Algebra Sem 2 - Semester 2 Final Review

Graphing:

Graphing a quadratic function in standard form:

Notes:

$y = ax^2 + bx + c$

- parabola "U"

Axis of Symmetry: $x = \frac{-b}{2a}$

y-intercept: $(0, c)$

Vertex: $x = \frac{-b}{2a}$ $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$

Example:

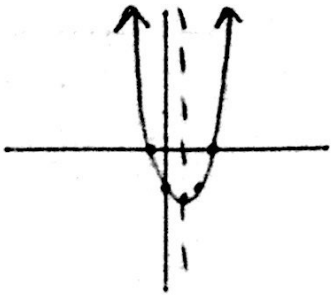
$y = x^2 - 2x - 3$

$x = \frac{-b}{2a} = \frac{-(-2)}{2(1)} = \frac{2}{2} = 1$

AOS: $x = 1$

y-int: $(0, -3)$

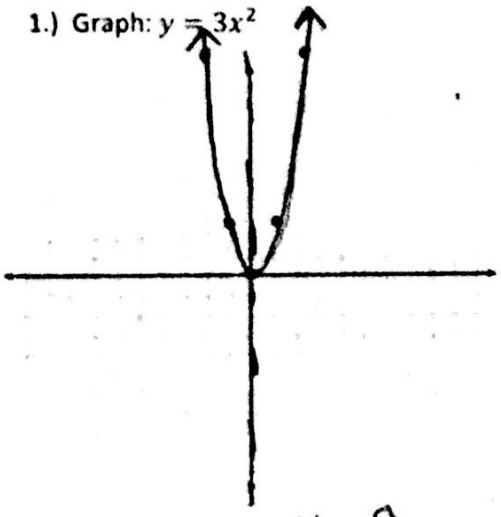
vertex: $(1, -4)$



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

Practice: Graph the following quadratics.

1.) Graph: $y = 3x^2$



Axis of symmetry: $x = 0$

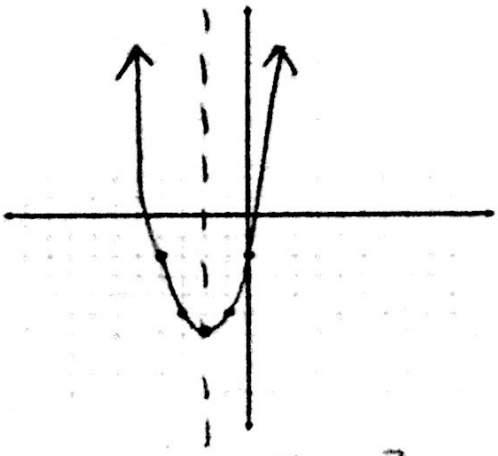
y-intercept: $(0, 0)$

Vertex: $(0, 0)$

x	y
-2	12
-1	3
0	0
1	3
2	12

$x = \frac{-b}{2a} = \frac{-(0)}{2(3)} = 0$

2.) Graph: $y = x^2 + 4x - 2$



Axis of symmetry: $x = -2$

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

Vertex: $(-2, -6)$

x	y
0	-2
-1	-5
-2	-6
-3	-5
-4	-2

$x = \frac{-b}{2a} = \frac{-(4)}{2(1)} = \frac{-4}{2} = -2$

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Solving Equations:

Solving quadratics using square roots:

Notes:
- only variable is x^2
- take $\sqrt{}$ of both sides
- DON'T FORGET $\pm$!!!

Example: $2x^2 - 7 = 11$
$2x^2 = 18$
$x^2 = 9$
$\sqrt{x^2} = \sqrt{9}$
$\boxed{x = \pm 3}$

Solving quadratics by factoring:

Notes:
- have both variables x^2 & x
- look for trinomials, binomials, & diff. of squares
- ZPP

Example: $x^2 + 2x = 3$
$x^2 + 2x - 3 = 0$
$(x+3)(x-1) = 0$
$\boxed{x = -3}$ $\boxed{x = 1}$

$1 \cdot -3 = -3$
$-1 + 3 = 2$
$x^2 + 3x - 1x - 3$
$x(x+3) - 1(x+3)$
$(x+3)(x-1)$

Solving quadratics using the quadratic formula:

Notes:
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Example: $2x^2 + x - 10 = 0$
$x = \frac{-(1) \pm \sqrt{(1)^2 - 4(2)(-10)}}{2(2)}$
$x = \frac{-1 \pm \sqrt{1 + 80}}{4}$
$x = \frac{-1 \pm \sqrt{81}}{4}$
$x = \frac{-1 \pm 9}{4}$
$\boxed{x = 2}$ $x = \boxed{-\frac{5}{2} \text{ or } -2.5}$

Solving equations by cross multiplying:

Notes:
- proportions (fractions)
- draw x through =
- check for extraneous solutions (DEN)

Example: $\frac{x+4}{3} \times \frac{x}{5}$
$5(x+4) = 3x$
$5x + 20 = 3x$
$2x + 20 = 0$
$2x = -20$
$\boxed{x = -10}$

check: 3✓ 5✓

Practice: **Solve the following equations. Some of your answers may be extraneous so be sure to check your solutions.**

1.) $(x+3)^2 - 4 = 12$
$+4 \quad +4$
$(x+3)^2 = 16$
$\sqrt{(x+3)^2} = \sqrt{16}$
$x + 3 = \pm 4$
$-3 \quad -3$
$\boxed{x = 1}$ $\boxed{x = -7}$

2.) $5x^2 - 15x = 0$
$5x(x-3) = 0$
$5x = 0$ $\quad x - 3 = 0$
$\boxed{x = 0}$ $\quad \boxed{x = 3}$

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3.) $(x+3)(2x+5)=0$

$x+3=0$ $\quad$ $2x+5=0$

$\boxed{x=-3}$ $\quad$ $2x=-5$

$\boxed{x=\frac{-5}{2}}$

4.) $x^2-6x+8=0$

$(x-4)(x-2)=0$

$x-4=0$ $\quad$ $x-2=0$

$\boxed{x=4}$ $\quad$ $\boxed{x=2}$

$1\cdot 8=8$

$-4+-2=-6$

$x^2-4x-2x+8$

$x(x-4)-2(x-4)$

$(x-4)(x-2)$

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

$5(x+3)=4(2x-6)$

$5x+15=8x-24$

$15=3x-24$

$39=3x$

$\boxed{x=13}$

Check:

4✓ 5✓

6.) $6x^2-4=20$

$6x^2=24$

$x^2=4$

$\sqrt{x^2}=\sqrt{4}$

$\boxed{x=\pm 2}$

7.) $(x-2)(3x+8)=0$

$x-2=0$ $\quad$ $3x+8=0$

$\boxed{x=2}$ $\quad$ $3x=-8$

$\boxed{x=\frac{-8}{3}}$

8.) $(x-6)^2+2=18$

$(x-6)^2=16$

$\sqrt{(x-6)^2}=\sqrt{16}$

$x-6=\pm 4$

$\boxed{x=10}$ $\quad$ $\boxed{x=2}$

9.) $\frac{x+3}{2}=\frac{x+1}{4}$

$4(x+3)=2(x+1)$

$4x+12=2x+2$

$2x+12=2$

$2x=-10$

$\boxed{x=-5}$

Check:

2✓ 4✓

10.) $25x^2+11=15$

$25x^2=4$

$x^2=\frac{4}{25}$

$\sqrt{x^2}=\sqrt{\frac{4}{25}}$

$\boxed{x=\pm\frac{2}{5}}$

Solve the following equations using the quadratic formula.

1.) $4x^2+3x=1$

$4x^2+3x-1=0$

$x=\frac{-(3)\pm\sqrt{(3)^2-4(4)(-1)}}{2(4)}$

$x=\frac{-3\pm\sqrt{9+16}}{8}$

$x=\frac{-3\pm\sqrt{25}}{8}$

$x=\frac{-3\pm 5}{8}$

$\boxed{x=\frac{1}{4}}$

$\boxed{x=-1}$

2.) $3x^2-4x-9=0$

$x=\frac{-(-4)\pm\sqrt{(-4)^2-4(3)(-9)}}{2(3)}$

$x=\frac{4\pm\sqrt{16+108}}{6}$

$\boxed{x=\frac{4\pm\sqrt{124}}{6}}$

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Simplifying Rational Expressions:

Simplifying rational expression:

Notes:
- factor NUM & DEN first!
- cancel out common factors

Example: $\frac{x^2-4}{x^2-x-2}$

$\frac{(x+2)(x-2)}{(x+1)(x-2)}$

$\boxed{\frac{x+2}{x+1}}$

$1 \cdot -2 = -2$, $-2+1=-1$

$x^2+1x-2x-2$

$x(x+1)-2(x+1)$

$(x+1)(x-2)$

Multiplying rational expressions:

Notes:
- factor NUM & DEN first!
- multiply NUM & DEN
- cancel out common factors

Example: $\frac{3x}{x^2-2x-24} \cdot \frac{x-6}{6x^2}$

$\frac{3 \cdot x}{(x-6)(x+4)} \cdot \frac{(x-6)}{3 \cdot 2 \cdot x \cdot x}$

$\frac{3 \cdot x \cdot (x-6)}{3 \cdot 2 \cdot x \cdot x \cdot (x-6)(x+4)}$

$\boxed{\frac{1}{2x(x+4)}}$

$1 \cdot -24 = -24$, $-6+4=-2$

$x^2-6x+4x-24$

$x(x-6)+4(x-6)$

$(x-6)(x+4)$

Dividing rational expressions:

Notes: (flip)
- multiply by reciprocal
- factor NUM & DEN first!
- multiply NUM & DEN
- cancel out common factors

Example: $\frac{3x}{2x-6} \div \frac{6x^2}{x-2}$

$\frac{3x}{2x-6} \cdot \frac{x-2}{6x^2}$

$\frac{3 \cdot x}{2(x-3)} \cdot \frac{(x-2)}{3 \cdot 2 \cdot x \cdot x}$

$\frac{3 \cdot x \cdot (x-2)}{3 \cdot 2 \cdot 2 \cdot x \cdot x (x-3)}$

$\boxed{\frac{x-2}{4x(x-3)}}$

Practice: **Simplify the following expressions.**

1.) $\frac{16x^6}{4x^4}$

$\frac{2 \cdot 2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \cdot x}{2 \cdot 2 \cdot x \cdot x}$

$\boxed{4x^2}$

2.) $\frac{2x^2+x}{4x}$

$\frac{x(2x+1)}{2 \cdot 2 \cdot x}$

$\boxed{\frac{2x+1}{4}}$

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

$1 \cdot -6 = -6$, $-3+2=-1$

$x^2-3x+2x-6$

$x(x-3)+2(x-3)$

$(x-3)(x+2)$

$\frac{(x-3)(x+2)}{(x+2)(x-2)}$

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

4.) $\frac{x^2+9x+14}{x^2-49}$

$1 \cdot 14 = 14$, $2+7=9$

$x^2+2x+7x+14$

$x(x+2)+7(x+2)$

$(x+2)(x+7)$

$\frac{(x+2)(x+7)}{(x+7)(x-7)}$

$\boxed{\frac{x+2}{x-7}}$

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

$\frac{3(x+2)}{2 \cdot x} \cdot \frac{5 \cdot 2 \cdot x \cdot x}{(x+2)(x-2)}$

$\frac{5 \cdot 3 \cdot 2 \cdot x \cdot x \cdot (x+2)}{2 \cdot x \cdot (x+2)(x-2)}$

$\boxed{\frac{15x}{x-2}}$

6.) $\frac{16x}{2} \cdot \frac{3}{4x}$

$\frac{2 \cdot 2 \cdot 2 \cdot 2 \cdot x}{2} \cdot \frac{3}{2 \cdot 2 \cdot x}$

$\frac{3 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot x}{2 \cdot 2 \cdot 2 \cdot x}$

$\boxed{6}$

7.) $\frac{x-3}{x+3} \cdot \frac{x+3}{x^2-9}$

$\frac{(x-3)}{(x+3)} \cdot \frac{(x+3)}{(x+3)(x-3)}$

$\frac{(x-3)(x+3)}{(x+3)(x+3)(x-3)}$

$\boxed{\frac{1}{x+3}}$

8.) $\frac{36}{x+5} \div \frac{12}{x^2-25}$

$\frac{36}{x+5} \cdot \frac{x^2-25}{12}$

$\frac{3 \cdot 3 \cdot 2 \cdot 2}{(x+5)} \cdot \frac{(x+5)(x-5)}{3 \cdot 2 \cdot 2}$

$\frac{3 \cdot 3 \cdot 2 \cdot 2 \cdot (x+5)(x-5)}{3 \cdot 2 \cdot 2 \cdot (x+5)}$

$\boxed{3(x-5)}$

9.) $\frac{3x-6}{x^2-6x+9} \div \frac{x^2-4}{x^2-x-6}$

$1 \cdot 9 = 9$

$-3 + -3 = -6$

$x^2 - 3x + 3x + 9$

$x(x-3) - 3(x-3)$

$(x-3)(x-3)$

$\frac{3x-6}{x^2-6x+9} \cdot \frac{x^2-x-6}{x^2-4}$

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

$\frac{3(x-2)(x-3)(x+2)}{(x-3)(x-3)(x+2)(x-2)}$

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

$1 \cdot -6 = -6$

$-3 + 2 = -1$

$x^2 - 3x + 2x - 6$

$x(x-3) + 2(x-3)$

$(x-3)(x+2)$

10.) $\frac{3x+15}{x+4} \div \frac{3x}{x+4}$

$\frac{3x+15}{x+4} \cdot \frac{x+4}{3x}$

$\frac{3(x+5)}{(x+4)} \cdot \frac{(x+4)}{3 \cdot x}$

$\frac{3(x+5)(x+4)}{3 \cdot x \cdot (x+4)}$

$\boxed{\frac{x+5}{x}}$

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Adding and Subtracting Rational Expressions:

Adding/subtracting rational expressions:

Notes:

① Find LCD (factor DEN)
② Rewrite fractions w/ LCD
③ Add/subtract NUM keep DEN
④ Simplify

Example: $\frac{2}{x} + \frac{1-2x}{x^2}$

$x \quad x \cdot x$

LCD: $x \cdot x = x^2$

$\frac{2}{x} \cdot \frac{x}{x} = \frac{2x}{x^2}$ $\qquad \frac{1-2x}{x^2}$ ✓

$\frac{2x}{x^2} + \frac{1-2x}{x^2}$

$\boxed{\frac{1}{x^2}}$

Practice: Add or subtract the following rational expressions.

1.) $\frac{x+7}{x+5} + \frac{4x+3}{x+5}$

$\boxed{\frac{5x+10}{x+5}}$

$\frac{5(x+2)}{x+5}$

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

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

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

$x \quad x \cdot x$

LCD: $x \cdot x = x^2$

$\frac{4}{x} \cdot \frac{x}{x} = \frac{4x}{x^2}$ $\qquad \frac{x-5}{x^2}$ ✓

$\frac{4x}{x^2} + \frac{x-5}{x^2} = \boxed{\frac{5x-5}{x^2}}$ $\qquad \frac{5(x-1)}{x \cdot x}$

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

$2 \cdot x \quad 3 \cdot x \cdot x$

LCD: $3 \cdot 2 \cdot x \cdot x = 6x^2$

$\frac{2}{2x} \cdot \frac{3x}{3x} = \frac{6x}{6x^2}$ $\qquad \frac{x-1}{3x^2} \cdot \frac{2}{2} = \frac{2x-2}{6x^2}$

$\frac{6x}{6x^2} - \frac{2x-2}{6x^2}$

$= \frac{4x+2}{6x^2}$ $\qquad \frac{2(2x+1)}{3 \cdot 2 \cdot x \cdot x}$

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

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

LCD: 15

$\frac{2x}{3} \cdot \frac{5}{5} = \frac{10x}{15}$ $\qquad \frac{x+1}{5} \cdot \frac{3}{3} = \frac{3x+3}{15}$

$\frac{10x}{15} - \frac{3x+3}{15}$

$\boxed{\frac{7x-3}{15}}$ $\qquad \frac{(7x-3)}{5 \cdot 3}$

6.) $\frac{1}{x} + \frac{1}{x-1}$

$x \quad (x-1)$

LCD: $x(x-1)$

$\frac{1}{x} \cdot \frac{(x-1)}{(x-1)} = \frac{x-1}{x(x-1)}$ $\qquad \frac{1}{x-1} \cdot \frac{x}{x} = \frac{x}{x(x-1)}$

$\frac{x-1}{x(x-1)} + \frac{x}{x(x-1)}$

$\boxed{\frac{2x-1}{x(x-1)}}$ $\qquad \frac{(2x-1)}{x(x-1)}$

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Operations with Polynomials:

Adding/subtracting polynomials:

Notes:
- look/underline like terms
- combine like terms
- distribute subtraction

Example: $(2x^2+3x-5)-(2x+8+x^2)$

$2x^2-x^2+3x-2x-5-8$

$\boxed{x^2+x-13}$

Multiplying polynomials:

Notes:
- DISTRIBUTE!!
- combine any like terms

Example: $(x-2)(5+3x-x^2)$

$5x+3x^2-x^3-10-6x+2x^2$

$\boxed{-x^3+5x^2-x-10}$

Practice: Find the sum or difference.

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

$\boxed{x^3+7x^2+3x}$

2.) $(6x^3+12x^2-x)-(15x^2+7x-8)$

$\boxed{6x^3-3x^2-8x+8}$

Find the product:

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

$8x^2-6x-20x+15$

$\boxed{8x^2-26x+15}$

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

$6x^3-15x^2+18x-4x^2+10x-12$

$\boxed{6x^3-19x^2+28x-12}$

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

$x^2+3x+3x+9$

$\boxed{x^2+6x+9}$

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

$\boxed{8x^4-6x^2+10x}$

5.) $(x-6)(x^2-4x+1)$

$x^3-4x^2+x-6x^2+24x-6$

$\boxed{x^3-10x^2+25x-6}$

6.) $(2x-1)(2x+1)$

$4x^2+2x-2x-1$

$\boxed{4x^2-1}$

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Factoring:

Factoring a monomial (one term):

Notes:
- factor string
_ · _ · _ · _

Example: $40x^3$

$5 \cdot 2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x$

Factoring a binomial (two terms):

Notes:
- factor out GCF
GCF( )
- difference of squares

Example: ① $30x^3 - 15x$

$15x(2x^2 - 1)$

② $9x^2 - 25$

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

Factoring a trinomial (three terms):

Notes:
- AC method
( )( )

Example: $6x^2 + 2x - 4$

$6 \cdot -4 = -24$, $6 + -4 = 2$

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

$6x(x + 1) - 4(x + 1)$

$(x + 1)(6x - 4)$

Practice: Factor.

1.) $48x^4$

$4 \cdot 3 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \cdot x$

2.) $x^2 - 4$

$(x + 2)(x - 2)$

3.) $16x^2 - 36$

$(4x + 6)(4x - 6)$

OR

$4(4x^2 - 9)$

$4(2x + 3)(2x - 3)$

4.) $x^4 - 4x^2$

$x^2(x^2 - 4)$

$x^2(x + 2)(x - 2)$

5.) $8x^3 - 2x^2$

$2x^2(4x - 1)$

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

$2 \cdot 3 = 6$, $-6 + -1 = -7$

$2x^2 - 6x - 1x + 3$

$2x(x - 3) - 1(x - 3)$

$(x - 3)(2x - 1)$

7.) $x^2 + 4x - 12$

$1 \cdot -12 = -12$, $6 + -2 = 4$

$x^2 + 6x - 2x - 12$

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

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

8.) $x^2 + 9x + 18$

$1 \cdot 18 = 18$, $3 + 6 = 9$

$x^2 + 3x + 6x + 18$

$x(x + 3) + 6(x + 3)$

$(x + 3)(x + 6)$

9.) $2x^2 - 20x + 50$

$2 \cdot 50 = 100$, $-20 = -10 + -10$

$2x^2 - 10x - 10x + 50$

$2x(x - 5) - 10(x - 5)$

$(x - 5)(2x - 10)$

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Simplifying Radical Expressions:

Simplifying radical expressions:

Notes:
- look for perfect squares
- NO DECIMALS!

Example: $\sqrt{90}$

$\sqrt{9} \cdot \sqrt{10}$

$\boxed{3\sqrt{10}}$

Adding/subtracting radical expressions:

Notes:
- combine "like" terms
- cannot add radicals

Example: $3\sqrt{7} + \sqrt{7} - \sqrt{5}$

$\boxed{4\sqrt{7} - \sqrt{5}}$

Multiplying radical expressions:

Notes:
- DISTRIBUTE
- can multiply radicals

$\sqrt{a} \cdot \sqrt{b} = \sqrt{a \cdot b}$

Example: $2\sqrt{3}(7\sqrt{2} - \sqrt{3})$

$14\sqrt{6} - 2\sqrt{9}$

$\boxed{14\sqrt{6} - 6}$ (2·3)

Dividing radical expressions:

Notes:
- can divide radicals

$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

Rationalize Denominator:
- NO $\sqrt{}$ in DEN

$\frac{\sqrt{a}}{\sqrt{b}} \cdot \frac{\sqrt{b}}{\sqrt{b}} = \frac{\sqrt{ab}}{b}$

Example: $\sqrt{\frac{2}{5}}$

$\frac{\sqrt{2}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$

$\frac{\sqrt{10}}{\sqrt{25}}$

$\boxed{\frac{\sqrt{10}}{5}}$

Practice: Simplify. NO DECIMALS!!!!!!!

1.) $\sqrt{36}$

$\boxed{6}$

2.) $\sqrt{48}$

$\sqrt{16}\ \sqrt{3}$

$\boxed{4\sqrt{3}}$

3.) $\sqrt{300}$

$\sqrt{100}\ \sqrt{3}$

$\boxed{10\sqrt{3}}$

4.) $4\sqrt{3} + \sqrt{12}$

$\sqrt{4}\ \sqrt{3}$

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

$\boxed{6\sqrt{3}}$

5.) $2\sqrt{6} - \sqrt{6}$

$\boxed{\sqrt{6}}$

6.) $3\sqrt{3} - \sqrt{5} + \sqrt{3}$

$\boxed{4\sqrt{3} - \sqrt{5}}$

7.) $\sqrt{3} \cdot \sqrt{75}$

$\sqrt{225}$

$\boxed{15}$

8.) $\sqrt{\frac{3}{6}}$

$\sqrt{\frac{1}{2}}$

$\frac{\sqrt{1}}{\sqrt{2}}$

$\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$\frac{\sqrt{2}}{\sqrt{4}}$

$\boxed{\frac{\sqrt{2}}{2}}$

9.) $(2\sqrt{3} - 7)(\sqrt{2} + 4)$

$\boxed{2\sqrt{6} + 8\sqrt{3} - 7\sqrt{2} - 28}$

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Pythagorean Theorem:

Pythagorean Theorem:

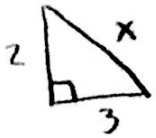
Notes: $a^2+b^2=c^2$

Example: $2^2+3^2=x^2$

$4+9=x^2$

$13=x^2$

$x=\sqrt{13}$



Practice: Let a and b represent the lengths of the legs of a right triangle and let c represent the length of the hypotenuse. Find the unknown length.

1.) $a = 14, c = 21$

$14^2 + b^2 = 21^2$

$196 + b^2 = 441$

$b^2 = 245$

$b = \sqrt{245}$

2.) $a = 10, b = 24$

$10^2 + 24^2 = c^2$

$100 + 576 = c^2$

$676 = c^2$

$c = 26$

Determine whether the triangle with the given side lengths is a right triangle.

1.) 3, 9, 10

$3^2+9^2=10^2$

$9+81=100$

$90 \neq 100$

NO

2.) 12, 16, 20

$12^2+16^2=20^2$

$144+256=400$

$400=400$

Yes

Distance and Midpoint Formula:

Distance Formula:

Notes: (x_1, y_1) (x_2, y_2)

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

- answer is a #

Example: find distance between x_1, y_1 x_2, y_2 $(-3,2)$ $(2,-2)$

$d=\sqrt{(2-(-3))^2+(-2-2)^2}$

$d=\sqrt{(5)^2+(-4)^2}$

$d=\sqrt{25+16}=\sqrt{41}$

Midpoint Formula:

Notes: (x_1, y_1) (x_2, y_2)

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

- answer is a point

Example: find midpoint of x_1, y_1 x_2, y_2 $(-3,2)$ $(2,-2)$

$\left(\frac{-3+2}{2}, \frac{2+-2}{2}\right)$

$\left(\frac{-1}{2}, \frac{0}{2}\right)$

$(-0.5, 0)$

Algebra Sem 2 - Semester 2 Final Review

Practice: **Using these ordered pairs, find the distance between the points as well as the midpoint.**

1.) $(0, 0)$ and $(-6, 9)$ (x_1, y_1 and x_2, y_2)

a.) Distance:

$d = \sqrt{(9-0)^2 + (-6-0)^2}$

$d = \sqrt{(9)^2 + (-6)^2}$

$d = \sqrt{81 + 36}$

$d = \boxed{\sqrt{117}}$

b.) Midpoint:

$\left(\frac{0+-6}{2}, \frac{0+9}{2}\right)$

$\left(\frac{-6}{2}, \frac{9}{2}\right)$

$\boxed{(-3, 4.5)}$

2.) $(-2, -4)$ and $(-8, 5)$ (x_1, y_1 and x_2, y_2)

a.) Distance:

$d = \sqrt{(5-(-4))^2 + (-8-(-2))^2}$

$d = \sqrt{(9)^2 + (-6)^2}$

$d = \sqrt{81+36}$

$d = \boxed{\sqrt{117}}$

b.) Midpoint:

$\left(\frac{-2+-8}{2}, \frac{-4+5}{2}\right)$

$\left(\frac{-10}{2}, \frac{1}{2}\right)$

$\boxed{(-5, 0.5)}$

3.) $(5, -2)$ and $(4, -5)$ (x_1, y_1 and x_2, y_2)

a.) Distance:

$d = \sqrt{(4-5)^2 + (-5-(-2))^2}$

$d = \sqrt{(-1)^2 + (-3)^2}$

$d = \sqrt{1+9}$

$d = \boxed{\sqrt{10}}$

b.) Midpoint:

$\left(\frac{5+4}{2}, \frac{-2+-5}{2}\right)$

$\left(\frac{9}{2}, \frac{-7}{2}\right)$

$\boxed{(4.5, -3.5)}$

4.) $(-1, 7)$ and $(0, 9)$ (x_1, y_1 and x_2, y_2)

a.) Distance:

$d = \sqrt{(0-(-1))^2 + (9-7)^2}$

$d = \sqrt{(1)^2 + (2)^2}$

$d = \sqrt{1+4}$

$d = \boxed{\sqrt{5}}$

b.) Midpoint:

$\left(\frac{-1+0}{2}, \frac{7+9}{2}\right)$

$\left(\frac{-1}{2}, \frac{16}{2}\right)$

$\boxed{(-0.5, 8)}$