Chapter 10 Student Success Sheet (SSS)

Radical Expressions and Geometry

Olathe East High School – Intermediate Algebra

Name:______________________________

Hour: _____

<u>Reminders</u>:

- Homework is completed in **homework packet.**
- **All pages** in homework notebook should be done in pencil!

Need Help? Support is available!

- www.mhollan.weebly.com
- www.srushingoe.weebly.com

"There are no secrets to success. It is the result of preparation, hard work, and learning from failure."

<u>Colin Powell</u>

Concept #	What we will be learning…	Mandatory Practice
1	Factor trees with numbers and variables & Simplifying Radicals	Practice Quiz 1
2	Simplifying radicals when multiply/divide first	Practice Quiz 2
3	Pythagorean Theorem	Practice Quiz 3
4	Rationalizing denominators	Practice Quiz 4
5	Adding and subtracting radicals (same only)	Practice Quiz 8
6	Using distribution and FOILing with radicals	Practice Quiz 1
7	Solving radical equations (one radical); check for extraneous solutions	Practice Quiz 7
8	Solving radical equations (one radical); check for extraneous solutions	Practice Quiz 8
9	Midpoint formula	Practice Quiz 9
10	Distance formula	Practice Quiz 10

#1 Factor trees with numbers and variables

Who can "go out of the house"? ______________________________

Who has to "stay home"? ______________________________

1) $\sqrt{150}$

2) $\sqrt{28}$

3) $\sqrt{96}$

4) $\sqrt{294}$

5) $\sqrt{75x^2}$

6) $\sqrt{175n^2}$

7) $\sqrt{64m^3}$

8) $\sqrt{174r^3}$

9) $\sqrt{36b^4}$

10) $\sqrt{63n^4}$

11) $\sqrt{320u^4v^3}$

12) $\sqrt{392x^3y^4}$

13) $\sqrt{144ab}$

14) $\sqrt{392x^4y^2}$

15) $\sqrt{125a^2b^2}$

16) $\sqrt{72xy^3}$

17) $\sqrt{25m^3p^4q^4}$

18) $\sqrt{200m^2np}$

19) $\sqrt{50x^3y^2z^3}$

20) $\sqrt{80p^4qr}$

#1 PART 2

A perfect square is

$1^2 =$	$2^2 =$	$3^2 =$	$4^2 =$	$5^2 =$	$6^2 =$	$7^2 =$	$8^2 =$
$9^2 =$	$10^2 =$	$11^2 =$	$12^2 =$	$13^2 =$	$14^2 =$	$15^2 =$	$16^2 =$

1 squared = $1^2 = 1 \cdot 1 =$ _____ $= \sqrt{1} =$ ____

2 squared = $2^2 = 2 \cdot 2 =$ _____ $= \sqrt{4} =$ ____

3 squared = $3^2 = 3 \cdot 3 =$ _____ $= \sqrt{9} =$ ____

4 squared = $4^2 = 4 \cdot 4 =$ _____ $= \sqrt{16} =$ ____

5 squared = $5^2 = 5 \cdot 5 =$ _____ $= \sqrt{25} =$ ____

6 squared = $6^2 = 6 \cdot 6 =$ _____ $= \sqrt{36} =$ ____

7 squared = $7^2 = 7 \cdot 7 =$ _____ $= \sqrt{49} =$ ____

8 squared = $8^2 = 8 \cdot 8 =$ _____ $= \sqrt{64} =$ ____

9 squared = $9^2 = 9 \cdot 9 =$ _____ $= \sqrt{81} =$ ____

10 squared = $10^2 = 10 \cdot 10 =$ _____ $= \sqrt{100} =$ ____

11 squared = $11^2 = 11 \cdot 11 =$ _____ $= \sqrt{121} =$ ____

12 squared = $12^2 = 12 \cdot 12 =$ _____ $= \sqrt{144} =$ ____

13 squared = $13^2 = 13 \cdot 13 =$ _____ $= \sqrt{169} =$ ____

14 squared = $14^2 = 14 \cdot 14 =$ _____ $= \sqrt{196} =$ ____

15 squared = $15^2 = 15 \cdot 15 =$ _____ $= \sqrt{225} =$ ____

PARTS OF A RADICAL

An expression that contains a square root is a ____________________. It can have three parts.

Index: ________________________________

____

$$a\sqrt[b]{c}$$

Radicand: ________________

____

Coefficient: ____________________________

____

SQUARE ROOTS

Taking the square root of a number is the

____

______________________ For example if $3^2 =$ ______, then $\sqrt{9} =$ ______.

The symbol $\sqrt{\ }$ tells you to ______________________

Simplify the following radical expressions.

$\sqrt{100} =$ __________ $\sqrt{25} =$ __________

$\sqrt{141} =$ __________ $\sqrt{36} =$ __________

If your radicand has more than one factor, ______________________

NON-PERFECT SQUARES

Simplify: $\sqrt{24}$

Since 24 is not a perfect square, its ______________________. To simplify

this radical, 24 needs to be ______________________.

However, one of the factors must be a ______________.

What is the highest factor of 24 that is also a perfect square? ______. Therefore, 24 = _____ X _____

$$\sqrt{24} = \sqrt{\_\_\_\_ \cdot \_\_\_\_} = \sqrt{\_\_\_\_} \cdot \sqrt{\_\_\_\_} = \_\_\_\sqrt{\_\_\_\_}$$

Simplify: $\sqrt{32}$

What is the highest factor of 32 that is also a perfect square? ______. Therefore, 32 = _____ X _____

$$\sqrt{32} = \sqrt{\_\_\_\_ \cdot \_\_\_\_} = \sqrt{\_\_\_\_} \cdot \sqrt{\_\_\_\_} = \_\_\_\sqrt{\_\_\_\_}$$

Simplify: $\sqrt{54}$

What is the highest factor of 54 that is also a perfect square? ______. Therefore, 54 = _____ X _____

$$\sqrt{54} = \sqrt{\_\_\_\_ \cdot \_\_\_\_} = \sqrt{\_\_\_\_} \cdot \sqrt{\_\_\_\_} = \_\_\_\sqrt{\_\_\_\_}$$

A variable is a perfect square if it has an ____________ exponent.

VARIABLES MULTIPLIED BY ITSELF	**PERFECT SQUARES**
$x \cdot x =$	________
$x^2 \cdot x^2 =$	________
$x^3 \cdot x^3 =$	________
$x^4 \cdot x^4 =$	________

Think about it: **If** $\sqrt{9} = 3$**, then what is** $\sqrt{x^2}$? $\sqrt{x^6}$? $\sqrt{x^4y^6}$ **?**

$\sqrt{x^4} =$ __________ $\sqrt{81x^8y^2} =$ ______________ = ______________

$\sqrt{4x^2} =$ ______________ = ______________ $\sqrt{36a^6b^4} =$ ______________ = ______________

Simplify: $\sqrt{x^5}$

What is the highest factor of $\sqrt{x^5}$ that is also a perfect square? ______. Therefore, $x^5 =$ ____ X ____

$$\sqrt{x^5} = \sqrt{\_\_\_\_ \cdot \_\_\_\_} = \sqrt{\_\_\_\_} \cdot \sqrt{\_\_\_\_} = \_\_\_\sqrt{\_\_\_\_}$$

Simplify: $\sqrt{50x^2y}$

What's the highest factor and perfect square of $\sqrt{50x^2}$? ________. Therefore, $50x^2 =$ ____ X ____

$$\sqrt{50x^2y} = \sqrt{\_\_\_\_ \cdot \_\_\_\_} = \sqrt{\_\_\_\_} \cdot \sqrt{\_\_\_\_} = \_\_\_\sqrt{\_\_\_\_}$$

Simplify: $\sqrt{42x^9}$

What is the highest factor and perfect square of $\sqrt{42x^9}$? _______. Therefore $42x^9 =$ ____ X ____

$$\sqrt{42x^9} =$$

#2 Simplifying radicals when multiply/divide first

Coefficient:

Radicand:

You can multiply/divide ________________ with ________________

You can multiply/divide ________________ with ________________

Then, _____________ with a _________ _________!

21) $\sqrt{2} \cdot \sqrt{20}$

22) $\sqrt{5} \cdot \sqrt{15}$

23) $\sqrt{3} \cdot \sqrt{15}$

24) $\sqrt{8} \cdot \sqrt{6}$

25) $\sqrt{15k^3} \cdot \sqrt{3k^3}$

26) $\sqrt{3n} \cdot \sqrt{15n^2}$

27) $\sqrt{3x} \cdot \sqrt{15x^3}$

28) $\sqrt{15p} \cdot \sqrt{15p^3}$

29) $-5\sqrt{10} \cdot -\sqrt{6}$

30) $-5\sqrt{12} \cdot -2\sqrt{15}$

31) $-5\sqrt{15} \cdot 5\sqrt{5}$

32) $3\sqrt{6} \cdot -3\sqrt{10}$

33) $-\sqrt{15b^2} \cdot 2\sqrt{20b}$

34) $2\sqrt{6n^3} \cdot 2\sqrt{5n^2}$

35) $-5\sqrt{2x^2} \cdot 4\sqrt{2x^3}$

36) $-5\sqrt{10v^3} \cdot 3\sqrt{20v}$

37) $\frac{\sqrt{6}}{\sqrt{16}}$

38) $\frac{\sqrt{4}}{\sqrt{16}}$

39) $\frac{\sqrt{3}}{\sqrt{16}}$

40) $\frac{\sqrt{2}}{\sqrt{25}}$

41) $\frac{2\sqrt{16}}{3\sqrt{25}}$

42) $\frac{2\sqrt{15}}{3\sqrt{4}}$

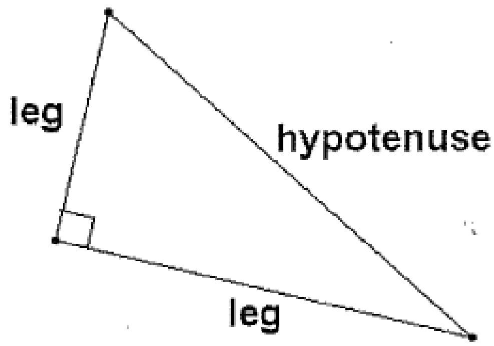
43) $\frac{4\sqrt{15}}{5\sqrt{4}}$

44) $\frac{2\sqrt{4}}{3\sqrt{9}}$

Pythagorean Theorem

#3

Given a right triangle with legs "a" and "b" and hypotenuse "c"



a RIGHT TRIANGLE

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

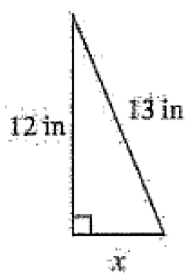
Pythagorean Theorem goes with Right Triangles
Hypotenuse is across from the Right Angle
Legs are "a" and "b"
Hypotenuse "c"
Plug the numbers in and see how easy it can be!

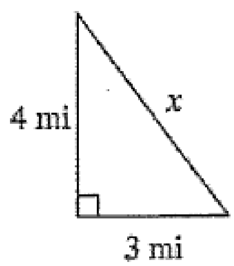
Singing "a squared plus b squared equals c squared!"

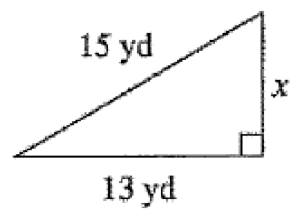
Pythagorean Theorem is a wonderful equation
Just gotta make sure you plug in the right location
Draw the Triangle
Label the sides
Then you'll solve these problems and get them all right

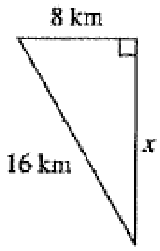
Examples

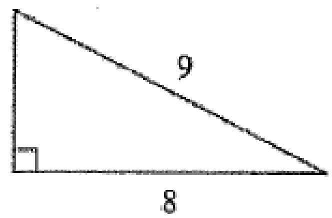
Find the missing side of each right triangle. Side c is the hypotenus. Sides a and b are legs. Leave your answers in simplest radical form.

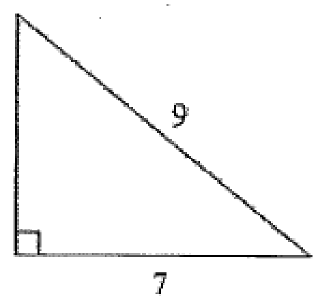


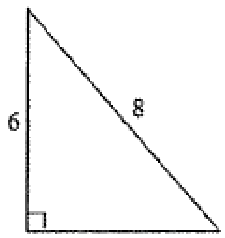


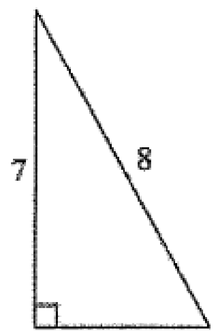










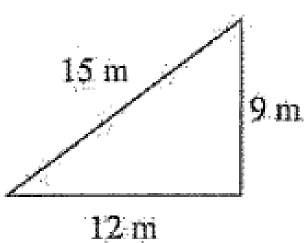


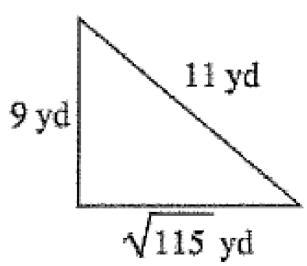
$a = 11$ m, $c = 15$ m

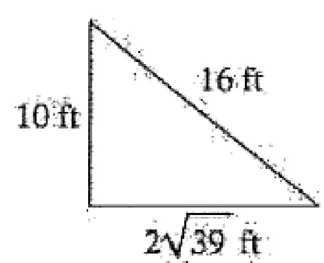
$b = \sqrt{6}$ yd, $c = 4$ yd

State if the triangle is a RIGHT triangle

(does the Pythagorean Theorem work? If so, it's a right triangle! If the Pythagorean Theorem doesn't work, it's not a right triangle!)







(the longest side must be the hypotenuse!)

10 cm, 49.5 cm, 50.5 cm

9 in, 12 in, 15 in

#4 Rationalizing denominators

There can never (______!) be a ____________ in the ____________. EVER!

So, we do something called ______________ the ______________

Basically, this means we ___________ top and bottom by the ____________ from the _____________

46) $\frac{\sqrt{3}}{\sqrt{5}}$

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

48) $\frac{3}{\sqrt{2}}$

49) $\frac{\sqrt{4}}{\sqrt{3}}$

50) $\frac{\sqrt{4}}{\sqrt{5}}$

51) $\frac{\sqrt{5}}{\sqrt{3}}$

52) $\frac{4}{\sqrt{3}}$

53) $-\frac{4}{\sqrt{2}}$

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

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

56) $\frac{\sqrt{3}}{\sqrt{2}}$

57) $\frac{\sqrt{12}}{\sqrt{15}}$

58) $\frac{\sqrt{3}}{\sqrt{15}}$

59) $\frac{\sqrt{16}}{\sqrt{12}}$

60) $\frac{\sqrt{4}}{\sqrt{12}}$

61) $\frac{\sqrt{25}}{\sqrt{15}}$

62) $\frac{\sqrt{20}}{\sqrt{15}}$

63) $\frac{\sqrt{2}}{\sqrt{6}}$

64) $\frac{\sqrt{10}}{\sqrt{6}}$

65) $-\frac{3}{\sqrt{2}}$

#5 Adding and subtracting radicals (same and different radicands)

3□+ 4□ = __□ ₩ + ₩ = _____ □ + 2□ = __□

2₩ - 3₩ + 4₩ = _____ 7⌂ - 3⌂ = _____ □ + 2⌂ = ______

8₩ - 4₩ + 3⌂ - ⌂ + 2⌂ = __________

66) $2\sqrt{5} + 2\sqrt{5}$

67) $-2\sqrt{2} - 3\sqrt{2}$

68) $-2\sqrt{2} + 2\sqrt{2}$

69) $-2\sqrt{5} - \sqrt{5}$

70) $-2\sqrt{2} + 3\sqrt{2} + 3\sqrt{2}$

71) $-2\sqrt{5} - 3\sqrt{3} - 3\sqrt{3}$

72) $3\sqrt{5} + 3\sqrt{5} + 3\sqrt{3}$

73) $2\sqrt{6} - 2\sqrt{3} + 2\sqrt{3}$

74) $2\sqrt{2} + 3\sqrt{2} - \sqrt{5} - \sqrt{5}$

75) $2\sqrt{5} + 3\sqrt{6} - 3\sqrt{5} - \sqrt{5}$

76) $3\sqrt{6} + 2\sqrt{3} + 2\sqrt{3} - \sqrt{3}$

77) $3\sqrt{6} + 3\sqrt{6} - 2\sqrt{2} - 3\sqrt{5}$

#6 *Using distribution and FOILing with radicals*

90) $\sqrt{3}(\sqrt{2}+\sqrt{3})$

91) $\sqrt{3}(\sqrt{6}+5)$

92) $\sqrt{5}(\sqrt{5}+3)$

93) $\sqrt{10}(\sqrt{2}+2)$

94) $\sqrt{10}(\sqrt{2}+5)$

95) $\sqrt{10}(\sqrt{2}+4)$

96) $\sqrt{6}(\sqrt{2}+\sqrt{6})$

97) $\sqrt{15}(\sqrt{2}+\sqrt{5})$

98) $-2\sqrt{10}(-4\sqrt{5}+2)$

99) $-2\sqrt{10}(2\sqrt{2}+2)$

Monomial x binomial:

	$\sqrt{2}$	$+\sqrt{3}$
$\sqrt{3}$		

	$\sqrt{6}$	+5
$\sqrt{3}$		

	$\sqrt{5}$	+3
$\sqrt{5}$		

	$\sqrt{2}$	+2
$\sqrt{10}$		

What about if there are coefficients?

	$-4\sqrt{5}$	$+2$
$-2\sqrt{10}$		

binomial x binomial:

100) $(\sqrt{5}+\sqrt{2})^2$

101) $(\sqrt{5}+\sqrt{3})(\sqrt{4}+\sqrt{3})$

102) $(\sqrt{3}+1)(\sqrt{3}-1)$

103) $(\sqrt{2}+\sqrt{3})(\sqrt{2}+\sqrt{5})$

104) $(\sqrt{5}-2)(\sqrt{5}-1)$

105) $(\sqrt{3}+4)(\sqrt{3}+3)$

106) $(\sqrt{3}-1)(\sqrt{3}+5)$

107) $(\sqrt{2}+\sqrt{5})(\sqrt{2}+\sqrt{2})$

108) $(-5\sqrt{3}+4\sqrt{5})(-2\sqrt{3}+3\sqrt{5})$

109) $(-5\sqrt{5}-2\sqrt{3})(4\sqrt{5}-\sqrt{3})$

	$\sqrt{5}$	$+\sqrt{2}$
$\sqrt{5}$		
$+\sqrt{2}$		

	$\sqrt{4}$	$+\sqrt{3}$
$\sqrt{5}$		
$+\sqrt{3}$		

	$\sqrt{3}$	-1
$\sqrt{3}$		
$+1$		

What about if there are coefficients?

	$-2\sqrt{3}$	$+3\sqrt{5}$
$-5\sqrt{3}$		
$+4\sqrt{5}$		

#7 Solving radical equations (one radical); check for extraneous solutions

How do you get rid of a radical? ____________________

What does it mean to "check for extraneous solutions"?

110) $\sqrt{x+5}=2$

111) $6=\sqrt{9a+36}$

112) $\sqrt{2k+18}=2$

113) $6=\sqrt{3x}$

114) $10=\sqrt{1-99p}$

115) $\sqrt{\frac{n}{4}}=1$

116) $\sqrt{-9-9m}=9$

117) $5=\sqrt{15-r}$

118) $0=\sqrt{-10-x}$

119) $\sqrt{n-10}=8$

#8 Solving radical equations (radicals on both sides); check for extraneous solutions

120) $\sqrt{19-2v}=\sqrt{3v-21}$

121) $\sqrt{b-2}=\sqrt{8-b}$

122) $\sqrt{3n-2}=\sqrt{2n}$

123) $\sqrt{-5-x}=\sqrt{2x+22}$

124) $\sqrt{6k}=\sqrt{5k+1}$

125) $\sqrt{2x-1}=\sqrt{15-2x}$

126) $\sqrt{\frac{a}{7}}=\sqrt{90-2a}$

127) $\sqrt{14-x}=\sqrt{2x-7}$

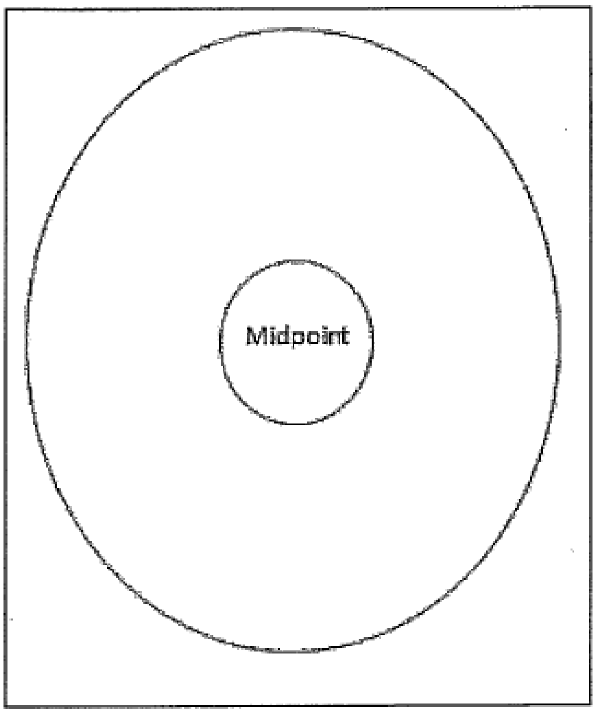
128) $\sqrt{13-n}=\sqrt{n+3}$

129) $\sqrt{2m+3}=\sqrt{m+6}$

#9 Midpoint formula

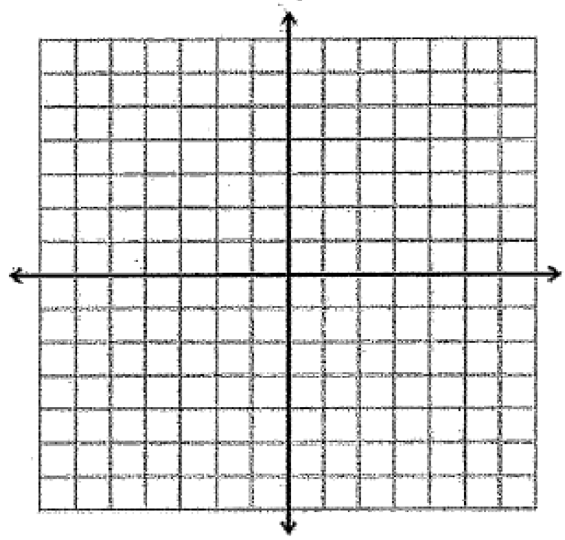
Given two ordered pairs: (x_1, y_1) *and* (x_2, y_2) *The midpoint is:*

$$\left(\frac{\quad + \quad}{2}, \frac{\quad + \quad}{2}\right)$$



Activity 1:

Plot the points (6, 3) and (-4, -1) on the coordinate plane below.



<u>Sequence</u> the steps in finding the midpoint: (*hint: use a Flow Map*)

Examples:

130) (3, 9), (8, 0)

131) (6, −2), (−7, 10)

132) (9, −6), (7, 0)

133) (−8, −9), (−8, 10)

134) (−2, −4), (−8, −3)

135) (−5, 0), (6, 7)

136) (1, −7), (6, 7)

137) (5, 2), (−9, 4)

138) (−10, −5), (−10, 4)

139) (8, −1), (5, −6)

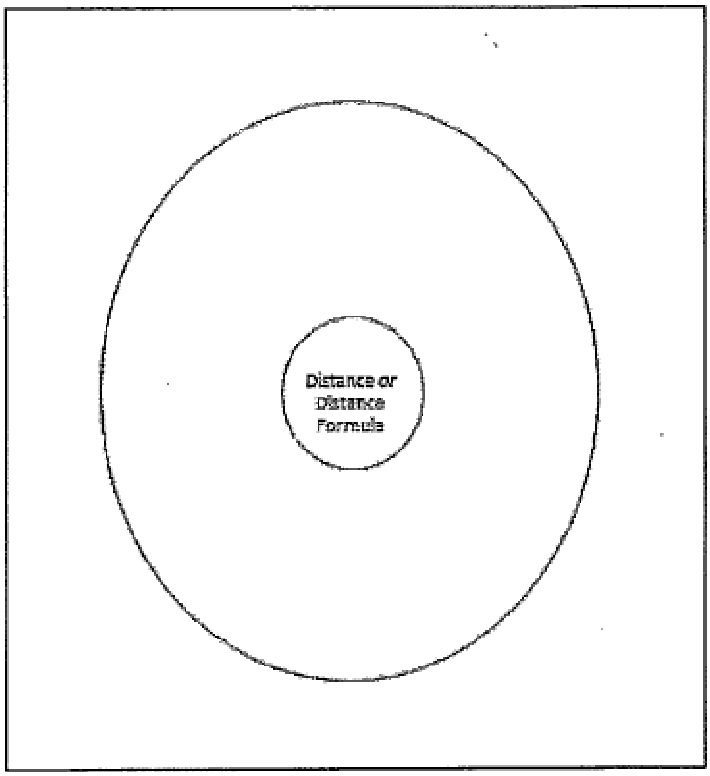
	$\left(\frac{\quad + \quad}{2}, \frac{\quad + \quad}{2}\right)$		$\left(\frac{\quad + \quad}{2}, \frac{\quad + \quad}{2}\right)$

#10 Distance formula

Given two ordered pairs: (x_1, y_1) *and* (x_2, y_2)

The distance between the two points is:

$$\boldsymbol{d} = \sqrt{(\quad - \quad)^2 + (\quad - \quad)^2}$$



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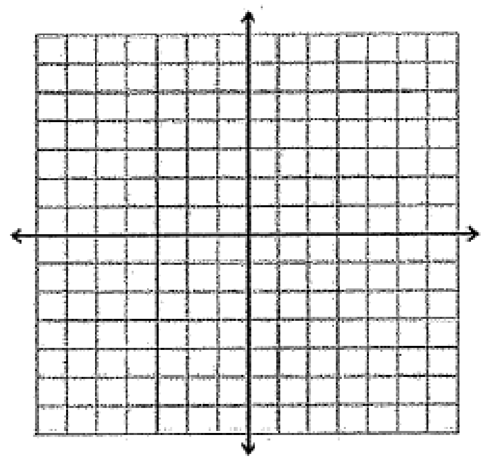
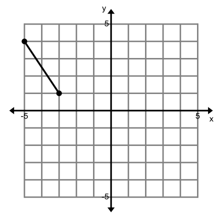


<u>**Sequence**</u> **the steps in finding the distance between two points: (*hint: use a Flow Map)***

Examples:

140) (−6, 6), (5, −4)
141) (−3, −7), (−7, −4)
142) (7, 1), (7, 5)
143) (3, −7), (−5, −6)
144) (0, 6), (7, −5)
145) (7, −3), (−8, 3)
146) (−4, −3), (−5, 1)
147) (−7, −7), (−3, 2)
148) (3, −3), (−3, −8)
149) (−1, 2), (0, 1)

150)



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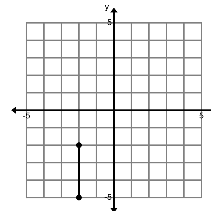

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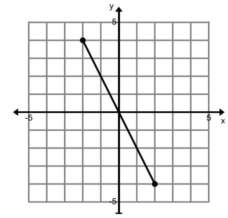

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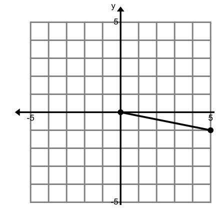

	$d = \sqrt{(\quad - \quad)^2 + (\quad - \quad)^2}$
	$d = \sqrt{(\quad - \quad)^2 + (\quad - \quad)^2}$
	$d = \sqrt{(\quad - \quad)^2 + (\quad - \quad)^2}$
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