Evan earns $8 an hour working at camp. The amount of money he earns changes, or varies, with the amount of time he works. If he works two hours he earns $16 (2x8=16). How much would he earn if he works 8 hours? You would take 8 x n, n represents the number of hours worked. The letter n is a variable.

A symbol that represents a number is called a variable. An expression that contains a variable is called a variable expression. Variable expressions involving multiplication are usually written without the x sign.

8 x n is usually written 8n.

When you evaluate a variable expression, you substitute a number for the variable. This number is called the value of the variable.

Evaluate the expression 7n, when n=10. You just substitute the n for 10. 7x10=70

Your turn:

Evaluate each expression when x = 2, y=4, and z=6

8x=	11 +z	16÷ y
y-3	z+z+1	x+y+z

Evaluate each expression when a=3, b=12, c=4.

10a	12 c	b-2
3ac	a+5+b	5ba
acb	b÷c	a+13

REVIEW

Write the word form of 9.0003

Find the product of 3185x79

Is 430 divisible by 2? by 3? by 4? by 5? by 10?

Find the product of ½ x 4/5

Round 69.553 to the nearest tenth

Evaluate 4cd when c=5 and d=9

4321x123

842÷12

Evan Maryon works at a camp store. He earns $287 per week in pay plus a bonus, or commission, on his total sales. Last week, Evan's commission was $102.67. What was his total pay for the week?

You can find his total pay for the week by evaluating the addition expression 287+ n, when n represents his commission for the week.

Evaluate 287 +n, when n is 102.67.

Your turn:

Evaluate each expression when a=94, b=21.4, c=12.86, and d=106.4.

17.7+b	c+9.37	a-c
114.5-c	d-b	1-14.8

Evaluate each expression when x=26.4, y=163.5, z=39

z+88	103-z	y+92
83-x	x-7.6	x+y

Write the expression for:

the sum of 7.9 and a number n

a number x minus 270.5

42.62 added to a number p

REVIEW

Find the quotient 5 ÷ 1/5

Add 6.9+7.2+6.7+6.9+7.4

Find the difference 7/8- ½

Find the sum 69, 483+ 35,670

Find the product 4.93x1000

Find the product 542.987x100

83442.98÷100

321.90÷`1000

Evaluate 2.5n when n=13.

First substitute 13 for n. 2.5n=2.5x13=32.5 *Remember when you multiply to move it over the number of decimal places that it is in the mulitiplicand.

In algebra it is important to know that you show both multiplication and division in a number of different ways. For each of these symbols represents multiplication:

7 x 5 (times sign) 7·5 (raised dot) 7(5) or 7(5) or (7)(5) –parentheses

These represent division:

42÷6 (division sign) $6\overline{)42}$ (division house) $\frac{42}{6}$ (fraction bar)

Evaluate $\frac{y}{x}$ when y=17.4 and x=6.

Write out the problem

$$\begin{array}{r} 2.9 \\ 6\overline{)\,17.4} \\ -12 \\ \hline 54 \\ -54 \\ \hline 0 \end{array}$$

Your turn:

Choose all the words that are associated with multiplication:

factor sum quotient product

Choose all the words associated with division:

addend divisor quotient differene

Evaluate the following expression when w=63, x=1.6, y=62.72, and z=18.27

87x 12.4w z÷30 xy

$\frac{y}{32}$ y÷x 30.87÷w 3.4z

REVIEW

Write a variable expression for the following phrases:

15.2 times a number z

983.2 divided by a number n

a number y divided by 2.4

Find the product 35 x 3/5

Evaluate 16n when n=5.4

Give the place value of the underlined digit: 13,242.8<u>7</u>42

Find the difference 6 ¾ - 4 ½

Write the following number in words: 54,090,003

How many digits is in the number: 432,321,345,421,313

When you are solving a problem, you must first understand it. This means that you need to read the problem several times to determine what information is given, what you must find out, and whether any facts are needed.

Read the follow paragraph for your exercises. Look back to find the answer that you need in the paragraph.

When Evan filled the gas tank on his car on August 5, the odometer showed 7251.3 mi. He bought 11.7 gal of gasoline. On August 18, Evan filled the gas tank with 14.2 gal of gasoline and the odometer showed 7588.7 mi.

How many gallons of gas did Evan buy on August 5?

11.7 gal 14.2 gal (14.2-11.7) gal

How many miles did the car's odometer show on August 18?

7251.3 mi 7588.7 mi (7251.3-7588.7) mi

Which of the following facts is not needed to find the number of miles traveled from August 5 to August 18?

a) the number of gasoline bought on August 5 and on August 18
b) the number of miles shown on the odometer on August 5
c) the number of miles shown on the odometer on August 18

Use the following paragraph to answer the questions below:

Collin bought a video game system for $600. The tax on the system was $30. He made a down payment of $100 and agreed to pay the remainder in 10 equal payments.

What is the paragraph about?

How much tax did Collin pay?

Identify any facts that are not needed to find the cost of the stereo system and underline them.

Describe how you would find the amount of each payment.

REVIEW

Find the difference 16.53-0.5319

Evaluate a +b, when a= 7.65 and b=12.4

Find the product 13.87x1000

Solve 13521.8 ÷1000

4532x213

5266÷3 answer with a decimal to two places

Fill in commas where needed in the following numbers

4324564333 235346276542634

Which number is in the thousandths place in 432.46266

Jadyn's height is 5 ft 2 in. and Brooklyn's height is 4ft 11 in. What is the relationship between their heights?

a) Jadyn is taller than Brooklyn
b) Jadyn is shorter than Brooklyn
c) Jadyn is the same height as Brooklyn

When you compare any two measurements, such as heights, weights, or ages, there are only three possible relationships between them. The comparison property of numbers summarizes these relationships.

In words	In symbols
a is greater than b	a>b
a is less than b	a<b
a is equal to b	a=b

The symbols < > are called inequality symbols.

Your turn:

Write each sentence in symbols.

Seventy-five is greater than fifteen

Seven and forty-nine hundredths is less than eight and four tenths.

Write each statement in words

5002<5200

9.03>3.2

Write < > =

11,388_____11,614 78.88____78.8 93.9___93.9

Write in order from least to greatest:

23.87 2.38 2.0

REVIEW

Find the quotient in 389,760÷96

Find the sum of 657.2+194+34.91

Round 9.975 to the nearest hundredth

Find the sum 6/7+ 4/7

Replace the ____with < > = 1.72_____1.072

Find the product 462x709

Evaluate the expression 2yz when y=3 and z=1.2

Write the following number in digits: four million, two hundred twenty-three thousand, seventeen.

Commutative Property of Addition

Changing the order of the terms does not change the sum.

In Arithmetic	In Algebra
26+10=10+26	a+b=b+a

Lauren travels 17 mi from her home to work. After work she travels the same 17 mi from work to home. Reversing the order does not change the distance that she commutes. This idea is similar to the commutate property of addition.

Associative property of addition.

Changing the grouping of terms does not change the sum.

In Arithmetic	In Algebra
(26+10) +5= 26+ (10+5)	(a+b)+c=a+(b+c)

You can sit between two friends and say the same thing first to one and then to the other. The result is the same no matter which friend you speak to first. This idea of associating first with one friend and then with the other is similar to the associate property of addition.

Parentheses show you how to group the numbers in an expression. Do the work within the parentheses first.

The number 0 has a special addition property. When 0 is added to any number, the sum is identical to the original number. For this reason, the number 0 is called the additive identity.

Identity Property of Addition

The sum of any number and zero is the original number.

In arithmetic	In algebra
13+0=13	b +0=b

Your turn:

Replace each ____with the number that makes the statement true.

43+15=15+_____ 0+3.2=3.2+_____

(7+5)+2=7+(_____+2) _____+8.3=8.3+29

REVIEW

Find the quotient 6.69÷5.4

Find the sum mentally 54+32+46

Find the average of the following scores: 43 22 42 73 30

2+3+3+2+2+8+23++8+23

323-177

8732-2789

Multiplication like Addition has commutative and associate properties.

Commutative property of multiplication.

Changing the order of the factors does not change the product.

IN ARITHMETIC	IN ALGEBRA
15x30=30x15	ab=ba

Associate property of multiplication

Changing the grouping of the factors does not change the product.

IN ARITHEMETIC	IN ALGEBRA
(15x30) x 2= 15 (30x2)	(ab)c= a (bc)

Identity property of multiplication

The product of any number and 1 is the original number.

IN ARITHEMETIC	IN ALGEBRA
15x1=15	a·1=a

Multiplication property of zero

The property of any number and zero is zero.

IN ARITHMETIC	IN ALGEBRA
16x0=0	a·0=0

Your turn: Use the properties to find each product mentally if you can.

2·32·5	1·89
(0.6)(1.1)(5)	22·5·0
26·38=38·_____	(5·_____)·4=5·(6·4)

REVIEW

6 ft 4 in=_____in

Solve mentally: 12(5)(0)(8)

Find the sum $3\ 2/3 + 4\ 5/6$

Is 6230 divisible by 2?_____by 3?_____by 4?_____by 5?_____by 10?_____

Answer < >

2.04_____2.040 33.9_____33.8

432.89_____432.98 13.3_____133.0

6321x89

4214-1789

Before doing a computation, you should inspect the problem and decide whether to use mental math, paper and pencil, or a calculator.

Mental math may be most efficient when you see sums of ten or products of ten, when you do not need to rename, or when you can add on or count back easily.

Paper and pencil may be most efficient when the computation seems simple or involves numbers with few digits.

A calculator may be most efficient when the computation involves many numbers. You may also decide to use a calculator when accuracy is very important.

Your turn:

Write whether it is most efficient to find each answer using mental math, paper and pencil, or a calculator. Then find each answer using the method that you chose.

$13 \cdot 5$

$84 \div 6$

$532(0.9)$

$10.93 - 2.982$

$45.7 \div 100$

$6.6 \div 2.75$

$(0.4)(0.7)$

Mom spent $2.70 on 3 packages of seeds. How much did each seed packet cost?

Let's do a review. If you don't know these efficiently, I would recommend printing off extra copies in the back of this book and doing them everyday until you get them down. It is very important that you know these quite quickly. It will help hugely in your math skills.

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

You can write a multiplication expression in which all the factors are the same in a shortened form called exponential form.

$3 \bullet 3 \bullet 3 \bullet 3 \bullet 3 \bullet 3 = 3^6$

If you were to multiply them all out---use a calculator, you would get 729. The number 3^6 is called a power of 3. The exponent 6 shows that the base 3 is used as a factor six times.

You read 3^6 as three to the sixth power or the sixth power of three

You read 2^2as two to the second power or two squared

You read 4^3 as four to the third power, or four cubed.

Any number to the first power is equal to that number, as in $4^1=4$. The number 1 to any power equals 1, as in $1^8=1$

You can use exponents with vairiables as well as with numbers. For instance you can write $x \bullet x \bullet x \bullet x \bullet x$ as x^5. You read x^5 as a number x to the fifth power or the fifth power of a number x.

Your turn:

Write an expression for each phrase:

three to the fifth power

a number x to the sixth power

six times a number x, cubed

Give the exponential form for each expression:

(7)(7)(7)(7)(7)

$5 \bullet d \bullet d \bullet d \bullet d$

$4y \bullet 4y \bullet 4y \bullet 4y$

Find the answer:

7^3 10^4 11^2

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Order of operations.

In math you must perform operations in an agreed-upon order to make sure that an expression has only one answer.

Order of operations:

1. First do all work inside any parentheses.
2. Then find each power.
3. Then do all multiplications and divisions in order from left to right.
4. Then do all additions and subtractions in order from left to right.

Remember PEMDAS—(parentheses, exponents, multiplication, division, addition, subtraction)

Your turn:

$9^2 + 3 \bullet 5$ $7^2 - 14 + 5 \bullet 2$

$9 + 45 \div 9 \bullet 8$ $14 + (3^3 - 7)$

Find each answer. Work inside the parentheses first. Then work on the square brackets.

$[(12-4) \bullet 2 + 11] \div 3$ $48 - [36 \div (4+5)] + 11$

Is the following true or false. Then mark each false statement by inserting parentheses where necessary.

$4 \bullet 5 + 6 = 44$ $24 - 4 \bullet 2 = 40$

$4 + 4^2 \div 2 = 32$ $12 - 2^2 \div 4 = 2$

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Evaluate each expression when a=3 and b=8

7a 4b 25+a

27÷a b÷2 ab

Replace _____with < >

14,259_____14,312 0.12_____0.012

Write in order from least to greatest:

12,456 5642 12,375

0.62 0.078 0.102

Solve: 3^5 1^8 10^4

Solve when a=3, b=5, and c=6

b^2= $4c^3$= $(4b)^2$ = $\frac{b+a}{c-2}$=

(4)(0.7)(2.5)= 2.9+0+4.1=

Tell whether it is more efficient to find each answer with mental math, paper and pen, or calculator

56+87_____1200÷6_____(79)(6.32)_____

Evaluate each expression when x=45 and y=9

8y 23+x x÷y

Replace each_____with < > =

2324_____2243 3.16_____3.106 2.50_____2.5

Write in order from least to greatest.

7623 779 7073

8.65 0.0522 0.832

Use the properties of addition and multiplication to find each answer mentally.

15•8•0 (50)(9)(0.2)

Tell whether it is most efficient to find each answer mentally, paper and pencil, or calculator and then solve in that method.

800+755_____ 8(17)_____ 13.58÷1.4_____

Evan bought two CD's for $9.99 each and a video for $13.95. Earbuds cost $8.95. Evan gave the clerk two $20 bills.

What is the paragraph about?

How much did Evan pay for the video?

Identify any facts not needed to find the total amount of Evan's purchase.

Describe how you would find the amount of change Evan received.

To multiply powers having the same base, add the exponents.

$a^m+a^n=a^{m+n}$

$4^3 \bullet 4^2=4^5$

$w^6 \bullet w=w^7$

You can use the products of powers to simplify an expression. You simplify an expression by performing as many of the indicated operations as possible.

To simplify some expressions, you might need to use the product of powers rule together with the commutative and associate properties.

$6a^2 \bullet 4a^3$
$(6 \bullet 4)(a^2 \bullet a^{3)}$
$(24)(a^{2+3})$
$24a^5$

$(5n)(7n^2)$
$(5 \bullet 7)(n \bullet n^2)$
$(5 \bullet 7)(n^1 \bullet n^2)$
$(35)(n^{1+2})$
$35n^3$

You can also simplify multiplication expressions that involve more than one variable.

$(7x)(2y)$
$(7 \bullet 2)(x \bullet y)$
$14xy$

$5y \bullet 3x \bullet 2y$
$(5 \bullet 3 \bullet 2)(y \bullet x \bullet y)$
$30xy^2$

Your turn: Simplify

$c^6 \bullet c^4$

$n^2 \bullet n$

$4d^2 \bullet 3d^3$

$(2c)(14d)$

$(7w)(4w)(2y)$

$66b^2(5b)$

56÷7=	15÷3=	12÷6=	8÷2=	63÷7=	0÷4=
14÷2=	42÷6=	6÷1=	16÷8=	20÷5=	49÷7=
36÷4=	64÷8=	0÷3=	54÷9=	4÷2=	48÷8=
18÷9=	3÷1=	35÷5=	8÷4=	72÷8=	6÷6=
0÷5=	42÷7=	2÷2=	36÷9=	7÷1=	12÷3=
16÷2=	30÷5=	0÷1=	28÷7=	4÷4=	40÷8=
3÷3=	32÷8=	45÷5=	4÷1=	20÷4=	15÷5=
56÷8=	5÷1=	0÷8=	6÷2=	45÷9=	0÷6=
6÷3=	21÷7=	0÷9=	7÷7=	12÷4=	18÷6=
63÷9=	18÷3=	27÷9=	24÷3=	0÷2=	28÷4=
21÷3=	16÷4=	24÷8=	10÷5=	30÷6=	1÷1=
18÷2=	27÷3=	32÷4=	9÷1=	35÷7=	40÷5=
10÷2=	8÷8=	48÷6=	5÷5=	8÷1=	24÷6=
25÷5=	9÷3=	81÷9=	24÷4=	14÷7=	12÷2=
9÷9=	54÷6=	72÷9=	0÷7=	2÷1=	36÷6=

The distributive property allows you to multiply each term inside a set of parentheses by a factor outside the parentheses. You say that multiplication is distributive over addition and over subtraction.

IN ARITHMETIC	IN ALGEBRA
3(80+10)=3(80)+3(10)	a(b+c)=ab+ac
3(80-10)=3(80)-3(10)	a(b-c)=ab-ac

Use the distributive property to find each answer mentally.

8•36-8•16	7(108)
8(36-16)	7(100+8)
8(20)	700+56
160	756

You can also simplify variable expressions

Simplify 3 (n+2) equals 3n +6

Your turn:

Use the distributive property to find each answer mentally.

7(68)+7(12)	9(197)

Simplify

5(n+12)	9 (10+a)	8(6m+9)
4 (4w-6)	3(9-4a)	5(3c+7)

56÷7=	15÷3=	12÷6=	8÷2=	63÷7=	0÷4=
14÷2=	42÷6=	6÷1=	16÷8=	20÷5=	49÷7=
36÷4=	64÷8=	0÷3=	54÷9=	4÷2=	48÷8=
18÷9=	3÷1=	35÷5=	8÷4=	72÷8=	6÷6=
0÷5=	42÷7=	2÷2=	36÷9=	7÷1=	12÷3=
16÷2=	30÷5=	0÷1=	28÷7=	4÷4=	40÷8=
3÷3=	32÷8=	45÷5=	4÷1=	20÷4=	15÷5=
56÷8=	5÷1=	0÷8=	6÷2=	45÷9=	0÷6=
6÷3=	21÷7=	0÷9=	7÷7=	12÷4=	18÷6=
63÷9=	18÷3=	27÷9=	24÷3=	0÷2=	28÷4=
21÷3=	16÷4=	24÷8=	10÷5=	30÷6=	1÷1=
18÷2=	27÷3=	32÷4=	9÷1=	35÷7=	40÷5=
10÷2=	8÷8=	48÷6=	5÷5=	8÷1=	24÷6=
25÷5=	9÷3=	81÷9=	24÷4=	14÷7=	12÷2=
9÷9=	54÷6=	72÷9=	0÷7=	2÷1=	36÷6=

In mathematics you can simplify an expression by combining like terms. The expression 2n+5m+4n contains three terms: 2n, 5m, and 4n. The terms 2n and 4n have identical variable parts, so they are called like terms. The terms 2n and 5m have different variable parts, so they are called unlike terms. The process of adding or subtracting like terms is often called combining like terms. Unlike terms cannot be comined.

4n-n your answer is 3n

2n+4n your answer is 6n

3n +4+2n your answer is 5n +4

9x +7x your answer is 16x

11c+c-8b your answer is 12c-8b

Your turn: Simplify

6x +8x	12w-w	14 p-5p	9y-y
6n+9n+4	6k+3K-6	8y-7y+4	2a+4b+5b
3x+7x+9y	5n+12n+n	m+4m+6m	5x+2x-5

REVIEW

Greg drove 255 mi in four days and used 10 gal of gasoline. Identify any facts that are not needed to find miles per gallon.

Evaluate x^4 when x=5

Simplify 4c+7c-5d

Find the sum ¾ +7/8

Find the product (0.37)(1000)

Use the distributive property to solve mentally:

5(107) 6•12+6•8

2 (x+9) 8(7-5x) 7x-4x-5y

Using a four step plan.

1. UNDERSTAND-read and understand the problem.
2. PLAN-make a plan and choose a problem solving strategy and an operation to solve
3. WORK-carry out the plan and do any calculations
4. ANSWER—check any calculations and answer the problem.

Two weeks ago, Evan worked 35 hours. Last week he worked 31 hours. Evan earns an hourly wage of $7.15. How much did Evan earn during these two weeks?

1. Find-the total amount Michael earned during two weeks.
2. Add to determine the number of hours he worked. Then multiply by number of hourly wage.
3. 35+31=66 7.15(66)=471.9
4. check the calculations 7.15(35+31)=7.15(66)-471.9

He earned 471.90

Your turn:

The student council bought 400 sweatshirts, 650 T-shirts, and 1100 notebooks to sell during the school year. At the end of the year the council had 96 sweatshirts, 139 T-shirts, and 227 notebooks left. How many items did they student council sell during the school year?

Upwards Church has budgeted $4350 for new chairs. Each chair costs $115 including tax. How many chairs can the church buy?

Brooklyn bought two loaves of bread for $1.29 each and three heads of lettuce for $.95 each. What was the total cost for food?

56÷7=	15÷3=	12÷6=	8÷2=	63÷7=	0÷4=
14÷2=	42÷6=	6÷1=	16÷8=	20÷5=	49÷7=
36÷4=	64÷8=	0÷3=	54÷9=	4÷2=	48÷8=
18÷9=	3÷1=	35÷5=	8÷4=	72÷8=	6÷6=
0÷5=	42÷7=	2÷2=	36÷9=	7÷1=	12÷3=
16÷2=	30÷5=	0÷1=	28÷7=	4÷4=	40÷8=
3÷3=	32÷8=	45÷5=	4÷1=	20÷4=	15÷5=
56÷8=	5÷1=	0÷8=	6÷2=	45÷9=	0÷6=
6÷3=	21÷7=	0÷9=	7÷7=	12÷4=	18÷6=
63÷9=	18÷3=	27÷9=	24÷3=	0÷2=	28÷4=
21÷3=	16÷4=	24÷8=	10÷5=	30÷6=	1÷1=
18÷2=	27÷3=	32÷4=	9÷1=	35÷7=	40÷5=
10÷2=	8÷8=	48÷6=	5÷5=	8÷1=	24÷6=
25÷5=	9÷3=	81÷9=	24÷4=	14÷7=	12÷2=
9÷9=	54÷6=	72÷9=	0÷7=	2÷1=	36÷6=

Many patterns occur naturally in the real world. In 1202 Leonardo Fibonacci wrote about a pattern from nature that is called the Fibonacci sequence. These are the first ten numbers of this pattern:

1,1,2,3,5,8,13,21,34,55

Beginning with the third number, 2, each number in the pattern is the sum of the two numbers immediately preceding it. You can find this pattern in the spirals of the seeds on most sunflowers and in the spirals of the scales on many pineapples. Recognizing a pattern is a useful way to solve some mathematical problems. Many involved addition, subtraction, multiplication, and division.

Your turn:

Find the next three numbers in the pattern.

3	6	12	24			

5	7	10	14			

Find the next three expressions in each pattern:

x	x+3	x+6			

12	22	32	42			

23	22	20	17			

2y	8y	82y				

n+3	2n+3	3n+3			

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

A function is a relationship that pairs each number in a given set of numbers with exactly one number in a second set of numbers. Often you can describe a function by a function rule. For instance, suppose your purchase costs $4. If you give the salesclerk x dollars, the amount of change you receive is (x-4) dollars. You can use the variable expression x-4 to create a function rule.

You say: x is paired with x-4

You can make a chart like this

Fill in the rest of the chart:

x	x-4
5	1
10	6
20	
50	
100	

Complete the following tables

X	X-6
10	
12	
14	
16	
18	

X	10X
1	10
2	20
4	
6	
8	

r	8.25r
7	
9	
12	
13	
16	

X	$\frac{X}{6}$
6	
12	
18	
24	
30	

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

The price of flat screen TV is $389.99. It can be bought on an installment plan for $50 down payment and 18 payments of $25. How much more does the TV cost on an installment plan?

Ninety-one students volunteered to clean parks and visit nursing homes. The students were evenly assigned to five parks and two nursing homes. How many students were assigned to each place?

Evan earns $12.25 for each new customer he recruits, plus a bonus of $8.50 for each subscriber to his newsletter. Last week Paul recruited 30 new customers, 12 of whom subscribed to the newsletter. How much did Paul earn last week?

Lauren earns $7.50 per hour. If she works more than 40 hours per week, she earns $10.75 per hour for each extra hour. Last week Lauren worked 45 hours. She says she earned $337.50. Is this correct? Explain

Some real life problems require only an estimate for a solution. Others require an exact answer. Before attempting to solve a problem, you should decide whether an estimate or an exact answer is needed.

Decide whether you will need an estimate or an exact answer for the following and why:

The number of hours a trip will take

The amount an employee is paid

The width of a new window curtain

The number of books in a library.

How much paint to buy to paint my room.

I want to plant lettuce seeds in a garden. Packets of seeds cost 85 cents each. How much money should I take to buy six packets? Then solve

It is recommended that restaurant customers leave a tip of 15 percent of the entire bill. If the bill was $19.97, how much should I leave? Then solve

Metric System of Measurement

Prefix and Meaning		Length	Liquid Capacity	Mass
kilo-	1000	kilometer	kiloliter	kilogram
hecto-	100	hectometer	hectoliter	hectogram
deka-	10	dekameter	dekaliter	dekagram
	1	meter	liter	gram
deci-	0.1	decimeter	deciliter	decigram
centi-	0.01	centimeter	centiliter	centigram
milli-	0.001	millimeter	milliliter	milligram

The table shows the three basic units of measure in the metric system are the meter for length, the liter for liquid capacity, and the gram for mass. Units beginning with kilo- are the largest units in the table and units beginning with milli- are the smallest.

The table lists enough data so that you can change one unit of measure to another. Each unit in the table is 10 times as large as the unit immediately below it. For example, 1 cm is equal to 10 mm. Therefore , to change from a larger metric until to a smaller until you multiply by `10,100,1000, and so on.

Your turn: Write 0.25 L in mL.

Liters are larger than millimeters. Multiply by 1000

Write 48 mm in cm

Write 37.5 g in kg

Write 615 mm in meters

0.74 m in centimeters

0.88 km in m

2345 ml in l

You can use mental math to multiply numbers by 0.1, 0.01, 0.001 and so on. You simply move the decimal point of the number being multiplied to the left the same number of decimal places as there are in the number in which you are multiplying. For example, 0.01 has two decimal places, so (231.4)((0.01) =2.314

Find each product mentally.

(43.6)(0.1)= (764.4)(0.01)=

(891.3)(0.001)= (8.09)((0.1)=

(24.5)(0.001)= (57.8)(0.01)=

Select the most reasonable measure for each item:

Length of a soccer field

a) 100 cm
b) 100 m
c) 100km

Height of a person

a) 175 mm
b) 175 cm
c) 175 m

Width of a computer screen

a) 23 cm
b) 23 m
c) 23 km

Distance from New York to London

a) 5567 mm
b) 5567 cm
c) 5567 km

Look at the following pattern

$8.3 \times 10^1 = 8.3 \times 10 = 83$

$8.3 \times 10^2 = 8.3 \times 100 = 830$

$8.3 \times 10^3 = 8.3 \times 1000 = 8300$

$8.3 \times 10^4 = 8.3 \times 10000 = 83{,}000$

A key to help remember is to move the decimal point over the number of zeros that you have.

Greater numbers can be difficult to read and to write. Scientists and other people who use these numbers often write them in scientific notation. A number is written in scientific notation when it is written as a number that is at least one but less than ten multiplied by a power of ten.

at least 1, but less than 10 → 6×10^5, 2.3×10^8, 1.53×10^9

Write each number in scientific notation

13,000 –move the decimal point to get a number that is at least 1, but less than 10. It moves over 4 places.

1.3×10^4

Your turn:

Write each number in scientific notation:

34,000 150,000 1,420,000

Write each number in decimal notation (just the opposite move the decimal over to the right the number of zeros.

4.2×10^3 2.173×10^8 8×10^9

56÷7=	15÷3=	12÷6=	8÷2=	63÷7=	0÷4=
14÷2=	42÷6=	6÷1=	16÷8=	20÷5=	49÷7=
36÷4=	64÷8=	0÷3=	54÷9=	4÷2=	48÷8=
18÷9=	3÷1=	35÷5=	8÷4=	72÷8=	6÷6=
0÷5=	42÷7=	2÷2=	36÷9=	7÷1=	12÷3=
16÷2=	30÷5=	0÷1=	28÷7=	4÷4=	40÷8=
3÷3=	32÷8=	45÷5=	4÷1=	20÷4=	15÷5=
56÷8=	5÷1=	0÷8=	6÷2=	45÷9=	0÷6=
6÷3=	21÷7=	0÷9=	7÷7=	12÷4=	18÷6=
63÷9=	18÷3=	27÷9=	24÷3=	0÷2=	28÷4=
21÷3=	16÷4=	24÷8=	10÷5=	30÷6=	1÷1=
18÷2=	27÷3=	32÷4=	9÷1=	35÷7=	40÷5=
10÷2=	8÷8=	48÷6=	5÷5=	8÷1=	24÷6=
25÷5=	9÷3=	81÷9=	24÷4=	14÷7=	12÷2=
9÷9=	54÷6=	72÷9=	0÷7=	2÷1=	36÷6=

Simplify $a^5 \bullet a$

$c^4 \bullet c^2 \bullet c^7$

$8n + 7m + 16n$

$8(3c - 9)$

$18d - 11d - 5c$

$6c \bullet 7c^3$

Greg bought two sets of screwdrivers at $19.49 each, three boxes of screws at $4.98 each, and a drill for $39.95. What was the total cost of Greg's purchase?

Find the next three numbers or expressions

3	10	17			

a+6	a+7	a+8			

Complete each function table.

x	x-8
12	4
16	
20	
24	
28	

x	9x
2	
4	
6	
8	
10	

x	?
3	1
6	2
9	3
12	4
15	5

Write each number in scientific notation.

350,000 6,550,000

Write each number in decimal notation

1.3×10^5 5.88×10^8

Decide whether an exact or an estimate is needed then solve.

Ground beef sells for $2.09 per pound. Amy needs to buy 36 lb for a party. How much money should she take to the store?

Convert each measurement

56.4 cm to mm

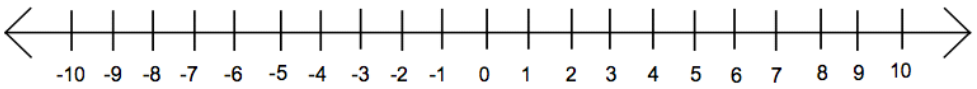
655 ml to liters

Simplify

$(b^2)^5$ $(c^7)^4$

Solve

$(3 \bullet 4)^2$ $(2 \bullet 3)^4$



An integer is any number in the following set: …-4,-3,-2,-1,0,+1,+2,+3,+4……

Integers greater than zero are called positive integers. Integers less than zero are called negative integers. Zero is neither positive nor negative. To make it easier you generally write positive integers without the positive sign.

Another way to show the integers is to locate them as points on a number line. On a horizontal number line, positive integers are to the right of zero and negative numbers are to the left. (See number line above.)

Numbers that are the same distance from zero, but on opposite sides of zero, are called opposites. To indicate the opposite of a number n, you write –n. You read –n as "the opposite of n."

The distance that a number is from zero on a number line is the absolute value of the number. You use the symbol | | to indicate absolute value. You read |n| as "the absolute value of n"

Use the number line above to find the absolute value of the following:

|3| |-4|

Notice that three is three units from 0, so |3| is 3.

The -4 is 4 units from 0, so |-4|=4

When you compare numbers, you may want to picture them on a number line. On a horizontal number line, numbers increase in order from left to right.

Answer the following with < > =

1___-3 -4_____-2

Find on the number line and notice that 1 is to the right of -3, so 1>-3.

-4 is the the left of -2 so -4<-2

Your turn:

Find each absolute value.

|-5| |7| |-1| |10|

Fill in the ____with < > =

9____-8 -4_____4 -11____-7 -5_____6

Write in order from least to greates.

4, -3, 9 -10,-8,-6 2,-2,0

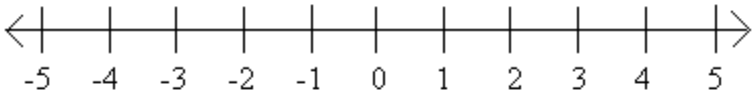
Find the sum 1539+732=

Evaluate 8q4 when q=5 and r=4

Evaluate 51.3 ÷ p when p=3

Find the product 453x219

Solve 25^5 33^3



Adding integers with the same sign

Find the sum -3+(-4).

Start at 0. slide 3 units to the left. Slide 4 more units left. Stop at -7.

Find the sum 3 +2

Start at 0. Slide 3 units right. Slide 2 more units right. Stop at 5.

**RULE To add integers that have the same sign, add their absolute values. Then give the sum the sign of the integers.

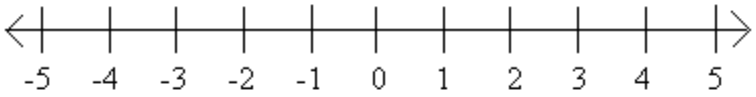
Find each sum.

22+7 -14 + (-13)

-5 +(-25) -32+(-18)

62+6 8+32

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9



Adding integers with different signs.

Find each sum:

-2 +5 1+(-3)

Start at 0. Slide 2 units left. Slide 5 units right. Stop at 3.

Start at 0. Slide 1 unit right. Slide 3 units left. Stop at -2

**RULE To add two integers with different signs, first find their absolute values. Then subtract the lesser absolute value from the greater absolute value. Give the result the sign of the integer with the greater absolute value.

Find each sum: 10 +(-16)

|10|=10 and |-16|=16

Subtract 16-10=6

The negative integer has the greater absolute value, so the sum is negative.

10 + (-16)=-6

-7+12

|-7|=7 and |12|=12

Subtract: 12-7=5

The positive integer has the greater absolute value, so the sum is positive.

-7+12=5

In the case of adding opposites, the sum will always be zero. This fact is so useful in algebra that it is identified as a property of opposites.

Addition Property of Opposites

The sum of a number and its opposite is zero. $a+(-a)=0$ and $-a+a=0$

Find each sum.

$-12+12$ $19+(-19)$

$-1+27$ $-13+6$

$14+(-40)$ $-8+(-13)+7$

$-8+18$ $-25+11+5$

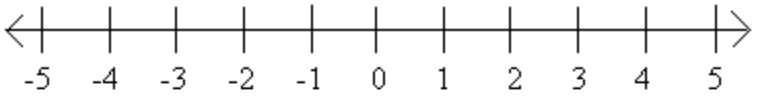
Mental Math

To add integers mentally, it is helpful to look for opposites. You can also group positive and negative integers.

$-3+5+(-8)+(-6)+9+3$

$-2+(-11)+5+11+9(-7)+16$

Write 2,700,000 in scientific notation



Subtracting Integers

Find the difference -3 – (-1)

**The easiest way to do this is to change the signs and then add.

-3 + (+1) Change from subtraction to addition and then change the next integers sign.

Answer is -2

Find the difference 4-6

Change the signs and then add : 4+(-6) Answer -2

Your turn:

12- (-3) -4-(-14) -24-(-16)

-5-4 -12-7 23-23

The record low temperature for March is -11F. The normal low temperature for March is 25F. How much greater is the normal than then record temperature?

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Multiplying and Dividing Integers

RULE

The product of two integers with the same sign is positive.

The product of two integers with the different sign is negative.

Find each product:

(-11)(4)=-44 (-7)(-10)=70 (-5)(-4)(2)=40

RULE

The quotient of two integers with the same sign is positive.

The quotient of two integers with the different sign is negative.

-15÷5=-3 $\frac{-48}{-12}$=4

Your turn:

(-4)(-1) 2(-30) 4(-32)(-3)

32÷(-8) 32÷8 -32÷(-8)

(-4)(5)(-2) (-6)(3)(0)

-250÷5 -144÷3

Answer < >=

5_____-6

-9_____-4

-3_____3

-2_____-1

Find each answer.

-2+(-2)

-5+(-17)

-4+(-14)

-4+9

7+(-13)

-16+16

-26-5

-7(5)(-2)

36÷(-3)

9(-9)

Evaluating Expressions involving integers

Evaluate each expression when y=-4 y^2

$y^2=(-4)^2$ (-4)(-4)=16

$2y^3+18$

$2(-4)^3+18$

-128+18

-110

Absolute value signs have the same priority as parentheses in the order of operations. When evaluating expressions involving absolute value, you evaluate any expression within absolute value signs first.

Evaluate each expression when c=-9 and d=4

|c+d|

|-9+4|

|-5|

=5

|c| +|d|

|-9|+|4|

9+4=13

Multiplication Property of -1

The product of any number and -1 is the opposite of the number.

-1n=-n and –n=-1n

Your turn:

$(-7)^2$ $(-1)^5$

Evaluate when m= (-3), n=8, and s=(-6)

|n|+|s|

|m+3|-6

-mn

-s+(-7)

7-|n-8|

-mn+14

Complete each function table.

x	x^2
-6	36
-3	
-2	
-1	
4	

x	-x+2
-5	7
-4	6
-1	
0	
2	

x	
-6	24
-5	20
-4	16
1	-4
3	-12

Mixed Review

-4+(-5)

35+(-97)

8(-4)

55÷5

-11+19

-164÷16

57+(-5)

(-5)(-7)

14+(-27)

33-(-21)

(-9)(3)

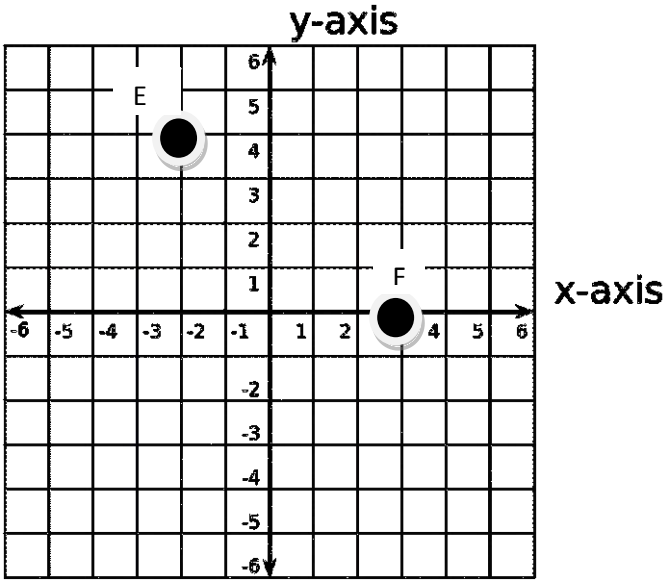
14-(-8)

56÷7=	15÷3=	12÷6=	8÷2=	63÷7=	0÷4=
14÷2=	42÷6=	6÷1=	16÷8=	20÷5=	49÷7=
36÷4=	64÷8=	0÷3=	54÷9=	4÷2=	48÷8=
18÷9=	3÷1=	35÷5=	8÷4=	72÷8=	6÷6=
0÷5=	42÷7=	2÷2=	36÷9=	7÷1=	12÷3=
16÷2=	30÷5=	0÷1=	28÷7=	4÷4=	40÷8=
3÷3=	32÷8=	45÷5=	4÷1=	20÷4=	15÷5=
56÷8=	5÷1=	0÷8=	6÷2=	45÷9=	0÷6=
6÷3=	21÷7=	0÷9=	7÷7=	12÷4=	18÷6=
63÷9=	18÷3=	27÷9=	24÷3=	0÷2=	28÷4=
21÷3=	16÷4=	24÷8=	10÷5=	30÷6=	1÷1=
18÷2=	27÷3=	32÷4=	9÷1=	35÷7=	40÷5=
10÷2=	8÷8=	48÷6=	5÷5=	8÷1=	24÷6=
25÷5=	9÷3=	81÷9=	24÷4=	14÷7=	12÷2=
9÷9=	54÷6=	72÷9=	0÷7=	2÷1=	36÷6=

The coordinate plane

The grid is called a coordinating plane. A coordinating plane is formed by two number lines called axes. The horizontal number line is the x-axis, and the vertical number line is the y-axis. The point where the axes meet is called the origin. The axes separate the coordinate plane into four sections called quadrants.

You can assign an ordered pair of numbers to any point on the plane. The first number in an ordered pair is the x-coordinate. The second number is the y-coordinate. The origin has coordinates (0,0)



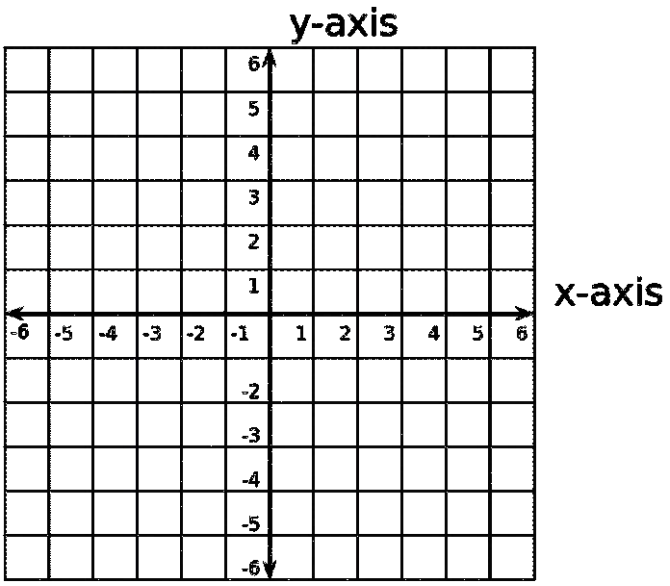
Use the coordinate plane above and write the coordinates of each point.

Start at the origin. Point E is 2 units left (negative) and 4 units up (positive). The coordinates are (-2,4)

Start at the origin. Point F is 3 units right (positive) and 0 units up or down. The coordinates are (3,0)

When you graph a point on a coordinate plane, you show the point that is assigned to the ordered pair (x,y).

1. Start at the origin.
2. Move x units horizontally along the x-axis
3. Then move y units vertically.
4. Draw the point and label it.



Graph each point on the coordinate plane.

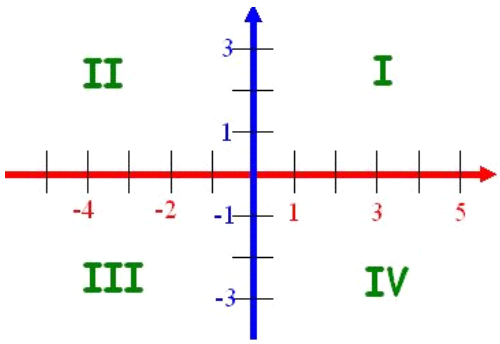
A (4,1)

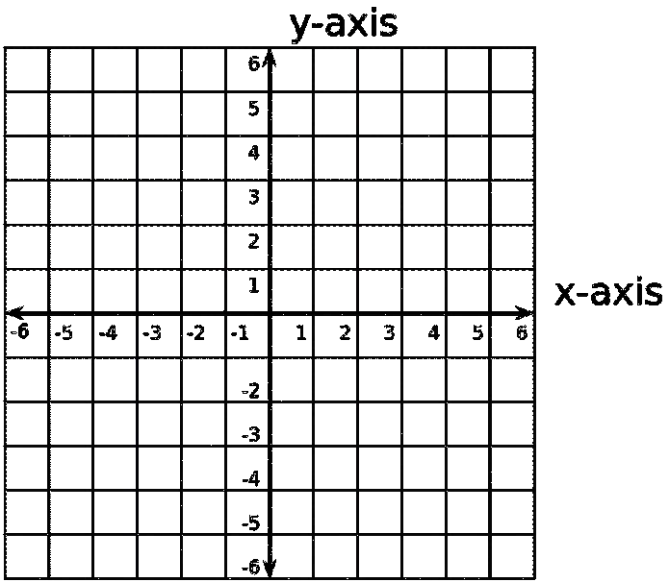
B (1,4)

C (-3,0)

D (0,-4)

Here the axe separate the coordinate plane into four sections called quadrants.





Graph each point on the coordinate plane.

A (5,1)

E (-3,-3)

B (3,3)

F (-2,4)

G (-6,1)

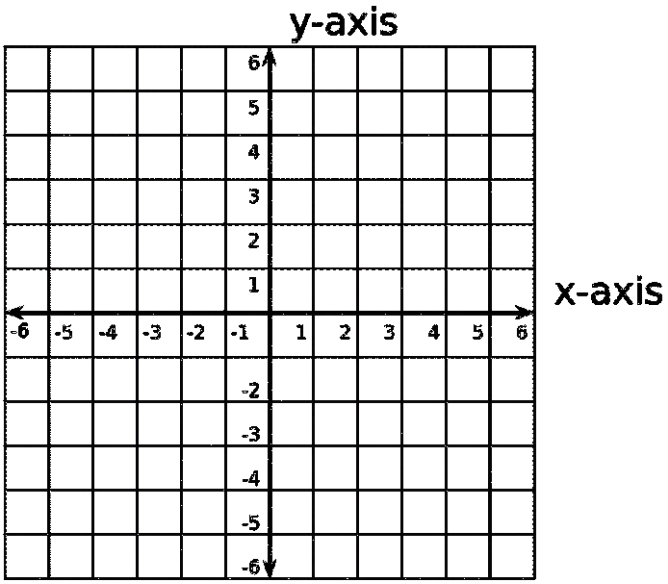
C (6,-2)

Graphing Functions

You can make a list of ordered pairs from a function table. The first column equals the x-coordinate. The second column represents the y-coordinate.

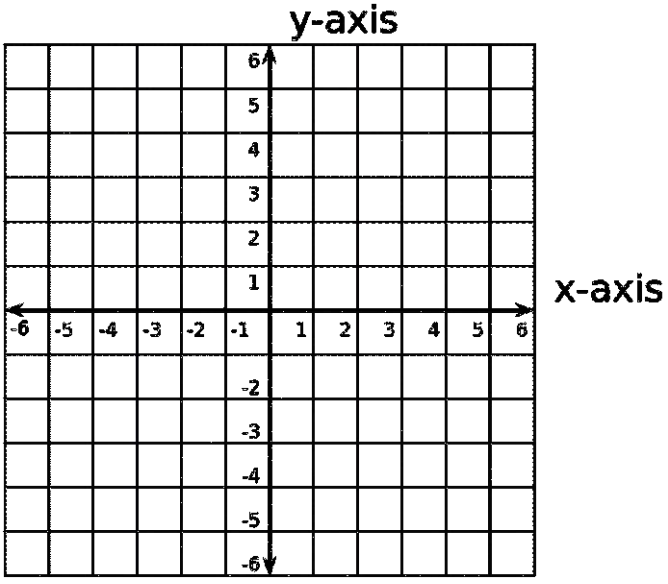
Fill in the chart and then graph.

x	x-2
-3	-5
-2	-4
0	
1	
5	



Graph each function.

x	-2x
-2	4
-1	2
0	
3	
4	



9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

REVIEW

Find each absolute value

|-11| |5| |-3|

Answer < > =

-12_____3 -8_____8 -5_____0

-2+(-3) 4(-5) (-6)(-8)

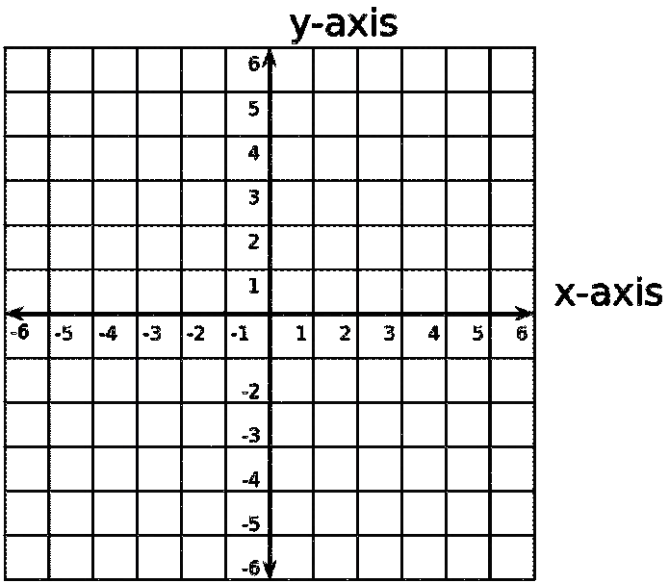
12+(-32) -32÷4

(-9)(5) -63÷-9

Evaluate each expression when a=6, b=-2, c=-7

b^2 c^2-9 |c|-b

a+|b| |a+b| $-5a^2$



Graph the following:

D (5,-3)

F (1,3)

E (-2,0)

G (-5,4)

Fill in each function chart.

x	3x-1
-2	
-1	
0	
1	
2	

x	x+4
-4	
-2	
0	
1	
3	

An equation is a statement that two numbers or two expressions are equal. Some equations such as x+1=6, contain a variable. A value of the variable that makes an equation true is called a solution of the equation.

Is the given number the solution of the equation? yes or no

x+1=6; 5

Substitute 5 for x in the equation. (5)+1=6 6=6 YES

15=5k; 2

15=5(2) 15≠10

The symbol ≠ means is not equal to. Answer is NO, 2 is not the solution

Your turn:

Is the given number a solution of the equation? yes or no

x +6=9;3 18=3n;15

b-3=-4; -1 5=m-9;4

Use mental math to find each solution.

p+8=9 z-4=-1

5+n=5 3r-11=4

56÷7=	15÷3=	12÷6=	8÷2=	63÷7=	0÷4=
14÷2=	42÷6=	6÷1=	16÷8=	20÷5=	49÷7=
36÷4=	64÷8=	0÷3=	54÷9=	4÷2=	48÷8=
18÷9=	3÷1=	35÷5=	8÷4=	72÷8=	6÷6=
0÷5=	42÷7=	2÷2=	36÷9=	7÷1=	12÷3=
16÷2=	30÷5=	0÷1=	28÷7=	4÷4=	40÷8=
3÷3=	32÷8=	45÷5=	4÷1=	20÷4=	15÷5=
56÷8=	5÷1=	0÷8=	6÷2=	45÷9=	0÷6=
6÷3=	21÷7=	0÷9=	7÷7=	12÷4=	18÷6=
63÷9=	18÷3=	27÷9=	24÷3=	0÷2=	28÷4=
21÷3=	16÷4=	24÷8=	10÷5=	30÷6=	1÷1=
18÷2=	27÷3=	32÷4=	9÷1=	35÷7=	40÷5=
10÷2=	8÷8=	48÷6=	5÷5=	8÷1=	24÷6=
25÷5=	9÷3=	81÷9=	24÷4=	14÷7=	12÷2=
9÷9=	54÷6=	72÷9=	0÷7=	2÷1=	36÷6=

Solving addition and subtraction in equations.

How to solve equations, you need to get the variable alone.

Solve 6+k=31

you want to get k alone, so subtract 6 from the left side and do the same to the other side.

$$\begin{array}{r} 6+k=31 \\ \underline{-6} \quad \underline{-6} \\ k=25 \end{array}$$

Solve -29=s-15 remember get s alone.

$$\begin{array}{r} -29=s-15 \\ \underline{+15} \quad \underline{+15} \\ -14=s \end{array}$$

Your turn:

a+2=11

5+b=-19

-10=c-20

a+9=9

45=d+8

1=r-3

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Solving multiplication and division equations works the same way. You want to get the variable alone. Remember whatever you do to one side, you do the same to the other side.

Solve 2s=860, get s alone

$\frac{2s}{2}=\frac{860}{2}$ you divide each side by 2, this will get the first side alone to 1.

s=430

$18=\frac{n}{-4}$ $18(-4)=\frac{n}{-4}(-4)$

-72=n

Solve –n=9 remember that there is 1 in front of n

$\frac{-1n}{-1}=\frac{9}{-1}$

n=-9

Your turn:

2b=30 -6c=108

-7t=-105 -10u=120

$1=\frac{x}{-5}$ $3=\frac{n}{12}$

Use mental math to fine each solution:

4 +4=-3

$\frac{h}{-3}$=3

13=3w-5

Solve and check.

c+12=9

m-8=-10

15=13+w

-3z=90

-4=$\frac{a}{6}$

-n=7

732x12

8432÷22 (goto two decimal places)

Two step Equations

Solve 2n+1=7

Remember we are to get n by itself. So we subtract 1 from one side and then the other.

2n+1=7
-1 -1
2n=6

Now you have to divide by 2 to get n alone. Do it to both sides.

$\frac{2n}{2}=\frac{6}{2}$

n=3

Solve $-20=\frac{t}{3}-4$

$+4=\frac{t}{3}+4$

$-16=\frac{t}{3}$

$-16\bullet 3=\frac{t}{3}\bullet 3$

-48=t

Your turn:

6n+4=28

8b-5=35

28=-3x-2

35=9m-10

16c-71=153

$\frac{x}{13}$ -32=58

1480+7w=2040

$\frac{b}{-15}$+112=-88

Mixed review

6n=-18

-a=0

-15 +9d=21

-y-18=-13

-7c=-84

4+g=56

54=-6g

-8=16-3w

Variable expressions

When writing a variable expression that represents a word phrase, you first choose a variable to represent the unknown number.

Write a variable expression that represents the phrase $35 less than twice Amy's salary.

Let s=Amy's salary

Then 2s=twice Amy's salary

So 2s-35=$35 less than twice Mary's salary.

Write a variable expression that represents the phrase eight increased by five times a number n.

Increased by suggests addition. Times suggest multiplication.

8+5n

Your turn:

a number x divided by 30

six more than twice as many hits

$4 less than last paycheck

the sum of four times a number r and two

five more than a number x

four less than six times a number d

twelve fewer apples on the tree than yesterday

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Writing Equations

Write an equation that represents each sentence.

Nine more than a number x is 12. $x+9=12$

Twenty-four is a number t divided by 3 $24=\frac{t}{3}$

Write an equation that represents the relationship in the following sentences.

A financial software package costs $115, which is $25 more than the cost of a game software package.

Choose a variable to represent the unknown number.

The cost of the financial package is $115

Let g= cost of the game package

Then g+25 = cost of the financial package

So g+25=115

Your turn:

Write an equation that represents each sentence:

Three times a number x is 18

Sixteen is a number m divided by 3

A number t more than 9 is 17

A number z decreased by 3 is 39

The product of 15 and a number k is 105

Two subtracted from a number b is 9

Thirty-five is a number t increase by 7

The low temperature on Monday was 10 F , which is 15F less than the low temperature on Sunday

Last week Collin earned $297, which is twice the amount that Greg earned.

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Some problems describe a relationship between two or more numbers. To solve this type of problem, choose a variable to represent one of the unknown numbers in the problem. Use that variable to write expressions for the other unknown numbers. Then use the facts of the problem to write an equation. You solve the problem by solving this equation and finding the unknown numbers.

A parking garage charges $5 for the first hour and $3 for each additional hour. On a recent day, a motorist paid $23 to park a car in the garage. How many hours was the car parked in the garage?

The problem is about the cost of parking a car in a parking garage. Facts: $5 for first hour, and $3 for each additional hour. Total number was $23.

Find: the number of hours the car was parked.

To solve, you choose a variable and decide what the variable will represent. Use the variable to write expressions and then an equation for the problem. Solve the equation to answer the question.

Let h= the number of additional hours the car was parked. Then 3h= the cost for the additional hours. The cost for the first hour plus the cost for the additional hours is $23.

$5 + 3h=23$ then solve for h:

$$5+3h=23$$
$$-5 \quad -5$$
$$3h=18$$
$$\frac{3h}{3}=\frac{18}{3}$$

h=6—the car was parked for 6 hours.

Your turn solve using an equation:

The greater of two numbers is nine less than four times the other number. If the greater number is 71, find the lesser number.

Evan bought a computer system for $989. He made a $125 down payment and paid the remaining in twelve equal payments. What was the amount of each payment?

Solve any way:

Collin Maryon bought 5 shirts at $14 each and six pairs of socks at $3.50 each. What was the total cost of his purchase?

REVIEW

64 oz=_____lb

The sum of three times a number and seven is 55. Find the number.

6m+3=-15 89=10q-11

Write a variable expression that represents each phrase.

A number z divided by fourteen

Seven more than a number n is 35.

Amy has twenty-two CDs, which is nine fewer than Danielle has.

4739-322 86545÷5

Solve equations by simplifying expression involving combining like terms and the distributive property.

Solve 4x +3x=560

Add the two variables by combining like terms 4x +3x=7x

7x=560 Divide each side by 7 and your answer is 80

Your turn:

7n +4n=132

2(3v+4)=-40

-5c+9c=-20

5(2x+7)=45

4y+7+8y=43

36=6b-6+b

-12=3(2x-10)

36=4(z+11)

56÷7=	15÷3=	12÷6=	8÷2=	63÷7=	0÷4=
14÷2=	42÷6=	6÷1=	16÷8=	20÷5=	49÷7=
36÷4=	64÷8=	0÷3=	54÷9=	4÷2=	48÷8=
18÷9=	3÷1=	35÷5=	8÷4=	72÷8=	6÷6=
0÷5=	42÷7=	2÷2=	36÷9=	7÷1=	12÷3=
16÷2=	30÷5=	0÷1=	28÷7=	4÷4=	40÷8=
3÷3=	32÷8=	45÷5=	4÷1=	20÷4=	15÷5=
56÷8=	5÷1=	0÷8=	6÷2=	45÷9=	0÷6=
6÷3=	21÷7=	0÷9=	7÷7=	12÷4=	18÷6=
63÷9=	18÷3=	27÷9=	24÷3=	0÷2=	28÷4=
21÷3=	16÷4=	24÷8=	10÷5=	30÷6=	1÷1=
18÷2=	27÷3=	32÷4=	9÷1=	35÷7=	40÷5=
10÷2=	8÷8=	48÷6=	5÷5=	8÷1=	24÷6=
25÷5=	9÷3=	81÷9=	24÷4=	14÷7=	12÷2=
9÷9=	54÷6=	72÷9=	0÷7=	2÷1=	36÷6=

A formula is an equation that states a relationship between two or more quantities. The quantities are usually represented by variables. The variable used is often the first letter of the word it represents.

For instance, the distance formula represents a relationship between distance (D), rate), and time (t).

distance=rate x time or D=rt

Find the distance when r=55 mi/hr and t =3hours

Find the time when D=240 mi and r=40 mi/hour.

Use the formula C=p-d where C represents cost, p represents price, and d represents discount.

p=$50, d=$5, and C=

p=$240, d=$60, C=

Geometry is a branch of mathematics that involves many formulas. These include formulas for perimeter and area. In order to do problems in geometry, you will often have to work with formulas.

Remember the area of a rectangle is A=lw Area=length x width

length is 8 and width is 2, what is the area of the rectangle?

56÷7=	15÷3=	12÷6=	8÷2=	63÷7=	0÷4=
14÷2=	42÷6=	6÷1=	16÷8=	20÷5=	49÷7=
36÷4=	64÷8=	0÷3=	54÷9=	4÷2=	48÷8=
18÷9=	3÷1=	35÷5=	8÷4=	72÷8=	6÷6=
0÷5=	42÷7=	2÷2=	36÷9=	7÷1=	12÷3=
16÷2=	30÷5=	0÷1=	28÷7=	4÷4=	40÷8=
3÷3=	32÷8=	45÷5=	4÷1=	20÷4=	15÷5=
56÷8=	5÷1=	0÷8=	6÷2=	45÷9=	0÷6=
6÷3=	21÷7=	0÷9=	7÷7=	12÷4=	18÷6=
63÷9=	18÷3=	27÷9=	24÷3=	0÷2=	28÷4=
21÷3=	16÷4=	24÷8=	10÷5=	30÷6=	1÷1=
18÷2=	27÷3=	32÷4=	9÷1=	35÷7=	40÷5=
10÷2=	8÷8=	48÷6=	5÷5=	8÷1=	24÷6=
25÷5=	9÷3=	81÷9=	24÷4=	14÷7=	12÷2=
9÷9=	54÷6=	72÷9=	0÷7=	2÷1=	36÷6=

REVIEW

Is the given number a solution of the equation write Yes or No

x-3=7; 10 9=t+7;16

Use mental math to solve:b

11=r +6 $13=\frac{b}{5}+3$

Solve and check.

r +12=15 b-4=-6

1+4n=9 -13=5+2r

Write a variable expression that represents each phrase.

6 less than 8 times a number q

4 more than twice the number of tickets sold yesterday

7 times as many books as Autumn read last year

Write an equation that represents the relationship:

A number x decreased by 15 is33.

Jim has 48 cars, which is three times as many as Mike has.

Solve:

-2x-7x=18

110=5(1+3k)

Use the formula C=np, where C is the total cost, n is the number of items purchased, and p is the price per item.

Amy spent $60 for 8 tickets. What was the price of each ticket?

Solve:

-72=6p-30

$15+\frac{m}{8}=20$

Write a variable expression:

eighteen ore than four times a number z

ten times the number of books Sam sold

Write an equation:

A number n divided by 8 is 90

Solve:

-12x+3+5x=38

6(8+3q)=66

Some equations have variables on both sides. To solve, you need to get the variable alone on one side.

*Remember whatever you do to one side, you have to do to the other side.

Practice:

7n+10=3n+2

5h-7=2h+2

1+9h=4h+11

2v+7=4v-19

8x+17=9x-8

-7g=2g+36

-5+12v=11v-7

8u=6u-20

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Chips	
Chocolate	
Candy	

 =10 items sold

 =10 items sold

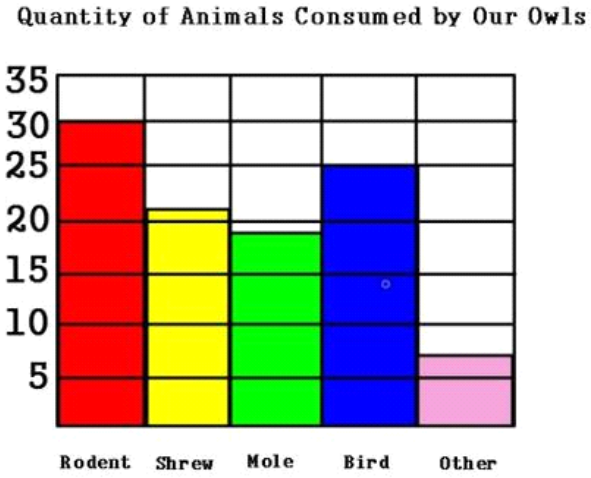
 =10 items sold

A graph is a picture that displays numerical facts, called data. One type of graph that you often see is a pictograph. In this type of graph, a symbol is used to represent a given number of items. A key on the graph tells you how many items the symbols represents. it is important to note that pictographs show only approximations of the data.

From the graph above, about how many chocolate were sold?

How many more bags of chips over candy were sold?

Do an internet search and find more examples of pictographs and figure out the data from them.



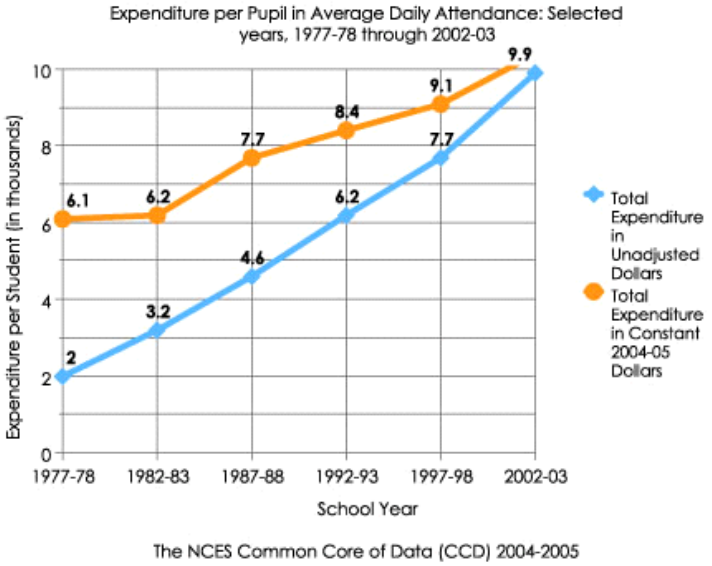
Another type of graph is a bar graph. This makes it easier to compare things. It has two axes. One axis is labeled with a numerical scale. The other is labeled with the categories. When reading a bar graph, you might find it is often necessary to estimate where the bars end.

Using the above graph.

What is the animal that is mainly consumed by owls?

About how many birds and moles are consumed by owls?

Do an internet search on different bar graphs so that you can understand them.



Another type of graph is called a line graph. A line graph shows an amount and a direction of change in data over a period of time. In a line graph the data are represented by points. These points are connected by line segments.

If a series of segments on a line graph slopes upward over a given interval, there is an increasing trend in the data over that interval. If a series of segments slopes downward, there is a decreasing trend over that interval.

Double line graphs such as the one above, are useful for comparing trends in two sets of data.

You will put these tools to work in tomorrows lesson.

Draw a bar graph to display the data.

Adults participating in Leisure Activities (millions)

activity	bicycling	swimming	softball	volleyball
adults	60	39	75	34

Draw a line graph to display the data.

Average payment period, finance company loans on new cars.

year	1994	1995	1996	1997	1998	1999	2000
number of months	48.3	53.5	50	53.5	56.2	54.2	60

Mean, Median, Mode, and Range

That branch of mathematics that deals with collecting, organizing, and analyzing data is called statistics. Statisticians use graphs and a variety of statistical measures to describe a set of data.

The mean or average of a set of data is the sum of the data items divided by the number of items.

The median of a set of data is the middle number when the data are listed in numerical order. If there is an even number of items, the median is the average of the two middle numbers.

The mode of a set of data is the item that appears most often. There can be more than one mode. There can also be no mode, if each item appears only once.

The range of a set of data Is the difference between the greatest and least values of the data.

*When you divide to find the mean, you may get an answer with many decimal places. When this happens you should round the answer to the nearest tenth.

Your turn:

Find the following from 2,7,7,10,12

mean

median

mode

range

Find the following from 20,16,22,16,15,20,21,16

mean

median

mode

range

56÷7=	15÷3=	12÷6=	8÷2=	63÷7=	0÷4=
14÷2=	42÷6=	6÷1=	16÷8=	20÷5=	49÷7=
36÷4=	64÷8=	0÷3=	54÷9=	4÷2=	48÷8=
18÷9=	3÷1=	35÷5=	8÷4=	72÷8=	6÷6=
0÷5=	42÷7=	2÷2=	36÷9=	7÷1=	12÷3=
16÷2=	30÷5=	0÷1=	28÷7=	4÷4=	40÷8=
3÷3=	32÷8=	45÷5=	4÷1=	20÷4=	15÷5=
56÷8=	5÷1=	0÷8=	6÷2=	45÷9=	0÷6=
6÷3=	21÷7=	0÷9=	7÷7=	12÷4=	18÷6=
63÷9=	18÷3=	27÷9=	24÷3=	0÷2=	28÷4=
21÷3=	16÷4=	24÷8=	10÷5=	30÷6=	1÷1=
18÷2=	27÷3=	32÷4=	9÷1=	35÷7=	40÷5=
10÷2=	8÷8=	48÷6=	5÷5=	8÷1=	24÷6=
25÷5=	9÷3=	81÷9=	24÷4=	14÷7=	12÷2=
9÷9=	54÷6=	72÷9=	0÷7=	2÷1=	36÷6=

Calculating statistical measures for data in a frequency table.

Mrs. Smith's first period gym class was doing a unit on health. The students were asked to measure their pulse rates. They organized the data in a frequency table shown below.

Pulse Rates (beats/min)		
rate	tally	frequency
69	𝍸 |	6
70	𝍸 |	6
71	|	1
72	𝍸 𝍸	10
73	𝍸 |	6
total		29

Do you see how the students made tally marks to count how many students had the amount of that pulse? Then they wrote the frequency.

From this information you can find the mean, median ,mode, and range from this frequency table.

Multiply each rate by its frequency: 69•6=414
70•6=420
71•1=71
72•10=720
73•6=438
ADD: 2063

Divide by the total of the frequencies: 2063÷29=71.1

The mean is about 71.1 beats/min

There are twenty-nine items. The median is the middle item, so look for the 15th item. The median is 72 beats/min.

Subtract 73-69=4. The range is 4 beats/min.

Your turn. Use an online search to find the minimum age requirement for obtaining a moped license in each of the fifty states. Make a frequency table for the data.

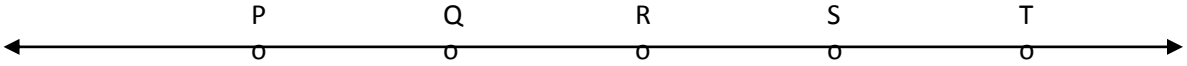
Then use your frequency table that you made and find the mean, median, mode, and range of the data.

A point is an exact location in space. A point has no size, but you use a dot to represent a point. You name a point by a capital letter. point A

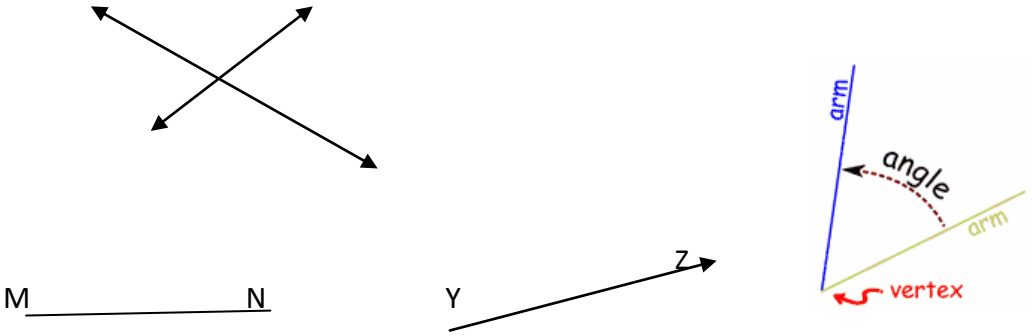
A line is a straight arrangement of points that extends forever in opposite directions. You can name a line using any two points on the line. line XY it is also written $\overleftrightarrow{XY}$

A planeis a flat surface that extends forever. A plane has no edges, but you can use a four-sided figure to represent a plane. You can name a plane using a capital letter. plane W

Points that lie on the same line are called collinear points. In the figure below, points P,Q,R,S, and T are collinear.



Two lines that meet at one point are said to intersect in that point.



A line segment is a part of a line that consists of two endpoints and all the points between. You name a line segment using its endpoints. line segment MN

A ray is a part of a line that has one endpoint and extends forever in one direction. You name a ray by writing the end point first, then writing one other point on the ray. ray YZ

When two rays share a common endpoint, the figure that is formed is an angle. The endpoint is called the vertex of the angle, and the rays are called the sides.

To name an angle using three letters, the vertex letter must be in the center.

Your turn:

Draw a line GH

Draw angle ONM

Draw line segment HG

Draw point P

line Q

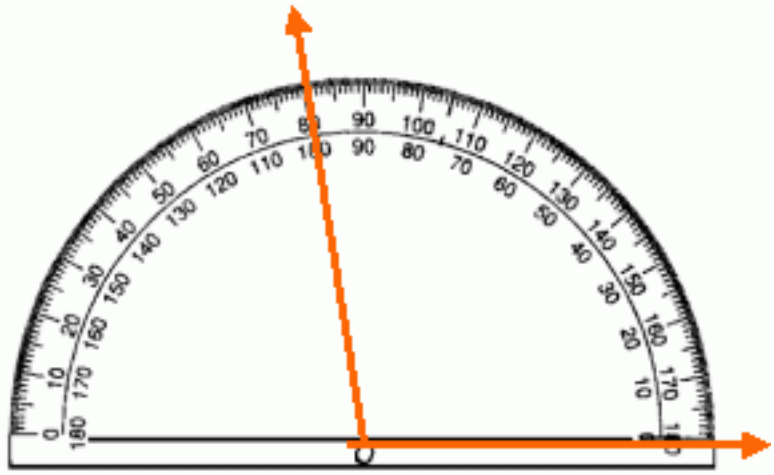
Angle NMO

plane r

Protractor

The architect who plans a building usually presents the plan in a blueprint. A blueprint shows not only the sizes of pieces such as walls and built in cabinets, but also their positions in relation to each other. To show positions accurately, the architect indicates the size of the angle formed where these pieces meet.

The unit that is commonly used to measure the size of an angle is the degree. The number of degrees in an angle's measure indicates the amount of openness between the sides of the angle. To measure an angle, you use the geometric tool called a protractor.



Use a protractor to measure the angle. Put the center mark of the protractor on the vertex of the angle. Place the 0 degrees mark on one side of the angle, then read the number where the other side crosses the scale. The measure of this is 100 degrees.

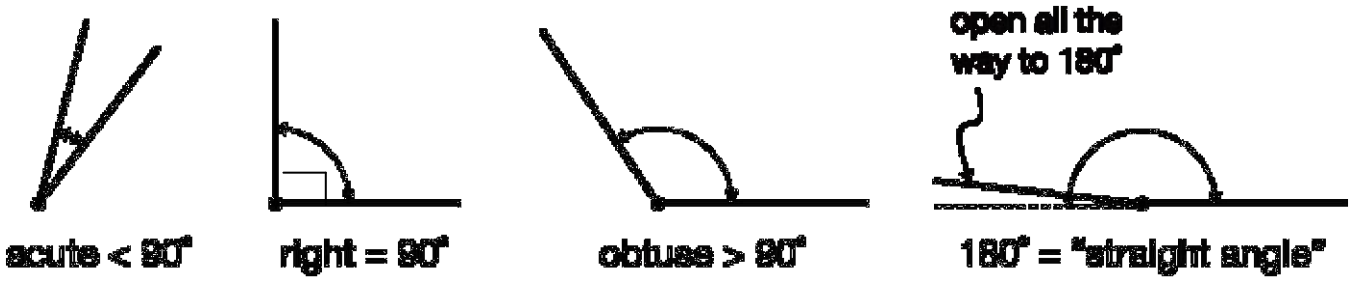
Use a protractor to draw angle RST with a measure of 160 degrees.

Use a protractor to draw an angle of 35 degrees

Use a protractor to draw an angle of 90 degrees

Draw angle JKL, which has a measure of sixty degrees.

Types of angles



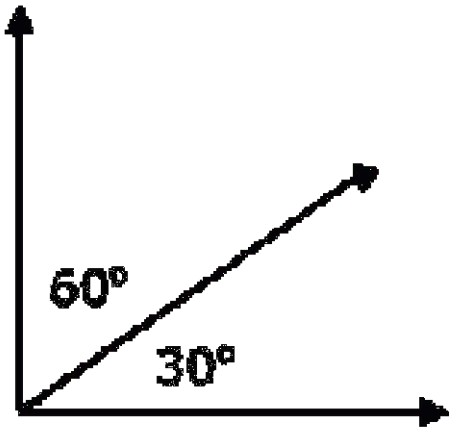
A acute angle is anything less than 90 degrees.

A right angle is exactly 90 degrees. A small square indicates a right angle.

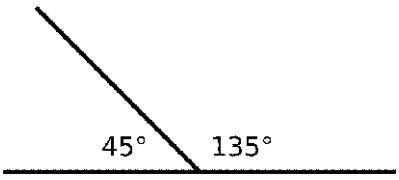
An obtuse angle is greater than 90.

A straight line is 180 degrees.

Two angles are complementary when the sum of their measure is 90 degrees.

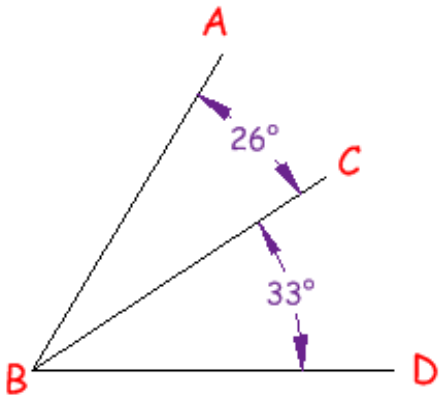


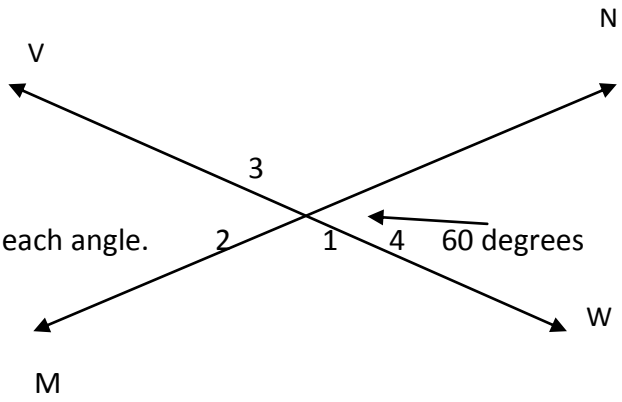
Two angles are supplementary when the sum of their measures is 180 degrees



Two angles that share a common side, but do not overlap each other are called adjacent angles.

In the figure below at the left. <ABC and <CDB are adjacent, but <ABD and<CBD are not.





Use the figure at the right to find the measure of each angle.

<2 and <3

<2 and <4 are vertical angles, they are equal. since <4 is 60 degrees then <2=60°

<3 and <4 are supplementary angles, so m<3=180°-m<4=180°-60°=120°

Your turn:

Tell whether two angles with the given measures are complementary, supplementary, or neither:

40°,50°

125°,55°

12°,88°

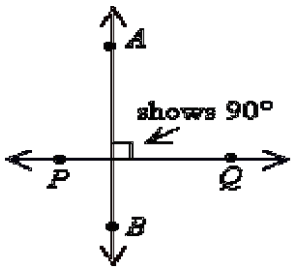
Replace each ____with always, sometimes, or never to make a true statement.

A supplement of an obtuse angle is _____an acute angle.

A complement of an acute angle is _____-an obtuse angle.

The measure of an angle is_____equal to the measure of its supplement.

Two vertical angles are are supplementary are _____right angles.

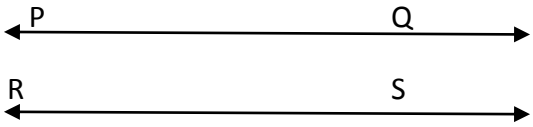


Two lines that intersect to form right angles are perpendicular lines.

In the figure you see that <AQ is a right angle by the box. So you know that $\overleftrightarrow{AB}$ and $\overleftrightarrow{PQ}$ are perpendicular. The symbol for is perpendicular to is ⊥

Line AB is perpendicular to line XY $\overleftrightarrow{AB} \perp \overleftrightarrow{XY}$

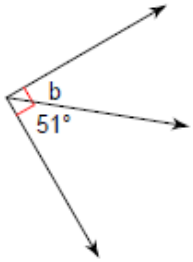
Two lines in the same plane that do not intersect are parallel lines. In these two lines they will always remain the same distance apart, so they are parallel. The symbol for parallel is ‖



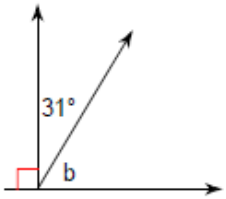
$\overleftrightarrow{PQ} \parallel \overleftrightarrow{RS}$

Your turn: Find the measure of the angles b in each of the following:

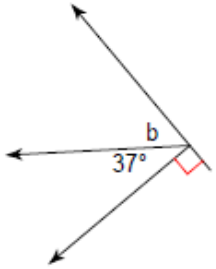
1)



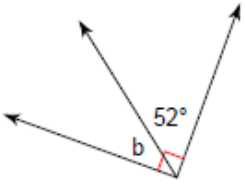
2)



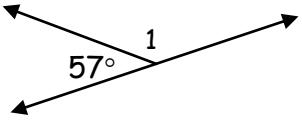
3)

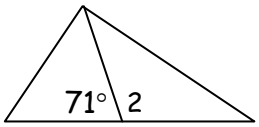


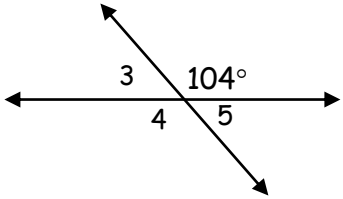
4)

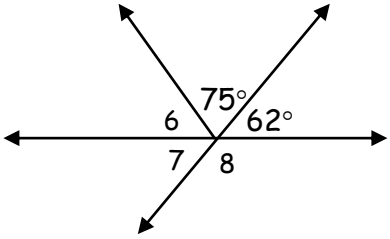


Find the measures of angles 1 through 8.





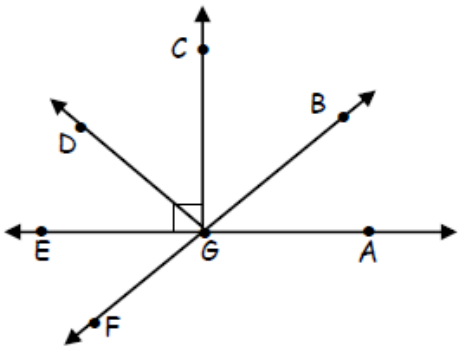




Use the diagram on the right to name:

a) two complementary angles

b) two adjacent angles



A shape is any closed two dimensional geometric figure that has an inside and an outside. A solid is just like a shape, only it's three dimensional.

Shapes are 2 basic types: polygons and nonpolygons. A polygon has all straight sides, and you can identify by the number of sides they have.

Polygon	Number of sides
Triangle	3
Quadrilateral	4
Pentagon	5
Hexagon	6
heptagon	7
octagon	8
nonagon	9
decagon	10

Any shape that has at least one curved edge is a nonpolygon. The most common is a circle.

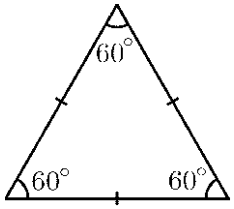
Draw me a pentagon

Draw me a hexagon

56÷7=	15÷3=	12÷6=	8÷2=	63÷7=	0÷4=
14÷2=	42÷6=	6÷1=	16÷8=	20÷5=	49÷7=
36÷4=	64÷8=	0÷3=	54÷9=	4÷2=	48÷8=
18÷9=	3÷1=	35÷5=	8÷4=	72÷8=	6÷6=
0÷5=	42÷7=	2÷2=	36÷9=	7÷1=	12÷3=
16÷2=	30÷5=	0÷1=	28÷7=	4÷4=	40÷8=
3÷3=	32÷8=	45÷5=	4÷1=	20÷4=	15÷5=
56÷8=	5÷1=	0÷8=	6÷2=	45÷9=	0÷6=
6÷3=	21÷7=	0÷9=	7÷7=	12÷4=	18÷6=
63÷9=	18÷3=	27÷9=	24÷3=	0÷2=	28÷4=
21÷3=	16÷4=	24÷8=	10÷5=	30÷6=	1÷1=
18÷2=	27÷3=	32÷4=	9÷1=	35÷7=	40÷5=
10÷2=	8÷8=	48÷6=	5÷5=	8÷1=	24÷6=
25÷5=	9÷3=	81÷9=	24÷4=	14÷7=	12÷2=
9÷9=	54÷6=	72÷9=	0÷7=	2÷1=	36÷6=

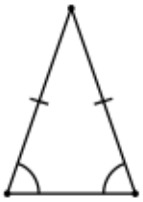
Triangles are a type of 3 sided polygon. Triangles are classified on the basis of their sides and angles.

An equilateral triangle, has three sides that are all the same length and three angles that measure 60 degrees. Look back at your protractor.

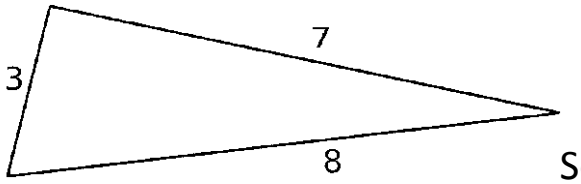


Equilateral

Isosceles triangle, has two sides that are the same length and two equal angles.

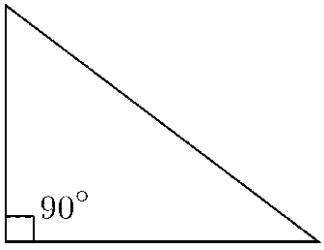

Isosceles Those marks show that those sides are equal and that those angles are equal.

Scalene triangle has three sides that are all different lengths and three different sized angles.



Scalene

A right triangle, has one right angle and it may be isosceles or scalene.



right

The triangle inequality.

In any triangle, the sum of the lengths of any two sides is greater than the length of the third side.

Tell whether line segments of the given length can or cannot be the sides of a triangle. If they can tell whether the triangle would be scalene, isosceles, or equilateral.

8ft, 7ft, 9ft

First compare each sum of two lengths to the third length.

8+7=15>9 8+9=17>7 7+9=16>8

Each sum of two lengths is greater than the third, so the line segments can be the sides of the triangle. No lengths are the same, so the triangle is scalene.

Your turn:

9m,3m,4m

Another way to classify is by the measure of their angles.

Acute triangle all angles are less than 90°.

Right triangle one angle is a right angle—represented by the little square in the corner.

Obstuse triangle one angle is an obtuse angle.

All angles within a triangle equal 180°. If we are given two angle measurements, we can find the other one.

The measures of two angles of a triangle are 28 and 40 degrees. Tell whether the triangle is acute, right, obtuse.

Add the known measures together: 28+40=68. Subtract that from 180. 180-68=112 degrees.

The third angle measure is 112, so the triangle is obstuse.

Your turn:

Tell whether the line segments of the given lengths can or cannot be the sides of a triangle. If they can, tell whether the triangle would be scalene, isosceles, or equilateral.

1 ft, 1 ft, 1 ft

Tell whether the line segments of the given lengths can or cannot be the sides of a triangle. If they can, tell whether the triangle would be scalene, isosceles, or equilateral.

6cm, 4.5 cm, 4.5 cm

6 mm, 9mm, 4mm

The measures of two angles of a triangle are given. Tell whether the triangle is acute, right, or obtuse.

27, 141 degrees

50 degrees, 50 degrees

34°,56°

Tell whether each statement is True or False.

An obtuse triangle can have a right angle.

An equliateral triangle is also an isosceles triangle.

A right triangle can be a scalene triangle.

An acute triangle can never be an equilateral triangle.

REVIEW

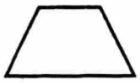
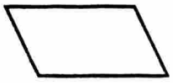
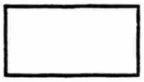
Use the formula P=2l+2w. Let l=11cm and P=34 cm. Find w

Find the quotient 6/7÷2/3

Find the difference -13-(-24)

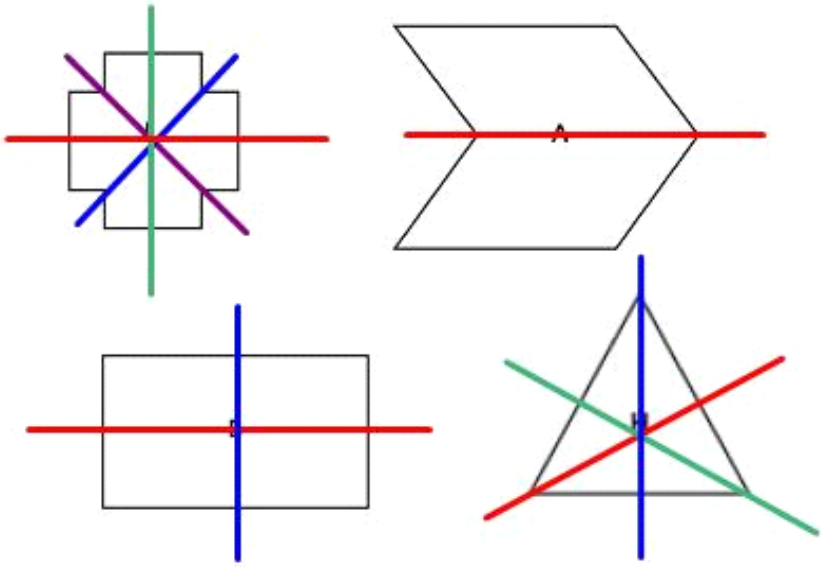
632x25.98=

Classification of Quadrilaterals

Shape	Characteristic	Name
	No sides parallel	Trapezium
	Exactly one pair of parallel sides	Trapezoid
	Two pairs of parallel sides	Parallelogram
	Parallelogram with congruent sides	Rhombus
	Parallelogram with right angles	Rectangle
	Rectangle with congruent sides	Square

Note that squares, rectangles, and rhombuses are types of parallelograms and that a square is a type of rectangle and a type of rhombus.

Line of symmetry. To draw a line of symmetry that divides each geometrical plane exactly in half is called line of symmetry. Here are some examples.



Your turn:

Draw a trapezoid

Draw a parallelogram

Does a kite have a line of symmetry

Does a snowflake have a line of symmetry

Which of the following letters has a line of symmetry: G Q F M

Review

5325÷25 round to two decimal points

32298x8=

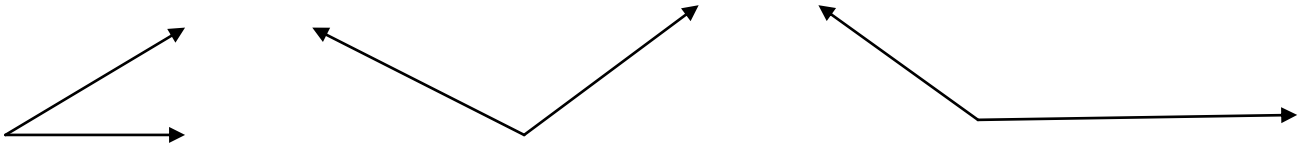
REVIEW

Draw a line segment GH

Draw an acute angle PQR

Draw a parallelogram

Use a protractor to measure each angle.



Use your protractor to draw an angle of the given measure.

25° 165° 62°

Find the measure of a complement of an angle of the given measure.

24° 45° 88°

Find the measure of a supplement of an angle of the given measure:

30° 85° 75°

Tell whether the triangle would be scalene, isosceles, or equilateral

8cm, 8cm, 8cm

7mm, 24mm, 25mm

Tell whether the triangle is acute, right, or obtuse.

15,52 degrees

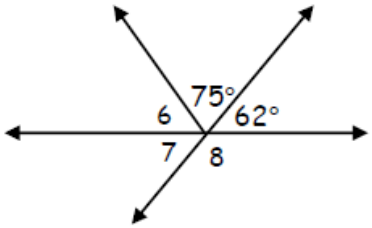
45, 45 degrees

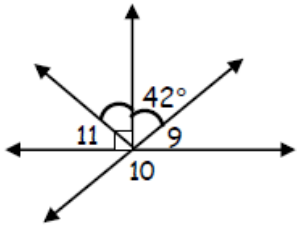
38, 67 degrees

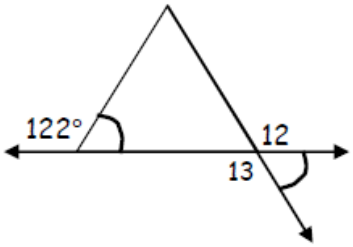
Draw an oval with a line of symmetry

Find the angle measurements of :

6
7
8
9
10
11
12
13







Factors and Prime Numbers

Remember that when one whole number is divisible by a second whole number, the second number is a factor of the first. A whole number greater than 1 with exactly two factors, 1 and the number itself, is called a prime number. A composite number has more than two factors.

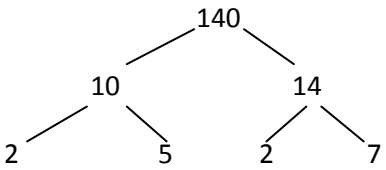
Tell whether each number is prime or composite.

11= The only factors of 11 are 1 and 11. Prime

21= The factors of 21 are 1,3,7, and 21. Composite

31= The only factors of 31 are 1 and 31. Prime

You can make trees to find the prime factorization of a number.



$140=2\bullet2\bullet5\bullet7=2^2\bullet5\bullet7$

Your turn:

Rewrite each statement using exponents.

$450=2\bullet3\bullet3\bullet5\bullet5$

Find all the factors of each number

48 64 37

Tell whether each number is prime or composite

27 100 19 96

Find the mean, median, mode, and range

84,96,72,77,91

Find the sum 9/16+3/4

Write the prime factorization of 96

Find the answer -12-(-12)

Find the next three expression in the pattern:

20n+5, 18n+5, 16n+5, _____,_____,_____

542x2.2

8932÷20 to two decimal places

Greatest common factors

A number that is a factor of two numbers is called a common factor of those two numbers. The greatest number in a list of common factors is called the greatest common factor GCF.

Find the GCF of 28 and 40.

28:1,2,4,7,14,28

40:1,2,4,5,8,10,20,40

The common factors of 28 and 40 are 1,2,4

The GCF of 28 and 40 is 4.

To find the GCF of variable expressions, include in it the least power that appears for each common variable factor.

Find the GCF of $12a^4$ and $27\ a^6$

$12a^4=2^2 \bullet 3 \bullet a^4$

$27a^6=3^3 \bullet a^6$

$GCF=3 \bullet a^4=3a^4$

Your turn:

Find the GCF

2 and 16

40 and 100

45,72,108

Find the GCF

48a and 51 a

$18y^5$ and $30y^2$

True or False

The GCF of an odd and an even number is always an odd number.

The GCF of a prime number and an even number is always odd.

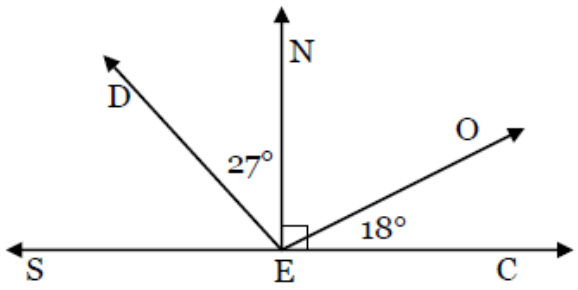
The GCF of a prime number and an odd number is always odd.

REVIEW

Find the measure of each angle.

a. m∠NEO = _____ b. m∠DES = _____

c. m∠DEO = _____ d. m∠SEO = _____

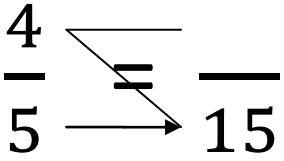


Equivalent Fractions

Fractions that represent the same amount are called equivalent fractions. Remember doing the Z method?

Sometimes at the beginning of a fraction problem, you need to increase the terms of a fraction. This means to write the fraction using a greater numerator and denominator. To increase the terms, multiply both the numerator and denominator by the same number. Also known as the backward Z method☺

You say to yourself…how many times does 5 go into 15? Three times. Then 3 x4 = 12. 12 is your answer



You solve:

Increase the terms of the fraction 2/3 so that the denominator is 18. Write it out with the above method.

Increase the terms of the fraction ¾ so that the denominator is 16.

Increase the terms of the fraction 1/8 so that the denominator is 64.

Increase the terms of the fraction ½ so that the denominator is 12.

Increase the terms of the fraction 4/5 so that the denominator is 25.

Reducing fractions to lowest terms

Reducing fractions is similar to increasing fractions, except it involves division rather than multiplication. But sometimes you can't always divide so reducing takes a little bit more work☺

When reducing fractions, its helpful to know your factoring. We did that a little bit ago. (Trees and GCF).

When shown a fraction, think in your head, what is the greatest number that will divide evenly into those numbers.

Reduce $\frac{12}{15}$ to lowest terms.

I would have to think what factors make up 12: 2,3,4,6
Which make up 15: 3,5
What is the largest common factor between the two? answer is 3.
Take and divide BOTH the numerator and denominator by 3
3 goes into 12=4 times
3 goes into 15=5 times Your answer is $\frac{4}{5}$

Reduce the following fractions to lowest terms:

$\frac{25}{75}$=_____ $\frac{15}{25}$=_____ $\frac{11}{33}$=_____

$\frac{12}{16}$=_____ $\frac{20}{30}$=_____ $\frac{14}{28}$=_____

$\frac{12}{60}$=_____ $\frac{135}{180}$=_____ $\frac{32}{40}$=_____

Simplifying algebraic fractions

You have worked with fractions in arithmetic. You can apply what you know to work with fractions in algebra. A fraction that contains a variable is called an algebraic fraction.

In arithmetic 3/5—the top is the numerator and the bottom denominator

In algebra a/b-the top is the numerator and the bottom denominator

Any fraction represents a division, so you know that the denominator of a fraction cannot be zero.

You simplify a fraction or an algebraic fraction by writing it in lowest terms. To do this, write the prime factorization of both the numerator and the denominator, then divide by all the common factors.

Simplify $\frac{10xy}{8x} = \frac{2 \cdot 5 \cdot x \cdot y}{2 \cdot 2 \cdot 2 \cdot x} = \frac{5y}{4}$

Your turn:

$\frac{6z}{14}$

$\frac{10j}{15j}$

$\frac{a^9}{a^6}$

$\frac{30}{6y}$

Simplify the algebraic fraction whose numerator is 21n and whose denominator is 3n

Simplify the algebraic fraction whose numerator is b^6 and whose denominator is 6b

Simplify

$$\frac{9z^{15}}{3z^3}$$

$$\frac{20m^8}{24m^3n^2}$$

$$\frac{3a^4b^3}{15a^2b}$$

Comparing fractions with cross multiplication

This is a great tool to know when comparing two fractions. Sometimes a math question could be is ½ larger than 3/8 ? How do you know? This is how you do it!

1. Multiply the numerator of the first fraction by the denominator of the second, writing the answer below the first fraction.

2. Multiply the numerator of the second fraction by the denominator of the first, writing the answer below the second fraction.

Then you take the denominators of the two fractions to find the new denominators.

What fraction is greater 5/8 or 6/11?

$$\frac{5}{8} \quad \frac{6}{11}$$

55 48

Then multiple the denominators 8•11=88 Use this number as your common denominator:

$\frac{55}{88}$ $\frac{48}{88}$ Since 55/88 is greater than 48/88, 5/8 is larger than 6/11

Which is the greater fraction: 2/9 or 4/7

Which is greater 3/5 or 6/11

Which is least 1/3 or 2/7

Which is greater

1/6 or 1/7

21/30 or 7/10

5/12 or 3/8

¾ or 7/9

Fractions and decimals

You can write any fraction as a decimal by dividing the numerator by the denominator. When the division results in a remainder of zero, the decimal is called a terminating decimal. When the remainder is not zero and a block of digits in the decimal repeats, the decimal is called a repeating decimal. You indicate that a block of digits repeats by putting a bar over those digits.

Write each fraction or mixed number as a decimal.

7/11—type in the calculator you get 0.63636363 that is a repeating decimal, write it as $=0.\overline{63}$

1 3/8 type in the calculator 3 divided by 8 you get =0.375 add the 1 in front= 1.375

Write each decimal as a fraction or mixed number in lowest terms.

0.555

$\frac{555}{1000}=\frac{111}{200}$

4.24

$4+\frac{24}{100}=4\frac{6}{25}$

Changing decimals to fractions

There are some common decimals to fractions converts that you should memorize in life.

.1= 1/10
.2= 1/5
.3= 3/10
.4= 2/5
.5=1/2
.6= 3/5
.7=7/10
.8=4/5
.9= 9/10

25= ¼
.50= ½
.75= ¾

.125=1/8
.375=3/8
.625=5/8
.875=7/8

.33= 1/3 or $.\overline{3}$
.66= 2/3 or $.\overline{6}$
the bar means repeating number

.
The other ones you will have to do a different approach and do some work.

0.3, the 3 is in the tenths place. So you put 3 over 10: $\frac{3}{10}$

.27 the 27 goes over to the hundredths place, So you put 27 over 100: $\frac{27}{100}$
**remember to reduce down if at all possible.

Your turn:

Rewrite each repeating decimal with a bar over the repeating digits.

0.416666….

1.825825

Write each decimal as a fraction whose denominator is a power of ten

0.18

9.44

Write each fraction or mixed number as a decimal

9/20

7 1/3

Write each decimal as a fraction or mixed number in lowest terms.

0.205

3.62

Write each fraction or mixed number as a decimal

7/10 3/5

9/11 1/33

4 4/25 9 13/15

Write each decimal as a fraction or a mixed number in lowest terms

0.432 0.525

0.19 3.32

$0.\overline{16}$ $2.\overline{6}$

Use a calculator, find the decimal equivalents for the fractions:

1/5

1/15

1/25

1/50

1/30

1/35

1/45

Draw a diagram to answer the following questions.

Greg lives 8 blocks due east of Collin. Collin lives 3 blocks due west of Evan. Where does Evan live in relation to Greg.

How many diagonals can be drawn in a hexagon?

An elevator started at ground level. It rose 15 floors, descended 3 floors, rose 8 floors, descended 12 floors, and descended 2 floors. At this point, where was the elevator relative to ground level?

Rational numbers

You have worked with whole numbers, integers, and fractions. All these numbers can be written in fractional form. For example, 5= $\frac{5}{1}$ and -3=$\frac{-6}{2}$. Any number that can be written as a quotient of two integers $\frac{a}{b}$, where b does not equal zero, is called a rational number. All whole numbers, integers, and arithmetic fractions as well as many decimals are rational numbers.

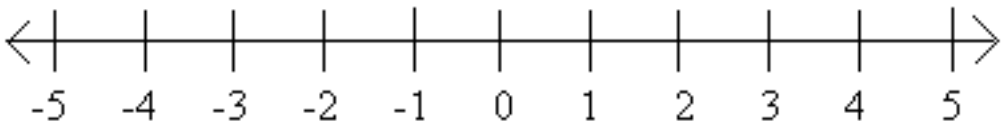
Express each rational number as a quotient of two integers.

-16 can be expressed as -$\frac{16}{1}$ 2 4/7 expressed as $\frac{18}{7}$

Numbers that cannot be written as the quotient of two integers are called irrational numbers. These numbers are nonrepeating, nonterminating decimals. Any number that is either rational or irrational is called a real number.

Every real number can be represented by a point on a number line.

Your turn:



Mark the following points on the number line.

A= -1.5 B -1.35 C= 2 1/3

Express each rational number as a quotient of two integers.

12 3/5 -50 10 5/12

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

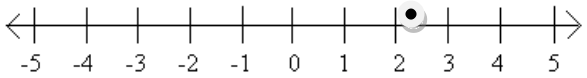
An open sentence is by itself neither true nor false. When you substitute a real number for the variable, however, you can determine whether the result is true or false. Any value of the variable that results in a true sentence is called a solution of the open sentence. Because a solution is a real number, you can show the graph of an open sentence in one variable by graphing all the solutions on a number line.

Graph the equation 8=12+x

First solve the equation. 8=12+x remember to get x by itself by subtracting 12 from each side.

8-12=12+x-12 -4=x

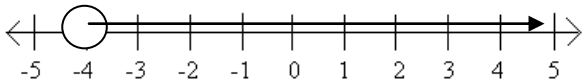
Now graph it.



A mathematical sentence that has an inequality symbol between two numbers or quantities is an inequality. When an inequality is an open sentence, like x> -4.2, there are infinitely many real-number solutions. To graph an inequality like this on a number line, you use an open dot and an arrow.

Graph >-4.2

Since -4.2 is not a solution of the inequality, you place an open dot at -4.2 on a number line. Then shade in a heavy arrow to the right to graph all numbers greater than -4.2



Two other inequality symbols that are commonly used in mathematics are a≤ b (a is less than or equal to b)

a≥b a is greater than or equal to b.

Your turn:

For each open sentence, choose all the given numbers that are solutions.

z +8=-1 a.7 b.-7 c.-9 d.9

Write each sentence in symbols.

A number n is greater than or equal to -4

Fifteen is greater than a number x

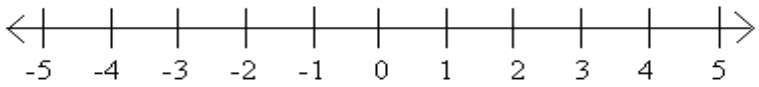
A number p is less than -2.25

Graph each open sentence.

n+4=-5

c-34=-29

g<2



Simplify

$\frac{30x}{42xy}$

Simplify negative exponents

$x^{-7} = \frac{1}{x^7}$

$3^{-3} = \frac{1}{3^3} = \frac{1}{27}$

$(-2)^{-2} = \frac{1}{(-2)^2} = \frac{1}{4}$

$(5.67)^0 = 1$

We learned how to write very large numbers in scientific notation.
$3.4x10^9 = 3.4x1{,}000{,}000{,}000 = 3{,}400{,}000{,}000$

Write 0.045 in scientific notation.

Move the decimal point to get a number that is at least 1, but less than 10. 4.5 (two places) $x10^{-2}$

Write 3.2×10^{-4} in decimal notation

Move the decimal point to the left. (move it four places) 0.00032

Your turn:

Simplify

4^4 6^3

$(-5)^3$ $(-2)^6$

8^{-2} $(-3)^{-3}$

Write each number in scientific notation:

0.0704

0.00005

Write each number in decimal notation

3.295×10^{-2}

1.7×10^{-5}

Draw me an obtuse, acute, and right angle

REVIEW

Tell whether each number is prime or composite

13 81 77 42

Write the prime factorization of each:

75:

216:

Find the GCG: greatest common factor

48 and 64 15xy and 24 x

Find the LCM –lowest common multiple

6 and 15 8 and 12

Write each fraction in lowest terms

6/12 8/10 48/10

Simplify

$\frac{10ac}{5c}$ $\frac{v^{12}}{v^5}$

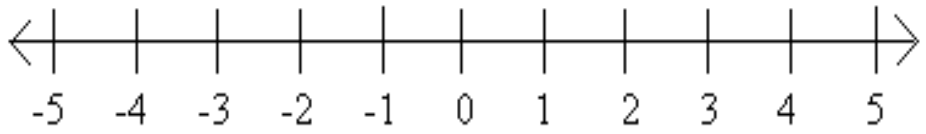
1/5 _____1/6 < > or =

Write each fraction as a decimal or mixed number

1/5 3/10 5/11

Write each decimal as a fraction or mixed number in lowest terms.

0.37 0.255



Draw on the number line each point:

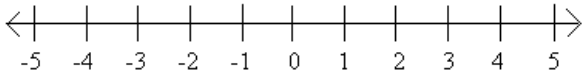
A 2.25 B .9/2 C -0.55 D 2 3/5

Write each number in scientific notation

0.0000074

Write each number in decimal notation

2.7×10^{-3}



Graph each open sentence

6=x +9 3w-8=1

Multiplying Fractions

Multiplying fractions is easy. Before you multiply, see if you can cancel out common factors that appear in both the numerator and denominator. Just like reducing a fraction. When you cancel and reduce out before you multiply, you get an answer that is already reduced to lowest terms.

$\frac{\cancel{3}^{1}}{\cancel{14}^{2}} \bullet \frac{\cancel{7}^{1}}{\cancel{9}^{3}} =$ to solve you can reduce down a numerator from the denominator by 7.

Then you can reduce down the 3 and the 9. Now just multiply across 1 x1=1 and 2x3=3 Answer $\frac{1}{3}$

**Remember when you reduce down—you can go only from a numerator and a denominator. Not across from each other.

Another example for algebraic equations:

Simplify $\frac{\cancel{5x}^{1}}{3} \bullet \frac{7a}{\cancel{10x}^{2}}$ multipliy $\frac{7a}{6}$

If you are given negatives in any problem, remember the rules for multiplying or dividing by negatives and positives. Two positives and the answer is positive, one negative and the answer is negative. Two negatives and the answer is positive.

Find $\frac{3}{8} \bullet \frac{6}{11}$ _____

Find $\frac{10}{33} \bullet \frac{11}{25} =$ _____

$\frac{2}{9} \bullet \frac{27}{14} =$ _____

$-\frac{9}{14} \bullet \frac{21}{3} =$ _____

$\frac{75}{33} \cdot \frac{11}{25} =$ _____

$\frac{7}{5} \cdot \frac{15}{3} =$ _____

$-\frac{22}{3} \cdot -\frac{12}{11} =$ _____

$\frac{2}{7} \cdot \frac{3}{4} =$ _____

$\frac{55}{48} \cdot \frac{6}{11} =$ _____

$\frac{7}{77} \cdot \frac{8}{88} =$ _____

Dividing of fractions

Remember when we reciprocated the fractions? The reciprocal of ½ is 2/1

When faced with a division problem for fractions, you don't actually divide. You flip the second number and then you multiply just like you did yesterday. Easy.

$\frac{5}{8} \div \frac{3}{8} =$ You actually rewrite it as $\frac{5}{8} \bullet \frac{8}{3} =$ Then you reduce down before you multiply. Then multiply across. 5x1=5 and 1x3=3 Answer is $\frac{5}{3}$ But we need to reduce down since it is an improper fraction. 3 goes into 5 how many times? 1 with 2 leftover. $1\frac{2}{3}$

Divide ¼ by 6/7. Rewrite the problem as a multiplication problem.

Find 3/5 ÷ 9/10

Find -8/9÷3/12

Find the following answers and reduce down to lowest terms.

$1/3 \div -4/5$

Find the following answers and reduce down to lowest terms

$-3/9 \div -21/27$

Find the following answers and reduce down to lowest terms

$5/25 \div 81/9$

Find the following answers and reduce down to lowest terms

$3/15 \div 7/45 =$

Addition of fractions

When you add fractions, one important thing to notice is whether the denominators are the same. If they are then you can just add the top numerators, but if they are not, you will have to make them equivalent.

1/5 + 2/5= 3/5 easy enough. What you are saying is that you have a pie that is cut into 5 pieces and you have one of those pieces. The other pie has 3 pieces of the pie cut into 5 pieces. When you add the pieces together you have 3 out of the 5 pieces of pie!

Add 2/7 +4/7=_____ rewrite them so that you can see them clearly.

Add 5/8 + 7/8 and reduce to lowest terms. Rewrite them so that you see them clearly.

Here is a quick way to add fractions. I will show you the "traditional" method but this is quick.

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

Step 1, cross multiply the two fractions and add the results together to get the numerator of the answer.
1 •5=5 and 2•3=6. Then add 5+6=11 11 is your numerator

Step 2, multiply the two denominators together to get the denominator of the answer.
3 •5= 15

Your answer is $\frac{11}{15}$

1. Now you try these: Add 7/9 and 8/9 to lowest terms

2. Find 5/6 +7/10 to lowest terms

3. Add 3/5 and 14/15

4. Find the sum of 3/17 and 10/19 in lowest terms—use calculator

5. Add 11/2 and 19/24

Now lets do some addition of fractions the traditional way.

We have to get the denominators the same . We have to know what is the lowest number that both the denominators will go into.

$\frac{3}{4} + \frac{7}{10}$ typically you can do the multiples of each number. Multiples of 4 are: 4,8,12,16,20,24 Multiples of 10 are: 10,20,30 oh wait stop they both have 20. So 20 is your new denominator.

$\frac{3}{4} = \frac{\quad}{20}$ now do the backwards z method to solve for the equivalent fractions. 4 goes into 20, 5 times and 5 x3= 15 so numerator is 15

$\frac{7}{10} = \frac{\quad}{20}$ now do the backwards z method to solve for the equivalent fractions. 10 goes into 20, two times and 2 x7=14, so numerator is 14

$\frac{15}{20} + \frac{14}{20} = \frac{29}{20}$ Reduced down $1\frac{9}{20}$

Now you solve using this method. Add 8/9 and 17/18

add 9/10 and 47/50

Now use whatever method you prefer for addition:

3/5 + 7/8

2/7 + 5/21

1/3 + 2/15

4/5 + 2/3

Addition and subtraction of fractions in algebra

You add the same way as you do in arithmetic.

Add the numerators and write the sum over the denominator.

$\frac{a}{c}+\frac{b}{c}=\frac{a+b}{c}$

To subtract rational numbers with like denominators, subtract numerators and write over the denominator

$\frac{a}{c}-\frac{b}{c}=\frac{a-b}{c}$.

Your turn:

$\frac{6}{x}+\frac{5}{x}=$

$\frac{11}{3m}-\frac{5}{3m}=$

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

$\frac{3c}{7}+\frac{5c}{7}+\frac{6c}{7}=$

Evan finished his math assignment in ¾ hour. Collin finished the same assignment in 1 ¼ hour. How much longer did it take Collin to do the assignment than Evan?

Lauren spent 1 3/8 hour cleaning the house, 7/8 hour doing the laundry, and 1 5/8 preparing food. How many hours did Lauren spend doing all the work?

From a 33 7/8 inch long board, Greg cut a piece of wood that was 10 5/8 inch long. The saw blade shaved 1/8 inch off the board. How long was the remaining piece?

Write 0.00000047 in scientific notation

Simplify 14m/5-9m/5

Solve however you would like:

1/8 + 3/16

2/7 + 1/28

-4/9 + -3/45

-7/17 + 2/3

2/3 • 9/12

-7/8• -24/21

-11/12• 144/121

13/24• 3/5

Subtraction of Fractions

Just like we learned with addition, subtracting fractions that have the same denominator(aka common denominator) is very simple: Just subtract the second numerator from the first and keep the denominator the same. Then we reduce down to lowest terms.

$\frac{2}{3} - \frac{1}{3} =$ This one is easy, the denominators are the same so just subtract the top 2-1=1 Answer is $\frac{1}{3}$

$\frac{3}{10} - \frac{1}{10} = \frac{2}{10}$ sometimes when you subtract, you need to reduce to lowest terms. Say, what can go into both the 2 and 10 evenly? 2, so divide both the numerator and the denominator by 2 and you get $\frac{1}{5}$

If you have a different denominator, we need to make them the same by either doing this "quick method" or the equivalent fractions. Let's do the quick method like we did for addition.

$\frac{6}{7} - \frac{2}{5}$ = Do the cross multiply like we did for addition (6•5) – (2•7)= 30-14=16

multiply the two denominators together to get the denominator of the answer 7•5=35

Your answer is $\frac{16}{35}$

Now you try, $\frac{9}{10} - \frac{5}{6}$ = in lowest terms

Subtract 7/10- 3/10=

Solve 4/5-1/3=

Solve 5/22- 1/4

Solve 1/3- 1/8=

Subtraction of fractions—finding common denominators

Using the cross method is easy and quick for most everything, but let's teach you finding the common denominators so when you have a larger denominator you don't have to reduce so much.

Let's subtract this problem $\frac{17}{20} - \frac{31}{80} =$ you can cross multiply, but you will be dealing with bigger numbers. It is easier to look at the denominators to see if we can get a common multiple for both. 20's multiples are: 20.40.60.80 and 80's multiples are 80, 160, oh wait they both have 80 so let's use that.

$\frac{17}{20} \diagdown\!\!\!\!\diagup \frac{\quad}{80}$ do that backwards z method for finding equivalent fractions 20 goes into 80, 4 times. 4 x 17= 68 , your new numerator is 68.

$\frac{68}{80} - \frac{31}{80}$ you don't need to change the second number because the denominator is already 80. Then subtract to get $\frac{37}{80}$

Practice 8/15 – 1/3

5/7 – 7/10

Solve these the same way you were taught today, so that you get the concept. Tomorrow you can choose to do them the easy way.

3/5- 1/3

5/8-1/2

5/7-5/8

½-1/4

1/3-1/6

Subtraction of fractions

Do these the easy and quick way if you would like to, otherwise do the traditional way☺

½-1/2

5/7-4/9

2/3-1/5

5/7-5/8

Simplify these if needed:-you can use a calculator is your teacher allows you to—to get the multiplication answer

8/15-1/3

10/17-9/10

5/7-12/19

3/7-2/9

20/23-5/7

Mixed numbers

Remember what a mixed fraction is? A whole number plus a fraction 2 ½ is an example

How you multiple and divide a mixed fraction is to convert the mixed fraction to an improper fraction first and then continue onward either multiply or dividing.

2 ½ converted is 2•2=4 +1=5 answer is $\frac{5}{2}$

Multiply the following after you convert them: $1\frac{3}{5} \bullet 2\frac{1}{3} =$

Divide the following after you covert them $3\frac{2}{3} \div 1\frac{4}{7} =$

You practice

$2\ 1/3 \bullet\ 3\ ¼$

What is $3\ ½ \div 1\ 1/7$

Multiply $2\ 1/3$ by $1\ 3/7$

Find $2\ 2/5 \bullet 1\ 5/6$

Simplify $\frac{5x}{12} + \frac{3x}{8} =$ $\frac{10x}{24} + \frac{9x}{24} = \frac{19x}{24}$

Find each answer -4.25+(-3.1)= -7.35 **remember the signs are the same so we just add them together.

-1.48-(-3.8)= change the sign and then add -1.48+3.8=2.32

Your turn:

3x-$\frac{x}{3}$=

5.4+0.19+(-3.5)=

-3 ½ + (-4 $\frac{1}{6}$)+$\frac{2}{3}$=

-10+2.66=

Rewrite in column form to solve easier if necessary.

-9.7-2.8=

4/5- (-3/4)

3b+ 5b/4

0.15+(-4.8)+(-6.35)

-15.4-(-20)

Subtraction of fraction is easy if the denominators are the same. When they are different, your first step is to always change them to a common denominator. You can do the quick way or the "find the common multiple way.)
When the two have the same denominator, you can subtract. Here is what you do when the fractional part of the first number is GREATER than the fractional part of the second number.

$8\frac{4}{5}$

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

_____ just subtract down

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

That is easy enough, right? Now let's try this one:

$9\frac{1}{6}$

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

_____ you can't subtract 1-5, so you need to borrow(just like in regular subtraction)

you borrow one whole from the 9 and make it 8. Since you borrowed a "whole part" your fraction is divided into 6 pieces. You borrowed 6 of those pieces. So you add 1 +6

8

$\not{9}\ \frac{1+6}{6}=8\frac{7}{6}$

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

_____

$5\ \frac{2}{6}$ reduced down to make $5\ \frac{1}{3}$

Now you try subtract $19\frac{4}{11} - 6\frac{3}{8}$

Subtract $5\frac{7}{9} - 2\frac{4}{9}$

Find $9\frac{1}{8} - 7\frac{5}{8}$

Figure out $16\frac{2}{5} - 8\frac{4}{9}$

more subtraction practice

4- 2 ¾

2 2/3 - 1 12/13

38/7 - 12/5

32/13- 9/4

7 - 6 ½

5 3/5 - 5 1/7

12 2/3 - 1

2 -1 11/12

Find each answer—mixed review

-5/7+6/7

-12 1/3 – 4 2/3

16a/21- a/21

-6.7+2.9

5b+ 7b/4

-4 11/18 - (-1 ½)

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Solving equations involving rational numbers.

7=-3x+5

7-5=-3x+5-5

$\frac{2=-3x}{-3 \quad -3}$

$x= - -\frac{2}{3}$

****

2m+5.1= -1.3

2m+5.1-5.1=-1.3-5.1

$\frac{2m=-6.4}{2 \quad 2}$

m= -3.2

****

z- ½ = ¾

z- ½ + ½ = ¾ + ½

z= ¾ + ½

z= ¾ + $\frac{2}{4}$ = z= 5/4 = 1 ¼

Your turn:

6n +3= - 1

9+4g=12

s- 1/8= - ¾

19.8= 7.17+3x

3 5/8+ r = 7/8

2a- 1.9= -4.1

m-8 = 3/5

Using reciprocals to solve equations.

Solve $\frac{2}{3}x = -5$

$\frac{2}{3} x (\frac{3}{2}) = \frac{3}{2} (-5)$ $1 \bullet x = \frac{3}{2} \bullet (-\frac{5}{1})$

$x = -\frac{15}{2} = -7\frac{1}{2}$

****

4= -5/6 b+1

4-1= -5/6b+1-1 --subtract "1" from both sides

3= -5/6 b This is your results

(-6/5)(3/1)= (-6/5)(-5/6b) here you are getting "b" by itself

-18/5=b make into a mixed number: -3 3/5

Your turn:

Jadyn carried home a number of one-half pound packages of sliced deli meats and a 10-lb bag of potatoes. Her total load was 13 ½ lb. How many packages of deli meats did she carry?

4/11 j=16

¾ x= -8

½ v -3=8

-1=$\frac{7}{12}$ z +6

-18= - 5/11x-8

-5/6 k=9

-8/9c=12

3y= 3/8

Brooklyn swam 20 ft farther than Autumn. Autumn swam 25 yards. How many yards did Brooklyn swim?

Review

5/8 •3/4

5/6÷2/3

11 5/6 + 2 5/6

2 1/6- 1/3

-6(3/4)

(-5 ¼)(- 2 2/3)

-3 + (-1 3/5) + 9/10

-48÷(-1.2)

12 + (-8.1)

(4.8)(-0.5)

$\frac{6a}{11} \div 4a$

Greg spends a total of $2\frac{1}{3}$ hours of commuting to work every day. How many hours does he spend commuting to work in 5 days?

A gym costs $15 per hour to rent. What is the cost to rent the room for 3 ½ hours?

The total weight of 12 identical packages is 15 lbs. What is the weight of each package?

When Collin reached the age of 30 he was 6.5 inches tall. At birth he was 21 inch long. How many inches did Collin grow in 30 years?

Solve 5x+9=13

3n-3.7= -4.3

p+ ¾ = $2\frac{1}{3}$

Ratio and rate

A ratio is a comparison of two numbers by division. The ratio of two numbers a and b can be written in three ways.

a to b a:b $\frac{a}{b}$

Write the ratio as a fraction in lowest terms : 21 days to 6 weeks.

Change 21 days to weeks= 3 weeks

$\frac{3\ weeks}{6\ weeks}$= ½

A ratio that compares two unlike quantities is called a rate. A unit rate is a rate for one unit of a given quantity. An example of unit rate is miles per hour, which indicates the number of miles for one hour.

Write the unit rate.

150 mi in 3 hours

$\frac{miles}{hours}=\frac{150}{3}=\frac{50}{1}$

The rate is 50 mi in 1 hr or 50mph

Your turn:

Write each ratio as a fraction in lowest terms

14/7 36/15

$2 to $.30 4yd:4ft

18 to 24 2:32

Write the unit rate.

300 mi in 6 hr

205 words in 5 min

33 m in 15 s

$42 for 5 hr

Proportions

A proportion is a statement that two ratios are equal

You write $\frac{3}{4} = \frac{9}{12}$ or 3:4 = 9:12

You read 3 is to 4 as 9 is to 12.

The numbers 3,4,9,12 are the terms of the proportion. If a statement is a true proportion, the cross products of the terms are equal.

Multiply across 3•12=4•9 you get 36=36

In algebra

$\frac{a}{b} \bullet \frac{c}{d}$ ad=bc

Solve each proportion

$\frac{n}{6} = \frac{3}{2}$ cross multiply and you get 2n=18, then divide by 2 on each side and you get n=9

Your turn:

Write five is to six as ten is to twelve in symbols

Write three is to one as fifteen is to five in symbols

Tell whether each proportion is true or false

$$\frac{5}{8} = \frac{15}{24}$$

$$\frac{12}{4} = \frac{4}{12}$$

Solve each proportion

$$\frac{3}{2} = \frac{9}{n}$$

$$\frac{2.5}{5} = \frac{c}{8}$$

Is 4/9 = 36/81 a true proportion?

Solve 14/2a=6/9

3w/5=24/10

$\frac{3}{2} = \frac{9}{n+2}$ solve using the distributive property

You can solve many problems that involve equal ratios or equal rates by using proportions.

The local paper charges $7.20 for 3 weeks of home newspaper delivery. At this rate, what is the cost of 8 weeks of home delivery?

Let c= the cost of 8 weeks of home delivery. Write a proportion using the ratio of the number of weeks to the cost of home delivery. Then solve the proportion using cross products.

$\frac{3}{7.2} = \frac{8}{c}$ $\frac{number\ of\ weeks}{cost\ of\ home\ delivery}$

3c= (7.2)(8)

3 c= 57.6, then divide both sides by 3

c=19.2

Your turn:

Amy sells balloons. She charges $9 for 12 balloons. At this rate, what will Amy charge for 50 balloons?

Madelyn spent 3 hours addressing 50 wedding invitations. At this rate, how long will it take her to address 125 wedding invitations?

Amy paid $12.72 for 8 cans of frozen lemonade to make for the party. Greg bought 10 cans of the same brand of lemonade. How much did Greg pay for the juice?

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Percentages

Percents are a way of describing parts of the whole. The word percent means 100. But in practice, when I say 50 percent of my socks are black, that means that out of the 100 socks I own, 50 are black. Or if you own 10 pants and 5 of them are jeans, then 50% of them are jeans.

To change a whole number percent to a decimal, simply replace the percent sign with a decimal point and then move this decimal point over two places to the left. Then you can drop any trailing zeros.

75%= 0.75 50%= 0.50 34%= 0.34

Sometimes a percent already has a decimal point. Just drop the percent sign and move the decimal point two places to the left. 12.5%= 0.125

Your turn:

Change 90% to a decimal _____

Change 34.6% to a decimal_____

Find the decimal equivalent of 99.44%_____

What is 243.1% expressed as a decimal_____

Convert 2.5% to a decimal_____

Convert 7% to a decimal_____

Convert 3% to a decimal_____

Convert 39% to a decimal_____

Convert 99.9% to a decimal_____

Changing decimal to a percent

Change 0.6 to a percent---Move the decimal to the right two places
60%

Convert 0.57 to a percent

What is 0.3 expressed as a percent

Change 0.015 to a percent

Express 2.222 as a percent

Express 35% as a decimal_____

Express 22.2% as a decimal_____

Express 12% as a decimal_____

Express 9.8% as a decimal_____

Express 89% as a decimal_____

Percent problems

Percent problems give you two pieces of information and ask you to find the third piece.
The most common type of percent problem is this

50% of 6 is?

The best way to remember is that “of” means multiple. “is” means equal.

50% x 6= use a calculator to solve this. If your calculator does not have the % sign, convert it to a decimal by moving it two places to the left and type in .50 x 6=3

You solve: What is 20% of 350?_____

17% of 125 is ?_____

7% of 200 is ?_____

23% of 100 is?_____

Now some problems will say what percent of 4 is 1?
*remember ”of” means “x-multiply” and “is” means “= equal”, so if you rewrite it you have

_____x4=1

Since division is the opposite of multiplication, you take 1 ÷4 and that equals .25 which you convert to 25%

What percent of 5 is 2?_____

What percent of 20 is 5?_____

Some may say what is 10% of ?= 40
let’s rewrite it, putting in the multiply and equals sign

10% x _____=40

since division is the opposite of multiplication, you take 40÷ 10% or (.10) and it gives you 400

**Just remember what of means and is means and you will be all set!

What is 30% of what number is 10?_____

35% of what number is 28?_____

More practice

75% of 20 is_____

What percent of 50 is 35?_____

79% of 11 is?_____

What is 37% of 600_____

What is 26% of 150?_____

What is 13% of 100?_____

81.3 is what percent of 271?_____

387.2 is what percent of 484?_____

608.8 is 80% of ?_____

282.6 is 90% of ?_____

740.35 is 85% of ?_____

223.5 is what percent of 745?_____

35.5 of 355 is what percent?_____

Percent	decimal	fraction
1%	0.01	1/100
5%		
10%		
12 ½%	0.125	1/8
20%		
25%		
33 1/3%		
50%		
75%		
80%		
90%		
99%		
100%	1	
125%	1.25	5/4
150%		
200%		

More practice

Collin wants to buy a tv. The regular price is $280 but it is on sale today for 30% off. How much will he save if he buys it today?

What number is 64% of 75?

What number is 40% of $236?

50% of 528 is what number?

8% of $24 is what number?

10% of $24 is?

Percent	decimal	fraction
1%	0.01	1/100
5%		
10%		
12 ½%	0.125	1/8
20%		
25%		
33 1/3%		
50%		
75%		
80%		
90%		
99%		
100%	1	
125%	1.25	5/4
150%		
200%		

Mixed review

write 13/20 as a percent

write 130% as a decimal

Write 0.45 as a percent

Write 28% as a fraction

Find each answer:

65% of 29 is what number

What percent of 99 is 16.5

57 is 15% of what number

What number is 4 ½ % of 150

Review

Write each ratio as a fraction in lowest terms.

50:75 $1 to $.40

Write the unit rate

80 mi on 2 gal $51 for 6 hours

Solve each proportion

$\frac{20}{a} = \frac{5}{6}$

$\frac{1.8}{6} = \frac{m}{4}$

Tammy can grade 20 exams in 3 hours. At this rate, how long will it take her to grade 72 exams?

Write each fraction or decimal as a percent

0.829

2/5

0.06

Write each percent as a fraction in lowest terms and as a decimal

64%

90%

6 ½ %

Find each answer:

What number is 18% of 70?

What percent of 128 is 38.4?

104 is what percent of 78?

Find each answer using a proportion

700 is 35% of what number

What percent of 75 is 50?

Perimeter

Perimeter of a polygon is the sum of the lengths of all its sides.

The length of one side of a regular pentagon is 4.9cm. Find the perimeter.

We know that there are 5 sides to a pentagon. If all sides are 4.9, then 5 x 4.9=24.9cm

Your turn:

Find the perimeter of the following:

A regular decagon with one side measures 2.8cm

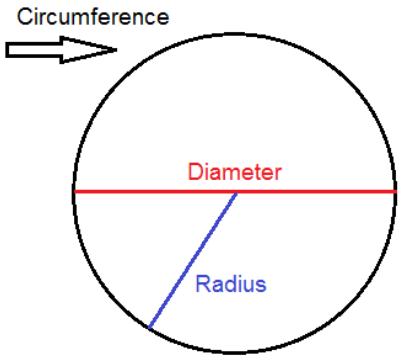
A rhombus with one side that measures 3.22m

A rectangular playground is 40 yd long and 57 ½ ft wide. Find the perimeter

Percent	decimal	fraction
1%	0.01	1/100
5%		
10%		
12 ½%	0.125	1/8
20%		
25%		
33 1/3%		
50%		
75%		
80%		
90%		
99%		
100%	1	
125%	1.25	5/4
150%		
200%		

Circles

The radius of a circle is the distance from the center to any point on the circle.
The diameter of a circle is the distance from any point on the circle through the center to the opposite point on the circle.



The perimeter of a circle has a special name: the circumference. There is a formula for finding the circumference (the distance) around the circle.

$$C=\pi d$$

The symbol π is called pi (pronounced pie.) It is a decimal that goes on forever, so you can't know its exact value. However, we round it to 3.14 when solving problems.

To find the distance around a circle take 3.14 and multiply it times your diameter.

What's the diameter of a circle who has a radius of 4 inches?

What's the circumference of a circle whose diameter is 4 centimeters?

What's the circumference of a circle whose radius is 8 ft? * you have to figure out the diameter to solve this first

To find the area of a circle—the inside part this is the formula:

A= $\pi \bullet r^2$
You take the radius and square it first and then multiply it by 3.14

You try:

What's the area of a circle whose radius is 3 feet?

Find the area AND circumference of a circle that has a radius of 15 yards?

What is the area and circumference of a circle whose diameter is 54 centimeters?

Area of polygons.

Do you remember the area of a rectangle?

Area of a rectangle= length x width A=lw

When the length and width of a rectangle are equal , the figure is a square. To find the area of a square, you need to know only one measure, the length of a side.

Area of square= (length of side)^2 $A=s^2$

Any parallelogram can be “rearranged” to form a rectangle. For this reason, the area formula for a parallelogram is closely related to the rectangle formula.

To use the parallelogram formula, either pair of parallel sides can be the bases. The height is the perpendicular distance between the bases.

Area of a parallelogram= base x height A=bh

A diagonal of a parallelogram separates it into identical triangles. You can find the area of a triangle by thinking of it as one half the area of a parallelogram with the same base and height.

To use the triangle formula, let any side of the triangle be the base. The height is the perpendicular distance between the base and the opposite vertex.

Area of triangle= ½ x base x height A= ½ bh

Now its your turn:

Make a sketch of each figure

a rectangle with length 5 cm and width 2.2 cm

Solve

A triangle with base 15 in and height 1 ft

A parallelogram with bases 8 ½ inch and height of 6 inch

A square with a side that measures t inches

Triangle with sides 5m and base 3m

A parallelogram with base 220cm and height 15 m

Tell whether you need to calculate the perimeter, circumference, or area to find each measure.

The amount of wood needed to frame a circular mirror

The amount of wallpaper needed for a rectangular wall

The amount of decorative molding needed around a square ceiling

The amount of floor space covered by a circular rug

The amount of concrete needed to cover a play area

The amount of fencing needed for a circular garden

The amount of grazing space in a square pasture

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

In arithmetic, you learned that fractions and decimals that represent the same number are called equivalent. For instance, you learned that there are infinitely many ways to represent the number ½.

½ =2/4= 3/6= 4.8=… and ½=0.5=0.50=0.500=…

Similarly in geometry, there are infinitely many ways to picture a given shape and size. For example, although triangles can have different names and be positioned differently, if they are identical in size and shape then they are congruent.

Geometric figures that have the same size and shape are called congruent. The symbol for congruent is ≅

Line segments are congruent when they have the same length. If you had two line segments that were congruent, you would write them like this:

$\overline{AB} \cong \overline{CD}$

Angles are congruent when they have the same degree measure. If you had two angles that were congruent you would write them like this:

$$\angle P \cong \angle R$$

You will do more of this in geometry. I want you to get familiar with the symbols and how to write them.

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Powers and square roots

Raising a number to a power is a quick way to multiply a number by itself. For example 5^3 means that you multiply five by itself three times:
5x5x5=125
The number 5 is called the base, and the number 3 is the exponent.

Solve the following:

2^4=_____ 3^4=_____8^2 = _____ 4^3=_____ 10^3=_____

**The powers with 10 in the base are easy to work with. To raise a 10 to the power of a positive whole number, write down the number 1 followed by the number of 0s indicated by the exponent. For example 10^3 is 1,000

Try these:

$10^{2=}$_____ $10^{8=}$_____$10^{5=}$_____$10^{9=}$_____$10^{3=}$_____

Some rules to remember:

- Every number raised to the power of 1 equals that number itself. $5^{1=5}$
- The number 0 raised to the power of any number (except 0) equals 0, because no matter how many times you multiple 0 by itself, the result is 0.

What is 3^4?

What is 10^7?

What is 52^1?

What is 0^8?

The inverse of squaring a number is called finding the square root of a number. Remember inverse undoes an operation.

$\sqrt{25}$= 5 (because 5 x5=25) Look on your calculator for this symbol and you can practice this easily.

What is $\sqrt{36}$?

What is $\sqrt{81}$?

What is $\sqrt{9}$?

What is $\sqrt{49}$?

This is helpful to remember those squares of numbers.

2x2=_____

3x3=_____

4x4=_____

5x5=_____

6x6=_____

7x7=_____

8x8=_____

9x9=_____

10x10=_____

11x11=_____

12x12=_____

Now lets find the following

$-\sqrt{16}$ 4^2=(4)(4)=16, so the answer is -4

$\sqrt{2500}$ 50^2=(50)(50)=2500, so the answer is 50

$\sqrt{0}$ 0^2=0 so the answer is 0

$\sqrt{\frac{16}{49}}$ $(\frac{4}{7})^2=\frac{4}{7}\bullet\frac{4}{7}=\frac{16}{49}$ so the answer is 4/7

$-\sqrt{0.16}$ $(0.4)^2$=(0.4)(0.4)=(0.16) so the answer is -0.4

Your turn:

$\sqrt{81}$

$-\sqrt{36}$

$\sqrt{\frac{4}{25}}$

$-\sqrt{0.49}$

$\sqrt{36}$ +$\sqrt{64}$ find and solve

$\sqrt{24}$ + $\sqrt{25}$

$\sqrt{25}$ $\sqrt{81}$

$\sqrt{36}$ $\sqrt{144}$

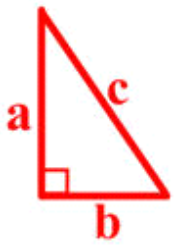
5 • $\sqrt{121}$

$\sqrt{100}$ +87

½($\sqrt{25}$)

More triangles

The longest side of a triangle is called the hypotenuse, the two short sides are called legs. The most important formula allows you to find the length of the hypotenuse given only the length of the legs. It is called Pythagorean theorem.



$$a^2 + b^2 = c^2$$

This is a formula like for finding the area, you plug in the numbers.
$a^2+b^2 = c^2$

Find the hypotenuse of a right triangle with legs that are 6 inches and 8 inches.

$6^2+8^2 = c^2$

36+64=100
c=10 because 10 •10=100

Now you try
Find the hypotenuse of a right triangle with legs that are 3 and 4 units.

Find the hypotenuse of a right triangle whose legs are 8 feet and 15 feet.

Find the unknown length, round to the nearest tenth

$a^2+b^2 = c^2$

Lengths of sides of triangle are 5cm and 8cm.

Lengths 28 ft and 35 ft

lengths 4cm and 6 cm

Review

Find the perimeter of a square with one side that measures 7 ¼ inch

Find the circumference of a circle with a radius 21 in.

Find the area of a triangle with base 1 yd and height 4 ft

Find the area of a circle with radius 2.3 m

Tell whether you need to calculate the perimeter, circumference, or area to find the amount of sod needed to cover a soccer field.

Find square root if possible. Otherwise approximate the square root to the nearest thousandth.

$\sqrt{3600}$ $\sqrt{\frac{9}{49}}$

$\sqrt{91}$ $\sqrt{147}$

Is a triangle with sides of 16ft, 30ft, and 34 ft a right triangle?

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Probability and Odds

Will the Cubs or the Giants be more likely to win the game? What is the change of drawing an ace from a deck of cards? What are the possibilities of rain today? When we are uncertain about the occurrences of an event, we can attempt to measure the chances of it happening with probability.

The probability of an event is a ratio that tells how likely it is that an event will take place The numerator is the favorable outcomes and the denominator is the number of possible outcomes.

For example, when you toss a die, there are six ways it can fall. The probability of getting a "2" on one roll of a die is one chance out of six or 1/6 .

Examples:

Collin has a collection of Cds that he plays regularly. He has six rock Cds, three country Cds, and four movie sound track Cds. If Collin chooses a Cd at random, what is the probability that he will pick a country Cd?

$$\frac{number\ of\ country\ Cd = 3}{total\ number\ of\ Cds = 13}$$

The probability of choosing a country Cd is 3 out of 13

Suppose a weather forecaster states that the probability of rain today is ¼ or 025. This means that the probability that it will not rain is ¾ or 0.75. The odds that it will rain today are 1:3. The odds that it won't rain is 3:1

your turn:

Brooklyn has a collection of various cereals on a shelf in the cabinet. Five of the cereals contain corn, two contain rice, and four contain oats. Without looking, she selects a box of cereal for breakfast. What is the probability that the cereal she selects will contain oats?

Jadyn collects stamps from different countries. She has five from Canada, 2 from France, 1 from Russia, 4 from Great Britain, and one from Germany. If she accidentally loses one stamp, what is the probability that it is the stamp from Russia?

The door prize of a party with 25 people is given by writing numbers 1 through 25 on the bottom of the paper plates used. What is the probability that an individual had the winning plate?

Statistics and probability

These are two of the most important and widely used applications of math. Statistics is science of gathering and drawing conclusions from data. An individual statistic is conclusion based on this data. Here are some examples:

- ✓ An average family has 2.4 children.
- ✓ Only 43% of students graduate from high school.

Probability is deciding how likely an event is to occur. It has a wide variety of applications in insurance, weather prediction, and sciences.

- ✓ What's the likelihood that the lottery ticket I bought will win?
- ✓ What's the likelihood that it will snow in WNC this winter?

The probability that an event will occur is a fraction whose numerator and denominator are :

$$\frac{\text{number of favorable outcomes}}{\text{total number of possible outcomes}}$$

Favorable means an outcome in which it DOES happen. Possible means one that CAN happen.

For example: What is the probability that a tossed coin will land heads up. There are only two possible outcomes. Only one is favorable—the head's up one. To find the probability make a fraction

$$\frac{\text{number of favorable outcomes}}{\text{total number of possible outcomes}} \qquad \frac{1}{2}$$

The probability that the coin will land heads up is ½ or 1 to 2 or 1:2

You try:

What's the probability that when you roll a die, the number 4 will land face up? ** to figure this out, how many possibilities are there?

What's the probability that in a deck of cards you will pick a King?**how many cards in a deck? How many possible kings?

What's the probability that you will select a day of the week that starts with an S ?

What's the possibility that you will select a month that starts with J?

Consider a true-false test. How many possible outcomes are there if the test consisted of (a) 2 questions? (b) 3 questions?

A solution of an equation with two variables is an ordered pair of numbers that make the equation true. For example, two solutions of the equation y= ½ x are (12,6) and (20,10). An equation with two variables may have infinitely many solutions. Using a table can help you find some of these solutions.

Find the solutions of the equation y= 5x+4. Use -2, -1, 0,1,2 as values for x.

Make a table

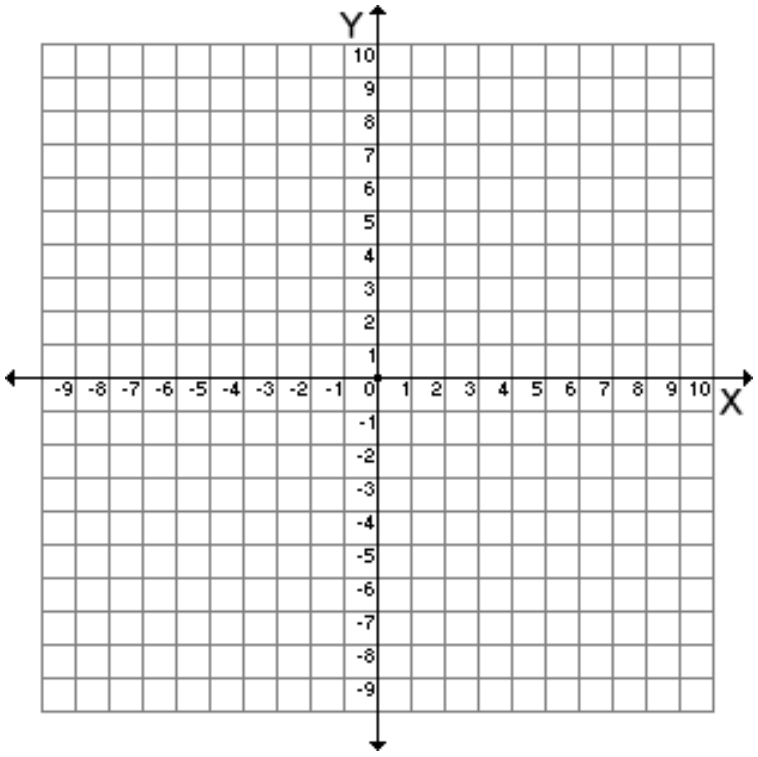
y=5x+4		
x	y	(x,y)
-2	5(-2)+4=-6	(-2,-6)
-1	5(-1)+4=-1	(-1,-1)
0	5(0)+4=4	(0,4)
1	5(1)+4=9	(1,9)
2	5(2)+4=14	(2,14)

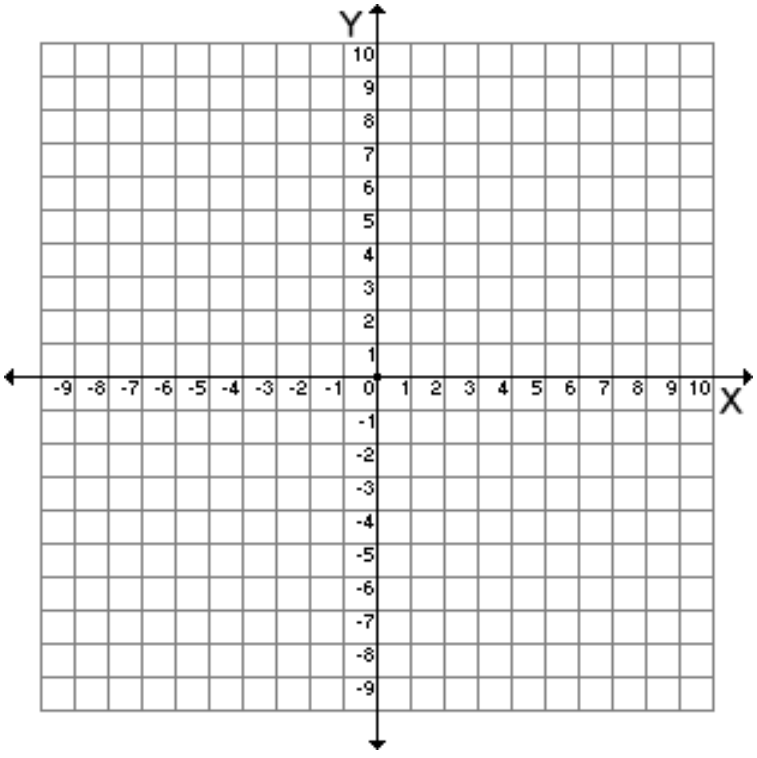
Your turn:

Make a chart and find solutions for the equation y-4x=7. Use -2,-1,0,1,2 as values for x

y-4x=7		
x	y	(x,y)
-2		
-1		
0		
1		
2		

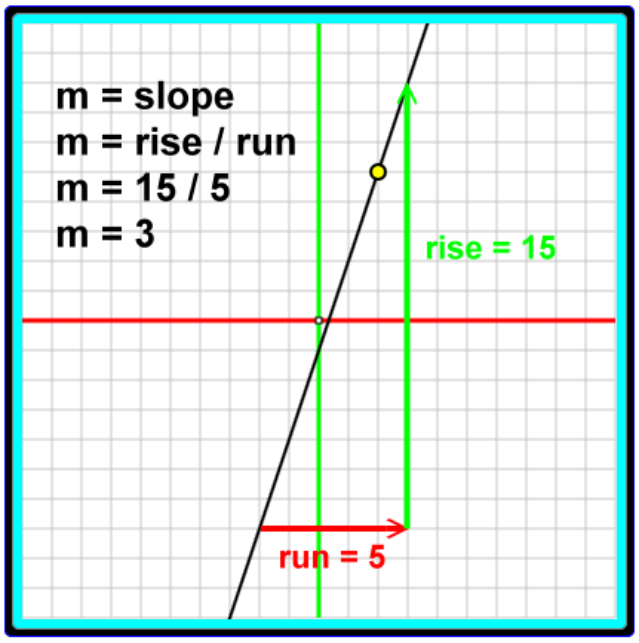
Now graph the two above examples on the two following planes. Draw a line to connect all of the dots.





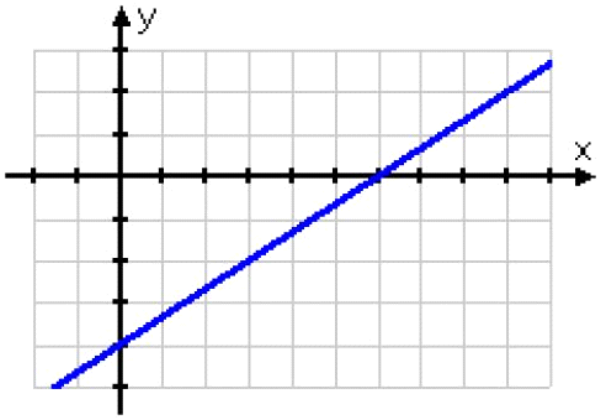
Slopes and intercepts

As you move from one point to another on a line, the vertical movement is called the rise, and the horizontal movement is called the run. The slope of a line is the ratio of the rise to the run. The slope of a line describes the line's steepness and direction.



The slope is the same between any two points on a given line. In the above example, the rise is 15 and the run is 5. So the slope is 15/5.

Your turn: What is the slope in the following graph: Your answer?



9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Systems of equations

Amy's delivery service charges $2 per pound to deliver a package, plus a service fee of $6. Greg's delivery service charges $3 per pound but only a $4 service fee. To find out how much to charge, the companies use the equations y=2x+6 and y=3x+4, where y is what a company charges to deliver a package and x is the weight of the package.

For what weight package will the charges be the same?

To answer this you fin d a solution common to both equations. Two equations with the same variables form a system of equations. An ordered pair that is a solution of both equations is called a solution of the system. You can solve a system of equations by graphing.

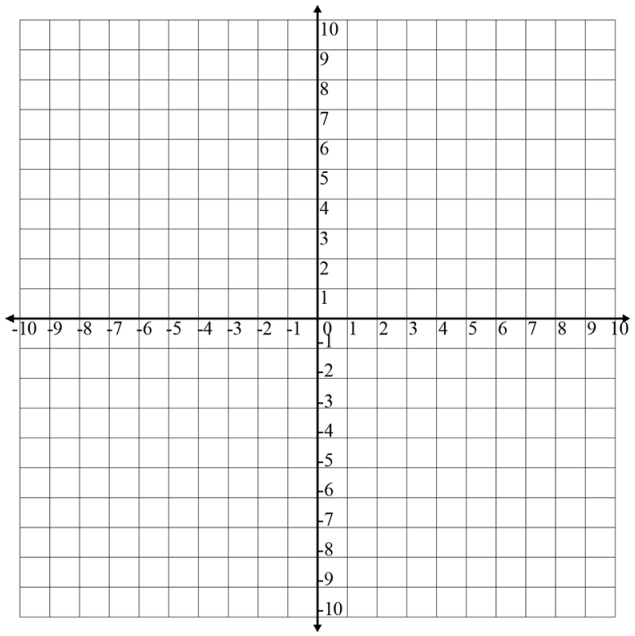
Solve the system by graphing: y=2x+6 and y=3x +4

Make a table for each equation. Then graph both equations on one coordinate plane.

y=2x+6		
x	y	(x,y)
-1	4	(-1,4)
0	6	(0,6)
1	8	(1,8)

y=3x+4		
x	y	(x,y)
-1	1	(-1,1)
0	4	(0,4)
1	7	(1,7)

Now graph both of these lines on the following graph



Draw your lines on the graph and you can find that point that they intersect. It should be at (2,10). You can check this by filling it into your equations and get 10=10

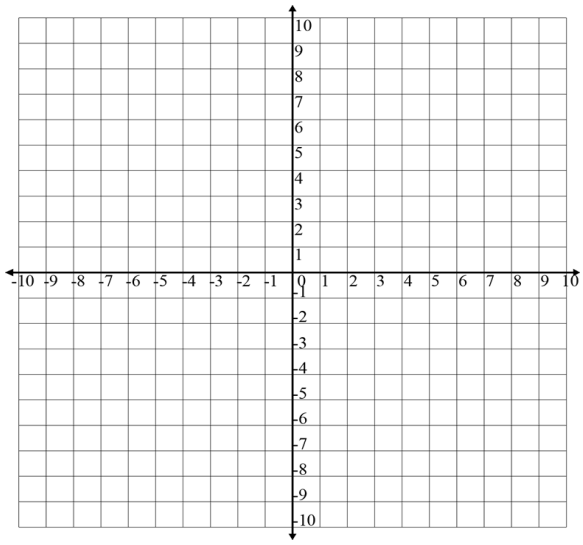
Now solve the system by filling in the chart and graphing

y=- ½ x+2		
x	y	(x,y)
-2	3	(-2,3)
0	2	(0,2)
2	1	(2,1)

y=- ½ x-1		
x	y	(x,y)
-2	0	(-2,0)
0	-1	(0,-1)
2	-2	(2,-2)

Now graph the following points and draw lines.

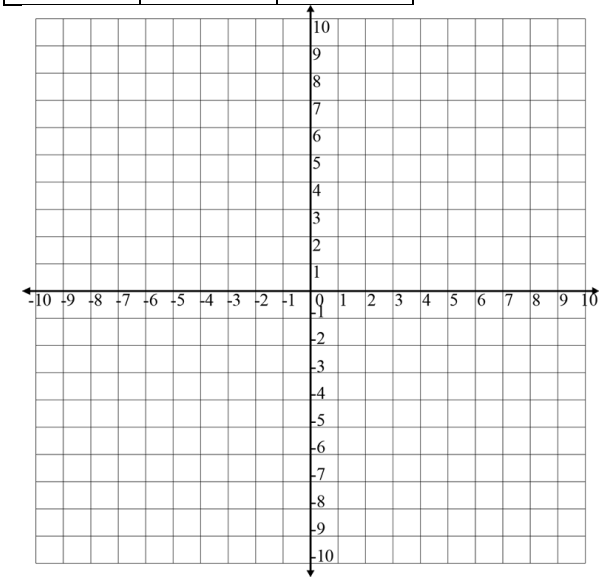
Do they intersect? No the lines are parallel, they have no solution.



Now your turn to do it all. Solve each system by graphing. Fill in the chart.

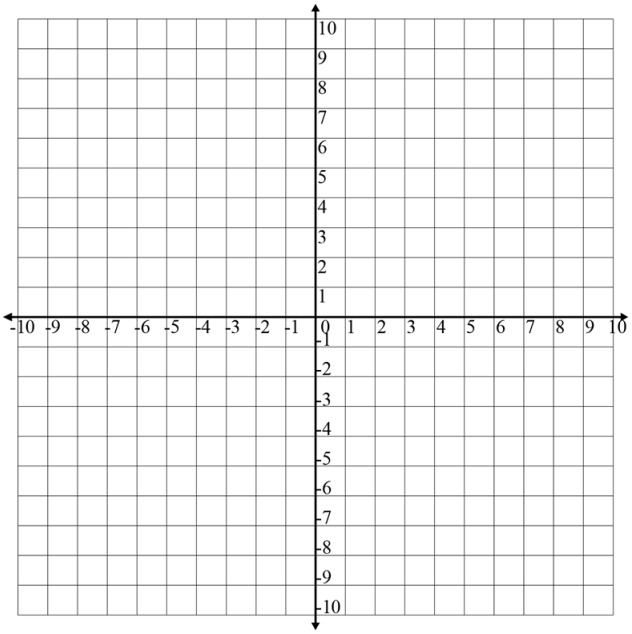
y=3x-1		

y=-x-5		



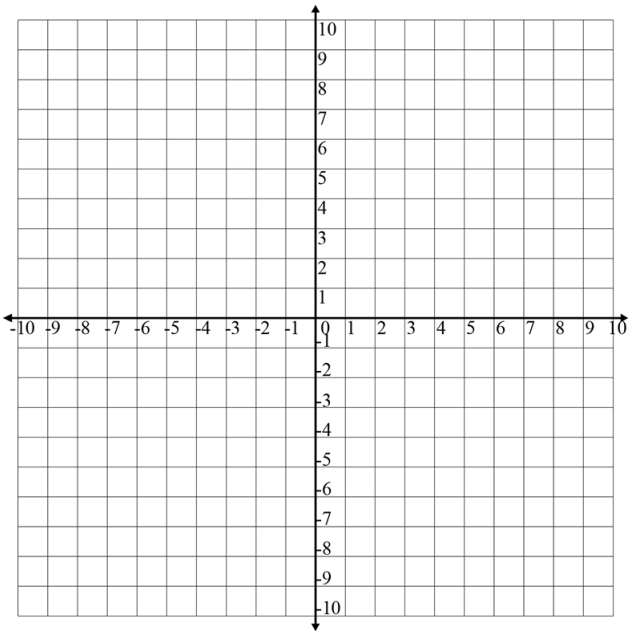
More graphing. Fill in the charts and graph.

y= -3x-2 and y= -3x+1



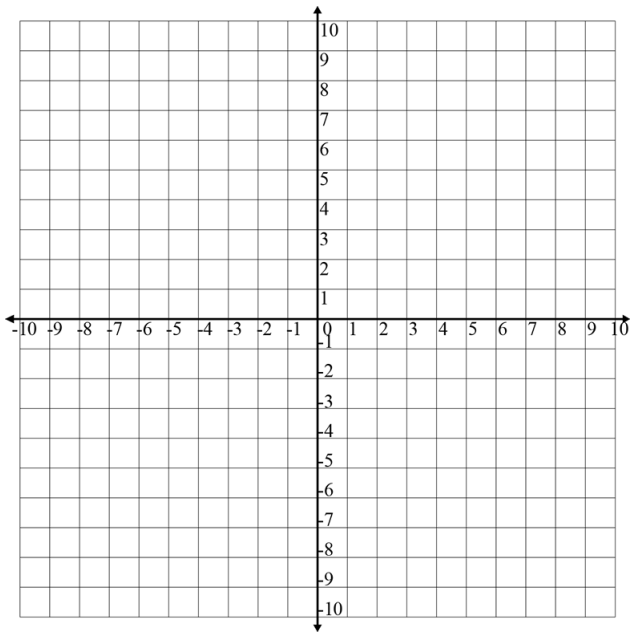
More graphing. Fill in the charts and graph.

y=4x-2 and y= -3x+5



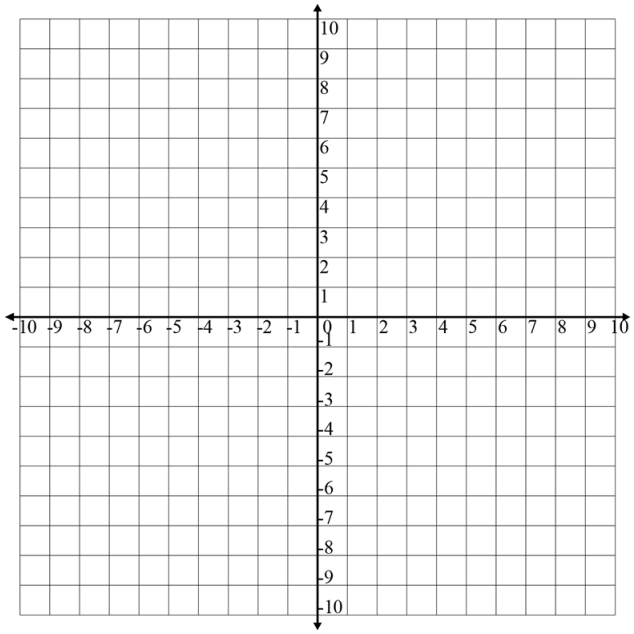
More graphing. Fill in the charts and graph.

y= -2x and y= -2x+3



More graphing. Fill in the charts and graph.

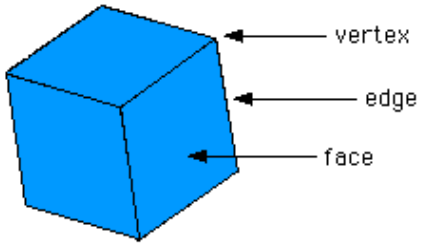
y= -2x+7 and y= 2x -1



Space figures

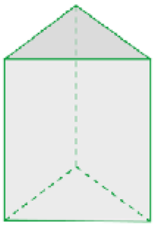
Polygons are sometimes referred to as plane figures because they lie in a plane. Space figures are three-dimensional figures that enclose part of a space.

Some space figures have flat surfaces called faces. A line segement on a space figure where two faces intersect is called an edge. A point where edges intersect is called a vertex.



A polyhedron is a space figure whose faces are polygons. Prisms and pyramids are polyhedrons. They are identified by the number and shape of their bases.

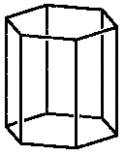
A prism has two parallel congruent bases. The other faces of the prisms will be rectangles. A cube is a rectangular prism whose faces are all square.

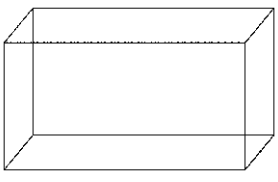


A pyramid has one base. Its other faces are triangles.

Your turn: Identify each space figure below:

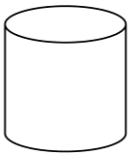
(a) triangular pyramid (b) rectangular prism (c) hexagonal prism

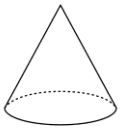


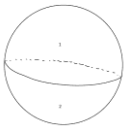


Identify each space figure as:

(a) cylinder (b) cone (c) sphere





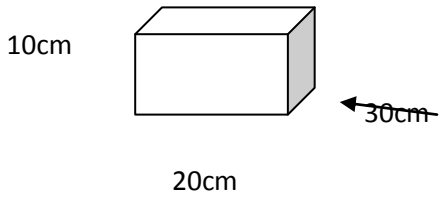


Learning to draw space figures can help you visualize them better. To help make them, draw the two bases first and then connect them with lines.

Draw a cube Draw a cylinder Draw a cone

Surface area of prisms

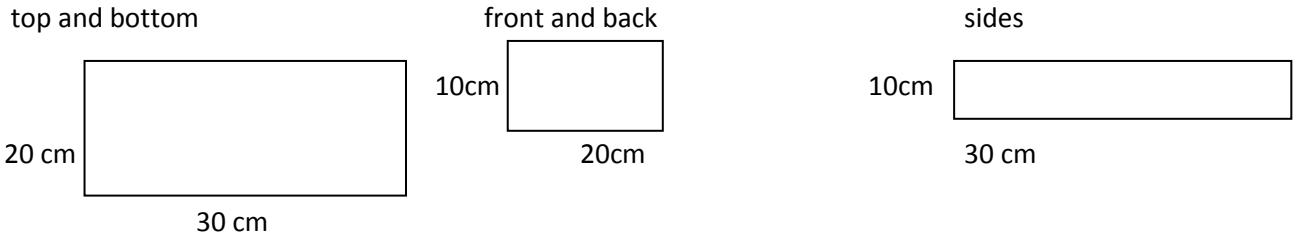
I need to wrap a present. I have a piece of paper measuring 2000cm^2. The dimensions of the box are given below



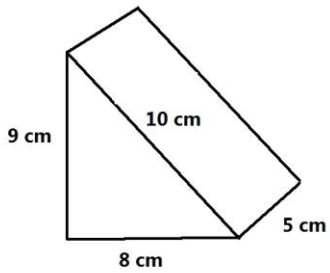
We need to find the surface area o fthe box or prism.

The surface area of a prism is the sum of the areas of the bases and faces of the prism. Surface area is expressed in square units.

To help, make a sketch of the rectangular faces and label the dimensions.



S.A.=top and bottom +front and back+sides
S.A.= 2 (30•20) + 2 (20•10) + 2 (30•10)
S.A.= 1200 +400 +600
S.A.= 2200
The surface area of the rectangular prism is 2200cm^2
The answer is that I do not have enough wrapping paper.



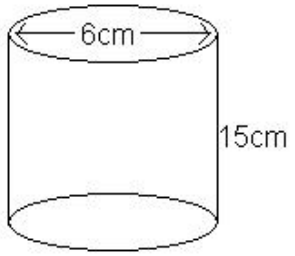
Your turn: find the surface area of the triangular prism. Draw pictures of all your bases. You should have four pictures. The triangle one you multiply two times because there are two. The rest you just find the area of each and then add them all up.

Draw images to help solve the surface area of a cube prism with sides measuring 8ft, 8ft, 8ft.

Draw images to help solve the surface area of a rectangular prism whose sides measure 2mm, 1mm, 0.5mm

The length of a box of cereal is 5 inch. The width is 2 inch. The height is 7 ¾ inches. Find the surface area of the box.

Surface area of cylinders



The surface area of a cylinder consists of the areas of a rectangle and two congruent circles. The length of the rectangle is the circumference of a base of the cylinder, and the width is the height of the cylinder.

Formula: Surface area of a cylinder

Surface area= area of bases + area of curved surface

S.A.= $\pi r^2+2\pi rh$

Just fill in the above formula with your numbers. The image gives 6 cm as the diameter, so you have to get half to get the radius.

S.A.= $(3.14)(3^2) + 2\ (3.14)(3)(15)$

S.A=28.26 +282.60

S.A.=310.86 cm^2

Your turn:

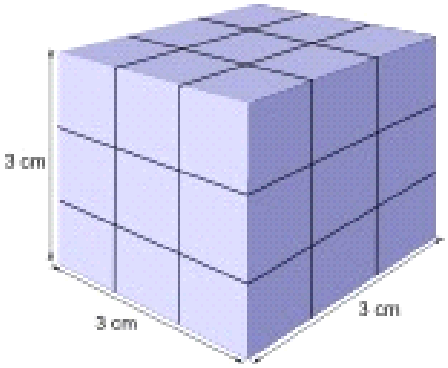
Find the surface area of a cylinder with a height of 20cm and a radius of 10cm

Find the surface area of a cylinderwith base of 21 inch and a radius of 14 inch

Draw a sphere pyramid cylinder

Volumes of prisms and pyramids

When you pack a suitcase or pour a glass of water, the amount of clothing or the amount of liquid your container can hold depends on its volume. The volume of a space figure is the amount of space it encloses. To measure volume you use cubic units: for instance, cubic centimeters (cm^3), cubic inches (in^3) and cubic yards (yd^3). You can find the volume of a rectangular prism by counting the number of unit cubes that can fit inside the prism.



Find the volume in the cube at the let. To measure the volume, think of the prism as layers of unit cubes that measure 1 cm on each side.

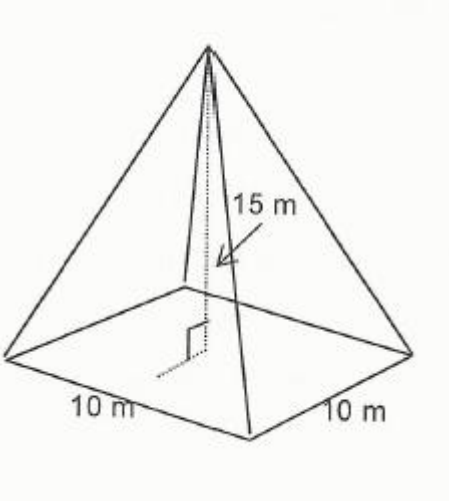
Number of cubes in layer 1: 3•3=9

Number of cubes in 3 layers= 27

The volume is 27 cm^3

Notice that you multiplied the area of a base of the prism by the height of the prism to find the volume. In fact, the volume of any prism is the product of the area of a base and the height. The volume of any pyramid is one third the product of the area of the base and the height.

Find the volume of the pyramid



The base is a rectangle.

B= (10•10)=100

V=1/3 Bh

V=1/3 (100)(15)

V=500m^3

Find the volume of a pyramid whose B=7.5m^2 and h= 16.4m

Find the volume of a rectangular prism whose sides measure: 2.5cm, 6cm, and 1.2 cm

Review

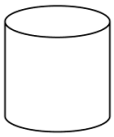
What number is 64% of 350?

Find the area of a circle with a radius of 5.6cm?

Volume of cylinders and cones

The formulas for the volumes of a cylinder and cone are similar to those for a prism and pyramid. The base of a cylinder or a cone is a circle, so use πr^2 for the area of the base, B, in the formula.

Volume of a cylinder= area of the base x height



$V= \pi r^2 h$

Volume of a cone= 1/3 x area of the base x height

$V= 1/3\ \pi r^2 h$

For example: The diameter of a cylinder is 30m and the height is 11m. Find the volume of the cylinder.

The radius, r, is ½ (30)=15

$V= 3.14\ (15^2)\ (11)$

$7771.5\ m^3$

Find the volume of a cone with radius 14 in and height 12 in.

$V= 1/3\ \pi r^2 h$ *remember π =3.14 or 22/7

$V= 1/3\ (22/7)(14^2)\ (12)$

$V=2464\ in^3$

Match each figure with the formula for its volume

cone	V=Bh
prism	V= $\pi r^2 h$
pyramid	V=1/3 Bh
cylinder	V= 1/3 $\pi r^2 h$

The diameter of a can of paint is 8 in and the height is 10 in. Find the volume.

The height of a funnel is 12 cm and the radius of the base is 7cm. Find the volume of the funnel.

Find the square root of 8100

Spheres

Suppose you were to cut open a sphere and lay it flat. The area of the figure formed is the surface area of the sphere. This surface area would be four times the area of a circle with the same raidus as the sphere.

Use these formulas to find the surface area and the volume of a sphere.

Surface Area S.A.=4 πr^2

Volume $V=\frac{4}{3}\pi r^3$

Find the surface area and volume of a shere with a diameter of 12 m.

r= ½ d= ½ •12=6

Substitute 6 for r in each formula.

S.A.=4 (3.14)(6^2)

S.A.=4(3.14)(36)

S.A.= 452.16

We label surface area as m^2 and volume as m^3

$V=\frac{4}{3}(3.14)(6^3)$

$V=\frac{4}{3}(3.14)(216)$

V=904.32

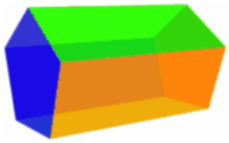
Your turn:

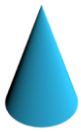
Find the surface area of a sphere with a radius of 10mm

Find the volume of a sphere with radius of 21 yd

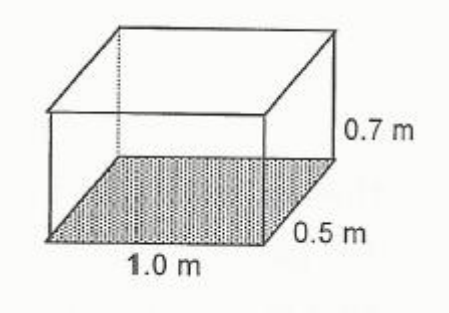
The radius of a basketball is 12cm. What is the surface area AND the volume

Identify each space figure

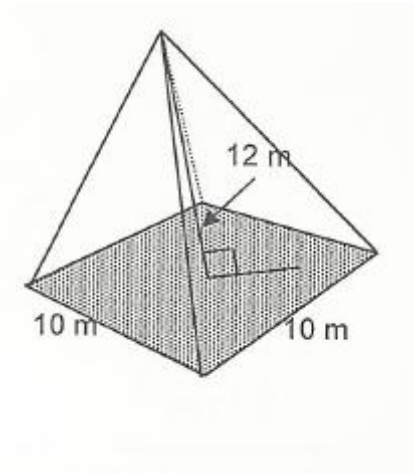




Find the surface area of each figure



Find the volume of the following figure



Find the surface area and volume of a sphere with a radius of 24 inch

What is the surface area and the volume of a sphere with a diameter of 60 ft

Find the volume of a cube with sides measuring 9inch

Draw a cylinder Draw a cone Draw a cube

Simplifying polynomials

Each expression below is a polynomial, a variable expression consisting of one or more terms.

$3x^2$ $-4t$ $2a^2-3ab+2b^2$ x^3-1

Some polynomials have special names.

A monomial has one term . Example $4x^2$ and $-4t$

A binomial has two terms. Example x^3-1

A trinomial has three terms. Example $2a^2-3ab+2b^2$

When you are working with a polynomial, it is often helpful to write the polynomial in standard form. To do this, write the terms in order from the highest to the lowest power of one of the variable.s

Write each polynomial in standard form.

$4x^2+x-3x^3$ ⟶ $-3x^3+4x^2+x$

$8c^3+7-9c+2c^4$ ⟶ $2c^4+8c^3-9c+7$

Like terms have the same variables raised to the same powers. To simplify a polynomial, you combine like terms and write the resulting polynomial in standard form.

Simplify $12c^3-4c^2-8c^3-5+7c^2-4c$

Group like terms $(12\ c^3-8c^3)+(-4c^2+7c^2)-5-4c$

$4c^3+3c^2-5-4c$

$4c^3+3c^2-4c-5$

Your turn:

Is the polynomial a monomial, binomial, or a trinomial?

$ab+3$ $x+y-2xy$ 5 $-t^6+s^4$

Tell whether the terms are like or unlike terms

$3m^3,5m^3$ $7x^4, 4x^7$ xy^3, xy $3ab^2,5ab^2$

Write each polynomial in standard form

$3g^3+4g^3-3g+8-7g^2$ $4k-8k^3+7k^2-9k^3$

simplify

$2x^2+x+2+3x-x^2+5$

$2w^3-6w^2+7w^3-7$

$-x^3+2x-3-4x^3-2x+3$

$6-2a^4+a^2-1+6a^4-a^2$

Adding polynomials

Add $(6x^4-2x^3+7x^2+x-6)$ and $(-7x^4+2x^3-5x+7)$.

Line up like terms vertically.

$6x^4 - 2x^3 + 7x^2 + x - 6$

$-7x^4 + 2x^3 \quad - 5x + 7$

$-1x^4+0x^3+7x^2-4x+1$ we get rid of the $0x^3$ because it means none

$-1x^4+7x^2-4x+1$

Your turn to add:

$(2a^2+3a+5) + (3a^2+a+5)$

$(3x^2+5x+9) + (4x^2+6x+2)$

$(-7a^2-4a+5) + (9a^2+2a-7)$

To subtract a polynomial add the opposite of each term of the polynomial.

Example:

$(3n^2+4n+8) – (2n^2+n+5)$

$(3n^2+4n+8) + (-2n^2-n-5)$

$(3n^2-2n^2) + (4n-n) + (8-5)$

$n^2+3n +3$

Example:

$(7a^3+3a^2-10) - (9a^3+4a^2-6a-9)$

Line up like terms. Insert zero terms as needed. Add the opposite.

$7a^3+3a^2+0a-10$
$\underline{9a^3+4a^2-\ 6a-9}$

$7a^3+3a^2+0a-10$
$\underline{-9a^{3-}4a^2+\ 6a+\ 9}$

$-2a^3-a^2+6a-1$

Your turn:

$(5a^2+7a+8)- (3a^2+4a+2)$

$(3w^3-5w^2-8) – (6w^3+2w-18)$

$(-6x^2+5x-9)-(-3x^2-x+7)$

$(8a^3-6a^2-2a+9)-(4a^3-2a^2+6a-8)$

$(7a^2+4a+5)+(2a^2-5a+8)-(3a^2-6a+4)$

Mulitiplying a polynomial

Multiply: $-4(2x^2+5x-3)$

$-8x^2+(-20x)-(-12)$

$-8x^2-20x+12$

Recall that to multiply pwers having the same base, you add the exponents. You can use this rule to multiply monomials.

Multiply: $(3a^3b^2)(-5a^2b^4)$

$3(-5)(a^3 \bullet a^2)(b^2 \bullet b^4)$

$-15(a^{3+2})(b^{2+4})$

$-15a^5b^6$

To multiply a polynomial of two or more terms by a monomial, you use the distributive property and the rule for multiplying powers of the same base.

Multiply $4x^2(7x^3+2x^2-6x-4)$

$4x^2(7x^3)+4x^2(2x^2)-4x^2(6x)-4x^2(4)$

$28x^5+8x^4-24x^3-16x^2$

Your turn:

$7(2x^2+x+2)$

$(-10x^4y)(10xy^4)$

$4a(6a^2+4a+5)$

$3d^2(5d^3-8d^2+7d-6)$

Multiplying Binomials

Multiply (2n+3)(n+2)

Use the distributive property.

2n (n+2)+3(n+2)

$2n^2+4n+3n+6$

$2n^2+7n+6$

Some polynomials involve subtraction. Pay careful notice to use the correct signs when multiplying such polynomials.

(3x-2)(7x+5)

3x(7x+5)-2(7x+5)

$21x^2+15x-14x-10$

$21x^2+x-10$

Your turn:

(x+4)(x+2)

(4y-2)(6y+7)

(x-4)(4x-1)

(4x-6)(3x-5)

(5c-3)(5c-3)

(2x-5)(2x+5)

(4d+7)(4d-7)

(2x+1)(2x+1)

Let's review

Write each polynomial in standard form

$4x + 5x^3 + 6x^4 - 3x^2 - 8$

$5a^2 - 7a + 4a^5 - 2 + 9a^3$

Simplify

$4x^3 + 4x^2 + 8x - x^3 + 7$

$7c^3 - 3c - 5c + 4 - 2c^2 + 1$

Find each answer

$(x^2 + 6x + 2) + (x^2 + 2x + 6)$

$(z^2-4z+2) +)(z^2+z-6)$

$(2b^3+b^2-4)-(b^3-b^2+2)$

$5xy^2(-2x^3y^4)$

$-3a^2(5a^3-3a^5)$

$(2x+3)(4x+5)$

Dividing a polynomial by a monomial

To add or subtract fractions with like denominators, you use the following rules.

$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$ and $\frac{a}{c} - \frac{b}{c} = \frac{a-b}{c}$

By using these rules in reverse, you can divide a polynomial by a monomial.

Divide

$$\frac{4a^5+8a^4+6a^2}{2a} = \frac{4a^5}{2a} + \frac{8a^4}{2a} + \frac{6a^2}{2a}$$

$$= \frac{4a^{5-1}}{2} + \frac{8a^{4-1}}{2} + \frac{6a^{2-1}}{2}$$

$$=2a^4+4a^3+3a$$

Dividing a polynomial by a monomial, divide each term of the polynomial by the monomial and simplify.

Divide

$$\frac{5x^7y^4 - 35x^5y^5 + 20x^3y^3}{-5x^3y}$$

$$\frac{5x^7y^4}{-5x^3y} - \frac{35x^5y^5}{-5x^3y} + \frac{20x^3y^3}{-5x^3y}$$

$$-x^4y^3-(-7x^2y^4)+(-4y^2)$$

$$= -x^4y^3+7x^2y^4-4y^2$$

Your turn:

$$\frac{9x-12y}{3}$$

$$\frac{5m^7+4m^2}{m^2}$$

$$\frac{24t^8+64t^3+8t^2}{8t^2}$$

$$\frac{21de+24de^2+27d^2e}{3de}$$

$$\frac{16r^4u^5-12r^7u^6}{-4r^4u^5}$$

REVIEW

Write each polynomial in standard form

$c^3-2c^2+6c^4-9c+7$

Simplify

$6b^3+7b^2-4b^3+5-11+b$

Add

$(3x^2+5x+2)+ (x^2-2x-1)$

Subtract

$(9b^2+6b-5) - (3b^2+5b+7)$

Multiply

$3b(7b^2-4b+3)$

$(4x+3)(3x+5)$

Divide

$\frac{7d^3-21d^2+14d}{7d}$

$\frac{8m^6-24m^5+32m^3}{-8m^2}$

What information is not needed to solve this problem

Joe earns $9 per hour and works 8 hours per day. He works 40 hours per week. How much does Joe earn per week?

a) earns $9 per hour
b) works 8 hours per day
c) works 40 hours per week
d) all the information is needed

Evaluate 45.97 +x when x=32.5

a) 13.47
b) 49.22
c) 4922
d) 78.47

Evaluatte 54.4 –a when a= 17.9

a) 72.3
b) 46.5
c) 36.5
d) 37.5

Ashlyn, Collin, Evan, and Lauren live 0.61mi, 0.061mi, 0.601 mi, 0.16 mi from school, respectively. Who lives closest to school?

a) Ashlyn
b) Collin
c) Lauren
d) Evan

Evaluate 247.04÷ a when a = 6.4

a) 38.6
b) 253.44
c) 240.64
d) 386

Evaluate 16m when m=4.3

a) 688
b) 6.88
c) 0.688
d) 68.8

List 0.847, 0.0847,8.47,0.1847 in order from least to greatest.

a) 8.47,0.847,0.1847,0.0847
b) 0.1847,0.0847,0.847,8.47
c) 0.0847,0.1847,0.847,8.47
d) 8.47,0.1847,0.0847,0.847

Write in exponential form.

4•4•4•4•4

a) 5^4
b) 20
c) 4^5
d) 1024

The volume of a cube is 8^3cubic feet. How many cubic feet is that?

a) 24
b) 83
c) 6561
d) 512

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Find the answer $24 \div 8+4x3^2$

a) 63
b) 147
c) 39
d) 441

Find the next number in the pattern: 3,6,10,15,____

a) 30
b) 21
c) 18
d) 20

Evaluate 412.5 +n when n=86

a) 498.5
b) 326.5
c) 421.1
d) 403.9

Write 76,500 in scientific notation

a) $7.65x10^4$
b) $76.5x10^3$
c) $7.65x10^3$
d) $765x10^2$

The exact weight of a package rather than the estimated weight is needed to ?

a) store the package on a shelf
b) carry the package on a bike rack
c) mail the package
d) all of the above

Evaluate a+b+2 when a=4 and b=8

a) 64
b) 34
c) 12
d) 14

Simplify x^2y^3

a) $(xy)^5$
b) xy^5
c) $(xy)^6$
d) already simplified

During the last 3 days, Amy drove 120 mi, 380mi, and 250 mi. Gas costs $2.10 per gallon. Her car used 30 gal of gas Which of the following cannot be determined?

a) number of mi/gal car averages
b) number of miles driven
c) capacity of gas tank
d) total cost of gas used

What number is greatest?

a) 0.2346
b) 0.3264
c) 0.3246
d) 0.3624

Evan bought 3lb of apples at $.89/lb and 2 lb of grapes at $2.49/lb. Find the total cost.

a) $7.65
b) $3.38
c) $9.25
d) $8.45

Evaluate the expression

$5+3(x-y^2)$ when x=10 and y=2

a) 197
b) 48
c) 512
d) 23

Write 6.45 kg in grams

a) 645 g
b) 64.5g
c) 6450g
d) 64,500g

Find the fuction rule

a) x+1
b) 3x-3
c) 2x-1
d) 4x+5

x	?
2	3
3	5
4	7
5	9
6	11

Simplify 3x +5y+4x

a) 12xy
b) 12(x+y)
c) 7x+5y
d) 5x+7y

Write 43.5mm in cm

a) 435 cm
b) 0.435 cm
c) 4.35 cm
d) 4350 cm

Find the sum -42+18

a) -60
b) -24
c) 60
d) 24

Find the quotient $\frac{-32+8}{-4}$

a) 10
b) -10
c) 6
d) -6

Evaluate $3-2c^2$ when c=-5

a) -47
b) -97
c) 53
d) -22

Write in order from least to greatest:

|12|,|0|,|-15|,|-1|

a) |0|,|-1|,|12|,|-15|
b) |-15|,|-1|,|0|,|12|
c) |-15|,|12|,|-1|,|0|
d) |12|,|0|,|-15|,|-1|

Simplify -4(-2t+3)

a) -8t+12
b) 8t-12
c) 8t+12
d) -8t-12

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Find the sum : -32+(-18)

a) -14
b) 14
c) -50
d) 50

The cost of three tickets at $3 each and two tickets at $9.50 each is ?

a) $28
b) $38
c) $12.50
d) $34.50

Solve $16=\frac{t}{4}+4$

a) t=80
b) t=192
c) t=60
d) t=48

Which number is to the left of -6 on a number line?

a) -8
b) 0
c) |-6|
d) 7

Solve -13n=52

a) n=-4
b) n=-676
c) n=4
d) n=676

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

How would you move the decimal point to change 47.5mm to m?

a) 2 places to the right
b) 2 places to the left
c) 3 places to the right
d) 3 places to the left

Evaluate $(2b)^3$ when b=4

a) 512
b) 32
c) 128
d) 216

Find the sum -12+(-18)

a) -6
b) -30
c) 6
d) 30

A rectangle has a perimeter of 28cm and width of 3cm. Use the formula P=2l+2w to find the length of the rectangle.

a) 25cm
b) 17cm
c) 22cm
d) 11cm

Solve 15-4y=3

a) y=3
b) y=4.5
c) y=-3
d) y=-4.5

Write the coordinates of the point 3 units to the left of the y-axis and 4 units up from the x-axis.

a) (-3,-4)
b) (-3,4)
c) (3,-4)
d) (3,4)

Find the answer $4^2 \bullet 3-(5-2)$

a) 0
b) 21
c) 45
d) 41

Choose the most appropriate graph to display a patient's temperature over a period of twelve hours.

a) bar graph
b) pictograph
c) line graph
d) double bar graph

Continue the pattern. 2,9,16,23, ___,_____,_____

a) 24,26,29
b) 30,37,44
c) 28,33,38
d) 32,42,53

Write the phrase as a variable expression: 7 less than 5n

a) 7-5n
b) 5n-7
c) 7<5n
d) 5n>7

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Simplify x^4x^3

a) x^{12}
b) x^7
c) x^{24}
d) $2x^7$

Find the mean of the data : 10,27,10,15

a) 17
b) 10
c) 12.5
d) 15.5

The temperature increased from -5 degrees F to 12 degrees F in 4 hours. Find the change in temperature.

a) 7 degree F
b) -17 degrees F
c) -7 degrees F
d) 17 degrees F

Ashlyn bought a tennis racket and some tennis balls. What information is needed to find the total amount she spent?

a) the price of the tennis racket
b) the price of each tennis ball
c) the number of tennis balls
d) all of the above

Solve 24=-3t

a) t=-8
b) t=-72
c) t=8
d) t=72

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Write an equation for the situation. Collin has 32 tapes. He has 6 fewer tapes than Evan. How many tapes does Evan have?

a) t+6=32
b) 6t=32
c) t-6=32
d) t+32=6

How many lines of symmetry does an equilateral triangle have?

a) 1
b) 6
c) 3
d) 0

Evaluate q^2-4 when q=4 and r =-7

a) 9
b) 11
c) 23
d) 45

Solve -44=4(2x-7)

a) x=-2
b) x=9
c) x=-9
d) x=-$4\frac{5}{8}$

What does $\overleftrightarrow{XW} \| \overleftrightarrow{YZ}$ mean?

I. The lines are parallel.
II. The lines are perpendicular.
III.The lines do not intersect.

a) I only
b) I and II
c) I and III
d) II only

The length of a book is about 230 mm. About how many centimeters long is the book?

a) 0.23
b) 2300
c) 2.3
d) 23

A pictograph shows that 900 people bought tapes and 600 people bought CDs. If 6 symbols represent the people who bought tapes, how many people does one symbol represent?

a) 250
b) 100
c) 150
d) 300

Which figure has no lines of symmetry?

a) regular octagon
b) square
c) scalene triangle
d) rhombus

Evaluate the difference a-b when a=51.2 and b=3.43

a) 1.69
b) 54.63
c) 47.77
d) 8.55

Find the measure of an angle that is supplementary to an angle with a measure of 83 degrees.

a) 97
b) 277
c) 7
d) 263

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Solve -4n+8=32

a) n=-10
b) n=-6
c) n=6
d) n=10

Write 5/12 as a decimal.

a) 0.416
b) $0.41\overline{6}$
c) $0.\overline{416}$
d) $0.41\tilde{6}$

Simplify $\frac{x^9}{x^3}$

a) x^3
b) x^6
c) x^{12}
d) x^{-6}

At noon, the temperature was -9 degrees C. During the next 5 hours, it fell 4 degrees. What was the temperature at 5:00pm?

a) 5 degree C
b) -5 degree C
c) 13 degree C
d) -13 degree C

Choose the fraction that is not equivalent to ¾

a) 39/52
b) 75/100
c) 21/28
d) 69/96

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Simplify $8a^6 \bullet 5a^2$

a) $3a^4$
b) $13a^8$
c) $40a^{12}$
d) $40a^8$

What is the prime factorization of 80?

a) $8 \bullet 10$
b) $2^4 \bullet 5$
c) $2 \bullet 5 \bullet 8$
d) $5 \bullet 16$

Decide which is the appropriate form of the answer. Vans hold 12 students each. If 5 students plan to travel in vans, how many vans will be needed?

a) decimals
b) dollars
c) fraction
d) whole number

Simplify s^{-6}

a) -6s
b) s-6
c) $\frac{s}{6}$
d) $\frac{1}{s^6}$

Solve 9x +2+4x=41

a) x=3
b) x=2
c) x=507
d) $x=3\frac{4}{13}$

Write 0.0000498 in scientific notation.

a) $4.98x\ 10^{-4}$
b) $4.98x10^{4}$
c) $4.98x10^{5}$
d) $4.98x10^{-5}$

On a trip, Evan plans to spend 10 days camping, and then 11 days at a resort. How many weeks long is his trip?

a) 21
b) 7
c) 2
d) 3

An angle that measures 79 degrees is a(n)_____angle.

a) obtuse
b) right
c) acute
d) adjacent

Five rulers cost $1.95. What is the cost of 12 rulers?

a) 4.68
b) 9.75
c) 23.64
d) 3.90

What is 45% of 120?

a) 45
b) 2.6
c) 54
d) 0.45

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Which fraction is equivalent to 2/5?

a) 12/15
b) 5/2
c) 24/60
d) 2 1/5

A furniture store manager busy lamps for $60 and sells them for $80. What is the percent of increase?

a) 20%
b) 25%
c) 33.3333%
d) 140%

Which number is most likely to be estimated?

a) an hourly wage of a cashier
b) the postage for a package
c) the number of frames on a roll of film
d) the number of people who visit an airport in one year

Write the ratio in lowest terms 16 in to 4 ft.

a) 4 to 1
b) 16 to 4
c) 1 to 3
d) 1 to 4

Solve $\frac{10}{15}=\frac{x}{36}$

a) x=$\frac{2}{3}$
b) x=15
c) x=12
d) x=24

Complete 35% of _____is 63?

a) 180
b) 63
c) 55.6
d) 1.8

Write the phrase “the sum of three times a number t and seven” as a variable expression.

a) 3t-7
b) t^3+7
c) 3t+7
d) 3(t+7)

Add -36 + (-17)

a) -53
b) 19
c) 53
d) -19

Write 475% as a fraction or mixed number in lowest terms.

a) 475/100
b) 19/40
c) 47 ½
d) 4 ¾

Simplify$\sqrt{4900}$

a) 60
b) 70
c) 2450
d) 700

Simplify $(7x^2)(2x)$

a) $14x^2$
b) 7
c) 1
d) $14x^3$

Which type of quadrilateral has exactly two lines of symmetry?

a) rhombus
b) square
c) trapezoid
d) none of the above

Solve 15+2q=9

a) q=12
b) q= -3
c) q= -12
d) q= $\frac{9}{17}$

A swimmer, a volleyball player, and a skier are named Amy, Betty, and Collin. Collin's sport only happens outdoors. What can you conclude?

a) Collin is the only skier.
b) Collin is not the swimmer.
c) Amy is not the skier
d) all of the above

Simplify $(36x^2)^0$

a) 1
b) $36x^2$
c) 0
d) $36x^{20}$

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

The radius of a circle is 10 in. What is the area of the circle?

a) $31.4in^2$
b) $100in^2$
c) $62.8in^2$
d) $314in^2$

The lengths of the legs of a right triange are 0.3cm and 0.4cm. What is the length of the hypotenuse?

a) 0.84 cm
b) 0.5 cm
c) 0.25 cm
d) 0.7 cm

Solve $\frac{x}{7}$= -21

a) x=3
b) x= -3
c) x= -147
d) x= 147

Write in decimal notation $6.35x\ 10^5$

a) $63.5x10^4$
b) 635,000
c) .0000635
d) 63.5

The scale of a statue of a famous citizen is 5 inch:3 ft. The actual person is 6ft tall. Find the height of the statue.

a) 6 inch
b) 2.5 inch
c) 10 inch
d) 3.6 inch

Evaluate $x-y^2$ when x=8 and y=7

a) 1
b) 15
c) -41
d) -57

What percent of 120 is 72?

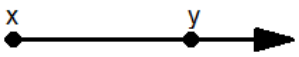
a) 52%
b) 60%
c) 48%
d) $166\frac{2}{3}\%$

A number cube is rolled. What is the probability of rolling an even number?

a) 0
b) 1
c) ½
d) 1 to 3

Write $\frac{13}{65}$ as a percent.

a) 5%
b) 2%
c) 500%
d) 20%

What is the correct name for this figure? 

a) $\overrightarrow{XY}$
b) $\overleftarrow{XY}$
c) $\overrightarrow{YX}$
d) $\overleftarrow{YX}$

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Jadyn plans to put a wallpaper border around her rectangular bedroom. Which measurement of the room should she find?

a) area
b) diameter
c) circumference
d) perimeter

Simplify $12+4(3-5)^2$

a) 64
b) -1
c) 28
d) -64

Simplify $\frac{15n^2}{n^6}$

a) $15n^8$
b) $15n^4$
c) $\frac{15}{n^3}$
d) $\frac{15}{n^4}$

Simplify -5 (-4)+6(-2)

a) 8
b) -32
c) 20
d) -52

The length of one side of a regular octagon is 15cm. Find the perimeter.

a) 90 cm
b) 120 cm
c) 23 cm
d) cannot be determined

The measure of an angle is 73 degrees. What is the measure of its complement?

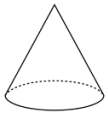
a) 17 degrees
b) 107 degrees
c) 27 degrees
d) 117 degrees

There are 3 teachers for every 50 students in a school. the school has 750 students How many teachers are there at the school?

a) 125
b) 703
c) 50
d) 45

Solve: r-13= -2

a) r=15
b) r=11
c) r=-15
d) r=-11

Identify the figure 

a) cone
b) sphere
c) cylinder
d) pyramid

Divide $\frac{3x^4+12x^2-6x}{3x}$

a) x^4+4x^2-2x
b) x^3+4x-2
c) x^3+12x^2-6x
d) $9x^5+36x^3-18x^2$

9 x1	2 x2	5 x1	4 x3	0 x0	9 x9	3 x5	8 x5	2 x6	4 x7
5 x6	7 x5	3 x0	8 x8	1 x3	3 x4	5 x9	0 x2	7 x3	4 x 1
2 x3	8 x6	0 x5	6 x1	3 x8	1 x 1	9 x0	2 x8	6 x4	0 x7
7 x7	1 x4	6 x2	4 x5	2 x4	4 x 9	7 x0	1 x2	8 x4	6 x5
3 x2	4 x6	1 x9	5 x7	8 x2	0 x8	4 x2	9 x8	3 x6	5 x5
8 x9	3 x7	9 x7	1 x7	6 x0	0 x3	7 x2	1 x5	7 x8	4 x0
8 x3	5 x2	0 x4	9 x5	6 x7	2 x7	6 x3	5 x4	1 x0	9 x 2
7 x 6	1 x 8	9 x6	4 x 4	5 x3	8 x1	3 x3	4 x8	9 x3	2 x0
8 x0	3 x1	6 x8	0 x9	8 x7	2 x 9	9 x4	0 x1	7 x4	5 x8
0 x6	7 x1	2 x5	6 x9	3 x9	1 x6	5 x0	6 x6	2 x1	7 x9

Find the product (m+7)(m-4)

a) m^2-28
b) m^2+3m-28
c) m^2-11m-28
d) m^2+28

Find the prime factorization of 240.

a) $2^4 \bullet 3 \bullet 5$
b) $15 \bullet 16$
c) $2^3 \bullet 15$
d) $2 \bullet 3 \bullet 5 \bullet 8$