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Test Taking 101

As you begin to prepare for taking college tests, please know that having the right attitude can make a huge difference in the outcome. Here are a few tips to help you in the process:

1. Prepare properly for the exam. This might include reviewing your homework / review, studying in small blocks of time, or preparing with another student.
2. Get plenty of rest, eat before testing, and relax.
3. Use the allotted time wisely, try not to rush through calculations, and check over your work.
4. Learn the concepts, rather than memorizing.
5. Read the directions carefully, and then read each question carefully.
6. Do the questions you understand first, and if you come to one you are not sure of the answer, come back to that question.
7. If there are formulas or facts you want to jot down to refer to later, do that as you first receive the test.
8. Take deep breaths. If you are anxious, stop and get control, then calmly proceed.
9. Be confident in your work, answer all questions, do your best!

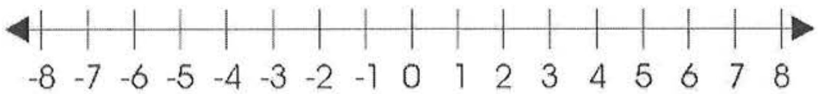
Additionally, whenever given a multiple choice test, it is important to use a variety of skills. If you come to a test question that you have no real idea about, use one or more of the following techniques:

- Eliminate any answers you know are incorrect.
- Work the problem on scratch paper first, then look for your answer among the given choices.
- Try substituting the given answers back into the question to help eliminate answers.

M^2 - I | Math Module I - S^2 Overview, Integers, Opposites, Absolute Value, Operations with Signed Numbers, and Operations on Fractions

In this module we will review integers, opposites, absolute value, operations with signed numbers, and operations on fractions.

Looking at the number line below, the set of **integers** is represented. Marked on the number line are the whole numbers and their opposites.



The **signed numbers** are made up of the __________ numbers, the __________ numbers, and _________.

Numbers that are the same distance from 0 on a number line are known as _____________. The "opposite of" is written as ______. By definition, if a is a number, then $-(-a) = a$.

Find the opposite of each number. These are not equal to each other, so be careful not to use an equal sign when writing the answer.

1. 12 2. -5 3. 0

T^2 To Try - Find the opposite of each number.

a. 9 b. -2 c. -8

The next concept that will be covered is absolute value. The symbol that denotes absolute value looks like ___________. The absolute value of a number is defined as ___________ ____________________________________. As you look above at the number line illustrated, you can see that 5 and -5 are both five units from zero. Likewise, the number 2 is the same distance from zero as -2.

Simplify the following.

1. $|-4|$ 2. $|8|$ 3. $|0|$

T^2 To Try - Find the absolute value.

a. $|-7|$ b. $|15|$ c. $|-9|$

As we review the four mathematical operations and signed numbers, it is important we recall the rules for each operation. Summarize the steps for adding integers in the spaces provided below.

When adding integers:

With the same sign 1. ______________________________

2. ______________________________

With different signs 1. ______________________________

2. ______________________________

1. $15 + 42$

2. $-5 + (-4)$

3. $-43 + 43$

4. $-10 + (-6) + (-1)$

T^2 To Try - Add each of the following.

a. $19 + 28$

b. $-7 + (-6)$

c. $-32 + 32$

d. $-12 + (-5) + (-2)$

When subtracting integers:

____

1. $12 - 7$

2. $-6 - 4$

3. $11-(-14)$

4. $-9-(-1)$

5. Subtract 10 from -22.

6. $7-8-(-5)-1$

$\boxed{\text{T}^2}$ To Try - Subtract each of the following.

a. $24-6$

b. $-17-8$

c. $-15-(-6)$

d. $42-(-42)$

e. Subtract 17 from -25.

f. $-4-3-7-(-5)$

When multiplying integers:

____

When dividing integers:

____

1. $-9\cdot 6$

2. $-12(-10)$

3. $-3(-4)(-2)$

4. $-24\div 6$

5. $\dfrac{0}{-15}$

6. $\dfrac{-72}{-8}$

$\boxed{T^2}$ To Try - Multiply or divide each of the following.

a. $-7 \cdot 8$

b. $-7(-9)$

c. $-2(-4)(-5)$

d. $-48 \div 8$

e. $\frac{-15}{0}$

f. $\frac{-75}{-5}$

Next we will review the basic concepts of fractions including the four operations with fractions.

Match each word to its definition in the list below:

_____ numerator	a. contains both a whole number and a fraction
_____ denominator	b. the top number of a fraction
_____ improper fraction	c. a fraction in which the numerator is less than the denominator
_____ proper fraction	d. the bottom number of a fraction
_____ mixed number	e. a fraction in which the numerator is greater than or equal to the denominator

Now that you have recalled the definitions, give an example of each.

numerator:

denominator:

improper fraction:

proper fraction:

mixed number:

Let's reduce the following fractions by dividing out common factors.

1. $\frac{3}{12}$

2. $\frac{14}{16}$

T^2 To Try - Write each of the following fractions in simplest form.

a. $\frac{35}{50}$

b. $\frac{24}{40}$

Now that we have reviewed the vocabulary of fractions and talked about reducing them to their simplest form, let's move to reviewing how to multiply and divide fractions.

To multiply fractions, we will multiply numerator times numerator and denominator times denominator. For some fractions, there is a short-cut we will use known as dividing out common factors. **Keep in mind the rules for operations with signed numbers as those rules will apply to fractions as well.** Let's look at a few examples:

1. $\frac{1}{3} \cdot \frac{4}{7}$

2. $-\frac{2}{5} \cdot \frac{15}{20}$

3. $\left(\frac{2}{9}\right)^2$

4. $\frac{5}{55} \cdot \left(-\frac{9}{10}\right)$

T^2 To Try - Multiply the following fractions. Give your answer in simplest form.

a. $\frac{1}{5} \cdot \frac{3}{8}$

b. $-\frac{3}{4} \cdot \frac{16}{27}$

c, $\left(\frac{5}{8}\right)^2$

d. $\frac{7}{25} \cdot \left(-\frac{3}{49}\right)$

Next we will divide fractions. With division, we will need to be reminded about reciprocals. Two numbers are reciprocals if __________________________. Give an example of two numbers that are reciprocals _____________________________.

We will rewrite each division problem by changing the division sign to multiplication and the term that follows the operational sign to its reciprocal. Let's look at a few examples:

1. $\frac{3}{8} \div \frac{2}{3}$

2. $-\frac{2}{3} \div \frac{5}{6}$

3. $\frac{\frac{a}{b}}{\frac{c}{d}}$

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

T^2 **To Try** - Divide the following fractions. Give your answer in simplest form.

a. $\frac{5}{8} \div \frac{2}{3}$

b. $-\frac{7}{8} \div \frac{5}{6}$

c. $\frac{\frac{1}{5}}{\frac{7}{10}}$

d. $\frac{\frac{1}{8}}{\frac{3}{4}}$

Next we will review the process for adding and subtracting fractions.

In your own words, list the steps for adding or subtracting fractions. Keep in mind that you must have matching (common) denominators before you can add or subtract fractions.

____

____

____

____

Using the steps above, let's work the following problems together.

1. $-\frac{1}{6}+\frac{5}{9}$

2. $-\frac{9}{20}-\frac{2}{5}$

T^2 To Try - Perform the indicated operation. Give answer in simplest form.

a. $-\frac{1}{6}+\frac{3}{8}$

b. $-\frac{11}{28}-\frac{2}{7}$

To multiply and divide mixed numbers, it will be important to change the mixed numbers to be improper fractions. You will want to divide out any common factors to make these operations easier to complete. Let's look at a few examples:

1. $2\frac{3}{4}\cdot 3\frac{1}{3}$

2. $4\frac{2}{3}\cdot 1\frac{3}{7}$

T^2 To Try - Multiply the following mixed numbers. Give your answer in simplest form.

a. $5\frac{1}{3}\cdot 3\frac{1}{2}$

b. $7\frac{1}{3}\cdot 4\frac{1}{2}$

Remember with division of fractions and mixed numbers you much change the division sign to a multiplications sign and the term that follows to its reciprocal.

1. $4\frac{2}{7}\div 1\frac{1}{4}$

2. $5\frac{2}{3}\div 5\frac{1}{3}$

$\boxed{T^2}$ **To Try** - Divide the following mixed numbers. Give your answer in simplest form.

a. $8\frac{1}{3} \div 2\frac{1}{4}$

b. $3\frac{3}{4} \div 6\frac{1}{2}$

When adding and subtracting mixed numbers, it is generally best to leave them in mixed number notation to perform the operation. Remember when adding or subtracting mixed numbers, the fractions must have a ______________________________.

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

2. $5\frac{3}{10} - 3\frac{4}{5}$

$\boxed{T^2}$ **To Try** - Add or subtract the following mixed numbers. Give your answer in simplest form.

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

b. $8\frac{1}{5} - 2\frac{5}{9}$

P^2 - I Practice Plus

Complete the table with your outside commitments and time per day spent doing each activity.

Activity	# of hours per day
work	
sleep	
eat	
school (in class)	
school (study/homework)	
family	
extra curricular	
other:	
other:	
other:	

Total hours per day committed: ______________

1. Now that you have totaled your daily commitments, reflect on one or more ways you could adjust your schedule when unexpected things arise.

   a. ____

   b. ____

2. List 3 test taking strategies you plan to use.

   a. ____

   b. ____

   c. ____

Find the opposite of each number.

3. 11 4. -2 5. 0

Find the absolute value.

6. $|-18|$ 7. $|25|$ 8. $|0|$

Add each of the following.

9. $-7+(-28)$

10. $32+(-17)$

11. $-16+16$

12. $9+(-22)+(-4)$

Subtract each of the following.

13. $-10-14$

14. $33-(-7)$

15. Subtract -9 from 16.

16. $-6-2-7-(-8)$

Multiply or divide each of the following.

17. $-3 \cdot 10$

18. $-7(-5)$

19. $\frac{-34}{-2}$

20. $\frac{-26}{0}$

Write each fraction in simplest form.

21. $\frac{15}{18}$

22. $\frac{20}{45}$

Multiply the fractions. Give your answer in simplest form.

23. $\frac{3}{5} \cdot \frac{4}{7}$

24. $-\frac{4}{9} \cdot \frac{12}{30}$

Divide the fractions. Give your answer in simplest form.

25. $\frac{5}{8} \div \frac{2}{3}$

26. $\frac{9}{10} \div \left(-\frac{3}{20}\right)$

Add or subtract the fractions. Give your answer in simplest form.

27. $-\frac{5}{12} + \frac{1}{4}$

28. $-\frac{3}{8} - \frac{5}{16}$

Multiply or divide the mixed numbers.

29. $5\frac{5}{6} \cdot 2\frac{2}{7}$

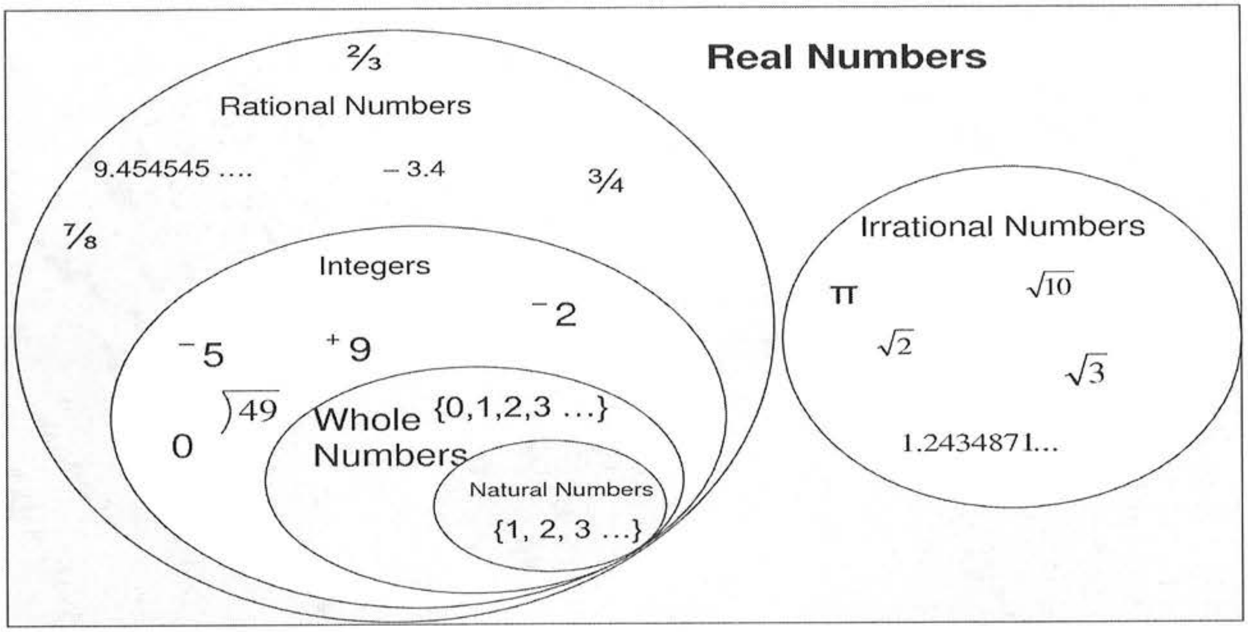
30. $8\frac{1}{3} \div 4\frac{5}{6}$

Add or subtract the mixed numbers.

31. $12\frac{3}{10} + 7\frac{1}{4}$

32. $15\frac{1}{9} - 12\frac{5}{6}$

M^2 - II Math Module II - Sets of Numbers, Exponents, Bases and Powers, Order of Operations, Evaluating Expressions



It is important to recall the different sets of numbers and the members of each set.

The set of Natural numbers includes: ______________________________

The set of Whole numbers includes: ______________________________

The set of Integers includes: ______________________________

The set of Rational numbers includes: ______________________________

The set of Irrational numbers includes: ______________________________

The set of Real numbers includes: ______________________________

Given: $\left\{-3,\ 0,\ \frac{2}{5},\ -3.4,\ 105,\ -7,\ 18,\ \sqrt{3}\right\}$ List the numbers in this set that belong to the set of:

Natural ______________ Rational ______________

Whole ______________ Irrational ______________

Integers ______________ Real ______________

$\boxed{T^2}$ To Try - Tell which set or sets each of the following numbers belongs to: natural numbers, whole numbers, integers, rational numbers, irrational numbers, and real numbers.

a. -15

b. 0

c. $\frac{3}{4}$

d. $\sqrt{5}$

e. 7

Exponents, Bases and Powers

Sometimes a number will be written as a factor multiple times like $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$. This is known as expanded form but can be written in exponential form with 2 being the base and 5 being the exponent since the 2 was multiplied 5 times. Exponential form would look like 2^5 and would be read "two to the fifth power." The standard number for 2^5 would be 32. There are special words for the exponents of 2 and 3. For 7^2, we could read this as "seven squared" and 4^3 could be read as "four cubed."

Write using exponential notation.

1. $6 \cdot 6$

2. $3 \cdot 3 \cdot 3 \cdot 3$

Evaluate the following exponential expressions.

1. 9^2

2. 4^3

3. $(-6)^2$

4. -7^2

$\boxed{T^2}$ To Try - Below is a chart listing the most common squares and cubes. Some of the values have been filled in for you. Fill in the remaining values.

Squares	Cubes
$1^2 = 1$	$1^3 = 1$
$2^2 = 4$	$2^3 = 8$
$3^2 = 9$	$3^3 =$
$4^2 =$	$4^3 =$
$5^2 =$	$5^3 =$
$6^2 =$	
$7^2 =$	
$8^2 =$	
$9^2 =$	
$10^2 =$	
$11^2 =$	
$12^2 =$	
$13^2 =$	
$14^2 =$	
$15^2 =$	

Square Roots and Cube Roots

Now that we have looked at squares and cubes, let's look at how to evaluate square roots and cube roots.

When we use this symbol, $\sqrt{\ }$, we will be looking for a square root. The $\sqrt{\ }$ symbol is called a radical sign. The $\sqrt{64}$ is 8 because $8 \cdot 8 = 64$. You see when calculating square roots we are looking for two identical factors whose product equals the given number under the radical sign. The number under the radical sign, which in this example is 64, is called the **radicand**. We are looking for the number that is squared to get the radicand.

Similarly, we use the $\sqrt[3]{\ }$ symbol when looking for a cube root. When calculating cube roots, we are looking for three identical factors whose product equals the given number under the radical sign, or radicand.

The number "3" in the cube root symbol is called the **index**. If you don't see an index in the radical sign, it is implied to be a square root.

T^2 **To Try** - Below is a chart listing the most common square roots and cube roots. Some of the values have been filled in for you. Fill in the remaining values.

Square Roots	Cube Roots
$\sqrt{1}=1$	$\sqrt[3]{1}=1$
$\sqrt{4}=2$	$\sqrt[3]{8}=2$
$\sqrt{9}=$	$\sqrt[3]{27}=$
$\sqrt{16}=$	$\sqrt[3]{64}=$
$\sqrt{25}=$	$\sqrt[3]{125}=$
$\sqrt{36}=$	
$\sqrt{49}=$	
$\sqrt{64}=$	
$\sqrt{81}=$	
$\sqrt{100}=$	
$\sqrt{121}=$	
$\sqrt{144}=$	
$\sqrt{169}=$	
$\sqrt{196}=$	
$\sqrt{225}=$	

After you have familiarized yourself with squares and square roots, use your reasoning skills to complete the following:

1. $\sqrt{39}$ is between what two integers? ______ and ______

2. $\sqrt{75}$ is between what two integers? ______ and ______

T^2 **To Try** - Find the unknown values.

1. $\sqrt{22}$ is between what two integers? ______ and ______

2. $\sqrt{65}$ is between what two integers? ______ and ______

Order of Operations

Now that we have reviewed sign rules and exponents, let's discuss order of operations.

Simplifying expressions is not as simple as moving left to right as we read. There are four basic steps to simplifying expressions and arriving at the correct answer each time. In addition to following the four steps, it will be essential to pay close attention to the sign rules we have already discussed.

Write the rules for order of operations in your own words.

1. ____________________

2. ____________________

3. ____________________

4. ____________________

Let's try a few problems together.

1. $15 + 3 \cdot 2$

2. $14 \div 7 \cdot 2 + 3$

3. $6^2 \cdot (10 - 8)$

4. $6 + (9 - 3) + 4^3$

5. $\dfrac{18 + 6}{(-2)^4 - 2^2}$

6. $3\left[9 + 4(7 - 5)\right]$

T^2 **To Try** - Simplify the following using order of operations.

a. $24 + 6 \cdot 3$

b. $100 \div 10 \cdot 5 + 4$

c. $4^2 \cdot (15 - 5)$

d. $2 + (7 - 2) + 9^2$

e. $\dfrac{40 + 8}{(-5)^2 - 3^2}$

f. $4[7 + 3(6 - 3)]$

Evaluating Expressions

Now that we have reviewed the rules for signed numbers and order of operations, we will next practice evaluating algebraic expressions.

If $x = -3$ and $y = -4$, evaluate each expression.

1. $3x - y$

2. $x^4 - y^2$

3. $\dfrac{2x}{3y}$

T^2 **To Try** - If $x = -2$ and $y = 5$, evaluate each expression.

a. $4x - y$

b. $x^3 + y^3$

c. $\dfrac{x}{6y}$

P^2 - II Practice Plus

Tell which set or sets each of the following numbers belongs to: natural numbers, whole numbers, integers, rational numbers, irrational numbers, and real numbers.

1. 12

2. 0

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

4. -3

5. $\sqrt{7}$

Give the base and the exponent of the following numbers written in exponential notation.

6. 7^4

   base: _____

   exponent: _____

7. 9^6

   base: _____

   exponent: _____

Write using exponential notation.

8. $5 \cdot 5 \cdot 5 \cdot 5$

9. $2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$

Evaluate the following exponential expressions.

10. 2^4

11. 8^2

12. 5^3

13. $(-3)^2$

Find each square root or cube root.

14. $\sqrt{49}$

15. $\sqrt{121}$

16. $\sqrt[3]{64}$

17. $\sqrt{82}$ is between what two integers? ______ and ______

Simplify the following using order of operations.

18. $9 + 6 \cdot 4$

19. $3 + (9 - 5) + 7^2$

20. $36 - 12 \div 4 + 2$

21. $16 \div 2 \cdot 4 - 3$

22. $5^2 \cdot (12 - 7)$

23. $\dfrac{10 + 8}{4^2 - 5^2}$

24. $\dfrac{(-6)^2 - 3^3}{15 - 12}$

25. $5\,[3 + 4\,(8 - 6)]$

If $x = -4$ and $y = -2$, evaluate each expression.

26. $2x - y$

27. $x^2 - y^2$

28. $\dfrac{2x}{6y}$

M^2 - III Math Module III - Equations

Recall in algebra that a letter, which is referred to as a variable, is used to represent an unknown. For instance, if you work 40 hours per week your gross pay is $40x$, with x representing your pay per hour. Another example might be two siblings who are two years apart in age. One sibling's age is x and the other's is $x+2$.

Using these examples, let's practice evaluating expressions.

$40x$ if $x = \$7.25$ an hour

$40x$ if $x = \$8.75$ an hour

$x+2$ if $x = 7$ years old

$x+2$ if $x = 51$ years old

T^2 To Try - Use the information to write an expression. Then evaluate the expression.

a. A car rental company charges a flat rate of $\$39$ a day to rent a compact car. Write an algebraic expression describing the cost of the compact car rented for x days, then determine how much will the rental company will change to rent this car for 7 days?

Now let's review how to combine like terms by looking at the next two examples.

1. $5x + x + 4 + 7$

2. $2x - 5 + 7 + 9x$

T^2 To Try - Simplify each expression by combining like terms.

a. $4b + 8b + 9 + 6$

b. $5y - 9 + 2 + 12y$

Next, let's apply the distributive property to simplify each of the following expressions.

1. $9(2x-5) + 7(x+4)$

2. $-6(2-x) + 14$

T^2 **To Try** - Simplify each expression by using the distributive property.

a. $5(3x-4)+8(x+2)$

b. $-3(2-x)+10$

Solving Linear Equations in One Variable

One of the basic concepts of algebra is learning to solve equations. Equations differ from expressions because equations have an equal sign, expressions do not. Linear equations can be simple equations that are easy to solve or reason out in our head. They can also be much more complicated equations that require multiple steps. To solve linear equations we will use the distributive property, addition property of equality, and the multiplication property of equality.

First, let's determine if 5 is a solution for the following equations.

1. $3x+1=16$

   Solution? "yes" or "no" ______

2. $4x-5=14$

   Solution? "yes" or "no" ______

The Addition Property of Equality states that a, b, and c are numbers. So

if $a=b$ then $a+c=$ ______ and are equivalent equations.	Also, if $a=b$ then $a-c=$ ______ and are equivalent equations.

Using the addition property of equality, solve.

1. $x-4=7$

2. $x+5=11$

3. $y-9=-15$

4. $n+10=7-3$

$\boxed{T^2}$ **To Try** - Solve each of the following using the addition property of equality.

a. $y-7=15$

b. $a+5=18$

c. $m-4=-6$

d. $x+3=10-2$

The Multiplication Property of Equality states that a, b, and c are numbers and $c \neq 0$. So

if $a=b$	Also, if $a=b$
then $a \cdot c =$ ________	then $\frac{a}{c} =$ ________
and are equivalent equations.	and are equivalent equations.

Using the multiplication property of equality, solve.

1. $3x=21$

2. $-2x=14$

3. $\frac{1}{6}x=5$

4. $\frac{3}{8}y=-3$

$\boxed{T^2}$ **To Try** - Solve each of the following using the multiplication property of equality.

a. $5x=15$

b. $-9x=18$

c. $\frac{1}{4}x=8$

d. $\frac{3}{5}y=-9$

Now let's look at solving equations using both the addition property of equality and the multiplication property of equality.

1. $19x - 7 = 5 + 15x$

2. $5x + 5 = -5 + 3x + 24$

3. $6(x + 3) = 3(x - 2)$

4. $8 - 2(a + 1) = 9 + a$

5. $\frac{5}{6}x - \frac{1}{2} = 2$

6. $\frac{7}{8}x + \frac{1}{2} = \frac{3}{4}x$

7. $4(3x + 9) = 12x + 36$

8. $3x - 7 = 3(x + 1)$

T^2 **To Try** - Solve each of the following using both the addition property of equality and the multiplication property of equality.

a. $21x - 7 = 9 + 17x$

b. $7x + 6 = -5 + 5x + 27$

c. $9(x - 2) = 2(3x + 6)$

d. $6 - 8(a + 1) = 7 + a$

e. $\frac{3}{4}x - \frac{1}{2} = 1$

f. $\frac{5}{6}x + \frac{1}{2} = \frac{2}{3}x$

g. $3(5x + 4) = 15x + 12$

h. $5x - 6 = 5(x + 2)$

P^2 - III Practice Plus

Use the information to write an expression. Then evaluate the expression.

1. A supermarket charges a flat rate of $\$19$ a day to rent a carpet cleaning machine. Write an algebraic expression describing the cost of the carpet cleaning machine rented for x days, then determine how much the supermarket will change to rent this machine for 3 days?

2. A Sonic employee earns $\$8$ an hour. Write an algebraic expression describing the earnings of this employee for working x hours, then determine how much the employee will earn for working 40 hours.

Simplify each expression by combining like terms.

3. $8y + y + 4y$

4. $6a + 9 - 2a - 4$

5. $2x - 3 - 8x + 11$

Simplify each expression by using the distributive property.

6. $4(y + 2) - 5$

7. $5(x + 6) + 3(2x - 4)$

8. $3(3x - 5) - 7(2x + 1)$

Solve each of the following using the addition property of equality.

9. $x - 7 = 10$

10. $y + 5 = 18$

11. $m-8=-14$

12. $x+4=9-5$

Solve each of the following using the multiplication property of equality.

13. $5y=45$

14. $-12x=60$

15. $\frac{1}{4}x=7$

16. $\frac{2}{5}y=-8$

Solve each of the following using both the addition property of equality and the multiplication property of equality.

17. $18x-7=5+12x$

18. $4x+7=-7+2x+24$

19. $4(x+2)=2(x-8)$

20. $6-4(a+1)=7+a$

21. $\frac{11}{12}x-\frac{1}{4}=8$

22. $\frac{9}{10}x+\frac{1}{2}=\frac{4}{5}x$

23. $3(7x+6)=21x+18$

24. $4x-3=4(x+1)$

M² - IV **Math Module IV - Solving Linear Inequalities, Graphing**

Solving Linear Inequalities

After reviewing the fundamental properties for solving equations, it is a normal transition to study inequalities next. There are a few rules to remember:

$<$ means ______________________________

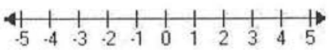
$>$ means ______________________________

$\leq$ means ______________________________

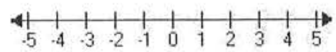
$\geq$ means ______________________________

Solve and graph each of the following.

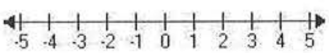
1. $3x + 2 > 8$



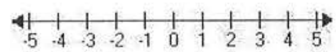
2. $5x - 6 < 14$



3. $12x \geq 36$



4. $-19x \leq 38$



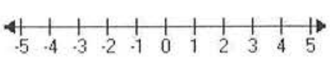
After reviewing these inequalities and the steps used to solve them, restate the rule to remember when multiplying or dividing both sides of an inequality by the same negative number.

____

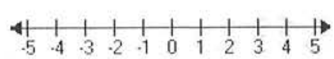
____

T² To Try - Solve each inequality and graph the solution set.

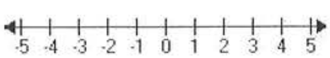
a. $4x + 4 > 20$



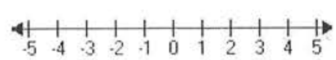
b. $7x - 6 < 15$



c. $17x \geq 34$



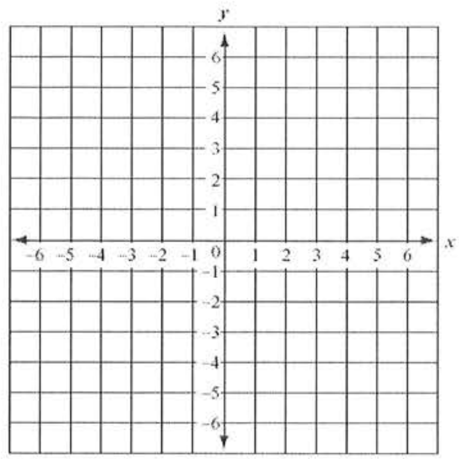
d. $-9x \leq 45$



Graphing

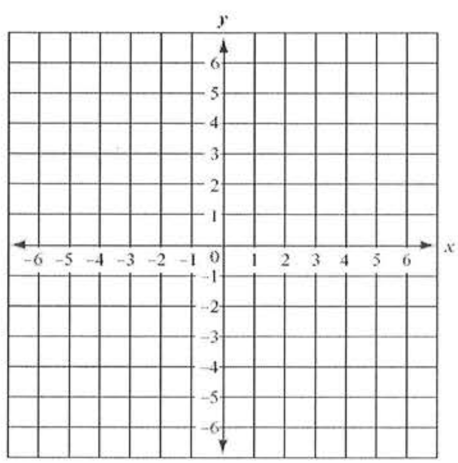
When graphing, recall the horizontal axis is the x-axis, and the vertical axis is the y-axis. Ordered pairs are written and graphed as (x, y).

Let's graph the following ordered pairs together:
$(3, 2), (-4, 5), (6, -1), (-4, -5), (0, 2), (5, 0), (0, 0)$



T² - **To Try** - Graph the following ordered pairs.

$(5, 1), (-3, 2), (4, -5), (-1, -4), (3, 0), (0, -2), (0, 0)$



When graphing linear equations there are a variety of graphing procedures:

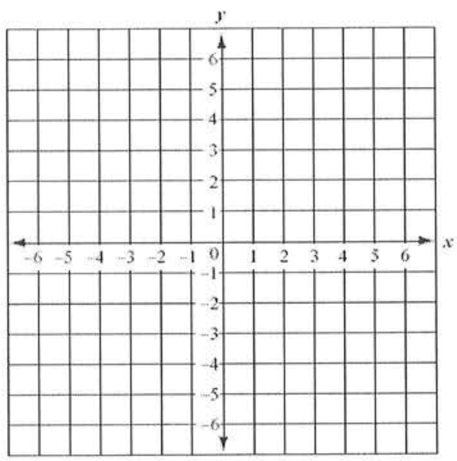
- graphing with a table of values
- graphing with intercepts
- graphing with slope-intercept

Let's look at a few examples of each.

Graphing with a Table of Values

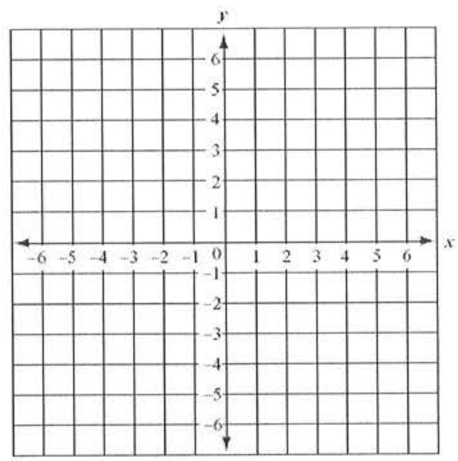
1. $y = 2x - 1$

x	y
-2	
-1	
0	
1	
2	



2. $y = -3x$

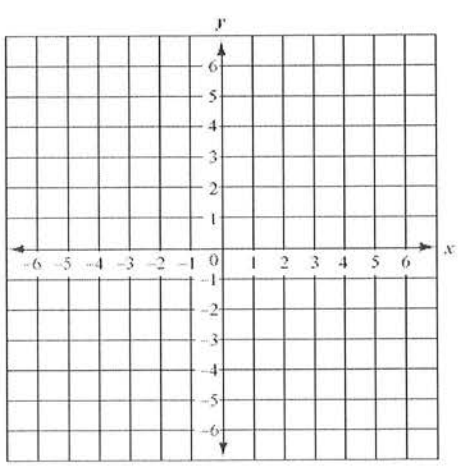
x	y
-2	
-1	
0	
1	
2	



T^2 - To Try - Graph the following linear equations using a table of values.

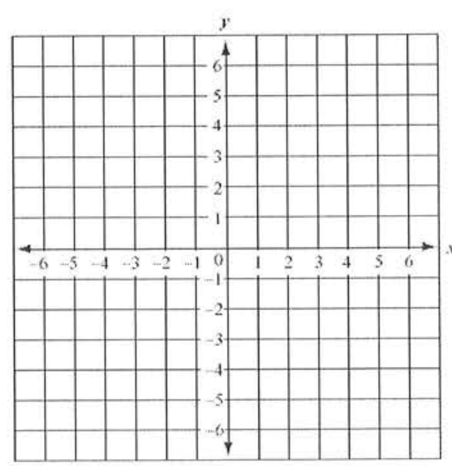
a. $y = 2x + 2$

x	y
-2	
-1	
0	
1	
2	



b. $y = -2x$

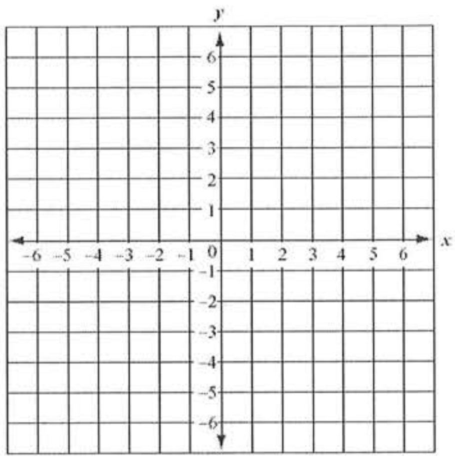
x	y
-2	
-1	
0	
1	
2	



Graphing with Intercepts

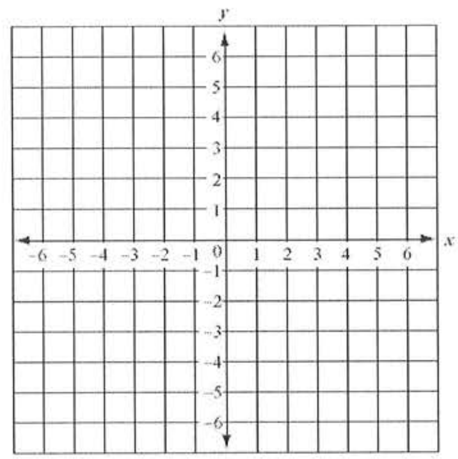
1. $x + 3y = 6$

x	y	
	0	x-intercept
0		y-intercept
3		check point



2. $2x + 4y = -8$

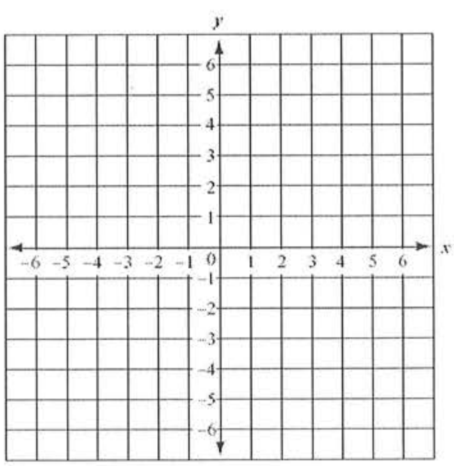
x	y	
	0	x-intercept
0		y-intercept
2		check point



T^2 - To Try - Graph the following linear equations using intercepts.

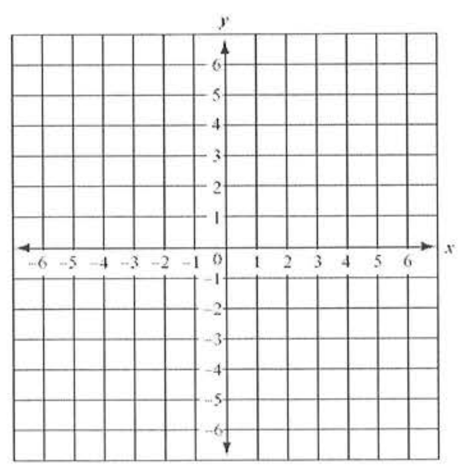
a. $x + 2y = 4$

x	y	
	0	x-intercept
0		y-intercept
2		check point



b. $5x + 2y = -10$

x	y	
	0	x-intercept
0		y-intercept
-4		check point



The Slope of a Line

In mathematics, the steepness or slant of a line is referred to as slope. We can measure the slope of a line by comparing the vertical change (rise) to the horizontal change (run) when moving from one fixed point to another on the same line. To calculate the slope of a line, we use a ratio that compares the vertical change in y (rise) to the horizontal change in x (run).

The letter m is commonly used to represent slope and we use the following formula to calculate a line's slope:

$$m = \frac{\text{change in } y \text{ (rise)}}{\text{change in } x \text{ (run)}} = \frac{y_2 - y_1}{x_2 - x_1}$$

Let's use this formula to calculate the slope of a line passing through two given points.

1. $(2, 7)$ and $(-3, 10)$

2. $(-2, 6)$ and $(1, 8)$

T^2 - To Try - Find the slope of a line that passes through the given points.

a. $(2, 5)$ and $(-4, 6)$

b. $(-3, 3)$ and $(6, 7)$

A linear equation that is solved for y is in what we refer to as slope-intercept form. This is because the slope and the y-intercept can be immediately determined from the equation. The coefficient of x is the line's slope and the constant is the y coordinate of the y-intercept. The general form of a line written in slope-intercept form is $y = mx + b$, where m is the slope and $(0, b)$ is the y-intercept.

Let's identify the slope and the y-intercept of the following lines. Be sure to write the y-intercept as an ordered pair.

1. $y = 3x + 5$

   $m =$ ________

   y-intercept: ________

2. $y = \frac{2}{3}x - 4$

   $m =$ ________

   y-intercept: ________

3. $-2x + y = 3$

   $m =$ ________

   y-intercept: ________

4. $3x - 4y = 8$

   $m =$ ________

   y-intercept: ________

T² - **To Try** - Find the slope and the y-intercept of each of the following lines.

a. $y = 6x + 3$

$m =$ ________

y-intercept: ________

b. $y = \frac{3}{5}x - 2$

$m =$ ________

y-intercept: ________

c. $-5x + y = 1$

$m =$ ________

y-intercept: ________

d. $2x - 3y = 6$

$m =$ ________

y-intercept: ________

Slope is sometimes used to determine whether two lines are parallel or perpendicular. Lines are said to be parallel if they do not intersect. Parallel lines will also have identical slopes. Lines are said to be perpendicular if they intersect at a right angle ($90°$). Perpendicular lines have slopes whose product equals -1. You might also say that the slopes of perpendicular lines are negative reciprocals of each other.

Let's look at some examples of how to determine whether two lines are parallel or perpendicular to each other, or neither.

1. $y = -3x + 2$
   $x - 3y = 6$

2. $x + y = 7$
   $4x + y = 7$

3. $2x + 3y = 9$
   $6y = -4x - 5$

T² - **To Try** - Determine whether each pair of lines is parallel, perpendicular, or neither.

a. $x + y = 5$
   $2x + y = 5$

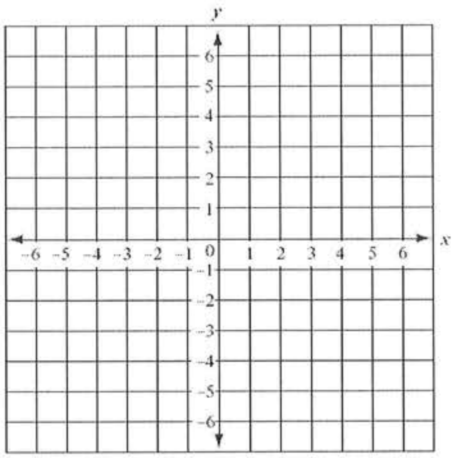
b. $5y = 2x - 3$
   $5x + 2y = 1$

c. $y = 2x + 1$
   $4x - 2y = 8$

Graphing with Slope-Intercept

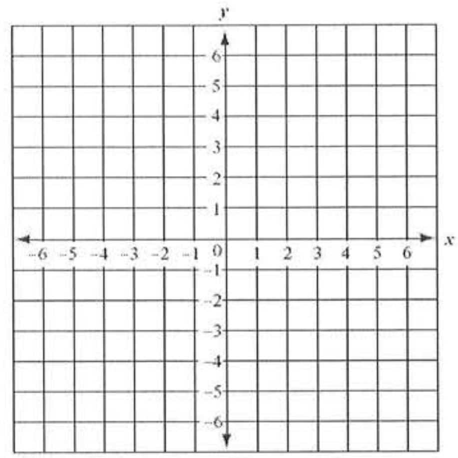
1. $y = 2x - 4$

$m =$ ______ y-intercept: (____, ____)



2. $y = -\frac{2}{3}x + 1$

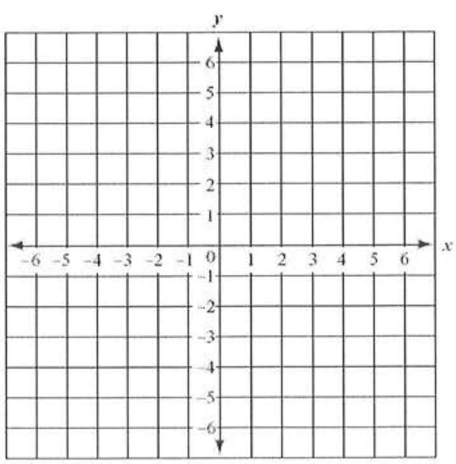
$m =$ ______ y-intercept: (____, ____)



T^2 **- To Try** - Graph the following linear equations using slope intercept.

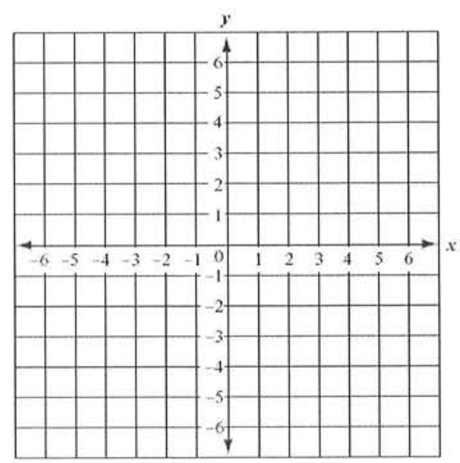
a. $y = 3x - 5$

$m =$ ______ y-intercept: (____, ____)



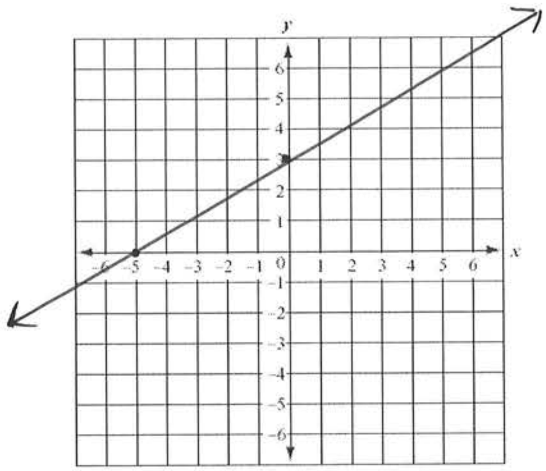
b. $y = -\frac{3}{4}x + 2$

$m =$ ______ y-intercept: (____, ____)



Interpret each of the following graphs.

1.

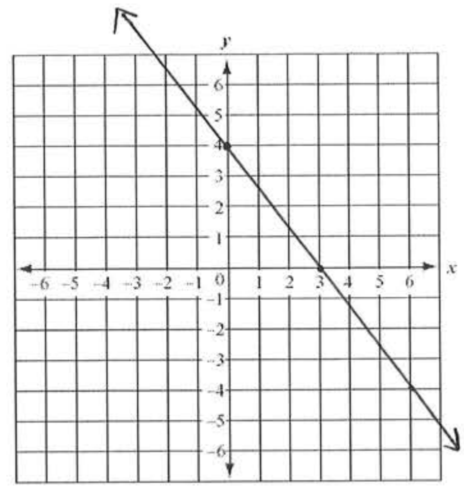


What is the y-intercept? ________

What is the x-intercept? ________

What is the slope? ____________

2.

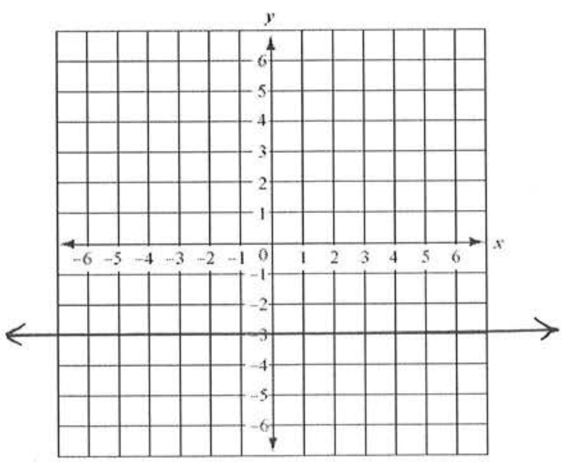


What is the y-intercept? ________

What is the x-intercept? ________

What is the slope? ____________

3.

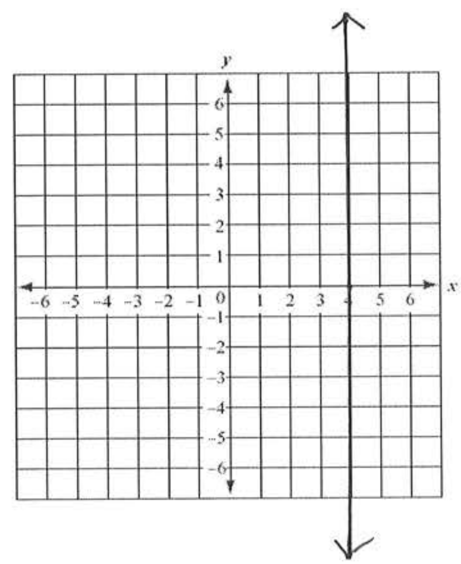


What is the y-intercept? ________

What is the x-intercept? ________

What is the slope? ____________

4.



What is the y-intercept? ________

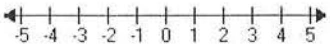
What is the x-intercept? ________

What is the slope? ____________

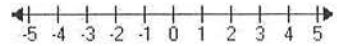
P^2 - IV Practice Plus

Solve each inequality and graph the solution set.

1. $3x + 6 > 15$

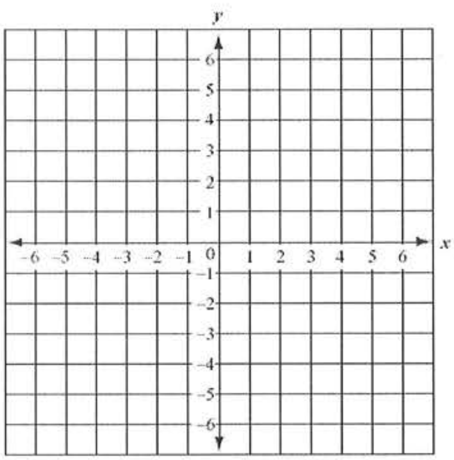


2. $-7x \leq 21$



Graph the following ordered pairs.

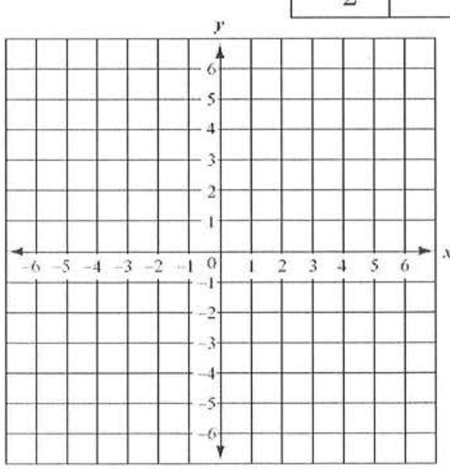
3. $(4,\ 2),\ (-1,\ 5),\ (3,\ -2),\ (-5,\ -3),\ (5,\ 0),\ (0,\ -4),\ (0,\ 0)$



Graph the equation using a table of values.

4. $y = x + 3$

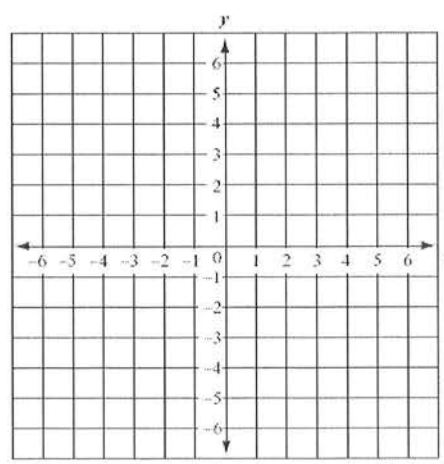
x	y
-2	
-1	
0	
1	
2	



Graph the equation using intercepts

5. $3x + 2y = 6$

x	y	
	0	x-intercept
0		y-intercept
	-3	check point



Find the slope of a line that passes through the given points.

6. $(1, -5)$ and $(6, -2)$

Find the slope and the y-intercept of the following line. Be sure to write the y-intercept as an ordered pair.

7. $y = 4x - 5$ $m =$ ________ y-intercept: ________

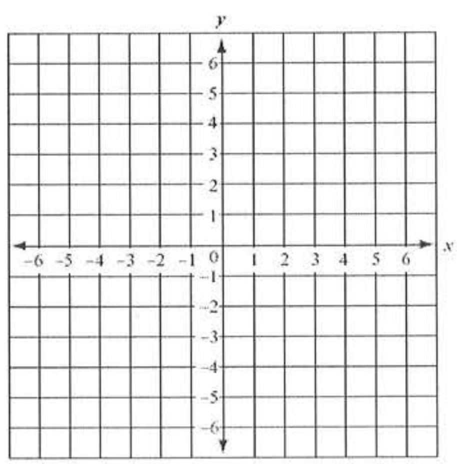
Determine whether each pair of lines is parallel, perpendicular, or neither.

8. $-x + 2y = -6$
$4y = 2x - 8$

9. $5y = 3x + 10$
$5x + 3y = 1$

Graph the following linear equations using slope intercept.

10. $y = 5x - 2$ $m =$ ______ y-intercept: (____, ____)



M² - V Math Module V - Systems of Linear Equations

Next we will review systems of equations in two variables. The solution to a system in two variables is an ordered pair written (x, y).

First, let's determine whether the given ordered pair is a solution to the system.

1. $\begin{cases} x + y = 7 \\ 2x - 3y = -6 \end{cases}$ $(3, 4)$

2. $\begin{cases} 3x + y = -2 \\ x - y = 2 \end{cases}$ $(1, -1)$

Solution? "yes" or "no" ______

Solution? "yes" or "no" ______

T² To Try - Determine whether the given ordered pair is a solution to the system.

a. $\begin{cases} -x - 4y = 1 \\ 2x + y = 5 \end{cases}$ $(3, -1)$

b. $\begin{cases} 4x + y = -4 \\ -x + 3y = 8 \end{cases}$ $(-2, 4)$

Solution? "yes" or "no" ______

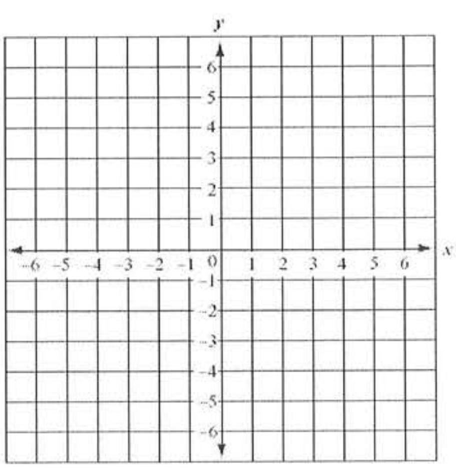
Solution? "yes" or "no" ______

There are a variety of methods that can be used for solving systems. These include: graphing, the substitution method, and the addition method.

First let's look at solving systems of equations by graphing.

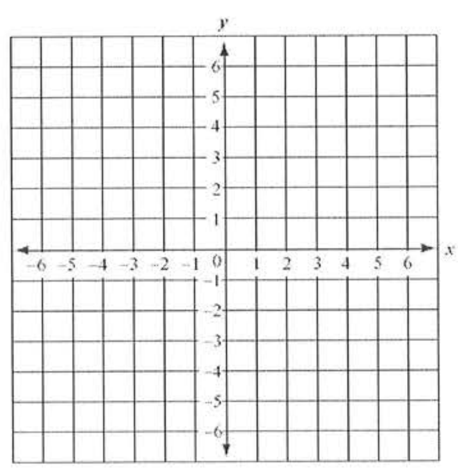
1. $\begin{cases} y = x + 1 \\ y = -x + 3 \end{cases}$

Solution: ________________

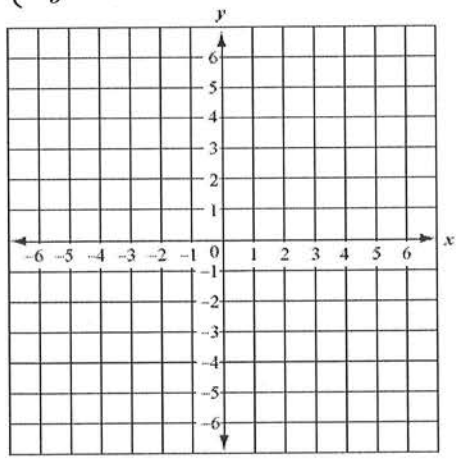


2. $\begin{cases} y = 2x - 4 \\ -2x + y = 1 \end{cases}$

Solution: ________________

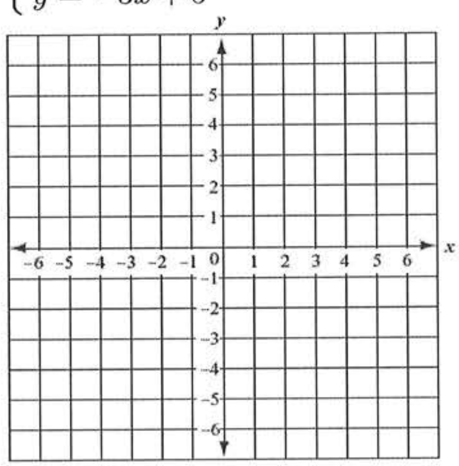


3. $\begin{cases} 3y = 9x - 12 \\ y = 3x - 4 \end{cases}$ Solution: ______________

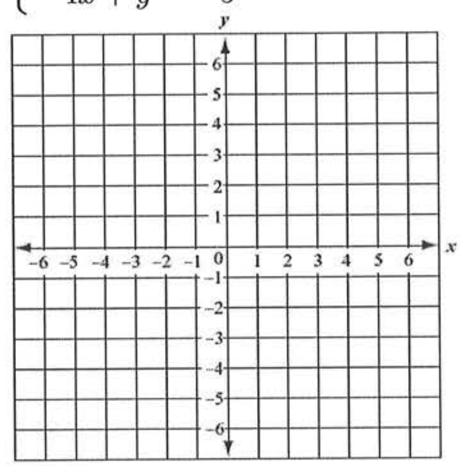


T^2 To Try - Solve each of the following systems by graphing.

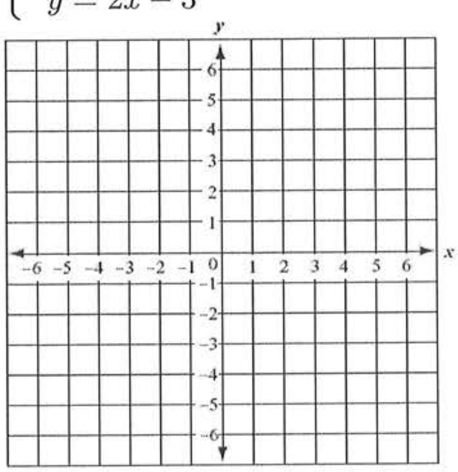
a. $\begin{cases} y = x + 1 \\ y = -3x + 5 \end{cases}$ Solution: ________



b. $\begin{cases} y = 4x - 1 \\ -4x + y = -5 \end{cases}$ Solution: ________



c. $\begin{cases} 2y = 4x - 6 \\ y = 2x - 3 \end{cases}$ Solution: ________



A second method of solving systems is call the substitution method. Let do five examples.

1. $\begin{cases} 4x + 5y = 1 \\ x = -3y + 2 \end{cases}$

2. $\begin{cases} 2x + 3y = 9 \\ x = y + 2 \end{cases}$

3. $\begin{cases} x - 2y = -4 \\ y = 2x - 1 \end{cases}$

4. $\begin{cases} 9x - 3y = 12 \\ y = 3x - 4 \end{cases}$

5. $\begin{cases} 4x + 2y = 5 \\ y = -2x - 4 \end{cases}$

$\boxed{T^2}$ **To Try** - Solve each of the following systems by the substitution method.

a. $\begin{cases} 2x + 3y = 18 \\ x = 2y - 5 \end{cases}$

b. $\begin{cases} 5x - 9y = 3 \\ y = x + 1 \end{cases}$

c. $\begin{cases} 3x + 9y = 6 \\ x = -3y + 2 \end{cases}$

d. $\begin{cases} 3x + y = -5 \\ y = -3x + 3 \end{cases}$

Another method of solving systems is known as the addition (or elimination) method.

1. $\begin{cases} 3x - 2y = 10 \\ x + 2y = -2 \end{cases}$

2. $\begin{cases} 2x - 5y = -1 \\ 3x + y = 7 \end{cases}$

3 $\begin{cases} -4x + y = -3 \\ x - 2y = -8 \end{cases}$

4. $\begin{cases} 2x - y = -9 \\ x + 3y = -1 \end{cases}$

5. $\begin{cases} 2x + 4y = 5 \\ 3x + 6y = 6 \end{cases}$

6. $\begin{cases} x + 3y = 5 \\ 2x + 6y = 10 \end{cases}$

T^2 **To Try** - Solve each of the following systems by the addition method.

a. $\begin{cases} x + 3y = -3 \\ 2x + y = 4 \end{cases}$

b. $\begin{cases} 4x + y = 11 \\ 2x + 5y = 1 \end{cases}$

c. $\begin{cases} 5x + 3y = 27 \\ 7x - 2y = 13 \end{cases}$

d. $\begin{cases} 2x + 4y = 5 \\ x + 2y = 2 \end{cases}$

P² - V Practice Plus

Determine whether the given ordered pair is a solution to the system.

1. $\begin{cases} 2x + y = 5 \\ 3x - y = 22 \end{cases}$ $(4, -3)$

Solution? "yes" or "no" ______

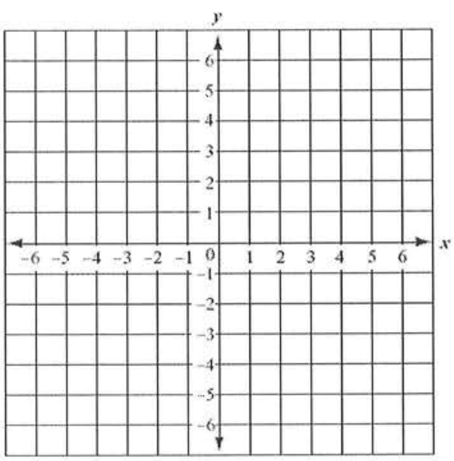
2. $\begin{cases} x - y = 1 \\ 2x + y = 5 \end{cases}$ $(2, 1)$

Solution? "yes" or "no" ______

Solve each of the following systems by graphing.

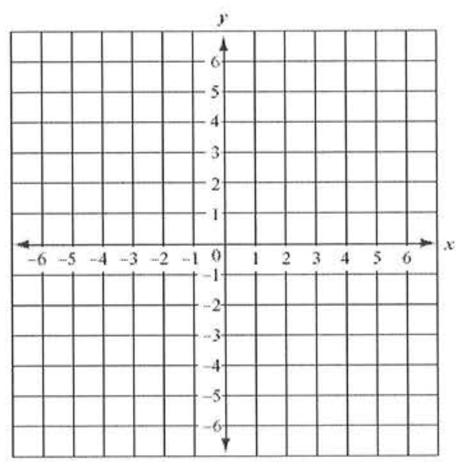
3. $\begin{cases} y = -x + 5 \\ y = 3x - 3 \end{cases}$

Solution: _________



4. $\begin{cases} y = 3x - 2 \\ -3x + y = 3 \end{cases}$

Solution: _________



Solve each of the following systems by the substitution method.

5. $\begin{cases} 5x + y = 15 \\ y = 4x - 3 \end{cases}$

6. $\begin{cases} 4x - 5y = -2 \\ x = 7y + 11 \end{cases}$

7. $\begin{cases} 12x + 4y = -7 \\ y = -3x + 5 \end{cases}$

Solve each of the following systems by the addition method.

8. $\begin{cases} 4x - y = -15 \\ 3x + y = -6 \end{cases}$

9. $\begin{cases} 2x + 3y = 18 \\ x - 2y = -5 \end{cases}$

10. $\begin{cases} 12x - 18y = 9 \\ -4x + 6y = -3 \end{cases}$

M² - VI Math Module VI - More on Exponents

Let's do a quick refresher on the rules for exponents. Looking at the rules listed on the left side of the chart below, use those rules to complete the rest of the chart.

Product Rule	$a^m \cdot a^n = a^{m+n}$	$x^5 \cdot x^3 =$ ____	$3x^2 \cdot 7x^9 =$ ____	$x^4 \cdot x^2 \cdot x =$ ____
Zero Exponent	$a^0 = 1,\ a \neq 0$	$5^0 =$ ____	$(-8)^0 =$ ____	$-3^0 =$ ____
Quotient Rule	$\dfrac{a^m}{a^n} = a^{m-n},\ a \neq 0$	$\dfrac{y^7}{y^4} =$ ____	$\dfrac{15x^{11}}{3x^3} =$ ____	$\dfrac{125x^8}{5x^4} =$ ____
Negative Exponent	$a^{-n} = \dfrac{1}{a^n},\ a \neq 0$	$6^{-2} =$ ____	$\left(\dfrac{2}{3}\right)^{-3} =$ ____	$\dfrac{x^{-3}}{x^2} =$ ____
Power Rules	$(a^m)^n = a^{m \cdot n}$; $(ab)^m = a^m b^m$; $\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n},\ b \neq 0$	$(9^4)^3 =$ ____	$(5y)^4 =$ ____	$\left(\dfrac{7x^{-2}}{x^5}\right)^3 =$ ____

T² To Try - Use the rules for exponents to solve each of the following.

a. $y^6 \cdot y^4$

b. $4x^3 \cdot 6x^7$

c. $x^5 \cdot x \cdot x^9$

d. $(-12)^0$

e. -10^0

f. $-5x^0$

g. $\dfrac{y^{14}}{y^9}$

h. $\dfrac{18x^{12}}{6x^3}$

i. $\dfrac{7x^3}{14x^2}$

j. 7^{-2}

k. $\left(\dfrac{3}{5}\right)^{-2}$

l. $\dfrac{x^{-7}}{x^3}$

m. $(y^3)^8$

n. $(4y)^3$

o. $(x^5y^3)^{-3}$

p. $\left(\dfrac{3x^{-2}}{x^4}\right)^3$

P^2 - VI Practice Plus

Simplify each of the following expressions. Write each answer using positive exponents only.

1. $m^7 \cdot m^8$

2. $3x^2 \cdot 5x^{10}$

3. $x^{10} \cdot x^3 \cdot x$

4. $(-7)^0$

5. -14^0

6. $25x^0$

7. $\frac{y^{16}}{y^7}$

8. $\frac{24x^{10}}{8x^6}$

9. $\frac{6x^5}{18x^4}$

10. 8^{-2}

11. $\left(\frac{2}{7}\right)^{-2}$

12. $\frac{x^{-9}}{x^4}$

13. $(y^3)^{10}$

14. $(5y)^3$

15. $(x^7y^4)^{-3}$

16. $\left(\frac{4x^{-5}}{x^4}\right)^3$

M² - VII Math Module VII - Polynomials

A **polynomial** is a single term or the sum of two or more terms containing variables with exponents. Recall that a **term** is a number or the product of a number and a variable raised to a power.

Here are some examples of polynomials:

$-4x^5$ $\quad$ $3x^3 - 7x^2$ $\quad$ $5y^5 - 9y^4 + 12y^2$ $\quad$ $12m^4n^2 + 7mn - 3m + 10n$

There are some polynomials that have special names. A **monomial** is a polynomial with exactly one term. A **binomial** is a polynomial with exactly two terms, and a **trinomial** is a polynomial with exactly three terms.

Polynomials can be simplified by combining like terms. Recall that like terms are terms with exactly the same variables raised to exactly the same powers.

Let's try a few examples together.

1. $(5x^3 + 7x^2 - 4) + (2x^3 - 4x^2 + 9)$
2. $(-8y^2 + 15y - 6) + (4y^2 - 3y - 7)$
3. $(-3x^3 + 7x^2 - 4) + (3x^2 - 9x)$
4. $(9x + 5) - (3x + 2)$
5. $(8x^2 - x) - (-2x^2 + 6x)$
6. $(2y^2 + 6y - 10) - (4y^2 - 8y - 3)$

T² To Try - Simplify each of the following polynomials by combining like terms.

a. $(7x^3 + 9x^2 - 3) + (5x^3 - 2x^2 + 1)$

b. $(-6y^2 + 12y - 4) + (3y^2 - 2y - 8)$

c. $(-10x^3 + 3x^2 - 7) + (5x^2 - x)$

d. $(7x + 6) - (2x + 4)$

e. $(4x^2 - x) - (-x^2 + 2x)$

f. $(14y^2 + 3y - 4) - (9y^2 - 6y - 7)$

We will now be using the rules of exponents to multiply polynomials. When multiplying a monomial times a polynomial, remember to use the distributive property and simplify when possible.

Let's look at some examples:

1. $3x(6x-2) = 3x(6x) + 3x(-2) =$ ____________________

You may instead choose to do the distributive work in your head and move directly to the answer.

2. $-2x^2(5x^2+3x-4) =$ ____________________

3. $ab(6a^2b+2ab-15) =$ ____________________

$\boxed{\text{T}^2}$ To Try - Use the distributive property to multiply the following polynomials.

a. $5x(3x-7)$

b. $-2y(3y-12)$

c. $-3a(6a^2+5a-9)$

d. $xy(4xy^2+2x^2y-9)$

When multiplying two binomials, you can use the distributive property, the FOIL method, or the BOX method. You may not recall the first method you were taught, or you may want to see all the methods to determine which is easiest for you.

Let's look at all the methods together:

Distributive Property	F O I L Method	B O X Method
$(x+3)(x+2)$	$(x+3)(x+2)$	$(x+3)(x+2)$
$x(x+2)+3(x+2)$	F O I L	x + 3 x + 2
= ____________	____ ____ ____ ____	
= ____________	= ____________	= ____________

Now try the method you prefer.

1. $(x-4)(x-5)$

2. $(x-7)(x+2)$

Another type of multiplication with polynomials is a binomial times a trinomial. When multiplying a binomial and a trinomial you can use the distributive property, the vertical method, or the BOX method.

Let's look at these methods together.

Distributive Property	Vertical Method	B O X Method
$(x+2)(x^2+3x-7)$	$(x+2)(x^2+3x-7)$	$(x+2)(x^2+3x-7)$
$x(x^2+3x-7)+2(x^2+3x-7)$ = ______________ = ______________	x^2+3x-7 $\times \qquad x+2$ = ______________	$x^2 \quad + \quad 3x \quad - \quad 7$ across the top; x, $+$, 2 down the side of a 2 × 3 box = ______________

Now try the method you prefer.

1. $(x+4)(x^2+3x-5)$

2. $(x-3)(x^2+8x+2)$

T^2 To Try - Multiply the following polynomials by the method of your choice.

a. $(x+9)(x+3)$

b. $(4y-3)(3y-5)$

c. $(3x+2)(2x-5)$

d. $(2x-3)(5x+4)$

e. $(3x+5)(3x-5)$

f. $(2y+5)^2$

g. $(x-2)(x^2+5x+6)$

h. $(5x+4)(x^2-x+4)$

Now let's look at dividing polynomials. First we will review dividing a polynomial by a monomial. The rule for dividing a polynomial by a monomial is as follows:

$$\frac{a+b}{c} = \frac{a}{c} + \frac{b}{c},\ c \neq 0$$

Let's try a few examples together.

1. $\dfrac{15x^5 + 9x^2}{x}$

2. $\dfrac{8x^3 - 4x^2 + 6x + 2}{2}$

3. $\dfrac{12m^4n^3 - 9m^2n^2}{3mn}$

4. $\dfrac{12x^4 - 18x^3 + 24x^2}{6x^2}$

$\boxed{T^2}$ **To Try** - Divide each of the following.

a. $\dfrac{10x^4 + 3x^3}{x}$

b. $\dfrac{16x^3 - 8x^2 + 12x + 4}{4}$

c. $\dfrac{15m^5n^3 - 10m^2n^2}{5mn}$

d. $\dfrac{9x^4 - 15x^3 + 21x^2}{3x^2}$

When dividing a polynomial by a binomial, we will use long division. Polynomial long division is similar to regular number long division so let's review that first.

$$13\,\overline{)\,3660}$$

Now we will use this same process to divide polynomials.

1. $\dfrac{x^2 + 10x + 21}{x + 3}$

2. $\dfrac{2x^2 + x - 15}{x + 3}$

3. $\dfrac{x^2 - 9x + 22}{x - 3}$

4. $\dfrac{x^2 - 3x + 4}{x + 2}$

$\boxed{T^2}$ **To Try** - Use long division to divide each of the following.

a. $\dfrac{x^2 + 14x + 45}{x + 9}$

b. $\dfrac{2x^2 + x - 10}{x - 2}$

c. $\dfrac{x^2 - 6x + 11}{x - 3}$

d. $\dfrac{x^2 - 7x + 5}{x + 3}$

P^2 - VII Practice Plus

Simplify each of the following polynomials by combining like terms.

1. $(8x^3 + 4x^2 - 3) + (2x^3 - 2x^2 + 9)$

2. $(-12x^3 + 4x^2 - 3) + (5x^2 - x)$

3. $(6x^2 - x) - (-2x^2 + 5x)$

4. $(8y^2 + 6y - 4) - (5y^2 - 4y - 8)$

Use the distributive property to multiply the following polynomials.

5. $2x(3x - 7)$

6. $-4a(6a^2 + 3a - 4)$

Multiply the following polynomials by the method of your choice.

7. $(x + 7)(x + 6)$

8. $(2y - 4)(3y - 5)$

9. $(2x + 1)(3x - 5)$

10. $(4x - 3)(3x + 7)$

11. $(x + 2)(x - 2)$

12. $(4x + 7)(4x - 7)$

13. $(y + 8)^2$

14. $(2x + 9)^2$

15. $(x-3)(x^2+6x+7)$

16. $(4x+5)(2x^2-x+3)$

Divide each of the following.

17. $\dfrac{14x^3-21x^2+28x+7}{7}$

18. $\dfrac{10x^4-15x^3+25x^2}{5x^2}$

Use long division to divide each of the following.

19. $\dfrac{x^2+15x+54}{x+6}$

20. $\dfrac{x^2+5x-24}{x+8}$

21. $\dfrac{x^2+2x+7}{x-2}$

22. $\dfrac{8x^2-19x-4}{x-3}$

M² - VIII Math Module VIII - Factoring

Factoring

Factoring is the reverse of multiplying. To review the many types of factoring, let's look at the following chart.

Greatest Common Factor	$3x^2 + 18x$	$7x^4 - 21x^3 + 28x^2$
Factor by Grouping	$x^3 + 4x^2 + 3x + 12$	$ab - 3a - 5b + 15$
Trinomials $x^2 + bx + c$	$x^2 + 7x + 6$	$x^2 - 2x - 15$
Trinomials $ax^2 + bx + c$	$9x^2 - 18x + 5$	$5x^2 - 18x - 8$
Special Products	$a^2 + 16$	$4x^2 + 49y^2$
	$9x^2 - 25$	$100 - y^2$
	$x^4 - 16$	$x^4 - 81$
	$a^3 + 27$	$8x^3 - 125$

Becoming proficient with factoring takes lots of time and practice. You may need to just review and refresh, or you may need to dedicate a good amount of time to mastering this skill. If you are struggling with the procedures and there are answers listed, you can always multiply the polynomials together to find the correct factored form.

T^2 **To Try** - Completely factor each polynomial.

a. $5x + 45$

b. $x^2 + 2x - 24$

c. $3x^2 + 14x + 8$

d. $x^2 + 25$

e. $10x^3 + 15x^2$

f. $x^2 + 5x + 6$

g. $2x^2 + 7x + 3$

h. $x^3 - 64$

i. $x^2 - 12x + 36$

j. $xy + 6y + 2x + 12$

k. $2x^2 + 16x + 30$

l. $4x^2 - 23x + 15$

m. $y^2 - 64$

n. $x^2 - 5x - 24$

o. $3x^2 - 27$

p. $16x^2 + 8x - 6$

q. $x^3 - 2x^2 + 7x - 14$

r. $4x^2 - 16x + 12$

s. $x^3 + 125$

t. $3x^2 + 8x - 16$

P^2 - VIII Practice Plus

Completely factor each polynomial.

1. $4x + 28$

2. $y^2 - 81$

3. $x^2 + 3x - 18$

4. $x^3 + 8$

5. $3x^2 + 16x - 12$

6. $4x^2 + 24x + 32$

7. $x^3 - 3x^2 + 6x - 18$

8. $3x^2 + 7x + 2$

9. $x^2 - 14x + 49$

10. $x^2 + 16$

11. $8x^3 + 12x^2$

12. $5x^2 - 20x + 15$

13. $2x^2 - 50$

14. $4x^2 + 11x + 6$

15. $x^2 + 9x + 14$

16. $15x^2 - 3x + 9$

17. $x^2 - 6x - 7$

18. $5x^2 - 23x + 12$

19. $x^3 - 125$

20. $xy + 5y + 2x + 10$

P^2 Practice Plus Answer Key

P^2 - I

Activity table - answers will vary

1. Schedule adjustments - answers will vary.
2. Test taking strategies - answers will vary.

3.	-11	4.	2	5.	0
6.	18	7.	25	8.	0
9.	-35	10.	15	11.	0
12.	-17	13.	-24	14.	40
15.	25	16.	-7	17.	-30
18.	35	19.	17	20.	undefined
21.	$\frac{5}{6}$	22.	$\frac{4}{9}$	23.	$\frac{12}{35}$
24.	$-\frac{8}{45}$	25.	$\frac{15}{16}$	26.	-6
27.	$-\frac{1}{6}$	28.	$-\frac{11}{16}$	29.	$13\frac{1}{3}$
30.	$1\frac{21}{29}$	31.	$19\frac{11}{20}$	32.	$2\frac{5}{18}$

P^2 - II

1. natural, whole, integers, rational, real
2. whole, integers, rational, real
3. rational, real
4. integers, rational, real
5. irrational, real

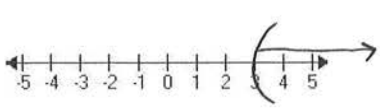
6.	base: 7 exponent: 4	7.	base: 9 exponent: 6		
8.	5^4	9.	$2^3 \cdot 3^2$	10.	16
11.	64	12.	125	13.	9
14.	7	15.	11	16.	4
17.	9 and 10	18.	33	19.	56
20.	35	21.	29	22.	125
23.	-2	24.	3	25.	55
26.	-6	27.	12	28.	$\frac{2}{3}$

P^2 - III

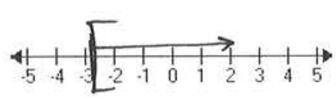
1.	\$57	2.	\$320	3.	$13y$
4.	$4a+5$	5.	$-6x+8$	6.	$4y+3$
7.	$11x+18$	8.	$-5x-22$	9.	$x=17$
10.	$y=13$	11.	$m=-6$	12.	$x=0$
13.	$y=9$	14.	$x=-5$	15.	$x=28$
16.	$y=-20$	17.	$x=2$	18.	$x=5$
19.	$x=-12$	20.	$a=-1$	21.	$x=9$
22.	$x=-5$	23.	all real numbers	24.	$\emptyset$

P^2 - IV

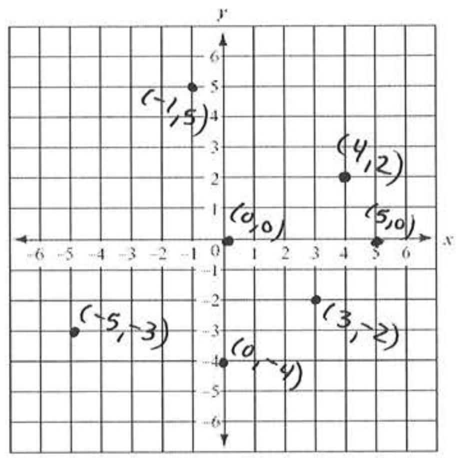
1. $x > 3$



2. $x \geq -3$

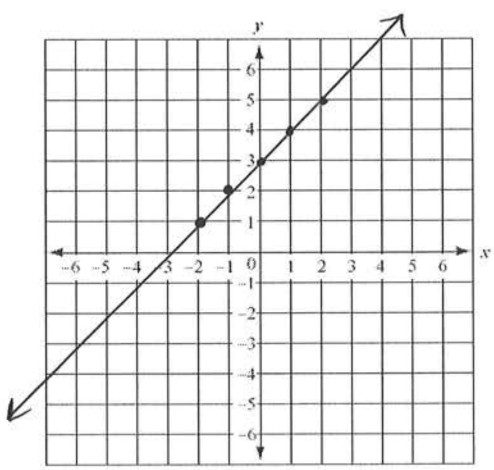


3.



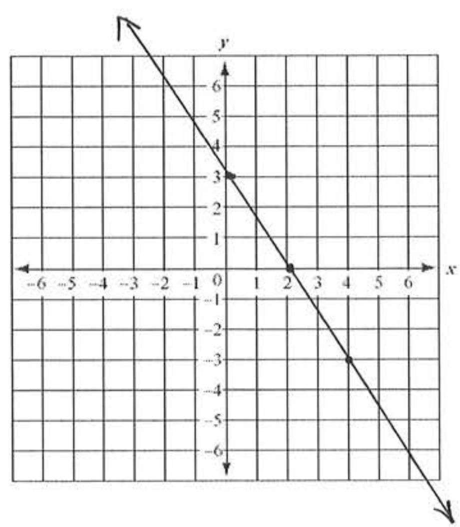
4. $y = x + 3$

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



5. $3x + 2y = 6$

x	y	
2	0	x-intercept
0	3	y-intercept
4	-3	check point



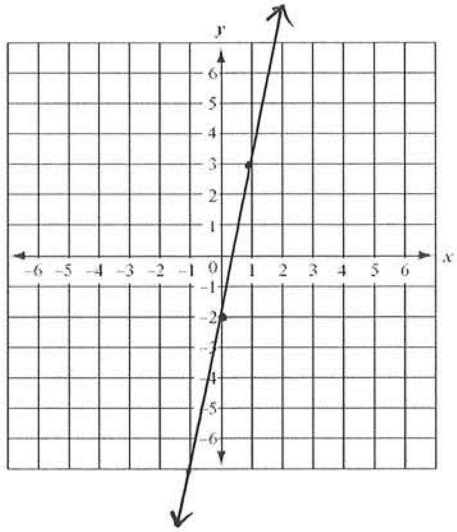
6. $\frac{3}{5}$

7. $m = 4$, y-intercept: $(0, -5)$

8. parallel

9. perpendicular

10. $y = 5x - 2$ $m = 5$ y-intercept: $(0, -2)$

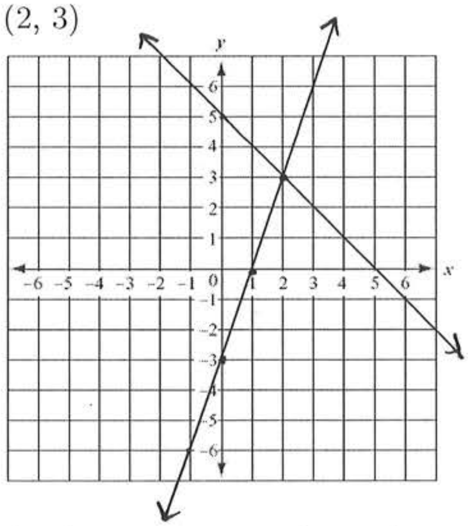


P² - V

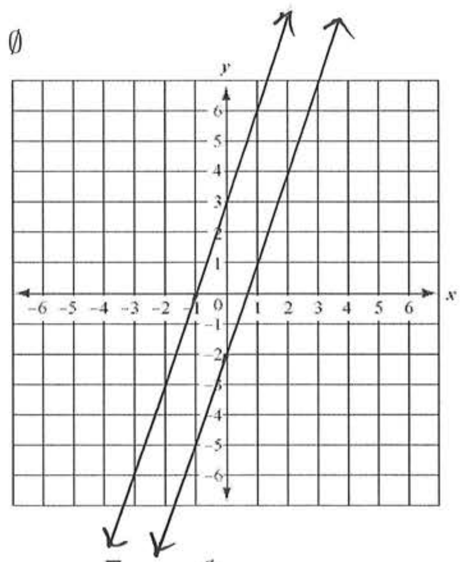
1. no

2. yes

3. $(2, 3)$



4. $\emptyset$



5. $(2, 5)$

6. $(-3, -2)$

7. $\emptyset$

8. $(-3, 3)$

9. $(3, 4)$

10. infinitely many solutions

P^2 - VI

1. m^{15}
2. $15x^{12}$
3. x^{14}
4. 1
5. -1
6. 25
7. y^9
8. $3x^4$
9. $\frac{x}{3}$
10. $\frac{1}{64}$
11. $\frac{49}{4}$
12. $\frac{1}{x^{13}}$
13. y^{30}
14. $125y^3$
15. $\frac{1}{x^{21}y^{12}}$
16. $\frac{64}{x^{27}}$

P^2 - VII

1. $10x^3 + 2x^2 + 6$
2. $-12x^3 + 9x^2 - x - 3$
3. $8x^2 - 6x$
4. $3y^2 + 10y + 4$
5. $6x^2 - 14x$
6. $-24a^3 - 12a^2 + 16a$
7. $x^2 + 13x + 42$
8. $6y^2 - 22y + 20$
9. $6x^2 - 7x - 5$
10. $12x^2 + 19x - 21$
11. $x^2 - 4$
12. $16x^2 - 49$
13. $y^2 + 16y + 64$
14. $4x^2 + 36x + 81$
15. $x^3 + 3x^2 - 11x - 21$
16. $8x^3 + 6x^2 + 7x + 15$
17. $2x^3 - 3x^2 + 4x + 1$
18. $2x^2 - 3x + 5$
19. $x + 9$
20. $x - 3$
21. $x + 4 + \frac{15}{x-2}$
22. $8x + 5 + \frac{11}{x-3}$

P^2 - VIII

1. $4(x+7)$
2. $(y+9)(y-9)$
3. $(x+6)(x-3)$
4. $(x+2)(x^2-2x+4)$
5. $(3x-2)(x+6)$
6. $4(x+4)(x+2)$
7. $(x^2+6)(x-3)$
8. $(3x+1)(x+2)$
9. $(x-7)^2$
10. prime
11. $4x^2(2x+3)$
12. $5(x-3)(x-1)$
13. $2(x+5)(x-5)$
14. $(4x+3)(x+2)$
15. $(x+7)(x+2)$
16. $3(5x^2-x+3)$
17. $(x-7)(x+1)$
18. $(5x-3)(x-4)$
19. $(x-5)(x^2+5x+25)$
20. $(x+5)(y+2)$

Perform the indicated operations. Write each answer in simplest form.

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

2. $12 \div 4 \cdot 3 - (6 \cdot 2)$

3. $(-6)(-2)$

4. -5^2

Tell which set or sets the following number belongs to: natural numbers, whole numbers, integers, rational numbers, irrational numbers, and real numbers.

5. 0.9

6. 2π

Evaluate the following expression when $x = 4$ and $y = 8$.

7. $\frac{4y}{2x}$

8. $2x - 3y$

Use the distributive property to rewrite the expression without parentheses. Simplify the result if possible.

9. $4(5x - 3 + 6y) + 1$

10. $-(3x - 6)$

Simplify each expression.

11. $3(w + 2) - (12 - w)$

12. $5x + x - 7x$

Solve each equation. Don't forget to first simplify each side of the equation if possible.

13. $9x = 8x + 4$

14. $\frac{3}{4}x = -9$

15. $4(x - 3) = 3(1 + x)$

16. $6x = 5x - 3$

17. $\frac{7}{8}x + \frac{1}{4} = \frac{3}{4}x$

18. $2x - 4 = 5x - 8$

Write as an equation, then solve.

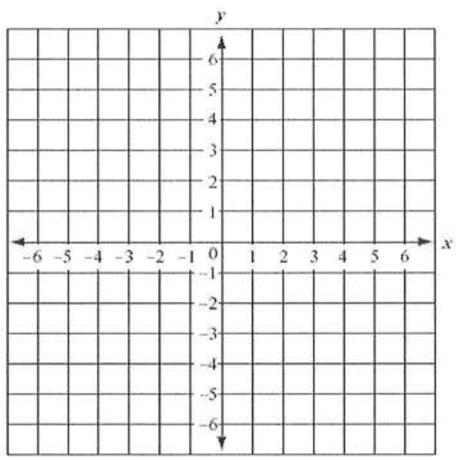
19. Twice a number increased by 8 is 34. Find the number.

20. A 12-foot board is divided into two pieces. One piece is twice as long as the other. If "x" represents the shorter piece, find the length of each piece.

Complete the table of ordered pairs for the following linear equation. Then use the ordered pairs to graph the equation.

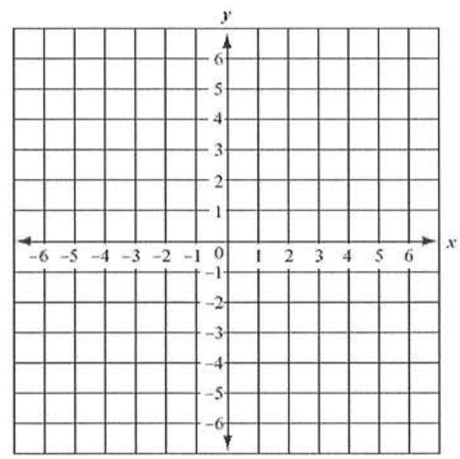
21. $y = -5x$

x	y
-1	
0	
1	



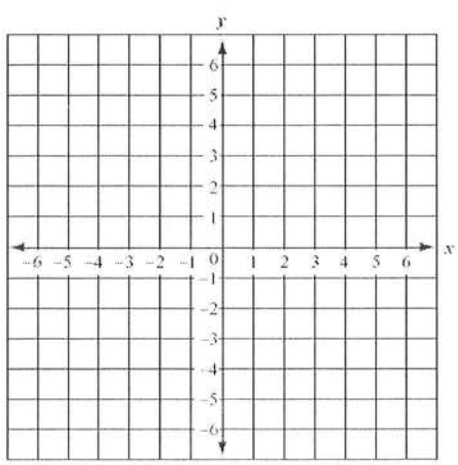
22. $y = 3x - 2$

x	y
-1	
0	
1	

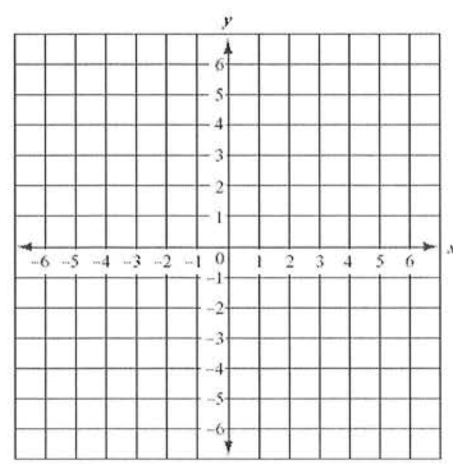


Find the x-intercept and the y-intercept. Then graph each equation.

23. $x - 3y = 6$
x-intercept: (____ , ____)
y-intercept: (____ , ____)



24. $2x + 4y = -8$
x-intercept: (____ , ____)
y-intercept: (____ , ____)



Find the slope of the line passing through the given points.

25. $(1, 3)$ and $(-6, -8)$

$m =$ ______________

26. $(1, 5)$ and $(1, -3)$

$m =$ ______________

Determine whether the pair of lines is parallel, perpendicular, or neither.

27. $-x + 2y = -8$
$2y = -4x + 6$

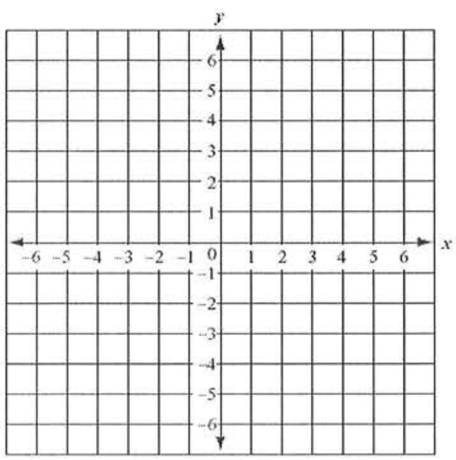
28. $3x + y = 7$
$-3x - y = 10$

Use the slope-intercept form to graph each equation.

29. $y = 4x - 3$

$m =$ ______________

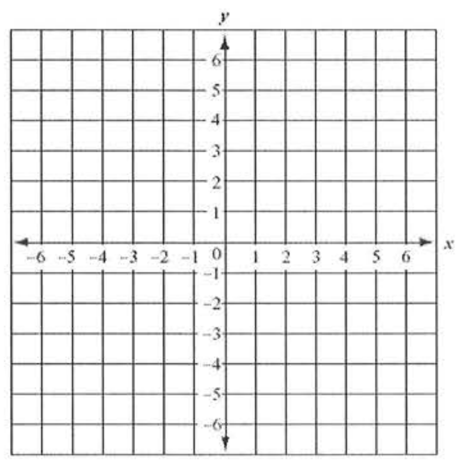
y-intercept: (___ , ___)



30. $y = -\frac{2}{5}x + 2$

$m =$ ______________

y-intercept: (___ , ___)



Determine whether the given ordered pair is a solution of the system.

31. $(5, -2)$
$$\begin{cases} 4x - 3y = 26 \\ x + 5y = 5 \end{cases}$$

Solution? "yes" or "no" __________

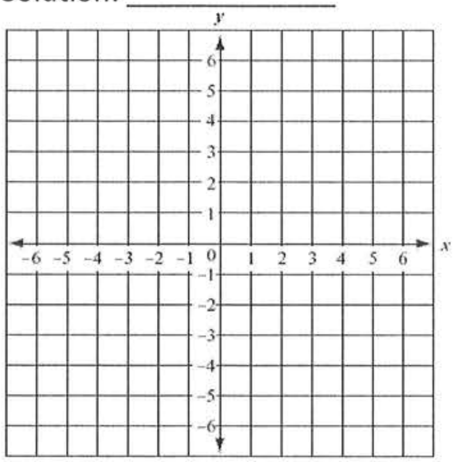
32. $(2, -3)$
$$\begin{cases} 2x + 3y = -5 \\ 7x - 3y = 23 \end{cases}$$

Solution? "yes" or "no" __________

Solve each of the following system of equations by graphing. Write the solution as an ordered pair (x, y) OR state there is no solution OR state there are infinite solutions.

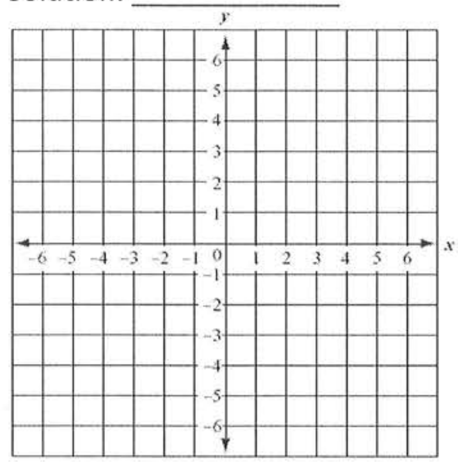
33. $\begin{cases} 2x + y = 0 \\ 2y = 6 - 4x \end{cases}$

Solution: ______________



34. $\begin{cases} x + y = 2 \\ -2x + y = 5 \end{cases}$

Solution: ______________



Solve the following system of equations by the substitution method. Write the solution as an ordered pair (x, y) OR state there is no solution OR state there are infinite solutions.

35. $\begin{cases} 4x + 5y = 13 \\ x = -3y + 5 \end{cases}$

36. $\begin{cases} 6x + 2y = 4 \\ y = -3x + 2 \end{cases}$

Solve the following system of equations by the addition method. Write the solution as an ordered pair (x, y) OR state there is no solution OR state there are infinite solutions.

37. $\begin{cases} x + 2y = -1 \\ 4x - 5y = 22 \end{cases}$

38. $\begin{cases} 4x - 8y = 36 \\ 3x - 6y = 20 \end{cases}$

Perform the indicated operations.

39. $(2x^2 - 3x + 5) + (-4x^2 + 2x - 3)$

40. $(3y^2 - y - 2) - (2y^2 + 4y - 8)$

41. $-3x^2(3x^2 - x + 4)$

42. $(2x - 4)(3x - 5)$

43. $(5x-1)^2$

44. $\dfrac{12x^4 - 8x^3 + 4x^2}{-2x^2}$

Simplify each expression.

45. $(2y^2)^{-3}$

46. $\dfrac{-18x^9}{6x^3}$

Use long division to divide the polynomials.

47. $\dfrac{x^2 - 10x + 21}{x-3}$

48. $\dfrac{x^2 + 4x - 3}{x-2}$

Factor completely.

49. $x^2 - 49$

50. $xy + 3y + 2x + 6$

51. $x^3 - 27$

52. $4x^2 + 4x - 15$

53. $x^2 - 3x + 2$

54. $x^2 + 25$

55. $9x - 45$

56. $2x^2 - 11x + 15$

57. $15x^3 + 35x^2$

58. $x^2 + 6x + 8$

ANSWER KEY

1. $-\dfrac{1}{3}$
2. -3
3. 12
4. -25
5. rational, real
6. irrational, real
7. 4
8. -16
9. $20x - 11 + 24y$
10. $-3x + 6$
11. $4w - 6$
12. $-x$
13. $x = 4$
14. $x = -12$
15. $x = 15$

16. $x = -3$

17. $x = -2$

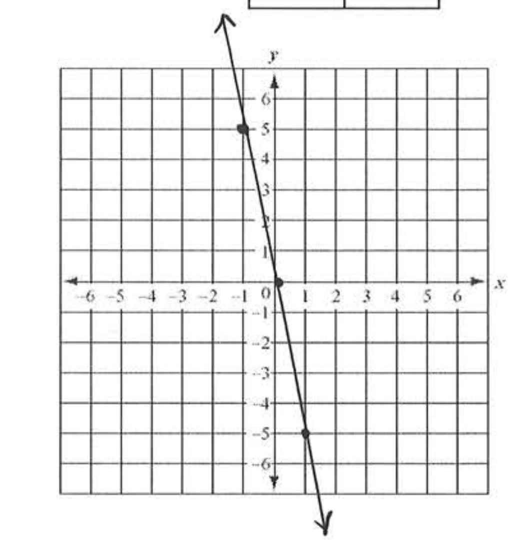
18. $x = \frac{4}{3}$

19. $2x + 8 = 34, \; x = 13$

20. $x + 2x = 12$, $x = 4$ feet, $2x = 8$ feet

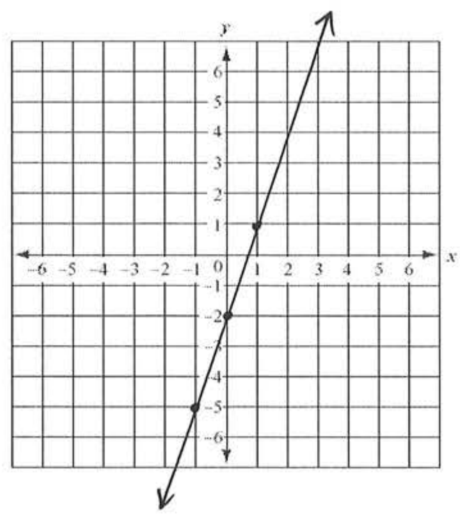
21. $y = -5x$

x	y
-1	5
0	0
1	-5



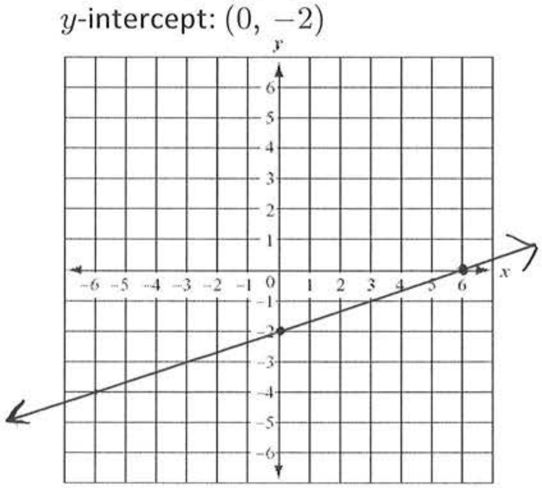
22. $y = 3x - 2$

x	y
-1	-5
0	-2
1	1



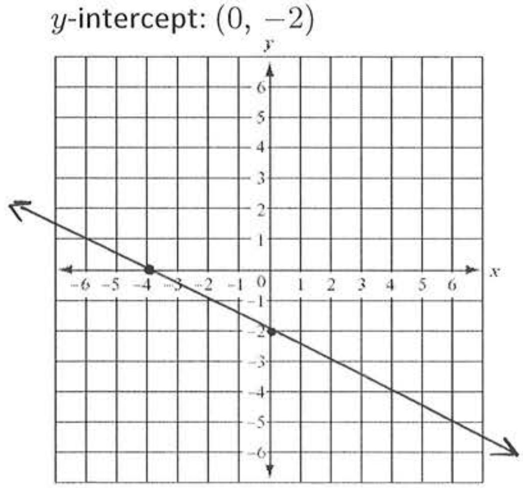
23. $x - 3y = 6$

x-intercept: $(6, 0)$
y-intercept: $(0, -2)$



24. $2x + 4y = -8$

x-intercept: $(-4, 0)$
y-intercept: $(0, -2)$



25. $m = \frac{11}{7}$

26. $m =$ undefined

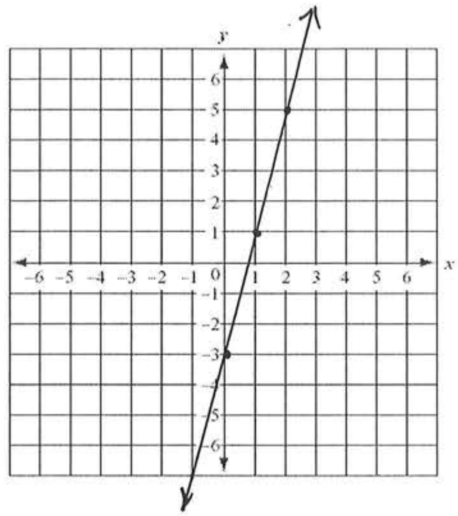
27. perpendicular $\perp$

28. parallel $\|$

29. $y = 4x - 3$

$m = 4$

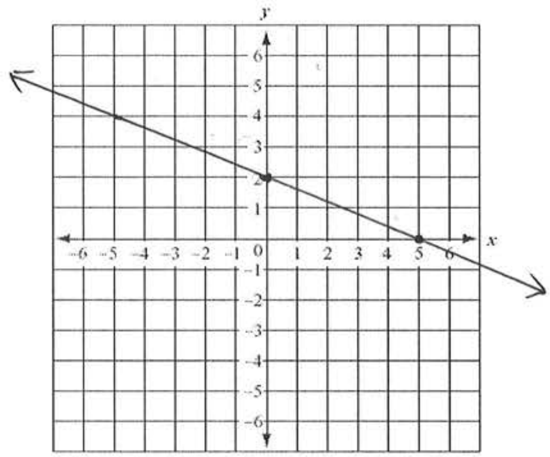
y-intercept: $(0,\ -3)$



30. $y = -\dfrac{2}{5}x + 2$

$m = -\dfrac{2}{5}$

y-intercept: $(0,\ 2)$

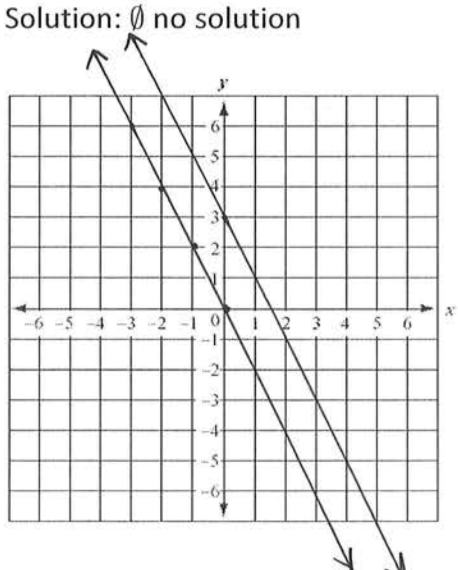


31. no

32. yes

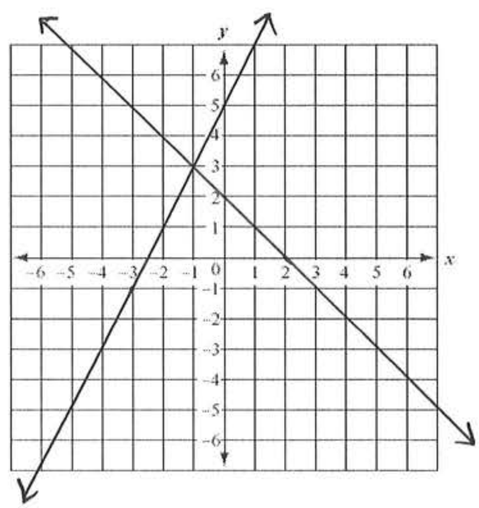
33. $\begin{cases} 2x + y = 0 \\ 2y = 6 - 4x \end{cases}$

Solution: $\emptyset$ no solution



34. $\begin{cases} x + y = 2 \\ -2x + y = 5 \end{cases}$

Solution: $(-1,\ 3)$



35. $(2,\ 1)$

36. infinite number of solutions

37. $(3,\ -2)$

38. $\emptyset$ no solution

39. $-2x^2 - x + 2$

40. $y^2 - 5y + 6$

41. $-9x^4 + 3x^3 - 12x^2$

42. $6x^2 - 22x + 20$

43. $25x^2 - 10x + 1$

44. $-6x^2 + 4x - 2$

45. $\frac{1}{8y^6}$

46. $-3x^6$

47. $x - 7$

48. $x + 6 + \frac{9}{x - 2}$

49. $(x + 7)(x - 7)$

50. $(x + 3)(y + 2)$

51. $(x - 3)(x^2 + 3x + 9)$

52. $(2x - 3)(2x + 5)$

53. $(x - 2)(x - 1)$

54. prime

55. $9(x - 5)$

56. $(2x - 5)(x - 3)$

57. $5x^2(3x + 7)$

58. $(x + 4)(x + 2)$