Algebra II

Name ______________________

Date ____________ Hour ____

Section 8.1 Model Inverse and Joint Variation

GOAL Write and use inverse variation models and joint variation models

VOCABULARY

Inverse variation is the relationship of two variables x and y if there is a nonzero number k such that $xy = k$, or $y = \frac{k}{x}$.

The nonzero constant k is called the **constant of variation.**

Joint variation occurs when a quantity varies directly as the product of two or more other quantities. For instance, if $z = kxy$ where $k \neq 0$, then z varies jointly with x and y.

Recall: Direct Variation $y = kx$

Tell whether x and y show *direct variation, inverse variation,* or *neither.*

1. $xy = 8$

2. $y = x + 5$

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

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

The variables x and y vary inversely. Use the given values to write an equation relating x and y. Then find y when $x = 4$.

5. $x = 10, y = 2$

6. $x = -3, y = 3$

7. $x = 2, y = 8$

The variable z varies jointly with x and y. Use the given values to find an equation that relates the variables. Then find z when $x = 2$ and $y = 8$.

8. $x = 4, y = 3, z = 24$

9. $x = 8, y = -54, z = 144$

10. $x = 1, y = \frac{1}{8}, z = 4$

11. Write an equation for the given relationship.

RELATIONSHIP	**EQUATION**
a. y varies directly with x.	
b. y varies inversely with x.	
c. z varies jointly with x and y.	
d. y varies inversely with the square of x.	
e. z varies directly with y and inversely with x.	

12. **TOOLS** The force F needed to loosen a bolt with a wrench varies inversely with the length l of the handle. Write an equation relating F and l, given that 250 pounds of force must be exerted to loosen a bolt when using a wrench with a handle 6 inches long. How much force must be exerted when using a wrench with a handle 24 inches long?

13. **Example** *Compare different types of variation*

Write an equation for the relationship.

Relationship	Equation
a. m varies jointly with n, p, and q.	$m =$ ______
b. r varies inversely with s.	$r =$ ___
c. x varies inversely with the cube of y.	$x =$ ___
d. p varies jointly with x and y and inversely with m.	$p =$ ____
e. t varies directly with u and inversely with w.	$t =$ ____

Checkpoint **Complete the following exercises.**

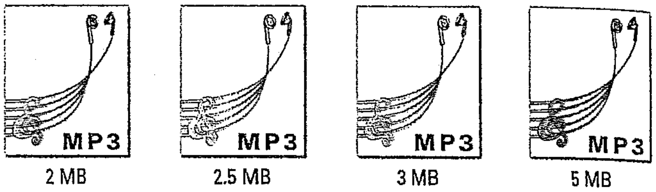
14. The variable z varies jointly with x and y. Also, $z = -44$ when $x = 4$ and $y = -1$. Write an equation that relates x, y, and z. Find z when $x = 6$ and $y = 3$.

15. Write an equation for the relationship: x varies jointly with y and z and inversely with the square of t.

16. **EXAMPLE** **Write an inverse variation model**

MP3 PLAYERS The number of songs that can be stored on an MP3 player varies inversely with the average size of a song. A certain MP3 player can store 2500 songs when the average size of a song is 4 megabytes (MB).

- Write a model that gives the number n of songs that will fit on the MP3 player as a function of the average song size s (in megabytes).
- Make a table showing the number of songs that will fit on the MP3 player if the average size of a song is 2 MB, 2.5 MB, 3 MB, and 5 MB as shown below. What happens to the number of songs as the average song size increases?



Solution

STEP 1 Write an inverse variation model.

Write general equation for inverse variation.

Substitute 2500 for n and 4 for s.

Solve for a.

▶ A model is

STEP 2 Make a table of values.

Average size of song (MB), s	2	2.5	3	5
Number of songs, n				

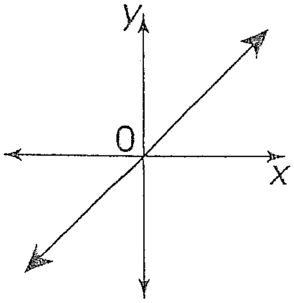
From the table, you can see that the number of songs that will fit on the MP3 player decreases as the average song size increases.

Graphs of Direct-variation formulas

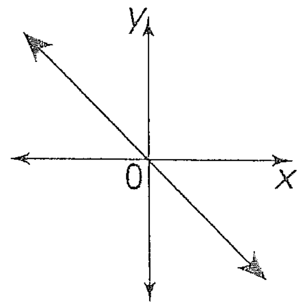
$y = kx$

y varies directly as x.

$k > 0$



$k < 0$



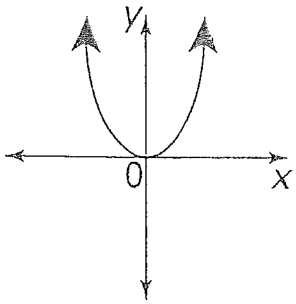
line

$D = R =$ the set of all real numbers

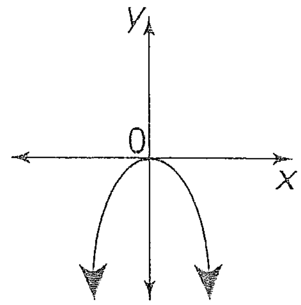
$y = kx^2$

y varies directly as the square of x.

$k > 0$



$k < 0$



parabola

$D =$ the set of all real numbers
$R = \{y: y \geq 0\}$

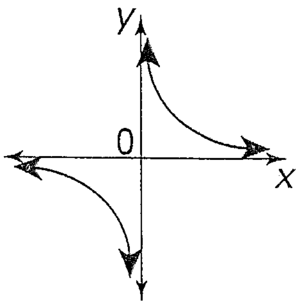
$D =$ the set of all real numbers
$R = \{y: y \leq 0\}$

Graphs of Inverse-variation formulas

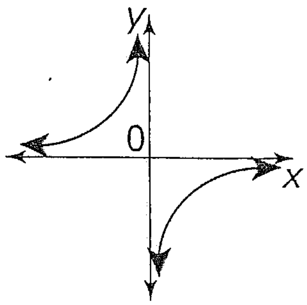
$$y = \frac{k}{x}$$

y varies inversely as x.

$k > 0$



$k < 0$



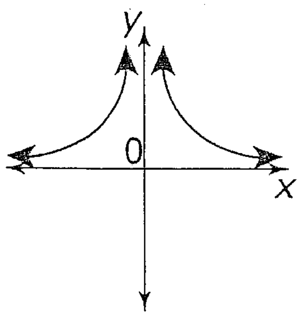
hyperbola

$D = R =$ the set of all nonzero real numbers

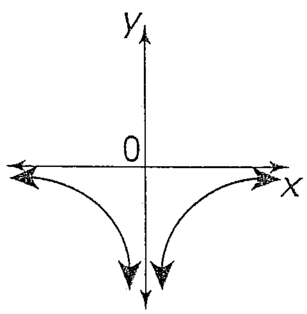
$$y = \frac{k}{x^2}$$

y varies inversely as the square of x.

$k > 0$



$k < 0$



inverse-square curve

$D =$ the set of all nonzero real numbers
$R = \{y: y > 0\}$

$D =$ the set of all nonzero real numbers
$R = \{y: y < 0\}$

Algebra II

Name____________________

Date___________ Hour____

8-4 Multiply and Divide Rational Expressions

VOCABULARY

Simplified form of a rational expression A rational expression in which its numerator and denominator have no common factors (other than ±1)

SIMPLIFYING RATIONAL EXPRESSIONS

Let *a*, *b*, and *c* be nonzero real numbers or variable expressions. Then the following property applies.

$\frac{a\not{c}}{b\not{c}} = \_\_\_$ Divide out common factor *c*.

Example 1 *Simplify a rational expression*

$\frac{x^2 + 7x + 10}{x^2 - 4} = \frac{\qquad}{\qquad}$ Factor numerator and denominator.

Divide out common factor.

$=$ Simplified form.

Exercises

If possible, simplify the rational expression.

1. $\frac{y^2 - 81}{2y - 18}$
2. $\frac{2x - 3}{4x - 6}$
3. $\frac{x + 3}{x^2 + 6x + 9}$
4. $\frac{y^2 - 7y}{y^2 - 8y + 7}$
5. $\frac{x^2 + 5x + 6}{x^3 + 3x^2}$

MULTIPLYING RATIONAL EXPRESSIONS

Let a, b, c, and d be nonzero real numbers or variable expressions. The rule for multiplying rational expressions is the same as the rule for multiplying numerical fractions: multiply ______________, multiply ______________, and write the new fraction in simplified form.

$\frac{a}{b} \cdot \frac{c}{d} =$ ← Simplify $\frac{ac}{bd}$ if possible.

Example 2 *Multiply rational expressions*

$$\frac{2x^2 + 4x}{x^2 - 4x - 12} \cdot \frac{x^2 - 9x + 18}{2x}$$

$= \frac{\_\_\_\_\_\_}{\_\_\_\_\_\_} \cdot \frac{\_\_\_\_\_\_}{\_\_\_\_\_\_}$ **Factor numerator and denominator.**

$= \frac{\_\_\_\_\_\_}{\_\_\_\_\_\_}$ **Multiply numerator and denominator.**

$=$ **Divide out common factors and write in simplified form.**

Example 3 *Multiply a rational expression by a polynomial*

$$\frac{x - 4}{x^3 + 1} \cdot (x^2 - x + 1)$$

$= \frac{x - 4}{x^3 + 1} \cdot \frac{\_\_\_\_\_\_}{\_\_\_\_\_\_}$ **Write polynomial as rational expression.**

$= \frac{\_\_\_\_\_\_}{\_\_\_\_\_\_}$ **Factor denominator.**

$=$ **Divide out common factor and write in simplified form.**

Exercises

Multiply the rational expressions. Simplify the result.

6. $\dfrac{5x - 20}{5x + 15} \cdot \dfrac{2x + 6}{x - 4}$

7. $\dfrac{12 - x}{3} \cdot \dfrac{3}{x - 12}$

8. $\dfrac{x^2 + 2x - 3}{x + 2} \cdot \dfrac{x^2 + 2x}{x^2 - 1}$

9. $\dfrac{x^2 - 2x}{x^2 + 2x + 1} \cdot \dfrac{x^2 + 4x + 3}{x^2 + 3x}$

DIVIDING RATIONAL EXPRESSIONS

To divide one rational expression by another, multiply the first expression by the reciprocal of the second expression.

$\dfrac{a}{b} \div \dfrac{c}{d} = \dfrac{a}{b} \cdot \dfrac{d}{c} =$ ⟵ Simplify $\dfrac{ad}{bc}$ if possible.

Example 4 *Divide rational expressions*

$\dfrac{3}{x + 7} \div \dfrac{8x^2 - 8x}{x^2 + 6x - 7}$

$= \dfrac{3}{x + 7} \cdot$ Multiply by reciprocal.

$= \dfrac{3}{x + 7} \cdot$ Factor.

$=$ Divide out common factors and write in simplified form.

Exercises

Divide the rational expressions. Simplify the result.

10. $\frac{48x^2}{y} \div \frac{36xy^2}{5}$

11. $\frac{x^2}{x^2 - 1} \div \frac{3x}{x + 1}$

12. $\frac{2x^3 - 12x^2}{x^2 - 4x - 12} \div \frac{8x^3 + 24x^2}{x^2 + 9x + 18}$

Checkpoint Multiply or divide the expression.

1. Simplify the expression.

$$\frac{x^2 - 2x - 15}{x^2 + 4x + 3}$$

2. Multiply the expression.

$$\frac{6x^2 + 18x}{x^2 + x - 6} \cdot \frac{x^2 - x - 2}{x^2 - 7x - 8}$$

3. $\dfrac{-2x^2}{x^3 - 27} \cdot (x^2 + 3x + 9)$

4. $\dfrac{x - 5}{9x^2 - 18x} \div \dfrac{2x^2 - 11x + 5}{2x^2 - 5x + 2}$

13. Factor $x^3 + 5x^2 - x - 5$

Perform the indicated operations. Simplify the result.

14. $\frac{x^2 - x - 12}{8x^2} \div \frac{x^3 + 3x^2}{8x^3 - 2x^2} \div \frac{4x - 1}{x + 2}$

15. $\frac{2x^2 + x - 15}{2x^2 - 11x - 21} \cdot (6x + 9) \div \frac{2x - 5}{3x - 21}$

Find the product.

16. $(x + 7)(x - 1)$

17. $(x + 3)(x^2 + 3x + 2)$

18. $x(x^2 - 4)(5 - 6x^3)$

Assignment 8-4 Pages 577-580, #6-14 even, 24-42 even, 54, 55

Algebra II

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Date____________Hour____

8-5 Add and Subtract Rational Expressions

VOCABULARY

Complex fraction A fraction that contains a fraction in its numerator or denominator

ADD (SUBTRACT) WITH LIKE DENOMINATORS

To add (or subtract) rational expressions with like denominators, simply add (or subtract) their ____________. Then place the result over the common denominator. Let a, b, and c be polynomials with $c \neq 0$.

Addition $\frac{a}{c} + \frac{b}{c} =$ **Subtraction** $\frac{a}{c} - \frac{b}{c} =$

Example 1 *Add with like denominators*

$\frac{9}{6x} + \frac{2}{6x} = \frac{\_\_\_}{6x} = \frac{\_\_\_}{6x}$ **Add numerators.**

ADD (SUBTRACT) WITH UNLIKE DENOMINATORS

To add (or subtract) two rational expressions with unlike denominators, find the least common ____________ (LCD), which is the least common ____________ (LCM) of the denominators.

Rewrite each rational expression using the LCD, then add (or subtract) using the procedure for like denominators. Let a, b, c, and d be polynomials with $c \neq 0$ and $d \neq 0$.

Addition $\frac{a}{c} + \frac{b}{d} = \frac{ad}{cd} + \frac{bc}{cd} =$ ____________

Subtraction $\frac{a}{c} - \frac{b}{d} = \frac{ad}{cd} - \frac{bc}{cd} =$

Example 2 *Add with unlike denominators*

Add: $\frac{5}{4x^2} + \frac{x+1}{2x^2+4x}$

To find the LCD, factor each denominator and write the highest power to which each factor occurs. Note that $4x^2 =$ ______ and $2x^2 + 4x =$ __________, so the LCD is ____________ = ____________.

$\frac{5}{4x^2} + \frac{x+1}{2x^2+4x}$

$= \frac{5}{4x^2} + \frac{x+1}{\_\_\_\_\_\_}$

$= \frac{5}{4x^2} \cdot \frac{\_\_\_}{\_\_\_} + \frac{x+1}{\_\_\_\_\_\_} \cdot$

$=$

$=$

Example 3 *Subtract with unlike denominators*

Subtract: $\frac{7}{3x-9} - \frac{x+4}{x^2-9}$

$\frac{7}{3x-9} - \frac{x+4}{x^2-9}$

$= \frac{7}{\_\_\_\_\_\_} - \frac{x+4}{\_\_\_\_\_\_}$

$= \frac{7}{\_\_\_\_\_\_} \cdot \frac{\_\_\_}{\_\_\_} - \frac{x+4}{\_\_\_\_\_\_} \cdot$

$=$

$=$

Adding with Unlike Denominators

Perform the indicated operation and simplify.

1. $\frac{1}{2} + \frac{3}{x^2}$

2. $\frac{3}{2x} + \frac{x}{2x^2 + 6x}$

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

4. $\frac{x}{x - 1} + \frac{3x}{x^2 - 1}$

Subtracting with Unlike Denominators

Perform the indicated operation and simplify.

5. $\frac{2x}{x + 2} - \frac{8}{x^2 + 2x}$

6. $\frac{5x}{x^2 - 4} - \frac{7}{x - 2}$

7. $\frac{3x + 1}{x^2} - \frac{x - 2}{x^3}$

8. $\frac{x}{x + 3} - \frac{6}{x + 2}$

SIMPLIFYING COMPLEX FRACTIONS

A complex fraction is a fraction that contains a fraction in its numerator or denominator.

Method 1: If necessary, simplify the numerator and denominator by writing each as a ________. Then divide the numerator by the denominator.

Method 2: Multiply the numerator and the denominator by the ________________ of every fraction in the numerator and denominator. Then simplify.

Example 4 *Simplify a complex fraction (Method 1)*

Simplify: $\dfrac{\frac{8}{5x}}{\frac{x+1}{15}+\frac{4}{15}}$

$\dfrac{\frac{8}{5x}}{\frac{x+1}{15}+\frac{4}{15}} = \dfrac{\frac{8}{5x}}{\quad}$ **Write denominator as a single fraction.**

$= \dfrac{8}{5x} \cdot$ **Divide numerator by denominator.**

$=$ **Simplify.**

Example 5 *Simplify a complex fraction (Method 2)*

Simplify: $\dfrac{\frac{2x}{x+1}}{\frac{1}{3x}+\frac{2}{x+1}}$

The LCD of all the fractions in the numerator and denominator is

$\dfrac{\frac{2x}{x+1}}{\frac{1}{3x}+\frac{2}{x+1}} = \dfrac{\frac{2x}{x+1}}{\frac{1}{3x}+\frac{2}{x+1}} \cdot$ **Multiply numerator and denominator by the LCD.**

$=$ **Simplify.**

$=$ **Simplify.**

Simplifying a Complex Fraction

9. $\dfrac{\dfrac{x^2}{x^2 - 1}}{\dfrac{3x}{x + 1}}$

10. $\dfrac{2 - \dfrac{1}{x}}{x}$

11. $\dfrac{1 + \dfrac{1}{x}}{1 - \dfrac{1}{x}}$

12. $\dfrac{\dfrac{6}{x - 1} - 3}{\dfrac{3}{x}}$

Checkpoint Perform the indicated operation and simplify.

1. $\frac{8x}{3+x} - \frac{7}{3+x}$

2. $\frac{13}{3x} + \frac{2}{3x}$

3. $\frac{x+1}{x^2+6x+9} + \frac{6}{x^2-9}$

4. $\frac{8}{4x^2} - \frac{2+x}{8x^2-12x}$

Simplify the complex fraction.

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

6. $\dfrac{\frac{5}{2x} + \frac{7}{x^2}}{\frac{3}{x^2} - \frac{1}{2x}}$

Solve the equation.

a) $\frac{3}{4}x + \frac{1}{2} = x - \frac{5}{6}$

b) $-\frac{1}{12}x - 3 = \frac{5}{2}$

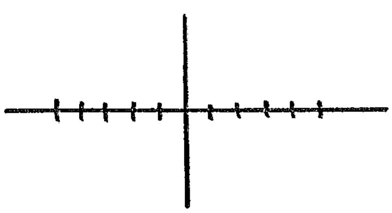
c) $x = 12 + \frac{5}{6}x$

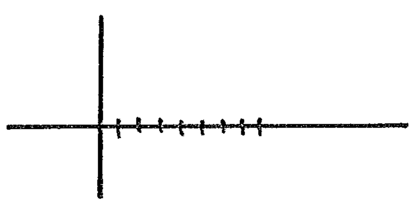
Solve the quadratic equation.

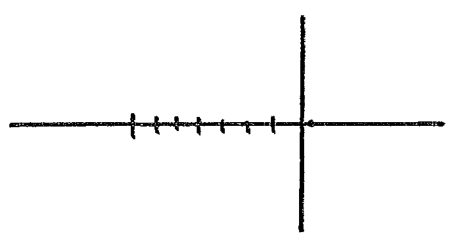
d) $5x^2 - 8 = 4(x^2 + 3)$

e) $3(x - 5)^2 = 27$

f) $2x(x + 6) = 7 - x$







Name ____________________

Find the least common denominator.

g) $\frac{1}{x^2 - 3x - 28}, \frac{x}{x^2 + 6x + 8}$

Simplify

h) $\frac{10x}{3x^2 - 3} + \frac{4}{x - 1} + \frac{5}{6x}$

i) $\dfrac{\frac{20}{x + 1}}{\frac{1}{4} - \frac{7}{x + 1}}$

j) $\dfrac{\frac{1}{4x + 3} - \frac{5}{3(4x + 3)}}{\frac{x}{4x + 3}}$

Assignment 8-5 Page 586, #4-8 even, 16-24 even, 28, 30

Algebra II

Name ______________________

Date ______________ Hour ____

8-5 Practice B

Find the least common denominator.

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

2. $\frac{8}{x+2}, \frac{2x}{x-1}$

3. $\frac{3x}{x-2}, \frac{2}{x^2-4}$

4. $\frac{x}{3x(x+3)}, \frac{1}{x^2-9}, \frac{4}{x(x-3)}$

Perform the indicated operation and simplify.

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

6. $\frac{x}{x^2-4x+3} + \frac{5}{x-3}$

7. $\frac{3x}{x-5} - \frac{2}{x^2-25}$

8. $\frac{3}{x} + \frac{2}{x-2} - \frac{2}{x^2}$

Perform the indicated operation and simplify.

9. $\frac{x}{x+3} - \frac{3}{x+2} - \frac{1}{x^2+5x+6}$

10. $\frac{2x}{x^2+4x+4} + \frac{x-1}{x(x+2)}$

11. $2 + \frac{x}{x^2-2}$

12. $\frac{x-2}{x^2+x-12} + \frac{x}{x^2-2x-3}$

Simplify the complex fraction.

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

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

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

9.1 Apply the Distance and Midpoint Formulas

Name ______________________

Goal • Find the length and midpoint of a line segment.

VOCABULARY
Distance formula
Midpoint formula

THE DISTANCE FORMULA

The distance d between (x_1, y_1) and (x_2, y_2) is

$d = \sqrt{(\_\_\_\_\_\_)^2 + (\_\_\_\_\_\_)^2}$.

Example 1 *Find the distance between two points*

Find the distance between (−5, −3) and (3, 6).

Let $(x_1, y_1) = (-5, -3)$ and $(x_2, y_2) = (3, 6)$.

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$= \sqrt{\_\_\_\_\_\_\_\_\_\_\_\_} = \_\_\_\_\_\_$

Example 2 *Classify a triangle using the distance formula*

Classify $\triangle ABC$ as *scalene*, *isosceles*, or *equilateral*.

$AB = \sqrt{\_\_\_\_\_\_\_\_\_\_\_\_}$

$= \_\_\_\_\_\_ = \_\_\_$

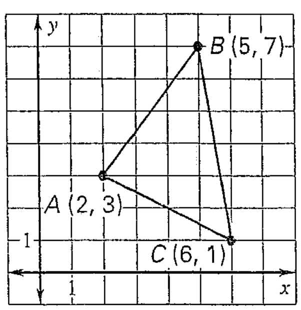
$BC = \sqrt{\_\_\_\_\_\_\_\_\_\_\_\_}$

$= \_\_\_\_\_\_$

$AC = \sqrt{\_\_\_\_\_\_\_\_\_\_\_\_}$

$= \_\_\_\_\_\_ = \_\_\_\_\_\_$

$\triangle ABC$ is ________.



Checkpoint Complete the following exercises.

1. Find the distance between (−7, 3) and (5, −2).

2. The vertices of a triangle are $T(2, 1)$, $U(4, 6)$, and $V(7, 3)$. Classify $\triangle TUV$ as *scalene*, *isosceles*, or *equilateral*.

THE MIDPOINT FORMULA

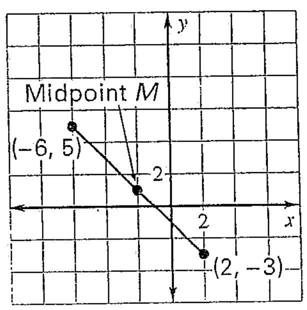
A line segment's midpoint is ____________ from the segment's endpoints. The midpoint formula describes the ____________ of a line segment joining $A(x_1, y_1)$ and $B(x_2, y_2)$ as follows:

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

In words, each coordinate of M is the ________ of the corresponding coordinates of A and B.

Example 3 *Find the midpoint of a line segment*

Find the midpoint of the line segment joining (−6, 5) and (2, −3).

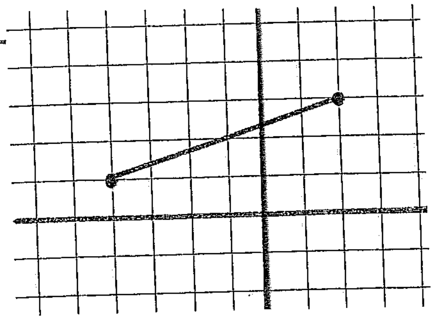


Let $(x_1, y_1) = (-6, 5)$ and $(x_2, y_2) = (2, -3)$.

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{\qquad}{\qquad}, \frac{\qquad}{\qquad}\right)$$

$$= (\_\_\_\_, \_\_\_\_)$$

Example 4 *Find a perpendicular bisector*



Write an equation for the perpendicular bisector of the line segment joining $A(-4, 1)$ and $B(2, 3)$.

Solution

1. **Find** the midpoint of the line segment.

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{\qquad}{\qquad}, \frac{\qquad}{\qquad}\right) = (\_\_\_, \_\_\_)$$

2. **Calculate** the slope of $\overline{AB}$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\qquad}{\qquad} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

3. **Find** the slope of the perpendicular bisector.

$$-\frac{1}{m} = \frac{\qquad}{\qquad} = \_\_\_$$

4. **Use** point-slope form: $y - \_\_\_ = \_\_\_(x - (\_\_\_))$ or
$y = \_\_\_\_\_\_$.

An equation for the perpendicular bisector of AB is
$y = \_\_\_\_\_\_$.

Checkpoint Complete the following exercises.

3. Find the midpoint of the line segment joining $(-6, 5)$ and $(1, 1)$.

4. Write an equation for the perpendicular bisector of the line segment joining $A(-5, 6)$ and $(3, -2)$.

9.3 Graph and Write Equations of Circles

Name ______________________

Goal • Graph and write equations of circles.

VOCABULARY

Circle

Center

Radius

STANDARD EQUATION OF A CIRCLE WITH CENTER AT THE ORIGIN

The standard form of the equation of a circle with center at (0, 0) and radius r is as follows:

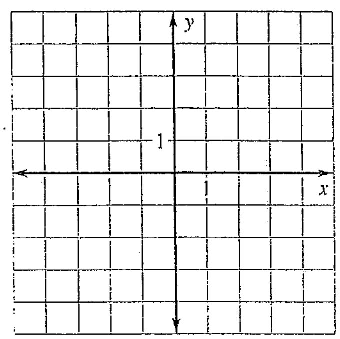
$x^2 + y^2 =$ ____

Example 1 *Graph an equation of a circle*

Graph $y^2 = -x^2 + 16$. Identify the radius of the circle.

Solution

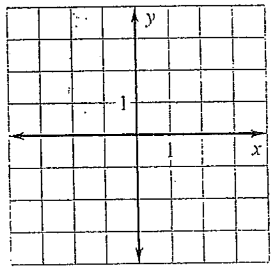
1. **Rewrite** the equation $y^2 = -x^2 + 16$ in standard form as ______________.



2. **Identify** the center and radius. From the equation, the graph is a circle centered at the origin with radius $r =$ ______ $=$ ___.
3. **Draw** the circle. First plot several convenient points that are 4 units from the origin, such as (0, ___), (4, ___), (0, _____), and (−4, ___). Then draw the circle that passes through the points.

Checkpoint Graph the equation. Identify the radius.

1. $x^2 = 4 - y^2$



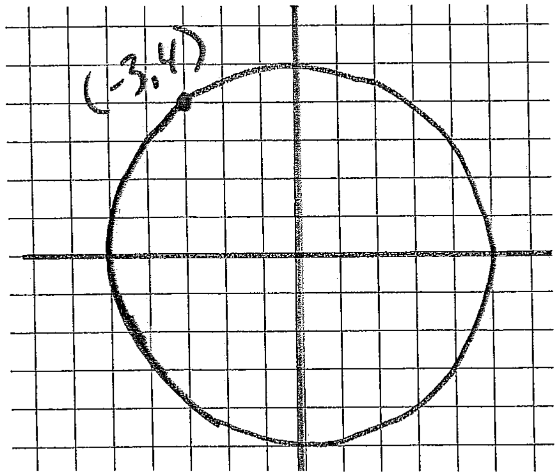
Example 2 *Write an equation of a circle*

The point (−3, 4) lies on a circle whose center is the origin. Write the standard form of the equation of the circle.

The circle's radius r must be the distance between the center and (−3, 4). Use the distance formula.

$r = \sqrt{(\_\_\_\_\_\_)^2 + (\_\_\_\_\_\_)^2}$

$= \sqrt{\_\_\_\_\_\_} = \sqrt{\_\_\_\_} = \_\_\_$



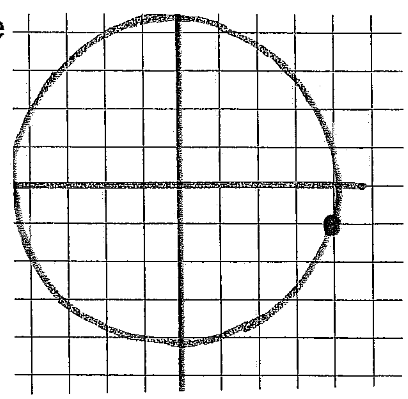
Use the standard form with $r =$ ___ to write an equation of the circle.

$x^2 + y^2 = r^2$	**Standard form**
$x^2 + y^2 = \_\_\_^2$	**Substitute for *r*.**
$x^2 + y^2 = \_\_\_\_$	**Simplify.**

Example 3 *Find a tangent line*

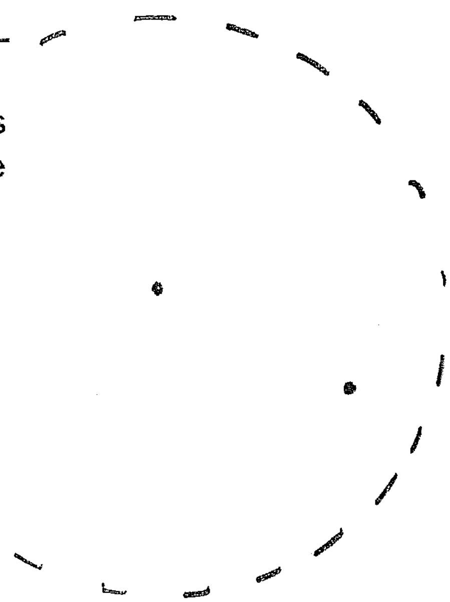
Write an equation of the line tangent to the circle $x^2 + y^2 = 17$ at (4, −1).

A line tangent to a circle and the radius to the point of tangency are perpendicular. The radius with endpoint (4, −1) has slope $m = \frac{\_\_\_\_\_\_}{\_\_\_\_\_\_} = \frac{\_\_\_\_}{\_\_\_\_}$, so the slope of the tangent line at (4, −1) is the negative reciprocal of $\frac{\_\_\_\_}{\_\_\_\_}$, or ___. An equation of the tangent line is as follows:



$y - \_\_\_ = \_\_\_(x - \_\_\_)$	**Point-slope form**
$y = \_\_\_\_\_\_\_\_$	**Solve for *y*.**

Example 4 *Write a circular model*



Lighthouse The beam from Oak Island Lighthouse in North Carolina can be seen for up to 24 miles. You are 18 miles east and 9 miles south of the lighthouse. Can you see the lighthouse beam?

Solution

1. **Write** an inequality for the region lit by the beam. This region is all the points that satisfy the following inequality: $x^2 + y^2 < \_\_\_\_^2$

2. **Substitute** the coordinates (18, 9) into the inequality.

$x^2 + y^2 < \_\_\_\_^2$		**Inequality**
________ $< \_\_\_\_^2$		**Substitute for x and y.**
________		**The inequality is ______.**

You ______ see the lighthouse beam.

Checkpoint Complete the following exercises.

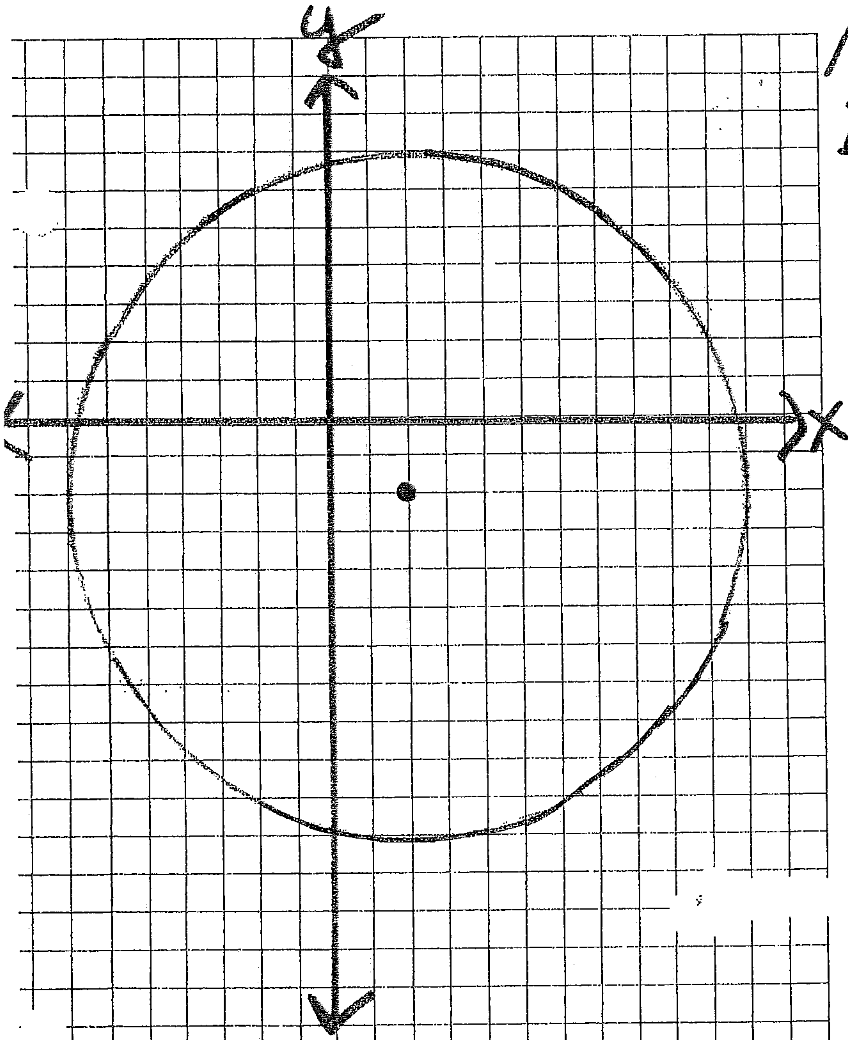
2. Write the standard form of the equation of the circle with center at the origin that passes through the point (6, −3).

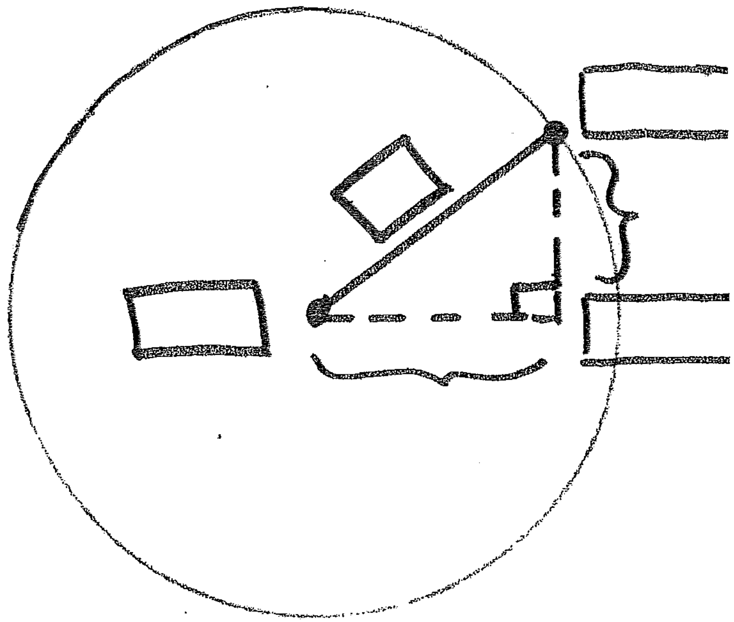
3. Write an equation of the line tangent to the circle $x^2 + y^2 = 34$ at $(-3, -5)$.

4. From Example 4, suppose you are 16 miles east and 19 miles south of the lighthouse. Can you see the lighthouse beam?

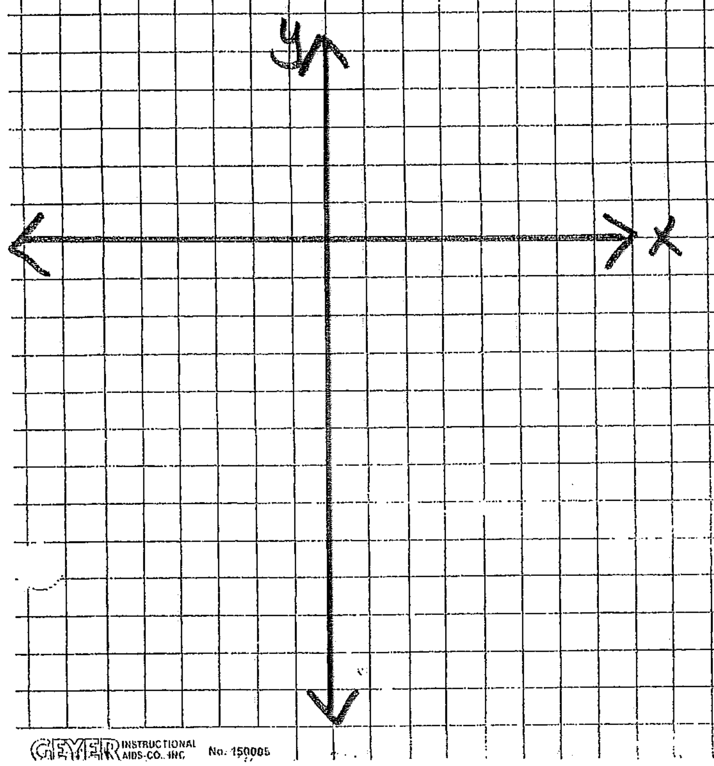
Name ____________________

Date __________ hr _____





GRAPH $(x-2)^2+(y+5)^2=3^2$



Pythagorean theorem

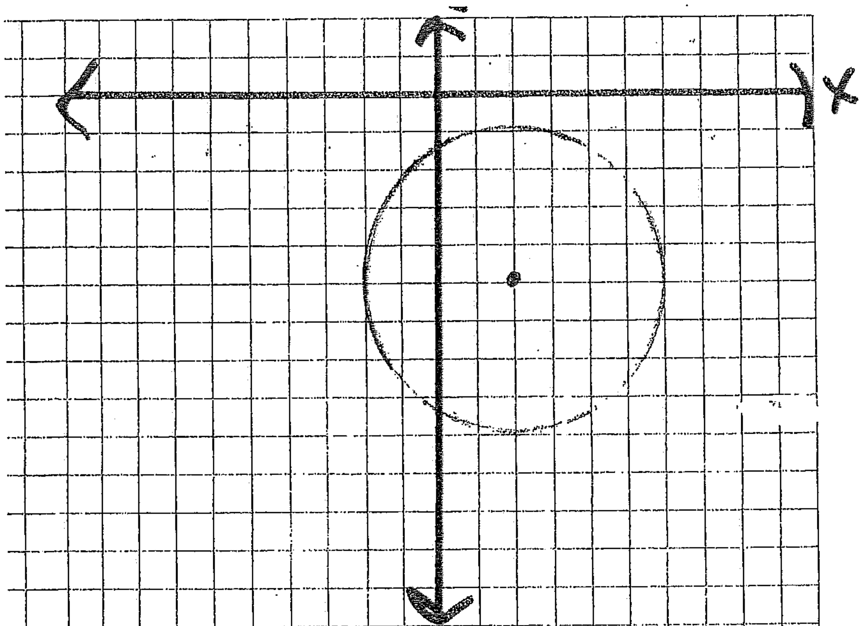
____

equation of circle

_________________________ *

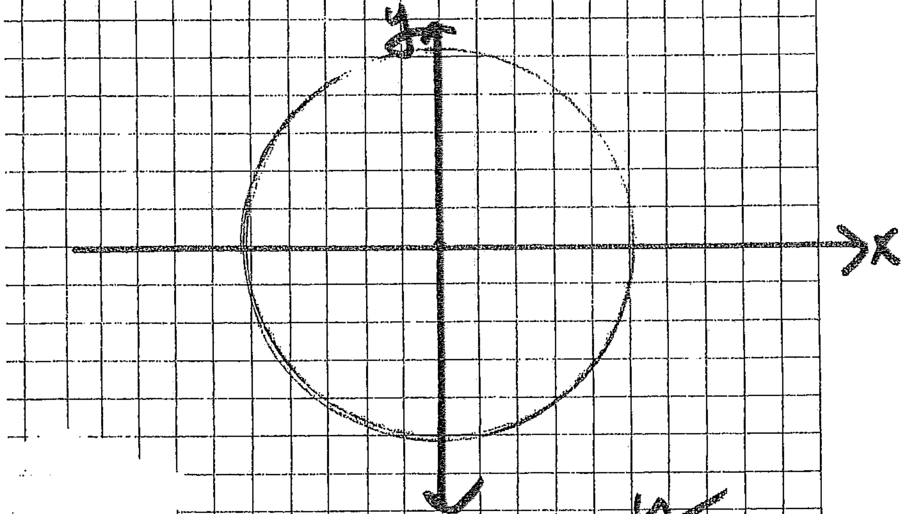
Name ____________________

Write the equation of the circle.



c=

r=



c =

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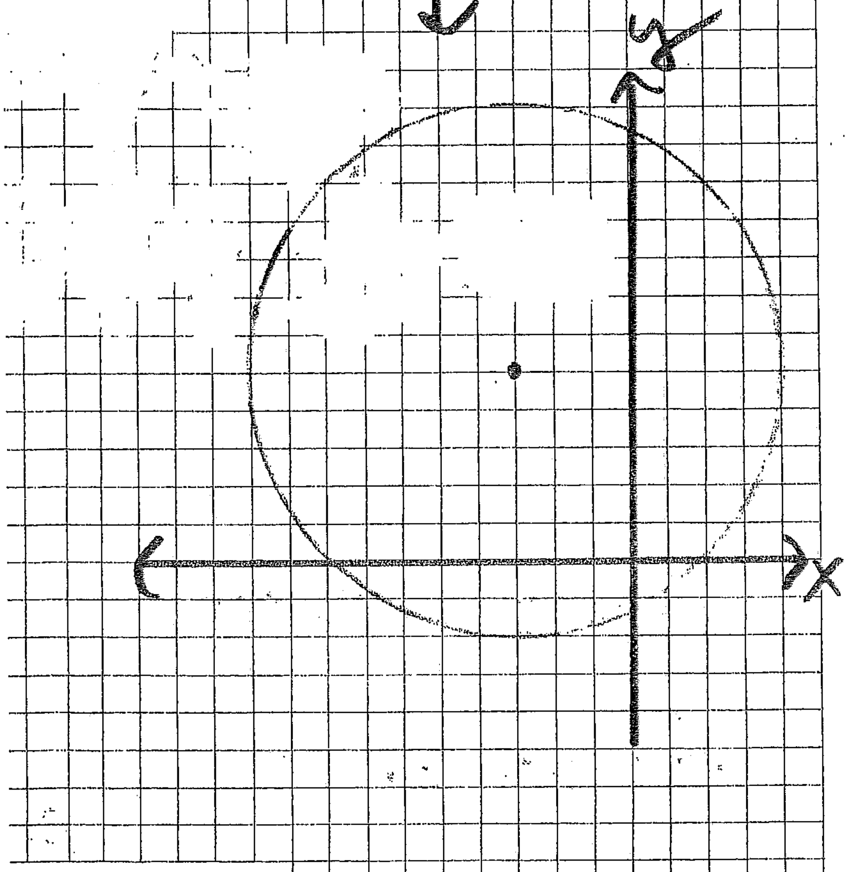

c =

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