Math 9 Adapted LG 1 - Expectation 1
Comparing Numbers: Decimals & Fractions

Turning a fraction into a decimal: $4\frac{1}{2}$ This means 4 wholes and one half.

To change to decimal form:

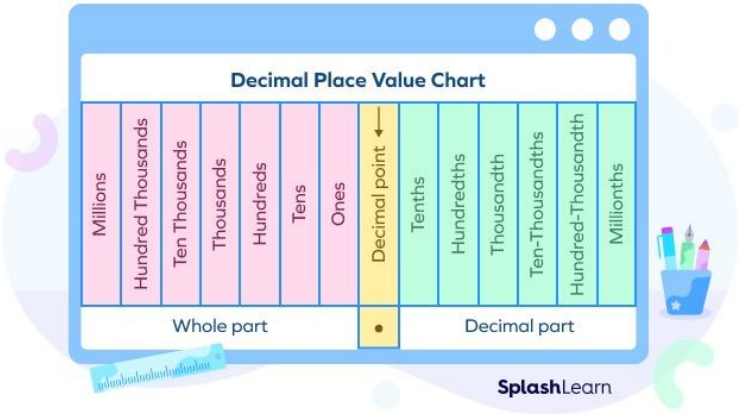
1. The value to the left of the decimal is the whole number (in this case 4)
2. the value on the right of the decimal is the numerator ÷ denominator.

$4\frac{1}{2}$ would be 4.5 (Since 4 is the whole number and 1 ÷ 2 = 0.5)

Fraction	Decimal	Fraction	Decimal
$3\frac{3}{4}$		$\frac{50}{100}$	
$6\frac{1}{2}$		$\frac{500}{1000}$	
$\frac{1}{2}$		$8\frac{13}{200}$	
$\frac{12}{36}$		$-1\frac{1}{2}$	For negative fractions do the same steps then put a negative in front ☺
$17\frac{15}{100}$		$-2\frac{1}{20}$	
$1\frac{151}{1000}$		$-72\frac{3}{10}$	
$\frac{2}{100}$		$-9\frac{43}{100}$	
$1\frac{2}{100}$		$-100\frac{7}{100}$	
$8\frac{13}{2000}$		$-\frac{130}{20}$	
$33\frac{1}{100}$		$-\frac{5002}{8}$	

Turning a decimal into a fraction:

- Anything to the left of the decimal is a whole number
- Numerator is the number to the right of the decimal
- Denominator is the place value of the last digit



Ex. 1 Write 3.75 as a mixed number.

Since the place value of the last digit is in the hundredths column, 3.7**5** would be $3\frac{75}{100}$

Ex. 2 Write 0.078 as a mixed number

Since the place value of the last digit is in the thousandths column, 0.678 would be $\frac{78}{1000}$

Decimal	Fraction	Decimal	Fraction
12.5		-4.1640	
0.14		-0.01	
7.245		0.005	
-10.2		-5.0642	
0.5678		-0.0006	
7.0102		-1.0040	

Reducing Fractions:
To reduce a fraction, divide the numerator (top) and denominator (bottom) by the same number.

A number is divisible by....	If it ends with...
2	0, 2, 4, 6, 8 (an even number)
5	0 or 5
10	0

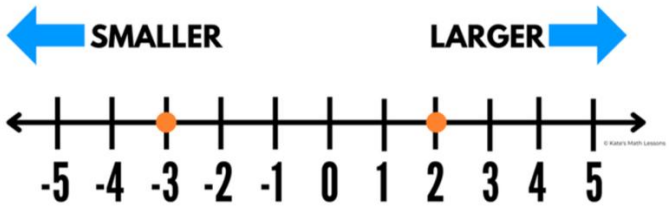
Ex.1.) $\frac{78}{1000}$ divide the numerator and denominator by 2 $\frac{78}{1000} = \frac{39}{500}$

Ex.2.) $3\frac{75}{100}$ divide the numerator and denominator by 5 $3\frac{75}{100} = 3\frac{3}{4}$

Fraction	Divide by... ***You may have to divide a few times	Reduced Fraction
$\frac{20}{100}$	÷10 then ÷ 2	$\frac{20}{100} = \frac{2}{10} = \frac{1}{5}$
$\frac{18}{144}$		
$\frac{25}{50}$		
$\frac{24}{240}$		
$\frac{50}{200}$		
If it is a mixed number, only reduce the fraction		
$9\frac{12}{20}$	÷ 2 then ÷ 2	$9\frac{12}{20} = 9\frac{6}{10} = 9\frac{3}{5}$
$7\frac{16}{40}$		
$-2\frac{12}{24}$		
$1\frac{28}{56}$		

If the number on top (numerator) is bigger than the number on the bottom you can write it as a mixed number…	First: Turn into a decimal (steps from page 2)	Then reduce the fraction part
$\frac{144}{64}$	144 ÷ 64 = 2.25	$2\frac{25}{100} = 2\frac{1}{4}$
$\frac{66}{20}$		
$-\frac{54}{8}$		
$\frac{4754}{16}$		
$\frac{200}{20}$	200 ÷20 = 10	if you get a whole number your done ☺ $\frac{200}{20} = 10$
$\frac{126}{6}$		
$-\frac{150}{25}$		
Now let's try them all….		
$\frac{10}{250}$		
$71\frac{12}{62}$		
$-3\frac{4}{12}$		
$-4\frac{45}{125}$		
$\frac{225}{20}$		
$-\frac{15}{125}$		
$\frac{3}{12}$		

Comparing Numbers (integers)



Circle the **larger** number:

5 or -2 1.2 or 1.3 0.573 or 0.580 -0.12345 or 1 8 or 8.000001

*Remember with negatives the larger value is the smaller number: ex. -0.11 or -0.12

- 5 or -6 -7.5 or -7.6. -6 or 1 -0.134 or -0.124

larger

Comparing integers with different a number of digits:

Remember that 0.7 = 0.70 = 0.700 (you can add as many zeros as you like and keep the same value)

Ex. Which is larger? 0.359 or 0.4

Since 0.4 = 0.400 Then 0.400 is larger than 0.359 0.359 or (0.4)

Circle the **larger** number:

0.57 or 0.9 0.4593. or 0.12 0.200 or 0.44 -0.4 or -0.55 1.1 or 0.2

-0.3 or $-0.\overline{3}$ $0.\overline{44}$ or 0.44 11.00001 or 11.0001 -0.52034 or -0.06

Comparing fractions

You MUST convert to same form (either fractions or decimal) to compare.

Which is larger?

$\frac{15}{20}$ or $\frac{3}{5}$ since $15 \div 20 = \mathbf{0.75}$ and $3 \div 5 = \mathbf{0.6}$ so $\mathbf{\frac{15}{20}}$ is larger.

larger

Which is larger?

$\frac{1}{3}$ or $\frac{2}{4}$ to compare they need a common denominator

since $\frac{1}{3} = \frac{4}{12}$ and $\frac{2}{4}$ or $\frac{6}{12}$ then $\frac{2}{4}$ is larger

larger

Which is larger – show your work (either converting to a fraction or decimal – your choice)

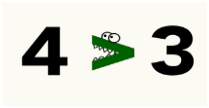
Circle the larger fraction	Show your work…
$\frac{1}{2}$ or $\frac{6}{10}$	
$-\frac{1}{3}$ or $-\frac{1}{2}$	
$\frac{12}{15}$ or $\frac{47}{60}$	
$-\frac{167}{376}$ or $-\frac{17}{32}$	
$\frac{21}{22}$ or $\frac{9}{10}$	
$\frac{7}{13}$ or $\frac{99}{200}$	
Circle the smaller fraction	**Show your work…**
$\frac{1}{2}$ or $\frac{1}{3}$	
$-\frac{10}{30}$ or $-\frac{10}{20}$	
$\frac{44}{89}$ or $\frac{3}{7}$	
$-\frac{1}{2}$ or $-\frac{1}{3}$	
$\frac{6}{1000}$ or $\frac{6}{10000}$	
$\frac{10}{3}$ or $\frac{10}{2}$	

Using symbols to compare numbers:

Symbols

< Less than = Equal > Greater than

the symbol > or < EATS the bigger number



Insert the correct symbol between each pair of numbers:

5_____6	-4_____-5	0.05_____0.05	7.045_____7.4
-0.7_____-0.66	3.4_____3.4	-0.865_____-0.805	-2.0001____-2.001
$\frac{11}{22}$ _____ $\frac{1}{2}$	$\frac{999}{1000}$ _____1	$\frac{45}{9}$ _____ $\frac{42}{7}$	$-\frac{1}{2}$ _____ $-\frac{1}{3}$

Finding numbers that fall between 2 numbers:

1. Convert to same form (either fraction or decimal)

Ex. 1 Find the numbers between $\frac{1}{4}$ and 0.3:

$\frac{1}{4}$ = 0.25 and 0.3 = 0.30. so the numbers between are 0.26, 0.27, 0.28 and 0.29

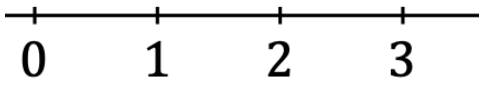
Find the numbers between:

$\frac{1}{2}$ and 0.53
$\frac{4}{5}$ and 0.85
$\frac{15}{16}$ and 0.938
$\frac{8}{5}$ and 1.64
$\frac{6}{10}$ and $\frac{9}{10}$
$\frac{44}{60}$ and $\frac{55}{60}$

Placing fractions on a number line.

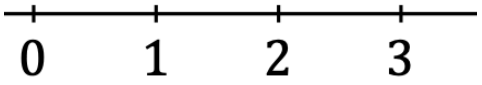
Example 1: Place $\frac{3}{4}$ on the number line shown

1. Since there is no whole number, the value lies between 0 and 1
2. We divide the space between 0 and 1 into **4** equal parts (because **4** is the denominator).
3. Place your dot on the 3rd line to represent $\frac{3}{4}$.



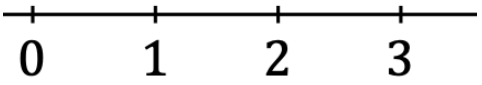
Example 2: Place $\frac{2}{5}$ on the number line shown

1. Since there is no whole number, the value lies between 0 and 1
2. Divide the space between 0 and 1 into **5** equal parts (because **5** is the denominator).
3. Place your dot on the 2nd line to represent $\frac{2}{5}$.



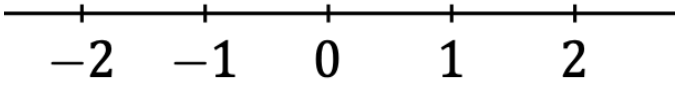
Example 3: Place $2\frac{1}{4}$

1. Since we have 3 wholes, our value lies between 2 and 3.
2. Divide the space between 2 and 3 into **4** equal parts (because **4** is the denominator).
3. Place your dot on the 1st line to represent $\frac{1}{4}$.

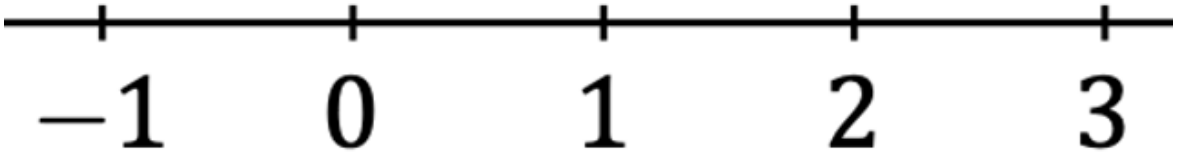


Example 4: Place $-1\frac{1}{3}$

1. Since we have -1 whole, our value lies between -1 and -2.
2. Divide the space between -1 and -2 into **3** equal parts (because **3** is the denominator).
3. Place your dot on the 1st line (moving towards the -2) to represent $-1\frac{1}{3}$.

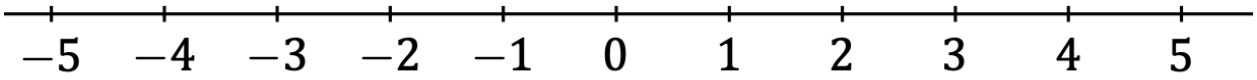


Place the following numbers on the number line below: $-\frac{3}{7}$ $\frac{7}{8}$ $2\frac{5}{6}$



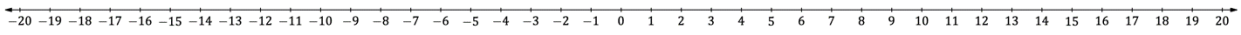
Place the following numbers on the number line below:

$-2\frac{1}{2}$ $4\frac{1}{3}$ $\frac{1}{2}$ $-1\frac{1}{3}$ $-\frac{3}{4}$ $3\frac{1}{2}$



Place the following numbers on the number line below:

$-17\frac{1}{6}$ $14\frac{1}{3}$ $10\frac{1}{2}$ $-11\frac{1}{3}$



In the space below, draw a number line and place these values on it:

$-9\frac{3}{5}$ $6\frac{2}{3}$ $\frac{9}{10}$ $-7\frac{7}{9}$

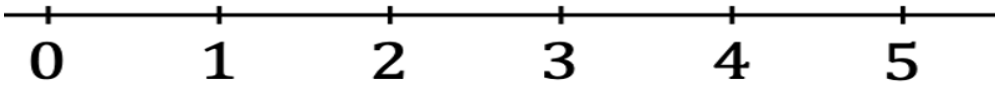
Placing fractions on a number line.

Example: Place 4.5 and 3.7 on the number line below.

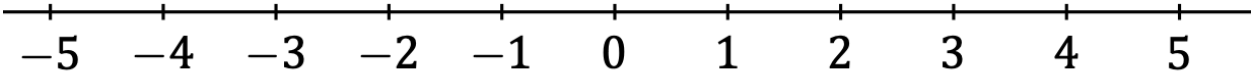
It is easiest to think of decimal numbers as fractions. So, for 4.5, 4 is the whole and the 5 is in the tenths column.

4.5 = $4\frac{5}{10}$ = $4\frac{1}{2}$

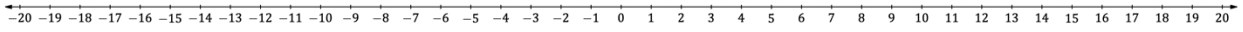
3.7 = $3\frac{7}{10}$



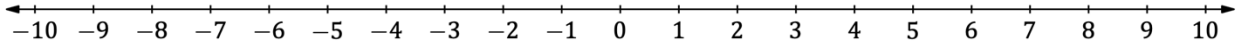
1. Place the following numbers on a number line: 2.4 -3.1 4.3 -1.9



2. Place the following numbers on the line below: 4 -18 10.5 3.5 -3.5

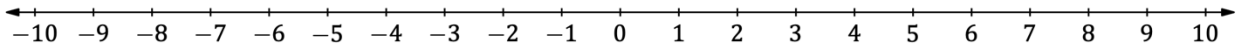


3. Place the following numbers on the line below: 6.3 - $4\frac{1}{2}$ - 9.7 $3\frac{3}{4}$



4. Write the values from question #3 in ascending order (from smallest to largest).

5. Place the following numbers on the line below: 3.6 - $7\frac{9}{10}$ - 2.1 $6\frac{10}{20}$



6. Now write them in descending order (from largest to smallest)

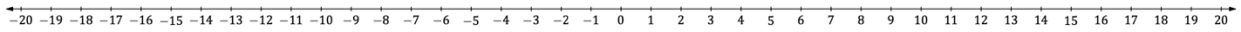
Math 9 Adapted LG 1 - Expectation 2
Adding & Subtracting Integers

Modelling: Adding negative & positive integers using a number line.

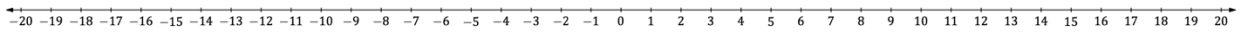
Put a dot for your starting value, then move to the:

- RIGHT if *adding* positivity (+)
- LEFT if *adding* negativity (-)

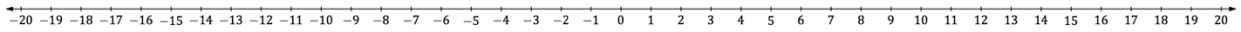
Example 1. (+4) + (+7) =



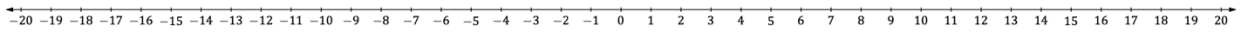
Example 2. (-8) + (+5) =



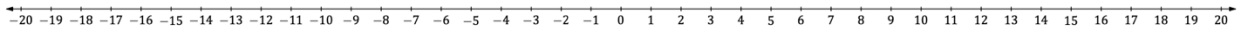
Example 3. (+4) + (-7) =



Example 4. (-10) + (-5) =



Example 5. (+20) + (-20) =



Answer the questions by using the number lines on the next page or by doing the calculations in in your head.

Put a dot for your starting value, then move to the:

- RIGHT if adding positivity (+)
- LEFT if adding negativity (-)

Number lines are on the following page

$(-8) + (-6) =$

$(+6) + (+9) =$

$(+6) + (+8) =$

$(-6) + (-6) =$

$(-7) + (-7) =$

$(+9) + (-6) =$

$(-9) + (-7) =$

$(-8) + (+9) =$

$(+8) + (+7) =$

$(+9) + (-1) =$

$(+6) + (-7) =$

$(-1) + (-5) =$

$(+8) + (+5) =$

$(+7) + (+5) =$

$(-9) + (-9) =$

$(-5) + (-3) =$

$(-1) + (-4) =$

$(-3) + (-1) =$

$(-9) + (+2) =$

$(-4) + (+5) =$

$(+5) + (-7) =$

$(-8) + (+2) =$

$(-2) + (-2) =$

$(-2) + (-8) =$

$(+3) + (-8) =$

$(-8) + (-6) = (-14)$

$(+6) + (+9) = (+15)$

$(+6) + (+8) = (+14)$

$(-6) + (-6) = (-12)$

$(-7) + (-7) = (-14)$

$(+9) + (-6) = (+3)$

$(-9) + (-7) = (-16)$

$(-8) + (+9) = (+1)$

$(+8) + (+7) = (+15)$

$(+9) + (-1) = (+8)$

$(+6) + (-7) = (-1)$

$(-1) + (-5) = (-6)$

$(+8) + (+5) = (+13)$

$(+7) + (+5) = (+12)$

$(-9) + (-9) = (-18)$

$(-5) + (-3) = (-8)$

$(-1) + (-4) = (-5)$

$(-3) + (-1) = (-4)$

$(-9) + (+2) = (-7)$

$(-4) + (+5) = (+1)$

$(+5) + (-7) = (-2)$

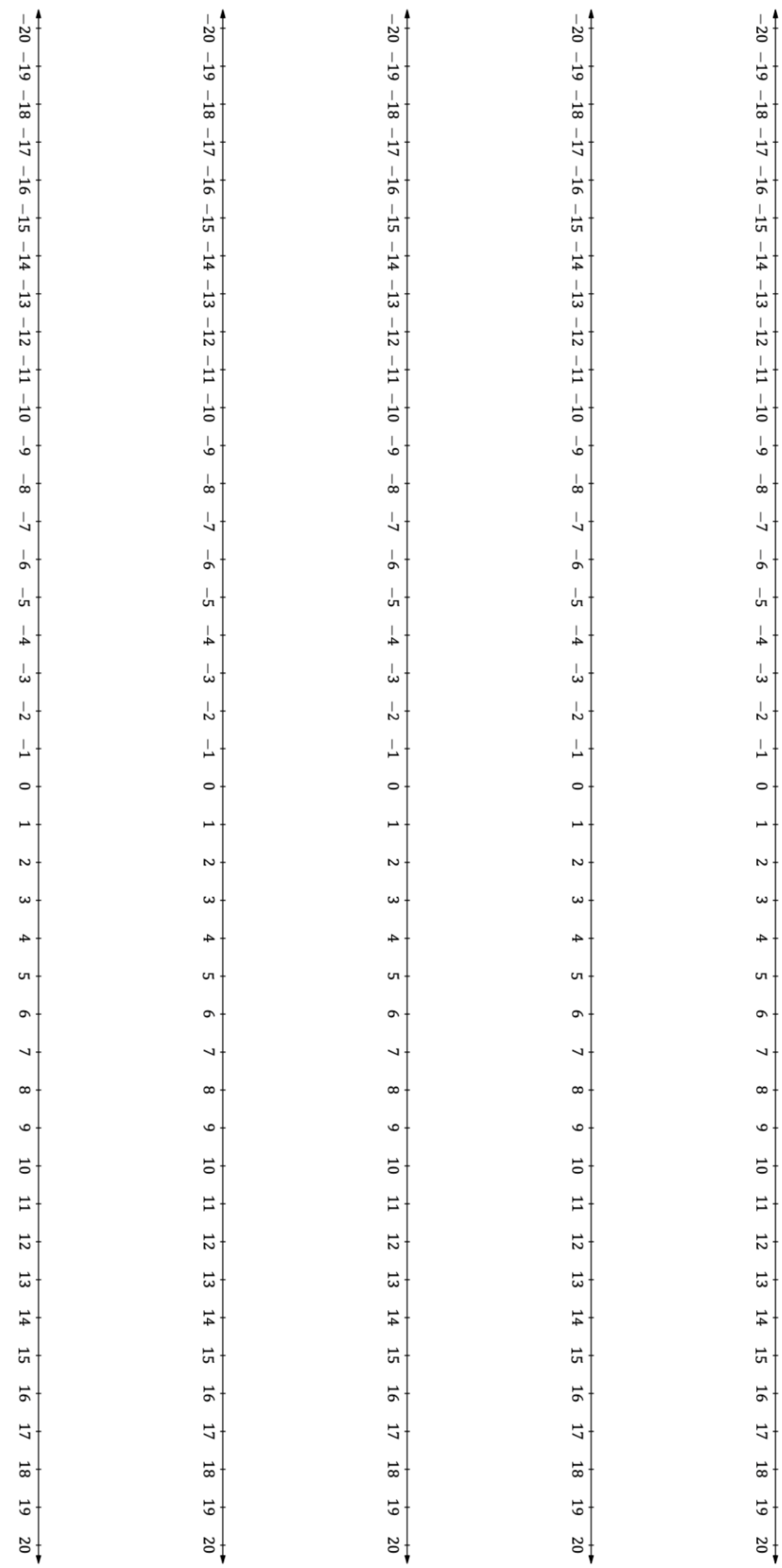
$(-8) + (+2) = (-6)$

$(-2) + (-2) = (-4)$

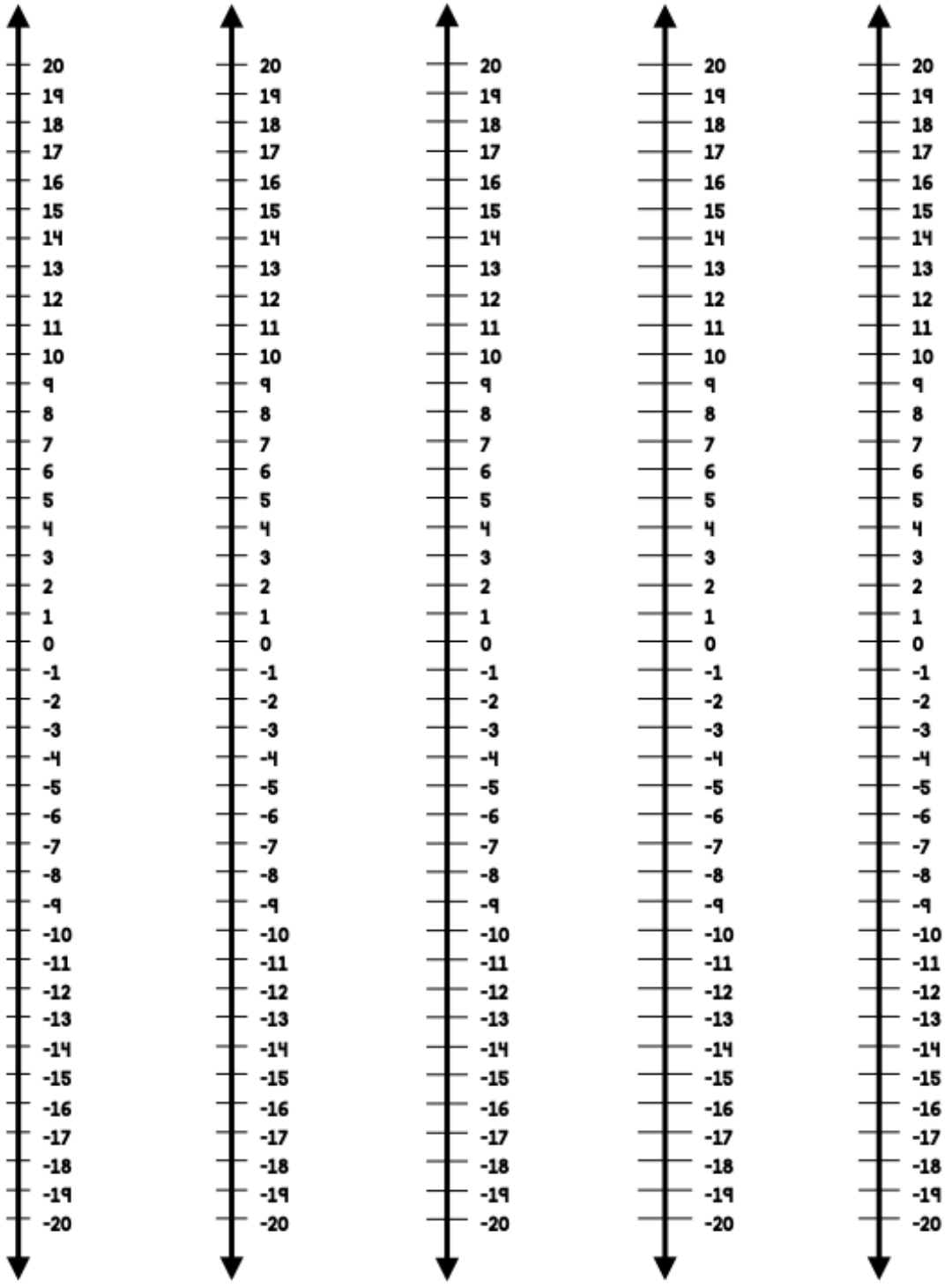
$(-2) + (-8) = (-10)$

$(+3) + (-8) = (-5)$

You can rip this page out to make it easier to use. Additional copies available ☺



You can also use vertical number lines.



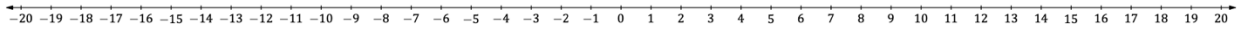
Modelling: Subtracting negative & positive integers using a number line.

We all like to feel pretty good. Imagine that someone comes along and takes away your positivity – that would make you more negative right? It is the same with numbers. If you are taking away positivity (+ number) then it becomes more negative. Same if you take away someone's negativity (- number) then it will be more positive!

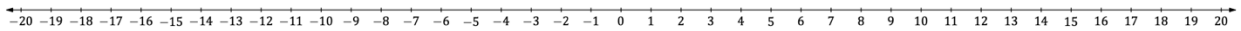
Put a dot for your starting value, then move to the:

- LEFT if *subtracting* positivity (+)
- RIGHT if *subtracting* negativity (-) **- (-)** subtracting a (-) means we are adding

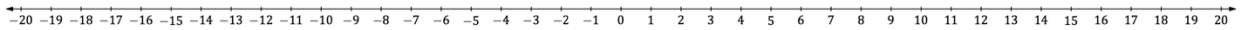
Example 1. (+4) - (+7) =



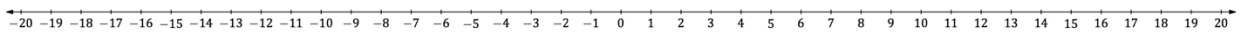
Example 2. (-8) - (+5) =



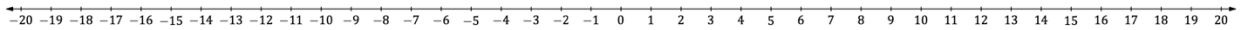
Example 3. (+4) - (-7) =



Example 4. (-10) - (-5) =



Example 5. (-10) - (-10) =



Answer the questions by using the number lines or by doing the calculations in in your head.

Additional number lines are available.

Put a dot for your starting value, then move to the:

- LEFT if *subtracting* positivity (+)
- RIGHT if *subtracting* negativity (-)

- (-) subtracting a (-) means we are adding

Check your work with the answer key below.

$(+7) - (+3) =$

$(-9) - (-1) =$

$(+7) - (-9) =$

$(-8) - (-7) =$

$(+7) - (+2) =$

$(-4) - (-8) =$

$(+1) - (-7) =$

$(-6) - (+8) =$

$(-6) - (+2) =$

$(-8) - (+1) =$

$(+6) - (-4) =$

$(-9) - (+5) =$

$(-7) - (-6) =$

$(+4) - (-7) =$

$(+5) - (-7) =$

$(+9) - (+7) =$

$(+9) - (+4) =$

$(-5) - (+3) =$

$(-6) - (+3) =$

$(-2) - (+4) =$

$(+4) - (+9) =$

$(+3) - (-7) =$

$(-4) - (-5) =$

$(-7) - (-7) =$

$(+7) - (+4) =$

$(+7) - (+3) = (+4)$
$(-9) - (-1) = (-8)$
$(+7) - (-9) = (+16)$
$(-8) - (-7) = (-1)$
$(+7) - (+2) = (+5)$
$(-4) - (-8) = (+4)$
$(+1) - (-7) = (+8)$
$(-6) - (+8) = (-14)$
$(-6) - (+2) = (-8)$
$(-8) - (+1) = (-9)$
$(+6) - (-4) = (+10)$
$(-9) - (+5) = (-14)$
$(-7) - (-6) = (-1)$

$(+4) - (-7) = (+11)$
$(+5) - (-7) = (+12)$
$(+9) - (+7) = (+2)$
$(+9) - (+4) = (+5)$
$(-5) - (+3) = (-8)$
$(-6) - (+3) = (-9)$
$(-2) - (+4) = (-6)$
$(+4) - (+9) = (-5)$
$(+3) - (-7) = (+10)$
$(-4) - (-5) = (+1)$
$(-7) - (-7) = (0)$
$(+7) - (+4) = (+3)$

Let's practice all the addition & subtraction rules together now.

Check your work with the answer key below.

$(+6) + (+6) =$

$(+8) - (-5) =$

$(-5) - (-9) =$

$(-9) + (-8) =$

$(+4) - (-9) =$

$(-5) + (+7) =$

$(-7) + (-6) =$

$(+6) - (-7) =$

$(-6) - (-1) =$

$(+4) - (-7) =$

$(-8) - (-2) =$

$(-4) - (-6) =$

$(-3) + (+9) =$

$(-6) + (+5) =$

$(-7) - (+4) =$

$(-4) + (+8) =$

$(+5) + (+8) =$

$(-7) - (+7) =$

$(+8) - (+3) =$

$(+8) - (-7) =$

$(+6) - (-2) =$

$(-3) - (-1) =$

$(-5) - (+6) =$

$(-2) - (-9) =$

$(+4) + (+4) =$

$(+6) + (+6) = (+12)$

$(+8) - (-5) = (+13)$

$(-5) - (-9) = (+4)$

$(-9) + (-8) = (-17)$

$(+4) - (-9) = (+13)$

$(-5) + (+7) = (+2)$

$(-7) + (-6) = (-13)$

$(+6) - (-7) = (+13)$

$(-6) - (-1) = (-5)$

$(+4) - (-7) = (+11)$

$(-8) - (-2) = (-6)$

$(-4) - (-6) = (+2)$

$(-3) + (+9) = (+6)$

$(-6) + (+5) = (-1)$

$(-7) - (+4) = (-11)$

$(-4) + (+8) = (+4)$

$(+5) + (+8) = (+13)$

$(-7) - (+7) = (-14)$

$(+8) - (+3) = (+5)$

$(+8) - (-7) = (+15)$

$(+6) - (-2) = (+8)$

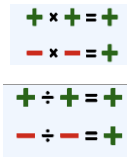
$(-3) - (-1) = (-2)$

$(-5) - (+6) = (-11)$

$(-2) - (-9) = (+7)$

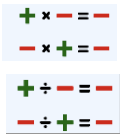
$(+4) + (+4) = (+8)$

Multiplying & Dividing Integers



Multiplication & Division

Same signs: Positive answer	Different signs: Negative answer
(-6) x (-5) = (+30)	(-12) ÷ (+3) = (-4)



Using a multiplication table, let's try these together:

x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

$$8\times(-12)=$$
$$7\div(-7)=$$
$$44\div4=$$
$$-6\times6=$$
$$27\div(-9)=$$
$$-4\times(-7)=$$
$$24\div8=$$
$$-9\times2=$$
$$6\times9=$$
$$-3\times(-5)=$$

Circle all equations that will have a **positive** answer:

$$64\div8=\qquad -11\div(-1)=\qquad -2\times(-8)=\qquad -80\div(-10)=$$
$$-120\div10=\qquad -36\div4=\qquad -6\div1=\qquad -42\div(-6)=$$
$$-8\times(-9)=\qquad 7\times(-9)=\qquad 120\div(-12)=\qquad -6\times(-11)=$$

Circle all equations that will have a **negative** answer:

$$-9\times10=\qquad -54\div(-6)=\qquad 10\div1=\qquad -56\div7=$$
$$9\times8=\qquad 5\times3=\qquad 20\div5=\qquad -10\div(-10)=$$
$$11\times(-11)=\qquad 2\div(-1)=\qquad -24\div3=\qquad -9\times3=$$

Let's practice all the multiplication & division rules together now.

You can calculate the answers in your head or use the multiplication table on the next page.

Check your work with the answer key below.

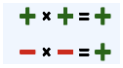
$12 \times (-11) =$
$-9 \times (-12) =$
$-10 \times 12 =$
$-11 \times 8 =$
$-10 \times (-10) =$
$108 \div (-9) =$
$121 \div 11 =$
$-132 \div 12 =$
$10 \times 9 =$
$80 \div 10 =$
$10 \times 11 =$
$8 \times (-9) =$
$90 \div 10 =$
$11 \times 10 =$
$-96 \div 12 =$
$-120 \div (-10) =$
$-80 \div (-8) =$
$1 \times (-8) =$
$48 \div (-12) =$
$11 \times (-7) =$
$84 \div (-7) =$
$45 \div (-5) =$
$-7 \div (-7) =$
$-21 \div (-3) =$
$-25 \div (-5) =$

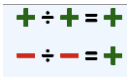
$15 \div (-3) =$
$-6 \times (-5) =$
$-72 \div (-12) =$
$24 \div (-6) =$
$-18 \div 9 =$
$-81 \div (-9) =$
$12 \times (-4) =$
$18 \div (-2) =$
$-4 \times (-11) =$
$-3 \times (-11) =$
$-10 \times (-3) =$
$3 \div (-1) =$
$-2 \times (-3) =$
$6 \times (-7) =$
$2 \times (-12) =$
$99 \div (-9) =$
$12 \times 12 =$
$-5 \times 2 =$
$-5 \times (-7) =$
$-77 \div (-11) =$
$-14 \div (-2) =$
$9 \times (-8) =$
$-5 \times (-10) =$
$99 \div (-11) =$
$-3 \div (-3) =$

$-9 \div 1 = -9$
$-8 - (-6) = -2$
$-5 - 8 = -13$
$-6 + (-4) = -10$
$-7 - (-4) = -3$
$14 \div (-2) = -7$
$7 + (-3) = 4$
$1 \times 6 = 6$
$9 - 9 = 0$
$8 - (-7) = 15$
$4 \times (-9) = -36$
$1 \times (-9) = -9$
$-4 \times 2 = -8$
$-7 - (-1) = -6$
$9 + 3 = 12$
$1 - 3 = -2$
$54 \div (-9) = -6$
$-1 + 8 = 7$
$4 + (-6) = -2$
$-20 \div (-5) = 4$
$49 \div (-7) = -7$
$2 + 8 = 10$
$-8 + (-2) = -10$
$-2 \times 7 = -14$
$-8 \times 1 = -8$

$1 \times (-7) = -7$
$-72 \div (-9) = 8$
$-4 + 7 = 3$
$2 + (-1) = 1$
$-48 \div (-8) = 6$
$1 - 1 = 0$
$6 + (-2) = 4$
$1 \times (-4) = -4$
$7 - 8 = -1$
$-5 + 9 = 4$
$5 + 7 = 12$
$-42 \div (-6) = 7$
$9 \times (-4) = -36$
$4 \times (-3) = -12$
$-4 + (-8) = -12$
$-3 - (-2) = -1$
$-9 + 8 = -1$
$-6 - 7 = -13$
$5 \times (-3) = -15$
$6 - 6 = 0$
$2 \div 2 = 1$
$-3 + (-3) = -6$
$-2 \times 2 = -4$
$-3 - 1 = -4$
$8 \times (-8) = -64$

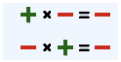
You can tear out this page to make it easier to reference

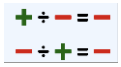




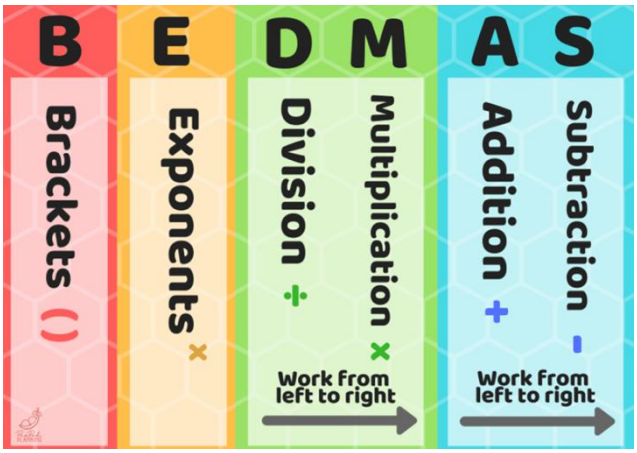
Multiplication & Division

Same signs: Positive answer	Different signs: Negative answer
(-6) x (-5) = (+30)	(-12) ÷ (+3) = (-4)





x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144



$$(5x6)x1^2 \div 3-8+4 =$$
$$30x1^2 \div 3-8+4 =$$
$$30x1 \div 3-8+4 =$$
$$30 \div 3-8+4 =$$
$$10-8+4 =$$
$$2+4 =$$
$$6$$

Try these:

$(3 \times 4) \div (7 + 9 - 10)$

$8 \times (10 - 6) \div 2 + 4$

$(10 \div 2) \times 7 + 5 - 4$

$8 \div (7 - 3) \times (4 + 6)$

$6 \times (8 - 3 + 5) \div 10$

$10 - 6 \times 5 \div (2 + 4)$

$(10 - 6 + 8 \div 2) \times 3$

$(4 + 8 \div 2 - 6) \times 10$

$7 \div (4 \times 2 + 9 - 10)$

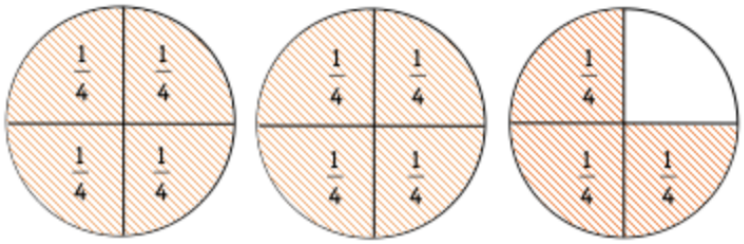
$((10 - 6 + 5) \div 9) \times 2$

Math 9 Adapted - LG 1 Expectation 3
Operations with Fractions

Fraction Rules Reference Sheet

Always change mixed numbers to improper fractions	$2\frac{1}{3} = \frac{7}{3}$
Finding common denominator to make equivalent fractions Ex. $\frac{2}{6} + \frac{1}{2}$	Butterfly method: $\frac{2}{6} + \frac{1}{2} = \frac{\quad}{12} + \frac{\quad}{12}$ 6 x 2 = 12 2 x 2 = 4 1 x 6 = 6 $\frac{2}{6} + \frac{1}{2} = \frac{4}{12} + \frac{6}{12}$ *always multiply the numerator in the 1st fraction 1st
Adding & Subtracting (Must have a common denominator)	$\frac{1}{5} + \frac{2}{3} = \frac{3}{15} + \frac{10}{15} = \frac{13}{15}$
Multiplying (multiply numerator, multiply denominator)	$\frac{1}{4} \times \frac{2}{3} = \frac{2}{12}$
Dividing (change to multiplication by flipping the second fraction)	$\frac{5}{6} \div \frac{2}{4} = \frac{5}{6} \times \frac{4}{2} =$

Fractions: Converting mixed fractions to improper fractions.



How many 4^{ths} are shown?

$2\frac{3}{4} = \frac{\quad}{4}$

Short cut ⟶ $2\frac{3}{4} = \frac{\quad}{4}$ (+ and x)

1. The denominator is the same (4)
2. New numerator
   a. Multiply the whole number by the denominator (2 x 4 = 8)
   b. Then add the numerator to that number (8 + 3 = 11)

Example 1. $1\frac{1}{2} =$

Example 2. $5\frac{3}{4} =$

Example 3. $-3\frac{4}{5} =$

Example 4. $-10\frac{1}{4} =$

Convert each mixed fraction to an improper fraction.

$9\frac{1}{9} = —$	$3\frac{8}{9} = —$	$8\frac{7}{12} = —$	$7\frac{7}{9} = —$
$3\frac{11}{15} = —$	$3\frac{2}{5} = —$	$4\frac{2}{7} = —$	$7\frac{1}{3} = —$
$5\frac{1}{7} = —$	$2\frac{7}{10} = —$	$3\frac{4}{5} = —$	$4\frac{5}{7} = —$
$3\frac{3}{8} = —$	$6\frac{1}{8} = —$	$5\frac{5}{6} = —$	$7\frac{4}{15} = —$
$4\frac{2}{9} = —$	$9\frac{1}{6} = —$	$7\frac{5}{8} = —$	$1\frac{5}{9} = —$
$6\frac{4}{7} = —$	$8\frac{7}{15} = —$	$6\frac{1}{5} = —$	$8\frac{1}{12} = —$
$8\frac{1}{15} = —$	$7\frac{5}{12} = —$	$1\frac{3}{10} = —$	$6\frac{8}{15} = —$
$1\frac{9}{10} = —$	$4\frac{6}{7} = —$	$1\frac{1}{4} = -$	$1\frac{11}{12} = —$
$3\frac{4}{9} = —$	$3\frac{1}{10} = —$	$2\frac{1}{2} = -$	$4\frac{3}{5} = —$
$4\frac{7}{8} = —$	$6\frac{2}{15} = —$	$5\frac{3}{4} = —$	$5\frac{3}{7} = —$

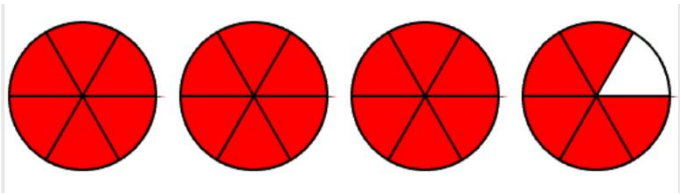
Converting mixed fractions to improper fractions.

How many 3rds are modelled in the picture?

How do we write this a mixed fraction?

$\frac{7}{3} = \frac{3}{3} + \frac{3}{3} + \frac{1}{3} = \frac{\ }{3}$

How many 6ths are modelled in the picture?



How do we write this a mixed fraction?

We can also use a short cut to convert mixed numbers to improper fractions.

Steps:

1. Use the denominator in the mixed fraction as the denominator for the improper.
2. Divide the numerator by the denominator.
3. The whole number gives you the number of wholes.
4. The **remainder** gives you the numerator.

Example 1. $\frac{23}{5} = 4\frac{3}{5}$

Example 2. $\frac{19}{7} =$

Example 3. $\frac{27}{4} =$

Convert each improper fraction to a mixed number.

$\frac{32}{9} = \_$ $\frac{67}{12} = \_$ $\frac{116}{15} = \_$ $\frac{34}{15} = \_$

$\frac{25}{12} = \_$ $\frac{41}{6} = \_$ $\frac{53}{7} = \_$ $\frac{25}{4} = \_$

$\frac{127}{15} = \_$ $\frac{21}{8} = \_$ $\frac{15}{4} = \_$ $\frac{33}{10} = \_$

$\frac{25}{9} = \_$ $\frac{38}{7} = \_$ $\frac{99}{10} = \_$ $\frac{44}{5} = \_$

$\frac{53}{15} = \_$ $\frac{41}{8} = \_$ $\frac{64}{9} = \_$ $\frac{57}{10} = \_$

$\frac{16}{7} = \_$ $\frac{56}{9} = \_$ $\frac{21}{10} = \_$ $\frac{67}{8} = \_$

$\frac{12}{7} = \_$ $\frac{83}{12} = \_$ $\frac{36}{7} = \_$ $\frac{19}{6} = \_$

$\frac{13}{2} = \_$ $\frac{22}{3} = \_$ $\frac{23}{5} = \_$ $\frac{20}{7} = \_$

$\frac{76}{15} = \_$ $\frac{85}{9} = \_$ $\frac{80}{9} = \_$ $\frac{41}{12} = \_$

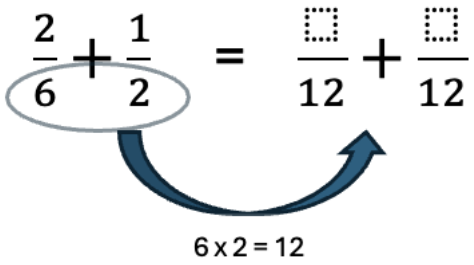
$\frac{6}{5} = \_$ $\frac{107}{15} = \_$ $\frac{63}{8} = \_$ $\frac{37}{5} = \_$

Adding and subtracting fractions.

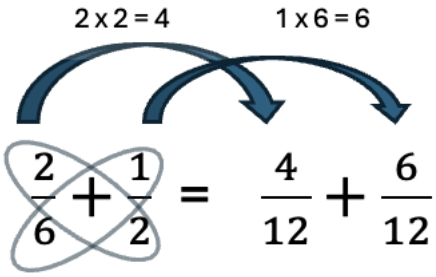
When adding and subtracting fractions, the denominator NEEDS to be the SAME! Use the butterfly method to solve.

Butterfly method:

1. Multiply denominators to find common denominator:



2. Then multiply the across.



*always multiply the numerator in the 1st fraction 1st

3. Now add the fractions.

$$\frac{4}{12} + \frac{6}{12} = \frac{10}{12}$$

4. Now reduce.

$$\frac{10}{12} = \frac{5}{6}$$

You can use the same method for subtraction too!

1) $\frac{1}{4} + \frac{9}{10} =$

2) $\frac{1}{2} + \frac{2}{4} =$

3) $\frac{4}{5} + \frac{1}{4} =$

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

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

6) $\frac{8}{10} - \frac{1}{2} =$

7) $\frac{3}{4} - \frac{5}{10} =$

8) $\frac{3}{4} - \frac{1}{2} =$

9) $\frac{3}{10} - \frac{1}{5} =$

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

Check your answers on the next page...

Answers from previous page....

1) $\frac{1}{4} + \frac{9}{10} = \frac{5}{20} + \frac{18}{20} = \frac{23}{20} = 1\frac{3}{20}$

2) $\frac{1}{2} + \frac{2}{4} = \frac{2}{4} + \frac{2}{4} = \frac{4}{4} = 1$

3) $\frac{4}{5} + \frac{1}{4} = \frac{16}{20} + \frac{5}{20} = \frac{21}{20} = 1\frac{1}{20}$

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

5) $\frac{1}{2} + \frac{3}{5} = \frac{5}{10} + \frac{6}{10} = \frac{11}{10} = 1\frac{1}{10}$

5) $\frac{1}{2} - \frac{2}{5} = \frac{5}{10} - \frac{4}{10} = \frac{1}{10}$

6) $\frac{8}{10} - \frac{1}{2} = \frac{8}{10} - \frac{5}{10} = \frac{3}{10}$

7) $\frac{3}{4} - \frac{5}{10} = \frac{15}{20} - \frac{10}{20} = \frac{5}{20} = \frac{1}{4}$

8) $\frac{3}{4} - \frac{1}{2} = \frac{3}{4} - \frac{2}{4} = \frac{1}{4}$

9) $\frac{3}{10} - \frac{1}{5} = \frac{3}{10} - \frac{2}{10} = \frac{1}{10}$

10) $\frac{3}{5} - \frac{6}{10} = \frac{6}{10} - \frac{6}{10} = 0$

Adding and subtracting mixed numbers.

Step 1. Change to improper.
Step 2. Use butterfly method to solve.

Example 1. $1\frac{2}{7} + 4\frac{4}{5} =$

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

1. $\frac{15}{7} - \frac{2}{6} =$

2. $\frac{9}{5} - \frac{5}{9} =$

3. $\frac{11}{9} - \frac{2}{10} =$

4. $\frac{13}{7} - \frac{1}{9} =$

5. $\frac{33}{9} - \frac{7}{4} =$

6. $\frac{10}{4} + \frac{10}{11} =$

7. $\frac{10}{3} + \frac{26}{7} =$

8. $\frac{7}{8} + \frac{31}{9} =$

9. $\frac{14}{9} + \frac{57}{17} =$

10. $\frac{15}{6} + \frac{22}{17} =$

Check your Work ☺

$\frac{15}{7} - \frac{2}{6} = \frac{90}{42} - \frac{14}{42} = \frac{76}{42} = \frac{38}{21} = 1\frac{17}{21}$

$\frac{9}{5} - \frac{5}{9} = \frac{81}{45} - \frac{25}{45} = \frac{56}{45} = 1\frac{11}{45}$

$\frac{11}{9} - \frac{2}{10} = \frac{110}{90} - \frac{18}{90} = \frac{92}{90} = \frac{46}{45} = 1\frac{1}{45}$

$\frac{13}{7} - \frac{1}{9} = \frac{117}{63} - \frac{7}{63} = \frac{110}{63} = 1\frac{47}{63}$

$\frac{33}{9} - \frac{7}{4} = \frac{132}{36} - \frac{63}{36} = \frac{69}{36} = \frac{23}{12} = 1\frac{11}{12}$

$\frac{10}{4} + \frac{10}{11} = \frac{110}{44} + \frac{40}{44} = \frac{150}{44} = \frac{75}{22} = 3\frac{9}{22}$

$\frac{10}{3} + \frac{26}{7} = \frac{70}{21} + \frac{78}{21} = \frac{148}{21} = 7\frac{1}{21}$

$\frac{7}{8} + \frac{31}{9} = \frac{63}{72} + \frac{248}{72} = \frac{311}{72} = 4\frac{23}{72}$

$\frac{14}{9} + \frac{57}{17} = \frac{238}{153} + \frac{513}{153} = \frac{751}{153} = 4\frac{139}{153}$

$\frac{15}{6} + \frac{22}{17} = \frac{255}{102} + \frac{132}{102} = \frac{387}{102} = \frac{129}{34} = 3\frac{27}{34}$

Multiplying Fractions

Simple: multiply the top (numerator), then multiply the bottom (denominator!

1. $\frac{4}{5} \times \frac{2}{3} = \_\_$
2. $\frac{1}{3} \times \frac{1}{7} = \_\_$
3. $\frac{6}{7} \times \frac{5}{7} = \_\_$
4. $\frac{7}{8} \times \frac{1}{2} = \_\_$
5. $\frac{1}{2} \times \frac{3}{4} = \_\_$
6. $\frac{1}{3} \times \frac{1}{2} = \_\_$
7. $\frac{1}{2} \times \frac{5}{6} = \_\_$
8. $\frac{1}{3} \times \frac{2}{3} = \_\_$
9. $\frac{7}{8} \times \frac{1}{3} = \_\_$
10. $\frac{1}{2} \times \frac{3}{5} = \_\_$
11. $\frac{1}{4} \times \frac{3}{4} = \_\_$
12. $\frac{1}{8} \times \frac{3}{4} = \_\_$
13. $\frac{2}{5} \times \frac{4}{9} = \_\_$
14. $\frac{1}{2} \times \frac{5}{8} = \_\_$
15. $\frac{1}{2} \times \frac{1}{3} = \_\_$
16. $\frac{6}{7} \times \frac{6}{7} = \_\_$

1. $\frac{4}{5} \times \frac{2}{3} = \frac{8}{15}$
2. $\frac{1}{3} \times \frac{1}{7} = \frac{1}{21}$
3. $\frac{6}{7} \times \frac{5}{7} = \frac{30}{49}$
4. $\frac{7}{8} \times \frac{1}{2} = \frac{7}{16}$
5. $\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$
6. $\frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$
7. $\frac{1}{2} \times \frac{5}{6} = \frac{5}{12}$
8. $\frac{1}{3} \times \frac{2}{3} = \frac{2}{9}$
9. $\frac{7}{8} \times \frac{1}{3} = \frac{7}{24}$
10. $\frac{1}{2} \times \frac{3}{5} = \frac{3}{10}$
11. $\frac{1}{4} \times \frac{3}{4} = \frac{3}{16}$
12. $\frac{1}{8} \times \frac{3}{4} = \frac{3}{32}$
13. $\frac{2}{5} \times \frac{4}{9} = \frac{8}{45}$
14. $\frac{1}{2} \times \frac{5}{8} = \frac{5}{16}$
15. $\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$
16. $\frac{6}{7} \times \frac{6}{7} = \frac{36}{49}$
17. $\frac{1}{7} \times \frac{3}{4} = \frac{3}{28}$
18. $\frac{3}{5} \times \frac{2}{7} = \frac{6}{35}$
19. $\frac{1}{3} \times \frac{2}{5} = \frac{2}{15}$
20. $\frac{2}{3} \times \frac{4}{7} = \frac{8}{21}$

Dividing Fractions

Keep *1st fraction* **Flip** *multiplication to division* **Flip** *2nd fraction*

1. $\frac{1}{4} \div \frac{2}{3} = \frac{1}{4} \times \frac{3}{2} = \frac{3}{8}$ (Inversion; Result)
2. $\frac{1}{8} \div \frac{2}{3} = \_\_ \times \_\_ = \_\_$
3. $\frac{1}{5} \div \frac{4}{9} = \_\_ \times \_\_ = \_\_$
4. $\frac{3}{8} \div \frac{2}{3} = \_\_ \times \_\_ = \_\_$
5. $\frac{3}{7} \div \frac{2}{3} = \_\_ \times \_\_ = \_\_$
6. $\frac{3}{4} \div \frac{8}{9} = \_\_ \times \_\_ = \_\_$
7. $\frac{1}{3} \div \frac{1}{2} = \_\_ \times \_\_ = \_\_$
8. $\frac{2}{3} \div \frac{3}{4} = \_\_ \times \_\_ = \_\_$
9. $\frac{1}{3} \div \frac{5}{7} = \_\_ \times \_\_ = \_\_$
10. $\frac{2}{9} \div \frac{1}{2} = \_\_ \times \_\_ = \_\_$
11. $\frac{5}{6} \div \frac{6}{7} = \_\_ \times \_\_ = \_\_$
12. $\frac{1}{4} \div \frac{4}{5} = \_\_ \times \_\_ = \_\_$
13. $\frac{1}{8} \div \frac{2}{7} = \_\_ \times \_\_ = \_\_$
14. $\frac{1}{2} \div \frac{5}{7} = \_\_ \times \_\_ = \_\_$
15. $\frac{1}{7} \div \frac{1}{5} = \_\_ \times \_\_ = \_\_$
16. $\frac{1}{2} \div \frac{3}{5} = \_\_ \times \_\_ = \_\_$
17. $\frac{1}{4} \div \frac{2}{7} = \_\_ \times \_\_ = \_\_$

1. $\frac{1}{4} \div \frac{2}{3} = \frac{1}{4} \times \frac{3}{2} = \frac{3}{8}$
2. $\frac{1}{8} \div \frac{2}{3} = \frac{1}{8} \times \frac{3}{2} = \frac{3}{16}$
3. $\frac{1}{5} \div \frac{4}{9} = \frac{1}{5} \times \frac{9}{4} = \frac{9}{20}$
4. $\frac{3}{8} \div \frac{2}{3} = \frac{3}{8} \times \frac{3}{2} = \frac{9}{16}$
5. $\frac{3}{7} \div \frac{2}{3} = \frac{3}{7} \times \frac{3}{2} = \frac{9}{14}$
6. $\frac{3}{4} \div \frac{8}{9} = \frac{3}{4} \times \frac{9}{8} = \frac{27}{32}$
7. $\frac{1}{3} \div \frac{1}{2} = \frac{1}{3} \times \frac{2}{1} = \frac{2}{3}$
8. $\frac{2}{3} \div \frac{3}{4} = \frac{2}{3} \times \frac{4}{3} = \frac{8}{9}$
9. $\frac{1}{3} \div \frac{5}{7} = \frac{1}{3} \times \frac{7}{5} = \frac{7}{15}$
10. $\frac{2}{9} \div \frac{1}{2} = \frac{2}{9} \times \frac{2}{1} = \frac{4}{9}$
11. $\frac{5}{6} \div \frac{6}{7} = \frac{5}{6} \times \frac{7}{6} = \frac{35}{36}$
12. $\frac{1}{4} \div \frac{4}{5} = \frac{1}{4} \times \frac{5}{4} = \frac{5}{16}$
13. $\frac{1}{8} \div \frac{2}{7} = \frac{1}{8} \times \frac{7}{2} = \frac{7}{16}$
14. $\frac{1}{2} \div \frac{5}{7} = \frac{1}{2} \times \frac{7}{5} = \frac{7}{10}$
15. $\frac{1}{7} \div \frac{1}{5} = \frac{1}{7} \times \frac{5}{1} = \frac{5}{7}$
16. $\frac{1}{2} \div \frac{3}{5} = \frac{1}{2} \times \frac{5}{3} = \frac{5}{6}$
17. $\frac{1}{4} \div \frac{2}{7} = \frac{1}{4} \times \frac{7}{2} = \frac{7}{8}$
18. $\frac{1}{5} \div \frac{2}{3} = \frac{1}{5} \times \frac{3}{2} = \frac{3}{10}$
19. $\frac{6}{7} \div \frac{7}{8} = \frac{6}{7} \times \frac{8}{7} = \frac{48}{49}$
20. $\frac{1}{5} \div \frac{1}{4} = \frac{1}{5} \times \frac{4}{1} = \frac{4}{5}$