



UNIVERSITY OF DETROIT JESUIT

HIGH SCHOOL AND ACADEMY

Dear parents and algebra students,

The mathematics department at U of D Jesuit has compiled a summer math packet for algebra students. It is designed to help reinforce skills and to provide practice with fundamental concepts learned in prior grades. The goal is to gain proficiency with these basic skills and to be prepared to move forward and to be successful in algebra.

This work should not be completed in one week at the beginning or the end of the summer. Please practice at a steady pace throughout the entire summer. The correct answers are provided, so check your answers. Always show steps and do not use a calculator.

Do not be overwhelmed by the number of problems. Use the opportunity to drill basic computational skills with fractions, decimals and integers. The rapid, automatic responses you will achieve will allow you time and mental resources to work on higher level processes in algebra class. Then, try some problems in subsequent topics and continue with additional problems if you are having difficulty. Plenty of problems are provided so that you will gain competency with all the material.

By the way, how do you make seven an even number?

Enjoy your summer!

Your U of D math teachers

You make seven even by removing the “S” 😊

Operations with fractions

Combining Fractions (Adding and Subtracting)	
<p>When combining fractions (adding or subtracting) make sure of the following:</p> <ol style="list-style-type: none"> 1. Denominators are the same <ol style="list-style-type: none"> a. Use Least Common Multiples to make sure they are the same b. If the denominators are the same they can be combined like integers c. It is not necessary to change mixed numbers to fractions to combine d. Simplify answer if necessary 	<p>Example 1:</p> $-3\frac{3}{8} - \frac{3}{5}$ $-3\frac{15}{40} - \frac{24}{40}$ $-3\frac{15}{40} + \left(-\frac{24}{40}\right)$ <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Some people like to see ← this as combining 2 negative numbers</p> </div> $-3\frac{39}{40}$
<ol style="list-style-type: none"> 2. Sometimes it is necessary to borrow to complete the arithmetic <ol style="list-style-type: none"> a. Find the common denominator for the fractions (15) b. You can't subtract 10 from 3 so you need to borrow a whole number from the 15 c. Rewrite the 1 as a fraction with the like denominator d. Subtract integers and fractional parts of the numbers e. Simplify if necessary 	<p>Example 2:</p> $15\frac{1}{5} - 7\frac{2}{3}$ $15\frac{3}{15} - 7\frac{10}{15}$ $14 + 1 + \frac{3}{15} - 7\frac{10}{15}$ $14 + \frac{15}{15} + \frac{3}{15} - 7\frac{10}{15}$ $14\frac{18}{15} - 7\frac{10}{15}$ $7\frac{8}{15}$

Complete the following problems on a separate sheet of paper. Show all your steps. No calculators or apps please.

(1)

$$\frac{3}{7} + 2\frac{4}{7}$$

(2)

$$-\frac{3}{7} + 2\frac{4}{7}$$

(3)

$$\frac{5}{6} + \left(-2\frac{1}{6}\right)$$

(4)

$$-\frac{1}{17} - \frac{13}{17}$$

(5)

$$\frac{4}{5} - \frac{13}{30}$$

(6)

$$-\frac{3}{5} - \frac{3}{8}$$

(7)

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

(8)

$$16\frac{2}{7} - 9\frac{11}{14}$$

(9)

$$18\frac{3}{8} - 12\frac{3}{4}$$

(10)

$$-6\frac{3}{4} + 7\frac{3}{8}$$

Multiplying and dividing Fractions

Multiplying fractions

- 1) Change any mixed numbers to improper fractions
- 2) Simplify fractions before multiplying
- 3) Multiply numerators by numerators and denominators by denominators
- 4) Simplify if necessary (return improper fractions to mixed numbers)

Example 3

$$3\frac{3}{8} \cdot 2\frac{1}{9}$$

$$\frac{27}{8} \cdot \frac{19}{9}$$

$$\frac{3\cancel{27}}{8} \cdot \frac{19}{\cancel{9}_1}$$

$$\frac{57}{8}$$

$$7\frac{1}{8}$$

Dividing Fractions

- 1) Change any mixed numbers to improper fractions
- 2) Invert and multiply 2nd term
- 3) Simplify fractions before multiplying
- 4) Multiply as above
- 5) Simplify if necessary (return improper fractions to mixed numbers)

Example 4

$$4\frac{3}{8} \div 1\frac{2}{5}$$

$$\frac{35}{8} \div \frac{7}{5}$$

$$\frac{35}{8} \cdot \frac{5}{7}$$

$$\frac{5\cancel{35}}{8} \cdot \frac{5}{\cancel{7}_1}$$

$$\frac{25}{8}$$

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

Complete the following problems on a separate sheet of paper. Show all your steps. No calculators or apps please.

(11)

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

(12)

$$7\frac{1}{2} \cdot 3\frac{3}{5}$$

(13)

$$4\frac{3}{8} \cdot 4\frac{4}{7}$$

(14)

$$\frac{5}{9} \div \frac{1}{3}$$

(15)

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

(16)

$$1\frac{4}{5} \div \frac{3}{5}$$

(17)

$$10\frac{5}{7} \div 1\frac{1}{14}$$

(18)

$$4\frac{5}{7} \div 1\frac{25}{63}$$

Applications of Fractions

(19) California has $7\frac{1}{4}$ many counties as Connecticut. If California has 58 counties how many counties does Connecticut have?

(20) Your uncle makes wooden stools. He can make one stool out of a piece of lumber that is $3\frac{1}{4}$ feet long.

a) How many feet of lumber does it take to make 18 stools?

b) The lumber is sold in $10\frac{1}{2}$ foot slats. How many of these slats does he need to make all 18 stools?

c) If he has to buy an integer number of slats, how much wood will be left over?

Algebra 1

Operations with Fractions Answer Key

1. 3

2. $2\frac{1}{7}$

3. $-1\frac{1}{3}$

4. $-\frac{14}{17}$

5. $\frac{11}{30}$

6. $-\frac{39}{40}$

7. $8\frac{1}{6}$

8. $6\frac{1}{2}$

9. $5\frac{5}{8}$

10. $\frac{5}{8}$

11. 3

12. 27

13. 20

14. $1\frac{2}{3}$

15. $\frac{2}{5}$

16. 3

17. 10

18. $3\frac{3}{8}$

19. 8 Counties

20a. $58\frac{1}{2}$ feet

20b. $5\frac{4}{7}$

20c. $4\frac{1}{2}$ feet

Operations with decimals

Combining Decimals (Adding and Subtracting)	
<p>When combining decimals (adding or subtracting) make sure of the following:</p> <ol style="list-style-type: none"> 1. Write down the numbers, one under the other, with the decimal points lined up 2. Put in zeros so the numbers have the same length 3. Then add using <u>column addition</u>, remembering to put the decimal point in the answer 	<p>Example 1: Add 2.372 and 14.04</p> $\begin{array}{r} 2.372 \\ + 14.04 \\ \hline \end{array}$ $\begin{array}{r} 2.372 \\ + 14.040 \\ \hline 16.412 \end{array}$
<p>Subtracting decimals can be a little tricky.</p> <ol style="list-style-type: none"> 1. It is easier to write this as a subtraction problem so apply the commutative property and write the problem \rightarrow 2. Then complete the subtraction like the addition above 3. Don't forget to borrow like you would with normal subtraction. 4. Put the decimal point in the answer 	<p>Example 2:</p> $-0.55 + 2.45$ $2.45 - 0.55$ $\begin{array}{r} 2.45 \\ - 0.55 \\ \hline 1.90 \end{array}$
<p>Decimals that make you think!</p> <ol style="list-style-type: none"> 1. If this were an integer problem like $-7+3$, the 2 numbers are subtracted and then the sign of the larger value is used so the answer is -4. 2. Complete the decimal problems similarly <ol style="list-style-type: none"> a. Subtract the values b. Assign the sign based on which value is larger <p><u>Make sure your answers make sense!!!</u></p>	<p>$-7.89 + 3.45 = \underline{\hspace{2cm}}$</p> <p>Solve $7.89 - 3.45$</p> $\begin{array}{r} 7.89 \\ - 3.45 \\ \hline 4.44 \end{array}$ <p>Since 7.89 has a larger value the sign is negative</p> <p>-4.44</p>

Complete the following problems on a separate sheet of paper. Show all your steps. No calculators or apps please.	
(1) $6.58 - 24.24$	(2) $33.47 - 0.6$
(3) $15 - 12.66$	(4) $0.5 - 9.14$
(5) $-6 + 0.537$	(6) $908.63 - 443.24$
(7) $\$ 328.46 + \$ 12.54$	(8) $-0.5 - 9.14$

Multiplying and dividing Decimals	
<p>Multiplying decimals</p> <ol style="list-style-type: none"> 1) When multiplying decimals then numbers are multiplied like integers (negative x negative = positive) 2) Determine the number of decimal places in the answer by counting all of the ones in the problem 	<p>Example 3</p> -5.928×-11.6 <p>-5.928 (3 places after decimal) \times-11.6 (1 place after decimal)</p> $\begin{array}{r} 35568 \\ 59280 \\ +592800 \\ \hline 687648 \end{array} \rightarrow 68.7648 \text{ (4 total places after decimal)}$
<p>Dividing Decimals</p> <ol style="list-style-type: none"> 1. Here are the three ways you will see division problems; they all mean the same thing: 2. When dividing decimal numbers, move the decimal point in the divisor (number you're dividing by) to the right end of the divisor. 3. Then move the decimal point in the dividend (the number you're dividing into) the same number of places to the right as you moved it in the divisor. 4. Move the decimal point to the answer (quotient) 	<p>Example 4</p> $\frac{46.62}{2.1} \rightarrow 2.1 \overline{)46.62} \rightarrow 46.62 \div 2.1$ $2.1 \overline{)46.62} \text{ becomes } 21 \overline{)466.2}$ <p>Complete the division \leftarrow Decimal point</p> $\begin{array}{r} 21 \overline{)466.2} \\ 22.2 \end{array}$

Complete the following problems on a separate sheet of paper. Show all your steps. No calculators or apps please.	
(9) 52.1×9	(10) $2.5 \overline{)37.5}$
(11) $1.593 \div 5.9$	(12) 12×0.01
Applications of Decimals	
(13) California has 7.25 many counties as Connecticut. If Connecticut has 8 counties how many counties does California have?	
(14)What number is 1.7 less than 10.25?	
(15) What number is six and four hundredths larger than four and five tenths?	
(16)What is the difference between one tenth and one hundredth?	
(17)What is the sum of eight, twelve and nine tenths, six and twenty four hundredths?	

Algebra 1

1.2 Operations with Decimals Answer Key

1. -17.66

2. 32.87

3. 2.34

4. -8.64

5. -5.463

6. 465.39

7. \$341.00

8. -9.64

9. 468.9

10. 15

11. 0.27

12. 0.12

13. 58 Counties

14. 8.55

15. 10.54

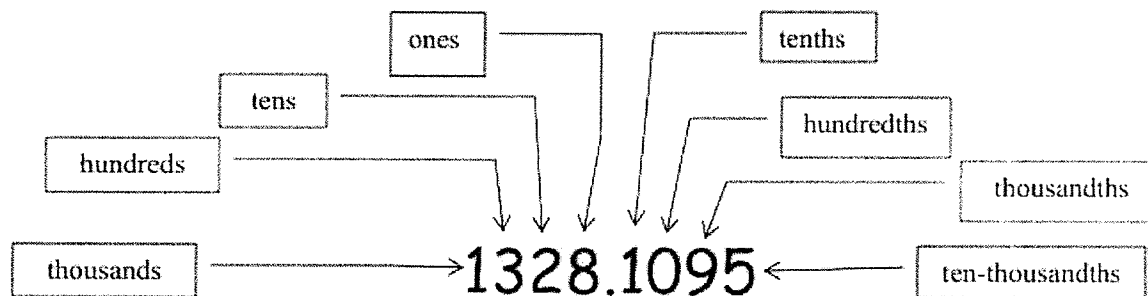
16. 0.09

17. 27.14

Fractions/Decimal/Percent Conversions Order of Rational Numbers

This is going to be important

The place values of the number 1328.1095 are shown below:



Changing Fractions to Decimals

$$\frac{1}{2} = 2 \overline{)1.0} \begin{matrix} .5 \\ 1.0 \end{matrix}$$

$$8\frac{1}{5} = 8 + 5 \overline{)1.0} = 8 + .2 = 8.2$$

Changing decimals to fractions

$$0.7 = \frac{7}{10} \text{ since the 7 is in the tenth place}$$

$$3.73 = 3 + 0.73 = 3 + \frac{73}{100} = 3\frac{73}{100}$$

$$2.6 = 2 + 0.6 = 2 + \frac{6}{10} = 2 + \frac{3}{5} = 2\frac{3}{5}$$

Changing Decimals to Percents Move decimal two places to the right (add zeros if necessary)

$$0.27 = 27\%$$

$$1.4 = 140\%$$

$$7 = 700\%$$

$$0.005 = 0.5\%$$

Changing Percents to Decimals move the decimal two places to the left

$$30\% = 0.30 = 0.3$$

$$0.57\% = 0.0057$$

$$8\frac{1}{5}\% = 8 + 0.2 = 8.2\% = 0.082$$

(change the fraction to the decimal and then move the decimal place)

Ordering of Rational Numbers

Place all the numbers in the same format (percent, decimal, fraction). Then compare. Beware of negatives

$$-2.3, \frac{5}{2}, 2.01, 201.4\%, -2\frac{5}{6}$$

Change to same format (decimals)

$$-2.3, 2.5, 2.01, 2.014, -2.\bar{8}\bar{3}$$

It helps to have the same number of decimal places when possible

$$-2.300, 2.500, 2.010, 2.014, -2.\bar{8}\bar{3}$$

Put in order

$$-2.\bar{8}\bar{3} - 2.300, 2.010, 2.014, 2.500 \text{ then change it to the original format } \rightarrow -2\frac{5}{6}, -2.3, 2.01, 201.4\% \frac{5}{2}$$

Meaning of Percents

Percent means per hundred or parts of one hundred. For example, 15 percent means fifteen parts out of a hundred or $\frac{15}{100}$, and 15 percent can be written 15%.

Examples Express each of the following as a percent

- 1) 2 hundredths = _____ % (2%)
- 2) 56.7 hundredths = _____ % (56.7%)
- 3) .67 = 67 hundredths = _____ % (67%)
- 4) $\frac{3}{4}$ hundredths = _____ % ($\frac{3}{4}$ %)

Exercise I Express each of the following as a percent

1. 7 hundredths _____
2. 40 hundredths _____
3. 300 hundredths _____
4. $\frac{1}{2}$ hundredths _____
5. 68 hundredths _____
6. 72.5 hundredths _____
7. $65\frac{1}{4}$ hundredths _____
8. 97 out of 100 _____
9. 1 out of 100 _____
10. 20 out of 100 _____








Changing percents to decimals

- 1) 35% means 35 one hundredths, but .35 also means 35 one hundredths; so 35% must equal .35
- 2) $63\% = \frac{63}{100} = .63$

RULE: To change a percent to a decimal 1) change fractions to decimals if necessary 2) drop the percent sign % and 3) move the point two places to the left (add zeroes as necessary) or 1) drop the % sign then 2) change the fractions to decimals 3) divide the percent by 100

Some Examples

Change the following percents to decimals

<u>Problem</u>	<u>How to do it</u>	<u>Answer</u>
a) 35% =	$35.\% =$  move 2 places	.35
b) $47\frac{1}{2}\%$	$47.5\% =$ 	.475
c) $6\frac{1}{2}\%$	<div data-bbox="345 997 467 1092" style="border: 1px solid black; padding: 2px; display: inline-block;">add zeroes</div> $06.5\% =$ 	.065
d) .3% =	$00.3\% =$ 	.003
e) $\frac{1}{4}\%$	$00.25\% =$ 	.0025
f) $\frac{2}{3}\%$	$00.667\% =$ 	.0067
g) 350% =	$350.\% =$ 	3.50

Exercise II Change the following percents to decimals

1) 30% _____

11) 42.6% _____

2) 14% _____

12) 700% _____

3) 25% _____

13) $\frac{7}{8}\%$ _____

4) 95% _____

14) 1% _____

5) 7% _____

15) 18% _____

6) 100% _____

16) 53% _____

7) 75% _____

17) 110% _____

8) 41% _____

18) $2\frac{1}{2}\%$ _____

9) 5% _____

19) 8.3% _____

10) .2% _____





20) $\frac{3}{4}\%$ _____

Changing Decimals into Percents

RULE: To change a decimal into a percent 1) move the decimal point two places to the right then 2) add the percent sign % or 1) multiply the decimal by 100 then 2) add the % sign.

Why does this work? Percent means hundredths; therefore multiplying the number by 100 moves the point two places to the right

Examples

Problem	How to do it	Answer
a) .85 =	$.85 =$ 	85%
b) .05 =	$.05 =$ 	5%
c) .085 =	$.085 =$ 	8.5%
d) .5 =	<div data-bbox="462 892 576 982" style="border: 1px solid black; padding: 2px; display: inline-block;">add zero</div> $.50 =$ 	50%

Exercise III Change the following from decimals to percents

1) .10

11) 4.37

2) .15

12) .003

3) .12

13) .07

4) .05

14) .19

5) .5

15) .065

6) .125

16) .32

7) .09

17) .75

8) .67

18) .84

9) 1.00

19) .04

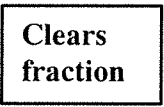
10) .625

20) .59

Changing percents to fractions

Rule: 1) Write the number over 100 and drop the percent sign
2) Reduce the resulting fraction, if necessary

Examples: Change these percents to fractions

Problem	How to do it	Answer
1) 60% =	$\frac{60}{100} = \frac{6}{10} =$	$\frac{3}{5}$
2) 225% =	$\frac{225}{100} =$	$\frac{9}{4}$ or $2\frac{1}{4}$
3) $12\frac{1}{2}\%$ =	$\frac{12\frac{1}{2}}{100} = \frac{\cancel{25}^1(\cancel{2})}{100(\cancel{2})} = \frac{25}{200} =$ 	$\frac{1}{8}$
4) $66\frac{2}{3}\%$ =	$\frac{66\frac{2}{3}}{100} = \frac{\frac{200}{3}(3)}{100(3)} = \frac{200}{300} =$	$\frac{2}{3}$
5) $16\frac{1}{4}\%$ =	$\frac{16\frac{1}{4}}{100} = \frac{\frac{65}{4}(4)}{100(4)} = \frac{65}{400} =$	$\frac{13}{80}$
6) 150% =	$\frac{150}{100} =$	$\frac{3}{2}$ or $1\frac{1}{2}$

Exercise IV Change the following from percents to fractions

- | | |
|----------------------------|-----------------------------|
| 1) 70% _____ | 11) $87\frac{1}{2}\%$ _____ |
| 2) 25% _____ | 12) 24% _____ |
| 3) $33\frac{1}{3}\%$ _____ | 13) 150% _____ |
| 4) 10% _____ | 14) 5% _____ |
| 5) 75% _____ | 15) 40% _____ |
| 6) 106% _____ | 16) $62\frac{1}{2}\%$ _____ |
| 7) 65% _____ | 17) 36% _____ |
| 8) $16\frac{2}{3}\%$ _____ | 18) 20% _____ |
| 9) 120% _____ | 19) 18% _____ |
| 10) 225% _____ | 20) $12\frac{1}{2}\%$ _____ |

Change the following from fractions to percents

Ex. 1 $\frac{1}{2} = \underline{\hspace{2cm}}\%$ Solution : $2 \overline{) \begin{array}{r} .50 \\ 1.00 \\ \underline{1\ 0} \\ 0 \end{array}}$ to find a decimal equivalent ; answer : $.50 = 50\%$

Ex. 2 $\frac{3}{5} = \underline{\hspace{2cm}}\%$ Solution : $5 \overline{) \begin{array}{r} .60 \\ 3.00 \\ \underline{3\ 0} \\ 0 \end{array}}$ to find a decimal equivalent ; answer : $.60 = 60\%$

Ex.3

$3\frac{4}{5} = \underline{\hspace{2cm}}\%$ $3\frac{4}{5} = \frac{19}{5}$ Solution : $5 \overline{) \begin{array}{r} 3.80 \\ 19.00 \\ \underline{15} \\ 40 \\ \underline{40} \\ 0 \end{array}}$ to find a decimal equivalent ; answer : $3.80 = 380\%$

Exercise V: Changing fractions to percents

1) $\frac{1}{2}$

7) $\frac{2}{3}$

13) $\frac{1}{16}$

2) $\frac{4}{5}$

8) $1\frac{1}{6}$

14) $\frac{1}{12}$

3) $1\frac{7}{8}$

9) $\frac{3}{10}$

15) $\frac{1}{4}$

4) $1\frac{7}{8}$

10) $\frac{1}{3}$

16) $\frac{3}{4}$

5) $\frac{2}{5}$

11) $\frac{7}{8}$

17) $\frac{5}{8}$

6) $\frac{5}{6}$

12) $5\frac{4}{5}$

18) $2\frac{2}{3}$

Percents

Percent means per hundred or for each hundred.

20% is twenty percent or 20 per hundred or $\frac{20}{100}$.

Hundredths are expressed in two-place decimals. To change percent to decimals: move the decimal point two places to the left and drop the % sign.

Example:

20% = .20	48.2% = .482
6% = .06	103.5% = 1.035
112% = 1.12	.0643% = .000643

Is this statement true? 20 is 50% of 40

There are 3 basic types of percent problems. Since there are 3 quantities in the statement 20 is 50% of 40, each type of problem relates to finding one of those quantities.

1) _____ is 50% of 40. How do we get 20 for an answer?

2) 20 is _____% of 40. How do we get 50% as an answer?

3) 20 is 50% of _____. How do we get 40 as an answer?

All problems of type #1 are worked the same way. Naturally, all of type #2 are worked the same way. This holds for type #3 as well. If you figure out these examples then you can apply them to all percentage problems.

Exercise VI: Find the percent of a number

1) 10% of 180

6) 8% of 1540

11) 4% of 8462

2) 60% of 160

7) 1% of 85

12) 3% of 180

3) 14% of 500

8) $37\frac{1}{2}\%$ of 48

13) 5% of 1540

4) $12\frac{1}{2}\%$ of 16

9) 15% of 300

14) 7% of 928

5) 2% of 18

10) 92% of 600

15) 24% OF 52

Exercise VII. Finding what percent one number is of another number

1) 25 is ____% of 40 7) What % of 110 is 22? 13) 9 is ____% of 54?

2) 150 is ____% of 600 8) What % of 80 is 56? 14) 2 is ____% of 5?

3) 12 is ____% of 144 9) What % of 10 is 7? 15) 8 is ____% of 40

4) 36 is ____% of 45 10) What % of 90 is 81? 16) 8 is ____% of 80

5) 2 is ____% of 4 11) What % of 50 is 15? 17) 9 is ____% of 100

6) 6 is ____% of 24 12) 6 is what % of 3? 18) 45 is ____% of 45

Exercise VIII. Finding a number when a percent of it is known

1) 15% of what number is 18? 7) $91 = 70\%$ of ____?

13) 28% of what number is 28?

2) 15 is 1% of ____?

8) 4 is $16\frac{2}{3}\%$ of what number?

14) 100% of what number is 70?

3) 43% of ____ = 43

9) 12 is 24% of 48

15) 75% of what number is 108?

4) 45% of what number is 90?

10) 40 is 45% of what number?

16) $62\frac{1}{2}\%$ of ____ = 200

5) 9 is 15% of what number?

11) 15% of what number is 45?

17) 18 is 60% of what number?

6) $33\frac{1}{3}\%$ of number is 78?

12) $\frac{3}{4}\%$ of ____ is 27

18) 20 is 20% of what number?

Exercise IX. Mixed problems in percent

- | | | |
|------------------------------|-------------------------------|--------------------------------|
| 1) 1% of 62 is ____ | 11) 12 is ____% of 36 | 21) 20 % of what number is 3? |
| 2) 4% of ____=26 | 12) 80 is 80% of ____ | 22) 16% of 240 is ____ |
| 3) 127% of 743 is ____ | 13) 39 is ____% of 52 | 23) 10% of 15.40 is ____ |
| 4) What % of 80 is 56? | 14) 6 is ____% of 8 | 24) 8 is ____% of 6 |
| 5) 17 is 85% of what number? | 15) 1% of 15.40 is ____ | 25) 60 is 45% of what number? |
| 6) 9 is ____% of 10 | 16) 18 is 1% of ____ | 26) .3% of 160 is ____ |
| 7) 63% of 75 is ____ | 17) 35% of what number is 70? | 27) 25% of what number is 108? |
| 8) 15% of what number is 24? | 18) 6 is 24% of what number? | 28) 3 is ____% of 9 |
| 9) What percent of 3 is 2? | 19) 6 is ____% of 60? | 29) 18% of 4.7 is ____ |
| 10) 64 is ____% of 64? | 20) 21% of 43 is ____ | 30) 55 is what percent of 110? |

Answer Key

Exercise I	4. 5%	19. $\frac{9}{50}$	15. 12.48	16. 320
1. 7%	5. 50%	20. $\frac{1}{8}$	Exercise VII	17. 30
2. 40%	6. 12.5%	Exercise V	1. 62.5%	19. 100
3. 300%	7. 9	1. 50%	2. 25%	Exercise IX
4. 0.5% or $\frac{1}{2}$ %	8. 67%	2. 80%	3. 8.33%	1. 0.62
5. 68%	9. 100%	3. 187.5%	4. 80%	2. 650
6. 7.25%	10. 62.5%	4. 325%	5. 50%	3. 943.61
7. 65 %	11. 437%	5. 40%	6. 25%	4. 70%
8. 97%	12. 0.3%	6. $83\frac{1}{3}$ %	7. 20%	5. 20
9. 1%	13. 7%	7. $66\frac{2}{3}$ %	8. 70%	6. 90
10. 20%	14. 19%	8. $116\frac{2}{3}$ %	9. 70%	7. 47.25
Exercise II	15. 6.5% or $6\frac{1}{2}$ %	9. 30%	10. 90%	8. 160
1. 0.30	16. 32%	10. $33\frac{1}{3}$ %	11. 30%	9. $66\frac{2}{3}$ %
2. 0.14	17. 0.5%	11. 87.5%	12. 200%	10. 100%
3. 0.25	18. 84%	12. 580%	13. $16\frac{2}{3}$ %	11. $33\frac{1}{3}$ %
4. 0.95	19. 4%	13. $6\frac{1}{4}$ %	14. 40%	12. 100
5. 0.07	20. 59%	14. $8\frac{1}{3}$ %	15. 20%	13. 75%
6. 1.00	Exercise IV	15. 25%	16. 10%	14. 75%
7. 0.75	1. $\frac{7}{10}$	16. 75%	17. 9%	15. 0.154
8. 0.41	2. $\frac{1}{4}$	17. $62\frac{1}{2}$ %	18. 100%	16. 1800
9. 005	3. $\frac{1}{3}$	18. $266\frac{2}{3}$ %	Exercise VIII	17. 200
10. 0.002	4. $\frac{1}{10}$	Exercise VI	1. 120	18. 25
11. .426	5. $\frac{3}{4}$	1. 18	2. 1500	19. 10%
12. 7.00	6. $1\frac{3}{50}$	2. 96	3. 100	20. 9.03
13. 0.00875	7. $1\frac{3}{20}$	3. 70	4. 200	21. 15
14. 0.001	8. $\frac{1}{6}$	4. 2	5. 60	22. 38.4
15. 0.18	9. $1\frac{1}{5}$	5. .36	6. 234	23. 1.54
16. 0.53	10. $2\frac{1}{4}$	6. 123.2	7. 130	24. $133\frac{1}{3}$ %
17. 1.1	11. $\frac{7}{8}$	7. .85	8. 24	25. $133\frac{1}{3}$
18. 0.025	12. $\frac{6}{25}$	8. 18	9. 50	26. 0.48
19. 0.083	13. $1\frac{1}{2}$	9. 45	10. 88.88	27. 432
20. 0.0075	14. $\frac{1}{20}$	10. 552	11. 300	28. $33\frac{1}{3}$
Exercise III	15. $\frac{2}{5}$	11. 338.48	12. 3600	29. .846
1. 10%	16. $\frac{5}{8}$	12. 5.4	13. 100	30. 50%
2. 15%	17. $\frac{9}{25}$	13. 77	14. 70	
3. 12%	18. $\frac{1}{5}$	14. 64.96	15. 144	

Using Prime Factorization to find the LCM and GCF

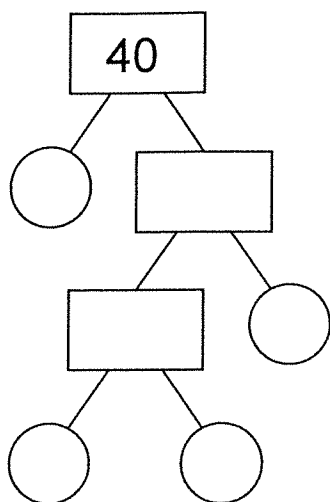
LCM

GCF

1)	35, 34, 10	_____	_____
2)	14, 2, 12	_____	_____
3)	3, 35, 10	_____	_____
4)	24, 32, 30	_____	_____
5)	21, 30, 18	_____	_____
6)	12, 40, 20	_____	_____
7)	36, 35, 12	_____	_____
8)	8, 15, 4	_____	_____
9)	36, 3, 18	_____	_____
10)	21, 18, 4	_____	_____
11)	40, 14, 27	_____	_____
12)	15, 24, 14	_____	_____

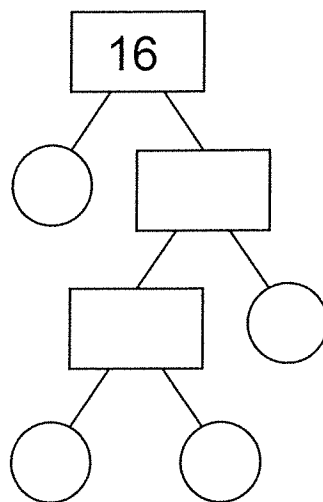
Find the Prime Factors of the Numbers

1)



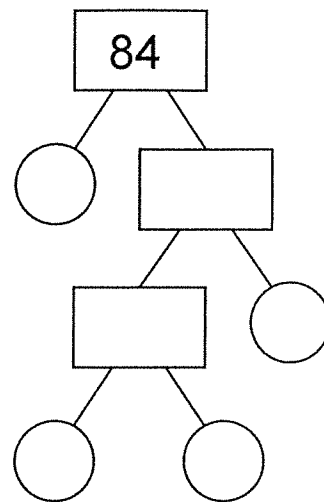
Prime Factors
_ x _ x _ x _ = 40

2)



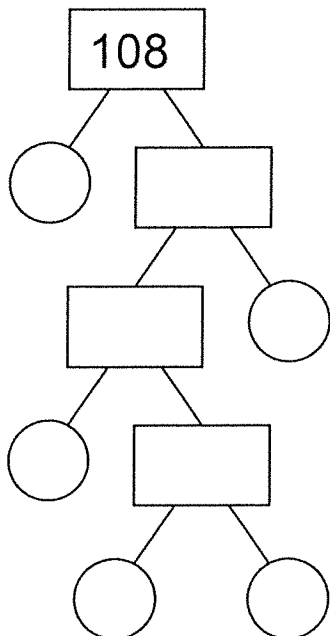
Prime Factors
_ x _ x _ x _ = 16

3)



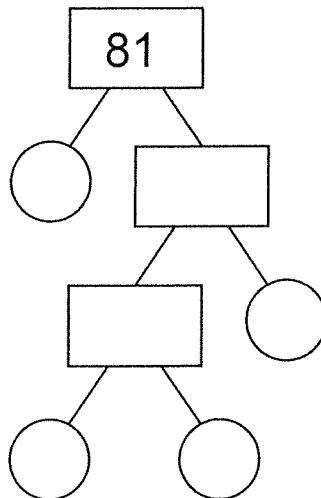
Prime Factors
_ x _ x _ x _ = 84

4)



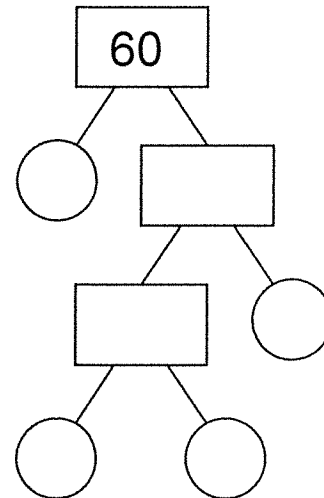
Prime Factors
_ x _ x _ x _ x _ = 108

5)



Prime Factors
_ x _ x _ x _ = 81

6)

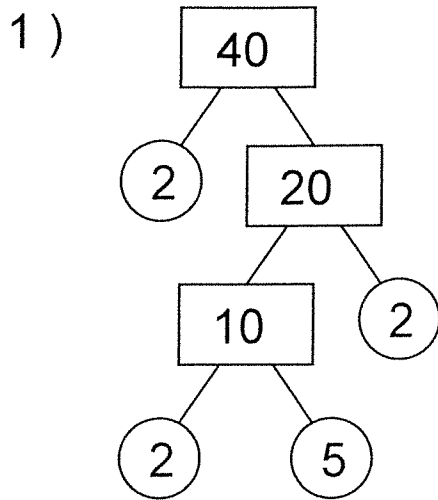


Prime Factors
_ x _ x _ x _ = 60

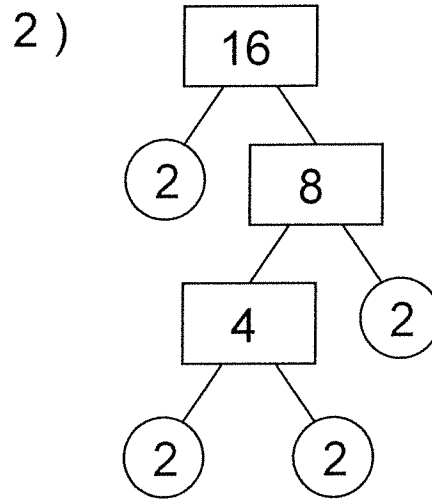
Using Prime Factorization to find the LCM and GCF

		LCM	GCF
1)	35, 34, 10	<u>1,190</u>	<u>1</u>
2)	14, 2, 12	<u>84</u>	<u>2</u>
3)	3, 35, 10	<u>210</u>	<u>1</u>
4)	24, 32, 30	<u>480</u>	<u>2</u>
5)	21, 30, 18	<u>630</u>	<u>3</u>
6)	12, 40, 20	<u>120</u>	<u>4</u>
7)	36, 35, 12	<u>1,260</u>	<u>1</u>
8)	8, 15, 4	<u>120</u>	<u>1</u>
9)	36, 3, 18	<u>36</u>	<u>3</u>
10)	21, 18, 4	<u>252</u>	<u>1</u>
11)	40, 14, 27	<u>7,560</u>	<u>1</u>
12)	15, 24, 14	<u>840</u>	<u>1</u>

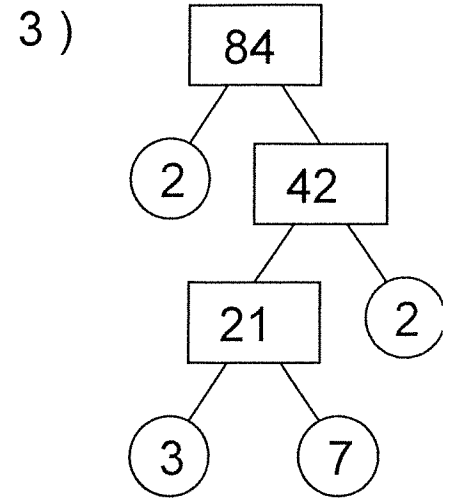
Find the Prime Factors of the Numbers



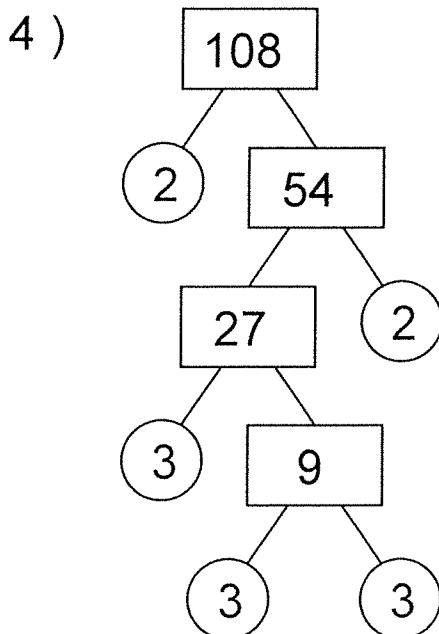
Factors
 $2 \times 2 \times 2 \times 5 = 40$



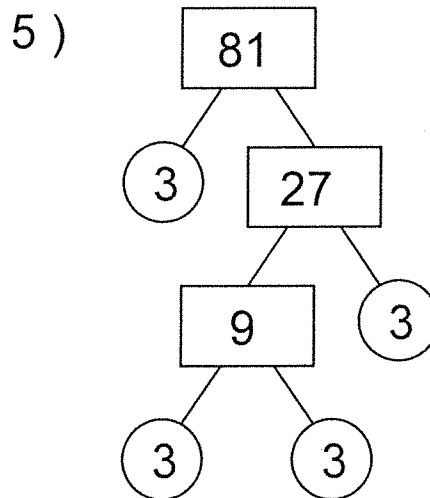
Factors
 $2 \times 2 \times 2 \times 2 = 16$



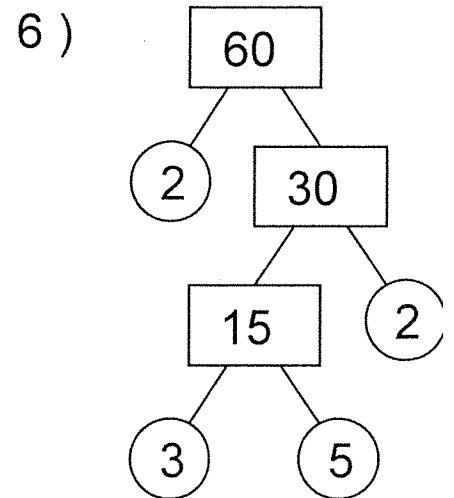
Factors
 $2 \times 2 \times 3 \times 7 = 84$



Factors
 $2 \times 2 \times 3 \times 3 \times 3 = 108$



Factors
 $3 \times 3 \times 3 \times 3 = 81$



Factors
 $2 \times 2 \times 3 \times 5 = 60$



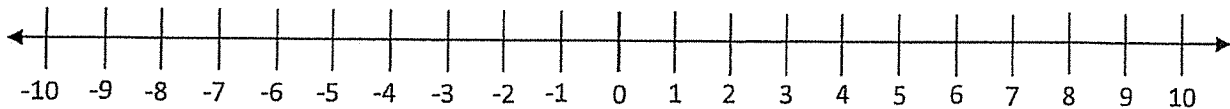
Operations with Integers

Sponsored by The Center for Teaching and Learning at UIS



What are integers?

Integers are zero and all the positive and negative whole numbers. When you first begin to work with integers, imagine a tremendously large line that extends infinitely left and right. Now, directly in front of you is a spot on that line we will call the center and label it zero. To the left are all the negative numbers and to the right all the positive.



Adding Integers

Integers with the Same Sign

Adding integers that have the same sign is pretty straightforward. Add the two numbers together and maintain the sign.

Example: $200 + 500 = 700$

Both numbers are positive so we add the numbers together and number remains positive.

Example: $-300 + (-900) = -1,200$

Both addends are negative, so we add them together and maintain the negative sign.

Integers with Different Signs

When adding integers with different signs, ignore the signs at first and subtract the smaller number from the larger. The final sum will maintain the sign of the larger addend.

Example: $-3 + 8 = 5$

Since we are adding two numbers with different signs, ignore the signs and we are left with 3 and 8. The number 3 is smaller than 8 so we subtract 3 from 8 which give us 5. Of the two addends, 8 was the larger and was positive, so the final sum will be positive. Thus, our final sum is 5.

Example: $-50 + 18 = -32$

In this example, when we ignore the signs, the number 50 is greater than 18. Therefore, subtract 18 from 50 which gives you 32. Since 50 is the greater number and is negative, the sum will be negative; thus the final sum is -32 .



Operations with Integers

Sponsored by The Center for Teaching and Learning at UIS



Sign of Addend 1	Sign of Addend 2	Sign of Sum	How to Compute Sum
+	+	+	Add
-	-	-	Add
+	-	Sign of larger addend	Subtract smaller addend from the larger
-	+	Sign of larger addend	Subtract smaller addend from the larger

Subtracting Integers

To subtract integers, we will follow some steps that will transform the subtraction problem into an addition problem. We then can follow the rules of addition.

Recall that in a subtraction problem, there are three parts: the minuend or the number being subtracted from, the subtrahend or the number you are subtracting and the difference which is your solution.

$$\begin{array}{r} 15 \quad \text{minuend} \\ -6 \quad \text{subtrahend} \\ \hline 9 \quad \text{difference} \end{array}$$

When subtracting integers, we will change the sign of the subtrahend and then follow the rules of addition.

Example:

$14 - (-4)$ Change the sign of the subtrahend,

$14 + 4$ Then add the two integers.

28 Since we are adding two integers of the same sign, we add and maintain the sign.

Example:

$-22 - 4$ In this problem, we are subtracting 4 from -22 .

$-22 - (+4)$ The subtrahend 4 is positive. So we can rewrite the problem for clarity.

$-22 + (-4)$ Change the sign of the subtrahend; then add.

-26 Both numbers are negative so we add and maintain the sign.



Operations with Integers

Sponsored by The Center for Teaching and Learning at UIS



Example:

$-49 - (-15)$ Subtract -15 from -49 .

$-49 + (+15)$ Change the sign of the subtrahend then add.

34 Since one number is negative and the other positive, we remove the signs and subtract the smaller number from the larger

-34 Since the sign of the larger number was negative, the final answer is negative.

Multiplying and Dividing Integers

Multiplying and dividing integers is also similar to the multiplying and dividing you have done in the past. The only difference is that with integers, you must beware of which sign to apply to the final answer. The rules for determining the sign are pretty straightforward: If the signs of the numbers you are multiplying or dividing are the same, then the answer will be positive. If the signs are different, then the answer will be negative.

The following chart shows the rules as it relates to multiplication.

Sign of Multiplicand 1	Sign of Multiplicand 2	Sign of Product
+	+	+
-	-	+
+	-	-
-	+	-

Division has its own chart, but still follows the same rules:

Sign of Divisor	Sign of Dividend	Sign of Quotient
+	+	+
-	-	+
+	-	-
-	+	-



Operations with Integers

Sponsored by The Center for Teaching and Learning at UIS



Multiplication Examples:

$$4 \times 3 = 12$$

Here is a positive number times a positive number, so the answer is positive.

$$-4 \times -3 = 12$$

Here is a negative number times a negative number, so the answer is positive.

$$-4 \times 3 = -12$$

This is a negative number times a positive number, so the answer is negative.

$$4 \times -3 = -12$$

Last is a positive number times a negative number, so the answer is negative.

Division Examples:

$$15 \div 3 = 5$$

Here is a positive number divided by a positive number, so the answer is positive.

$$-15 \div -3 = 5$$

Here is a negative number divided by a negative number, so the answer is positive.

$$-15 \div 3 = -5$$

This is a negative number divided by a positive number, so the answer is negative.

$$15 \div -3 = -5$$

Last is a positive number divided by a negative number, so the answer is negative.

Integer Addition and Subtraction (A)

$31 - (-17) =$

$93 - 22 =$

$(-20) + 41 =$

$20 + 62 =$

$82 + 38 =$

$(-8) + (-23) =$

$87 - (-36) =$

$34 + 62 =$

$20 - (-41) =$

$3 + (-63) =$

$(-63) - (-79) =$

$55 + 44 =$

$(-87) - (-31) =$

$84 - (-37) =$

$(-43) - 71 =$

$(-25) - 88 =$

$(-56) + 91 =$

$(-39) + 47 =$

$(-3) + (-71) =$

$52 + 23 =$

$(-61) - 26 =$

$(-3) - 33 =$

$(-29) + (-87) =$

$(-2) - (-56) =$

$24 - 50 =$

$65 + 19 =$

$46 + 46 =$

$43 - (-6) =$

$(-20) - 37 =$

$12 + (-84) =$

$5 + (-40) =$

$75 - (-83) =$

$(-36) + (-29) =$

Multiplying Integers (A)

Find each product.

$(-1) \times 2 =$	$(-7) \times 0 =$	$(-7) \times 7 =$	$8 \times (-4) =$
$(-3) \times (-18) =$	$5 \times 13 =$	$2 \times 1 =$	$(-8) \times (-19) =$
$(-8) \times (-7) =$	$20 \times (-9) =$	$11 \times (-1) =$	$9 \times (-4) =$
$(-11) \times 12 =$	$3 \times (-2) =$	$(-5) \times 9 =$	$16 \times 5 =$
$(-10) \times 1 =$	$6 \times (-12) =$	$(-6) \times 3 =$	$(-6) \times (-9) =$
$11 \times (-16) =$	$1 \times (-19) =$	$17 \times (-5) =$	$(-13) \times (-5) =$
$10 \times (-8) =$	$(-10) \times (-9) =$	$10 \times 12 =$	$5 \times (-11) =$
$(-14) \times 1 =$	$17 \times 7 =$	$4 \times 2 =$	$(-8) \times (-2) =$
$19 \times (-8) =$	$10 \times (-7) =$	$(-11) \times 6 =$	$7 \times (-18) =$
$(-6) \times (-4) =$	$(-20) \times 13 =$	$9 \times 7 =$	$14 \times (-8) =$
$6 \times 5 =$	$13 \times 17 =$	$12 \times 2 =$	$1 \times 10 =$
$(-2) \times 13 =$	$(-20) \times (-20) =$	$(-18) \times (-20) =$	$20 \times 6 =$
$2 \times 8 =$	$20 \times 15 =$	$15 \times 14 =$	$17 \times (-1) =$
$(-6) \times 20 =$	$(-3) \times (-15) =$	$(-20) \times 15 =$	$(-9) \times 1 =$
$(-11) \times (-4) =$	$(-1) \times (-19) =$	$11 \times (-6) =$	$9 \times (-17) =$
$18 \times (-1) =$	$(-19) \times 13 =$	$9 \times 0 =$	$8 \times 9 =$
$4 \times (-3) =$	$10 \times (-1) =$	$13 \times 19 =$	$2 \times (-11) =$
$6 \times (-6) =$	$1 \times 2 =$	$6 \times (-9) =$	$0 \times (-4) =$
$19 \times 17 =$	$19 \times 1 =$	$(-10) \times (-3) =$	$11 \times (-3) =$
$(-17) \times (-9) =$	$17 \times 14 =$	$(-8) \times 14 =$	$(-7) \times 17 =$
$12 \times (-14) =$	$11 \times (-8) =$	$(-9) \times 13 =$	$11 \times (-17) =$
$18 \times (-7) =$	$(-19) \times (-17) =$	$(-19) \times (-10) =$	$18 \times 1 =$
$20 \times (-6) =$	$12 \times 8 =$	$(-3) \times (-11) =$	$(-14) \times 0 =$
$(-16) \times 7 =$	$2 \times (-8) =$	$(-12) \times (-9) =$	$16 \times (-14) =$
$(-3) \times (-5) =$	$13 \times (-15) =$	$15 \times 17 =$	$8 \times (-5) =$

Integer Division (A)

Find each quotient.

$(-2160) \div 45 =$	$(-1935) \div 43 =$	$264 \div 33 =$	$(-87) \div (-29) =$
$(-1230) \div (-30) =$	$161 \div 7 =$	$(-6) \div 1 =$	$(-209) \div 11 =$
$376 \div (-8) =$	$900 \div 36 =$	$630 \div (-35) =$	$(-45) \div 45 =$
$874 \div (-46) =$	$481 \div 13 =$	$87 \div 29 =$	$(-234) \div (-13) =$
$1980 \div 44 =$	$(-1008) \div (-48) =$	$450 \div (-9) =$	$86 \div (-43) =$
$(-572) \div (-44) =$	$66 \div (-3) =$	$(-960) \div 40 =$	$(-423) \div 47 =$
$3 \div 3 =$	$43 \div (-43) =$	$(-385) \div 11 =$	$(-1575) \div 45 =$
$(-468) \div 13 =$	$(-2450) \div 49 =$	$(-210) \div (-14) =$	$608 \div (-19) =$
$546 \div 39 =$	$(-992) \div (-31) =$	$646 \div 34 =$	$(-1428) \div 34 =$
$2300 \div 46 =$	$1100 \div 25 =$	$986 \div (-29) =$	$968 \div 22 =$
$198 \div (-33) =$	$(-836) \div (-22) =$	$(-323) \div 19 =$	$1170 \div (-39) =$
$(-375) \div (-25) =$	$(-2160) \div 48 =$	$(-1800) \div 40 =$	$600 \div (-15) =$
$102 \div 3 =$	$(-560) \div (-14) =$	$840 \div (-20) =$	$(-270) \div 10 =$
$(-60) \div (-5) =$	$(-33) \div 33 =$	$(-1645) \div 35 =$	$52 \div 26 =$
$1054 \div (-31) =$	$(-240) \div 5 =$	$1184 \div 37 =$	$36 \div (-12) =$
$33 \div 3 =$	$174 \div (-29) =$	$250 \div 10 =$	$340 \div 17 =$
$(-578) \div (-17) =$	$539 \div (-49) =$	$252 \div 36 =$	$(-624) \div (-39) =$
$1053 \div (-39) =$	$460 \div (-20) =$	$(-407) \div 37 =$	$(-357) \div 17 =$
$(-1175) \div (-25) =$	$264 \div 22 =$	$(-736) \div (-16) =$	$(-408) \div 34 =$
$(-1824) \div (-48) =$	$(-1258) \div (-34) =$	$(-928) \div 29 =$	$(-1274) \div (-26) =$
$348 \div 12 =$	$(-744) \div 31 =$	$(-1764) \div 49 =$	$(-111) \div (-37) =$
$287 \div 41 =$	$(-200) \div (-50) =$	$(-60) \div 20 =$	$798 \div 21 =$
$(-600) \div (-50) =$	$432 \div 16 =$	$(-704) \div (-44) =$	$(-940) \div (-47) =$
$(-98) \div 7 =$	$(-135) \div (-9) =$	$7 \div 1 =$	$234 \div (-18) =$
$225 \div (-5) =$	$612 \div (-36) =$	$(-270) \div 15 =$	$54 \div 3 =$

Integer Addition and Subtraction (A) Answers

$31 - (-17) = 48$

$93 - 22 = 71$

$(-20) + 41 = 21$

$20 + 62 = 82$

$82 + 38 = 120$

$(-8) + (-23) = -31$

$87 - (-36) = 123$

$34 + 62 = 96$

$20 - (-41) = 61$

$3 + (-63) = -60$

$(-63) - (-79) = 16$

$55 + 44 = 99$

$(-87) - (-31) = -56$

$84 - (-37) = 121$

$(-43) - 71 = -114$

$(-25) - 88 = -113$

$(-56) + 91 = 35$

$(-39) + 47 = 8$

$(-3) + (-71) = -74$

$52 + 23 = 75$

$(-61) - 26 = -87$

$(-3) - 33 = -36$

$(-29) + (-87) = -116$

$(-2) - (-56) = 54$

$24 - 50 = -26$

$65 + 19 = 84$

$46 + 46 = 92$

$43 - (-6) = 49$

$(-20) - 37 = -57$

$12 + (-84) = -72$

$5 + (-40) = -35$

$75 - (-83) = 158$

$(-36) + (-29) = -65$

Multiplying Integers (A) Answers

Find each product.

$(-1) \times 2 = (-2)$	$(-7) \times 0 = 0$	$(-7) \times 7 = (-49)$	$8 \times (-4) = (-32)$
$(-3) \times (-18) = 54$	$5 \times 13 = 65$	$2 \times 1 = 2$	$(-8) \times (-19) = 152$
$(-8) \times (-7) = 56$	$20 \times (-9) = (-180)$	$11 \times (-1) = (-11)$	$9 \times (-4) = (-36)$
$(-11) \times 12 = (-132)$	$3 \times (-2) = (-6)$	$(-5) \times 9 = (-45)$	$16 \times 5 = 80$
$(-10) \times 1 = (-10)$	$6 \times (-12) = (-72)$	$(-6) \times 3 = (-18)$	$(-6) \times (-9) = 54$
$11 \times (-16) = (-176)$	$1 \times (-19) = (-19)$	$17 \times (-5) = (-85)$	$(-13) \times (-5) = 65$
$10 \times (-8) = (-80)$	$(-10) \times (-9) = 90$	$10 \times 12 = 120$	$5 \times (-11) = (-55)$
$(-14) \times 1 = (-14)$	$17 \times 7 = 119$	$4 \times 2 = 8$	$(-8) \times (-2) = 16$
$19 \times (-8) = (-152)$	$10 \times (-7) = (-70)$	$(-11) \times 6 = (-66)$	$7 \times (-18) = (-126)$
$(-6) \times (-4) = 24$	$(-20) \times 13 = (-260)$	$9 \times 7 = 63$	$14 \times (-8) = (-112)$
$6 \times 5 = 30$	$13 \times 17 = 221$	$12 \times 2 = 24$	$1 \times 10 = 10$
$(-2) \times 13 = (-26)$	$(-20) \times (-20) = 400$	$(-18) \times (-20) = 360$	$20 \times 6 = 120$
$2 \times 8 = 16$	$20 \times 15 = 300$	$15 \times 14 = 210$	$17 \times (-1) = (-17)$
$(-6) \times 20 = (-120)$	$(-3) \times (-15) = 45$	$(-20) \times 15 = (-300)$	$(-9) \times 1 = (-9)$
$(-11) \times (-4) = 44$	$(-1) \times (-19) = 19$	$11 \times (-6) = (-66)$	$9 \times (-17) = (-153)$
$18 \times (-1) = (-18)$	$(-19) \times 13 = (-247)$	$9 \times 0 = 0$	$8 \times 9 = 72$
$4 \times (-3) = (-12)$	$10 \times (-1) = (-10)$	$13 \times 19 = 247$	$2 \times (-11) = (-22)$
$6 \times (-6) = (-36)$	$1 \times 2 = 2$	$6 \times (-9) = (-54)$	$0 \times (-4) = 0$
$19 \times 17 = 323$	$19 \times 1 = 19$	$(-10) \times (-3) = 30$	$11 \times (-3) = (-33)$
$(-17) \times (-9) = 153$	$17 \times 14 = 238$	$(-8) \times 14 = (-112)$	$(-7) \times 17 = (-119)$
$12 \times (-14) = (-168)$	$11 \times (-8) = (-88)$	$(-9) \times 13 = (-117)$	$11 \times (-17) = (-187)$
$18 \times (-7) = (-126)$	$(-19) \times (-17) = 323$	$(-19) \times (-10) = 190$	$18 \times 1 = 18$
$20 \times (-6) = (-120)$	$12 \times 8 = 96$	$(-3) \times (-11) = 33$	$(-14) \times 0 = 0$
$(-16) \times 7 = (-112)$	$2 \times (-8) = (-16)$	$(-12) \times (-9) = 108$	$16 \times (-14) = (-224)$
$(-3) \times (-5) = 15$	$13 \times (-15) = (-195)$	$15 \times 17 = 255$	$8 \times (-5) = (-40)$

Integer Division (A) Answers

Find each quotient.

$(-2160) \div 45 = (-48)$	$(-1935) \div 43 = (-45)$	$264 \div 33 = 8$	$(-87) \div (-29) = 3$
$(-1230) \div (-30) = 41$	$161 \div 7 = 23$	$(-6) \div 1 = (-6)$	$(-209) \div 11 = (-19)$
$376 \div (-8) = (-47)$	$900 \div 36 = 25$	$630 \div (-35) = (-18)$	$(-45) \div 45 = (-1)$
$874 \div (-46) = (-19)$	$481 \div 13 = 37$	$87 \div 29 = 3$	$(-234) \div (-13) = 18$
$1980 \div 44 = 45$	$(-1008) \div (-48) = 21$	$450 \div (-9) = (-50)$	$86 \div (-43) = (-2)$
$(-572) \div (-44) = 13$	$66 \div (-3) = (-22)$	$(-960) \div 40 = (-24)$	$(-423) \div 47 = (-9)$
$3 \div 3 = 1$	$43 \div (-43) = (-1)$	$(-385) \div 11 = (-35)$	$(-1575) \div 45 = (-35)$
$(-468) \div 13 = (-36)$	$(-2450) \div 49 = (-50)$	$(-210) \div (-14) = 15$	$608 \div (-19) = (-32)$
$546 \div 39 = 14$	$(-992) \div (-31) = 32$	$646 \div 34 = 19$	$(-1428) \div 34 = (-42)$
$2300 \div 46 = 50$	$1100 \div 25 = 44$	$986 \div (-29) = (-34)$	$968 \div 22 = 44$
$198 \div (-33) = (-6)$	$(-836) \div (-22) = 38$	$(-323) \div 19 = (-17)$	$1170 \div (-39) = (-30)$
$(-375) \div (-25) = 15$	$(-2160) \div 48 = (-45)$	$(-1800) \div 40 = (-45)$	$600 \div (-15) = (-40)$
$102 \div 3 = 34$	$(-560) \div (-14) = 40$	$840 \div (-20) = (-42)$	$(-270) \div 10 = (-27)$
$(-60) \div (-5) = 12$	$(-33) \div 33 = (-1)$	$(-1645) \div 35 = (-47)$	$52 \div 26 = 2$
$1054 \div (-31) = (-34)$	$(-240) \div 5 = (-48)$	$1184 \div 37 = 32$	$36 \div (-12) = (-3)$
$33 \div 3 = 11$	$174 \div (-29) = (-6)$	$250 \div 10 = 25$	$340 \div 17 = 20$
$(-578) \div (-17) = 34$	$539 \div (-49) = (-11)$	$252 \div 36 = 7$	$(-624) \div (-39) = 16$
$1053 \div (-39) = (-27)$	$460 \div (-20) = (-23)$	$(-407) \div 37 = (-11)$	$(-357) \div 17 = (-21)$
$(-1175) \div (-25) = 47$	$264 \div 22 = 12$	$(-736) \div (-16) = 46$	$(-408) \div 34 = (-12)$
$(-1824) \div (-48) = 38$	$(-1258) \div (-34) = 37$	$(-928) \div 29 = (-32)$	$(-1274) \div (-26) = 49$
$348 \div 12 = 29$	$(-744) \div 31 = (-24)$	$(-1764) \div 49 = (-36)$	$(-111) \div (-37) = 3$
$287 \div 41 = 7$	$(-200) \div (-50) = 4$	$(-60) \div 20 = (-3)$	$798 \div 21 = 38$
$(-600) \div (-50) = 12$	$432 \div 16 = 27$	$(-704) \div (-44) = 16$	$(-940) \div (-47) = 20$
$(-98) \div 7 = (-14)$	$(-135) \div (-9) = 15$	$7 \div 1 = 7$	$234 \div (-18) = (-13)$
$225 \div (-5) = (-45)$	$612 \div (-36) = (-17)$	$(-270) \div 15 = (-18)$	$54 \div 3 = 18$



Order of Operations

Sponsored by The Center for Teaching and Learning at UIS



When performing mathematical calculations, it is critical to know the correct order in which each operation should be done. Whether you are adding or subtracting multiplying or dividing, or if you are using exponents and parenthetical expressions, you must perform the calculations in the correct order, or you may end up with an incorrect answer. At times the results could be devastating.

PEMDAS

To remember the correct order calculations should be performed, remember PEMDAS. PEMDAS stands for Parentheses – Exponents – Multiplication – Division – Addition – Subtraction. Reading from left to right, it tells us the correct order to do our calculations.

Parentheses – Perform all calculations located within parentheses.

Exponent – Evaluate any exponents (radicals) which are present

Multiplication – Perform all multiplication

Division – Perform all division

Addition – Perform all addition

Subtraction – Perform all subtraction

Take note that multiplication and division are grouped together and addition and subtraction are as well. That is because they are considered to be on the same operational level.

An easy way of recalling the order is to know the phrase: Please Excuse My Dear Aunt Sally. The first letter of each word corresponds to the first letter of a particular operation.

Word	First Letter	Corresponds to
Please	P	Parentheses
Excuse	E	Exponents
My	M	Multiplications
Dear	D	Division
Aunt	A	Addition
Sally	S	Subtraction



Order of Operations

Sponsored by The Center for Teaching and Learning at UIS



Example 1: $(4 + 5) \times 2$

$(4 + 5) \times 2$ Since $4 + 5$ is inside the parentheses, we do that calculation first
 $(9) \times 2$ Perform the calculation $4 + 5 = 9$
 9×2 Because 9 is the only thing inside the parentheses, we can remove them
18 Perform the calculation $9 \times 2 = 18$

Example 2: $(6 - 4 \times 3)^2$

$(6 - 4 \times 3)^2$ Since $6 - 4 \times 3$ is inside the parentheses, we do that calculation first
 $(6 - 12)^2$ Looking at PEMDAS, we see we must do the multiplication first
 $(-6)^2$ Then we subtract
36 Now that all the calculations inside are completed, we take the power

Example 3: $\left[\frac{(2+7)(3-1)}{2}\right]^2$

$\left[\frac{(2+7)(3-1)}{2}\right]^2$ We must first perform calculation inside the inner most parentheses.
So, in this case, we will add $2 + 7$ and subtract $3 - 1$

$\left[\frac{(9)(2)}{2}\right]^2$ Next, we will perform the multiplication inside the brackets
(which are treated the same as parentheses).
In this case, we multiply 9×2

$\left[\frac{18}{2}\right]^2$ The final operation we must perform inside the brackets is division.
Divide $8 \div 2$

$[9]^2$ Finally, we apply the exponent

81 And get the final Answer



Order of Operations

Sponsored by The Center for Teaching and Learning at UIS



Example 4: $\sqrt{(7 + 6 \times 10) - 3} + 5$

$\sqrt{(7 + 6 \times 10) - 3} + 5$	Begin by performing the calculations under the radical sign
$\sqrt{(7 + 60) - 3} + 5$	Multiply 6 and 10
$\sqrt{(67) - 3} + 5$	Add 7 and 60
$\sqrt{64} + 5$	Subtract 67 and 3
$8 + 5$	Take the square root of 64
13	Add 8 and 5

Example 5: $[(4 + 6) \times 7] + 6 \div 4$

$[(4 + 6) \times 7] + 6 \div 4$	Start with the innermost parentheses
$[(10) \times 7] + 6 \div 4$	Add 4 and 6
$(70) + 6 \div 4$	Multiply 10 and 7
$76 \div 4$	Add 70 and 6
19	Divide 76 by 4

Example 6: $42 \div 6 \times [75 \div (5 + 100 \div 5)]$

$42 \div 6 \times [75 \div (5 + 100 \div 5)]$	Begin with the innermost parentheses
$42 \div 6 \times [75 \div (5 + 20)]$	Divide 100 by 5
$42 \div 6 \times [75 \div (25)]$	Add 5 and 20
$42 \div 6 \times [3]$	Divide 75 by 25. Now complete the operations in the order they appear
7×3	Divide 42 by 6
21	Multiply 7 and 3

Order of Operations
Show your work.
Worksheet # 6

Name: _____

1. $(3^3 + 7) - 1$

2. $(2^3 - 5^2 \times 7^3) + 1$

3. $8^3 \times (2^2 + 7 - 7) + 5$

4. $4 + (9^2 - 7) \times 7$

5. $(9^2 + 5) - 8^3 + 1$

6. $(4^2 \times 2^2 \div 8)$

7. $(2 \times 7 \times 8)$

8. $(5 \times 9 \times 1^2) \div 5 \times 2$

9. $(8^3 - 2^2) \times 3$

10. $(3 + 5) + 8$

11. $5^3 \div (7^3 \div 7^3) \times 6$

12. $(5 \times 3 + 4^2) + 2$

13. $(5 + 9^2 \times 2^2) - 9 \times 7$

14. $(1 - 5) - 9^2 + 2$

15. $6 + (7^3 \div 7) - 6 - 3 = 46$

16. $(3 + 4^2 + 8) = 27$

17. $8^2 \times (1 \times 1^3 - 9 \times 8)$

18. $(8 - 6 + 9) + 3 - 6$

19. $3 \times (7 - 6) \times 7$

20. $(3^2 + 8^2 + 9)$



Using Order of Operations

Name: _____

Solve each problem.

1) $2 - 4 - 49 \div 1 + 6 \times 3 - 8$

2) $1 - 3 - 5 + 8 - 1 + 2 \times 2$

3) $4 \times 16 \div 8 + 8 + 5 - 1 + 4$

4) $64 \div 4 \times 2 - 6 - 9 + 2 \times 1$

5) $15 \div 3 \times 2 + 3 - 4 - 3 - 7$

6) $6 \times 6 + 9 \times 7 \times 41 \div 7 \times 9$

7) $3 + 4 - 5 + 5 + 78 \div 2 + 5$

8) $6 + 3 + 83 \div 1 + 3 \times 5 - 1$

9) $88 \div 8 - 9 - 7 + 2 \times 3 + 5$

10) $5 \times 97 \div 1 - 6 \times 5 - 6 + 7$

Answers

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

Order of Operations

Show your work.

Worksheet # 6: Answers

1. $(3^3 + 7) - 1 = 33$

2. $(2^3 - 5^2 \times 7^3) + 1 = -8566$

3. $8^3 \times (2^2 + 7 - 7) + 5 = 2053$

4. $4 + (9^2 - 7) \times 7 = 522$

5. $(9^2 + 5) - 8^3 + 1 = -425$

6. $(4^2 \times 2^2 \div 8) = 8$

7. $(2 \times 7 \times 8) = 112$

8. $(5 \times 9 \times 1^2) \div 5 \times 2 = 18$

9. $(8^3 - 2^2) \times 3 = 1524$

10. $(3 + 5) + 8 = 16$

11. $5^3 \div (7^3 \div 7^3) \times 6 = 750$

12. $(5 \times 3 + 4^2) + 2 = 33$

13. $(5 + 9^2 \times 2^2) - 9 \times 7 = 266$

14. $(1 - 5) - 9^2 + 2 = -83$

15. $6 + (7^3 \div 7) - 6 - 3 = 46$

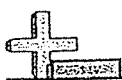
16. $(3 + 4^2 + 8) = 27$

17. $8^2 \times (1 \times 1^3 - 9 \times 8) = -4544$

18. $(8 - 6 + 9) + 3 - 6 = 8$

19. $3 \times (7 - 6) \times 7 = 21$

20. $(3^2 + 8^2 + 9) = 82$



Solve each problem.

1) $2-4-49\div 1+6\times 3-8$

$2-4-49+6\times 3-8$

$2-4-49+18-8$

$-2-49+18-8$

$-51+18-8$

$-33-8$

-41

2) $1-3-5+8-1+2\times 2$

$1-3-5+8-1+4$

$-2-5+8-1+4$

$-7+8-1+4$

$1-1+4$

$0+4$

4

3) $4\times 16\div 8+8+5-1+4$

$64\div 8+8+5-1+4$

$8+8+5-1+4$

$16+5-1+4$

$21-1+4$

$20+4$

24

4) $64\div 4\times 2-6-9+2\times 1$

$16\times 2-6-9+2\times 1$

$32-6-9+2\times 1$

$32-6-9+2$

$26-9+2$

$17+2$

19

5) $15\div 3\times 2+3-4-3-7$

$5\times 2+3-4-3-7$

$10+3-4-3-7$

$13-4-3-7$

$9-3-7$

$6-7$

-1

6) $6\times 6+9\times 7\times 41\div 7\times 9$

$36+9\times 7\times 41\div 7\times 9$

$36+63\times 41\div 7\times 9$

$36+2583\div 7\times 9$

$36+369\times 9$

$36+3321$

3357

7) $3+4-5+5+78\div 2+5$

$3+4-5+5+39+5$

$7-5+5+39+5$

$2+5+39+5$

$7+39+5$

$46+5$

51

8) $6+3+83\div 1+3\times 5-1$

$6+3+83+3\times 5-1$

$6+3+83+15-1$

$9+83+15-1$

$92+15-1$

$107-1$

106

9) $88\div 8-9-7+2\times 3+5$

$11-9-7+2\times 3+5$

$11-9-7+6+5$

$2-7+6+5$

$-5+6+5$

$1+5$

6

10) $5\times 97\div 1-6\times 5-6+7$

$485\div 1-6\times 5-6+7$

$485-6\times 5-6+7$

$485-30-6+7$

$455-6+7$

$449+7$

456

Answers

1. -41

2. 4

3. 24

4. 19

5. -1

6. 3,357

7. 51

8. 106

9. 6

10. 456

Translate Algebraic Expressions

- 1) 3 is added to three-fifths of q _____
- 2) Add three-fourths to 2 times m _____
- 3) One-sixth of the sum of 9 and r plus the product of 8 and k _____
- 4) Three-fourths of the sum of s and 6 plus the product of 8 and c _____
- 5) 2 times the sum of 6 and z _____
- 6) 7 times the sum of x and 4 _____
- 7) The sum of five-sixths of s , one-fourth of r , and 9 _____
- 8) One-sixth of the sum of q and 3 _____
- 9) Two-thirds of f is added to 5 _____
- 10) Four-fifths of f is added to the product of 2 and x _____



Translate Algebraic Expressions

- 1) One-half of r is added to the product of 8 and m _____
- 2) The sum of one-half of x , two-fifths of n , and 4 _____
- 3) Two-thirds of the sum of 4 and s plus the product of 9 and q _____
- 4) Two-thirds of the sum of 3 and q minus the product of 5 and y _____
- 5) Two-fifths of the sum of r and 3 minus the product of 4 and c _____
- 6) c squared plus the product of 7 and w plus 4 _____
- 7) q cubed minus the product of 5 and c plus 2 _____
- 8) The sum of three-fourths of q and one-fifth of d , minus 5 _____
- 9) Two-fifths of the sum of d and 9 plus the product of 5 and w _____
- 10) The product of m and 2 is subtracted from one-fourth of y _____



Translate Algebraic Expressions

1) 3 is added to three-fifths of q $3 + \frac{3}{5}q$

2) Add three-fourths to 2 times m $2m + \frac{3}{4}$

3) One-sixth of the sum of 9 and r plus the product of 8 and k $\frac{1}{6}(9+r) + 8k$

4) Three-fourths of the sum of s and 6 plus the product of 8 and c $\frac{3}{4}(s+6) + 8c$

5) 2 times the sum of 6 and z $2(6+z)$

6) 7 times the sum of x and 4 $7(x+4)$

7) The sum of five-sixths of s, one-fourth of r, and 9 $\frac{5}{6}s + \frac{1}{4}r + 9$

8) One-sixth of the sum of q and 3 $\frac{1}{6}(q+3)$

9) Two-thirds of f is added to 5 $\frac{2}{3}f + 5$

10) Four-fifths of f is added to the product of 2 and x $\frac{4}{5}f + 2x$



Translate Algebraic Expressions

- | | |
|---|---|
| 1) One-half of r is added to the product of 8 and m | <u>$\frac{1}{2}r + 8m$</u> |
| 2) The sum of one-half of x, two-fifths of n, and 4 | <u>$\frac{1}{2}x + \frac{2}{5}n + 4$</u> |
| 3) Two-thirds of the sum of 4 and s plus the product of 9 and q | <u>$\frac{2}{3}(4+s) + 9q$</u> |
| 4) Two-thirds of the sum of 3 and q minus the product of 5 and y | <u>$\frac{2}{3}(3+q) - 5y$</u> |
| 5) Two-fifths of the sum of r and 3 minus the product of 4 and c | <u>$\frac{2}{5}(r+3) - 4c$</u> |
| 6) c squared plus the product of 7 and w plus 4 | <u>$c^2 + 7w + 4$</u> |
| 7) q cubed minus the product of 5 and c plus 2 | <u>$q^3 - 5c + 2$</u> |
| 8) The sum of three-fourths of q and one-fifth of d, minus 5 | <u>$\frac{3}{4}q + \frac{1}{5}d - 5$</u> |
| 9) Two-fifths of the sum of d and 9 plus the product of 5 and w | <u>$\frac{2}{5}(d+9) + 5w$</u> |
| 10) The product of m and 2 is subtracted from one-fourth of y | <u>$\frac{1}{4}y - m2$</u> |



Name _____

Date _____

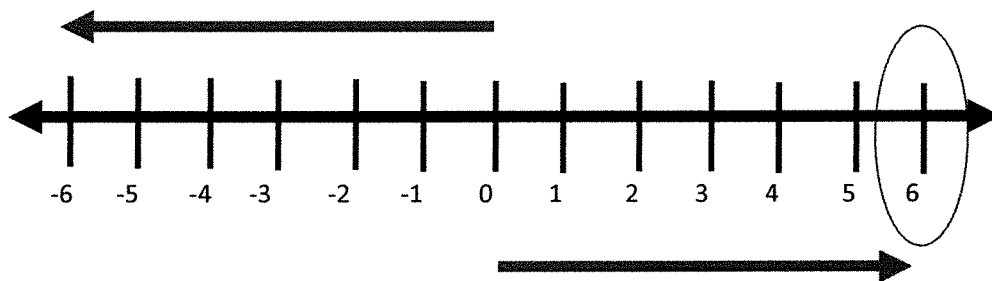
Working with Absolute Value - Step-by-Step Lesson**Lesson 1 Absolute Value Problem:**

1. Find the absolute value.

$$|6| = \underline{\hspace{2cm}}$$

Explanation:

Absolute values focus on the size or magnitude of a number. They do not leave any regard for the sign of the number, as a result absolute values are positive or zero. The absolute value of a number is its distance from 0.



Again it does not matter if the number is negative or positive. On a number line, 6 is 6 units to the right of 0. So the absolute value is 6.

As you can see above, -6 and 6 have the same absolute value since they are 6 units from 0.



Name: _____

Score: _____

Absolute Value

Find the value:

1) $ 46 = \boxed{}$	2) $ -18 = \boxed{}$	3) $- 23 = \boxed{}$
4) $- -3 = \boxed{}$	5) $ 91 = \boxed{}$	6) $ -15 = \boxed{}$
7) $- 75 = \boxed{}$	8) $- 8 = \boxed{}$	9) $ 0 = \boxed{}$
10) $ -16 = \boxed{}$	11) $- 96 = \boxed{}$	12) $- -24 = \boxed{}$
13) $ 2 = \boxed{}$	14) $ -63 = \boxed{}$	15) $- 7 = \boxed{}$
16) $- -31 = \boxed{}$	17) $ 49 = \boxed{}$	18) $ -72 = \boxed{}$
19) $- 85 = \boxed{}$	20) $- -14 = \boxed{}$	21) $ 6 = \boxed{}$
22) $ -59 = \boxed{}$	23) $- 18 = \boxed{}$	24) $- -40 = \boxed{}$

Name: _____

Score: _____

Answers:

1) $ 46 = \boxed{46}$	2) $ -18 = \boxed{18}$	3) $- 23 = \boxed{-23}$
4) $- -3 = \boxed{-3}$	5) $ 91 = \boxed{91}$	6) $ -15 = \boxed{15}$
7) $- 75 = \boxed{-75}$	8) $- 8 = \boxed{-8}$	9) $ 0 = \boxed{0}$
10) $ -16 = \boxed{16}$	11) $- 96 = \boxed{-96}$	12) $- -24 = \boxed{-24}$
13) $ 2 = \boxed{2}$	14) $ -63 = \boxed{63}$	15) $- 7 = \boxed{-7}$
16) $- -31 = \boxed{-31}$	17) $ 49 = \boxed{49}$	18) $ -72 = \boxed{72}$
19) $- 85 = \boxed{-85}$	20) $- -14 = \boxed{-14}$	21) $ 6 = \boxed{6}$
22) $ -59 = \boxed{59}$	23) $- 18 = \boxed{-18}$	24) $- -40 = \boxed{-40}$

A one-step equation contains one operation. To solve it, use the inverse operation on both sides of the equation.

$$x + 2 = 9$$

Subtract 2 from each side.

$$\begin{array}{r} x + 2 = 9 \\ -2 \quad -2 \\ \hline x = 7 \end{array}$$

$$y - 15 = 45$$

Add 15 to each side.

$$\begin{array}{r} y - 15 = 45 \\ +15 \quad +15 \\ \hline y = 60 \end{array}$$

$$2x = 6$$

Divide each side by 2.

$$\begin{array}{r} \frac{2x}{2} = \frac{6}{2} \\ x = 3 \end{array}$$

$$\frac{y}{4} = 2.5$$

Multiply each side by 4.

$$\begin{array}{r} \frac{y}{4} \cdot 4 = 2.5 \cdot 4 \\ y = 10 \end{array}$$

Solve each equation.

1. $x + 15 = 31$

2. $y - 2 = 7$

3. $6m = 90$

7. $6.75 + b = 7.5$

8. $\frac{n}{12} = 10$

9. $r + 21 = 24$

Write an equation for each problem and solve.

1. The sum of a and 35 is 100. What is a ?

2. The product of x and 4 is 100. What is x ?

1. $x = 16$	2. $y = 9$	3. $m = 15$	7. $b = 0.75$	8. $n = 120$
9. $r = 3$	1. $a + 35 = 100$ $a = 65$	2. $4x = 100$ $x = 25$		

Solve the Equations

Round your answers to the nearest hundredth.

1) $v + 20 = -13\frac{3}{8}$

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

2) $-7a = -91$

7) $f - 7 = -8$

3) $13 = \frac{d}{2}$

8) $-56.4 = -4.7r$

4) $26\frac{2}{5} = 24\frac{3}{8} + k$

9) $5 = -2.8 + h$

5) $-2.7 = b - 3.7$

10) $s + 6.2 = 3.2$



Solve the Equations

Round your answers to the nearest hundredth.

1) $v + 20 = -13\frac{3}{8}$

$v = -33.38$

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

$y = -3.17$

2) $-7a = -91$

$a = 13$

7) $f - 7 = -8$

$f = -1$

3) $13 = \frac{d}{2}$

$d = 26$

8) $-56.4 = -4.7r$

$r = 12$

4) $26\frac{2}{5} = 24\frac{3}{8} + k$

$k = 2.02$

9) $5 = -2.8 + h$

$h = 7.8$

5) $-2.7 = b - 3.7$

$b = 1$

10) $s + 6.2 = 3.2$

$s = -3$



Simplifying Algebraic Expressions

1) $-5(-7k - 8f)$ use $f = 5$ and $k = -3$

6) $6 - 4c + 8n$ use $c = 7$ and $n = -2$

2) $\frac{c}{-3} + 2 - 3x$ use $c = -12$ and $x = 9$

7) $-\frac{8}{h} + 4 + 6x$ use $h = -2$ and $x = -9$

3) $-5f - \frac{z}{-4}$ use $z = -8$ and $f = -7$

8) $3c - n$ use $c = -3$ and $n = 2$

4) $8w - 7 + 6 + 2c$ use $w = -3$ and $c = -8$

9) $6r + \frac{-10}{b}$ use $b = -5$ and $r = 9$

5) $-8 - 9n + 7 - 3f$ use $n = 4$ and $f = 7$

10) $7r + 8d$ use $r = -2$ and $d = 6$



Simplifying Algebraic Expressions

1) $-5(-7k - 8f)$ use $f = 5$ and $k = -3$

95

6) $6 - 4c + 8n$ use $c = 7$ and $n = -2$

-38

2) $\frac{c}{-3} + 2 - 3x$ use $c = -12$ and $x = 9$

-21

7) $-\frac{8}{h} + 4 + 6x$ use $h = -2$ and $x = -9$

-54

3) $-5f - \frac{z}{-4}$ use $z = -8$ and $f = -7$

33

8) $3c - n$ use $c = -3$ and $n = 2$

-11

4) $8w - 7 + 6 + 2c$ use $w = -3$ and $c = -8$

-41

9) $6r + \frac{-10}{b}$ use $b = -5$ and $r = 9$

56

5) $-8 - 9n + 7 - 3f$ use $n = 4$ and $f = 7$

-58

10) $7r + 8d$ use $r = -2$ and $d = 6$

34

