{2}$", how much of the board will he have left?

10. Juan earns $7.75 per hour working as a cashier. If he works 38 hours each week, how much will he make in one month(4-weeks)?

11. Lora spends $25 out of every $100 she makes on rent. If she makes $480 every two weeks, how much would go toward her rent?

12. Mickey sells 25 items for $1.25. If he and 4 others are working their stand and split the money equally, how much will each one get?

Answers to Applications

1. Ann bought a lot of yarn. She bought 27 pink, 15 green, 37 blue, 12 red, and 14 black skeins of yarn. How many skeins did she buy in all? If each skein was $2, how much did she spend?
   27+15+37+12+14 = 105 skeins of yarn

   105 X $2 = $210

2. Berry had $348 on payday. If he spent $35 on shoes, $18 on a haircut, and $197 to repair his car, how much money does he have left for the week? To the nearest dollar, how much per day could he spend for the next week?
   $348-(35+18+197) = 348-250 = $98
   $98 ÷7 = $14 per day

3. Charles has to fill in a 2-inch space with washers that are 0.125 inch thick. How many washers will he need? If each washer costs $0.25, how much will he spend to finish the job?

   2÷0.125 = 16 washers
   16 washers X $0.25 = $4.00

4. Darcie has 25 rock CD's, 18 country CD's, 7 jazz CD's, and 14 classical CD's. What fractional part of her total CD collection is country CD's?

   25+18+7+14 = 64 total CD's

   $\frac{18}{64} = \frac{9}{32}$ **are country CD's**

5. Edward has to add the fractional areas of a complex figure. The areas are 3.725-sq. in., 47.2- sq. in., 57.25-sq. in., 10.123- sq. in., and 297- sq. in. What is the total area of the figure?

3.725 + 47.2 + 57.25 + 10.123 + 297 = 415.298

6. Francis measures a window with the following sides: $64\frac{1}{8}$ in., $27\frac{3}{4}$ in., $64\frac{1}{4}$ in., $27\frac{5}{8}$ in. How much trim would be needed to go around this window?

$$64\frac{1}{8} = \frac{1}{8}$$
$$27\frac{3}{4} = \frac{6}{8}$$
$$64\frac{1}{4} = \frac{2}{8}$$
$$+\,27\frac{5}{8} = \frac{5}{8}$$
$$182 \quad \frac{14}{8} = 1\frac{6}{8} = 1\frac{3}{4} = 183\frac{3}{4} \text{ inches}$$

7. Gabriel needs to use $\frac{1}{8}$ inch washers to fill a space $2\frac{3}{4}$ inches long. How many washers does he have to use?

$$2\frac{3}{4} \div \frac{1}{8} = \frac{11}{\cancel{4}_{1}} \times \frac{\cancel{8}^{2}}{1} = 22 \text{ washers}$$

8. Harriett has a piece of clay, which weighs 14.2 kg. After she removes pieces which weigh 2.4 kg, 3.7 kg, and 2.23 kg, how much will she have left?

14.2 - (2.4+3.7+2.23) = 5.87kg

9. Ira has a board which is 84" long. If he cuts off pieces of $17\frac{3}{8}$", $15\frac{3}{4}$", and $22\frac{1}{2}$", how much of the board will he have left?

84 – ($17\frac{3}{8}+15\frac{3}{4}+22\frac{1}{2}$**) = 84 - 55**$\frac{5}{8}$ **=** $28\frac{3}{8}$ **inches**

10. Juan earns $7.75 per hour working as a cashier. If he works 38 hours each week, how much will he make in one month(4-weeks)?

$7.75 X 38 = $294.50

$294.50 X 4 = $1178.00

10. Lora spends $25 out of every $100 she makes on rent. If she makes $480 every two weeks, how much would go toward her rent?

$$\frac{25}{100}=\frac{1}{\cancel{4}_{1}}\times\frac{\cancel{480}^{120}}{1}=\$120$$

12. Mickey sells 25 items for $1.25. If he and 4 others are working their stand and split the money equally, how much will each one get?

25 X $1.25 = $31.25 **$31.25** $\times\frac{1}{5}$ **= $6.25**