

Name : _____

Teacher : _____

Integrated II

1st Semester Study Review Sheet

The study review problems below are for your benefit. You do not have to work the problems in order. Use your time wisely! Choose the more difficult problems to work either in class, with a friend, at lunch/after school with your teacher, or at tutoring. Save easy stuff to do on your own.

Chapter 5 : Quadratic Functions

5.01 [Definitions] Explain using complete sentences:

- A. What is a “quadratic” and how does one recognize it?
- B. When dealing with a quadratic, what is a “root?”
- C. Write in your own words the definition of “line of symmetry”.
- D. A quadratic can be written in many forms. Explain when you might use each form:
 - i. Standard Form $y = ax^2 + bx + c$
 $a \equiv$ stretch factor ; $b \equiv$ helps determine the shift ; $c \equiv$ the y-intercept
 $x \equiv$ input ; $y \equiv$ output
 - ii. Root Form $y = a(x - r_1)(x - r_2)$
 $a \equiv$ stretch factor ; r_1 and $r_2 \equiv$ are the roots (where it crosses the x-axis)
 $x \equiv$ input ; $y \equiv$ output
 - iii. Graphing Form $y = a(x - h)^2 + k$
 $a \equiv$ stretch factor ; $h \equiv$ the shift left/right ; $k \equiv$ the shift up/down
 $x \equiv$ input ; $y \equiv$ output ; $(h, k) \equiv$ the locator point (vertex – highest or lowest point)

5.02 [Line of symmetry] Graph the following parabolas and draw with a colored pencil the line of symmetry:

A. $y = x^2 - 3$

B. $y = x^2 - 4x + 3$

5.03 [Zero Product Property]

- A. Explain in complete sentences when one would use the “zero product property” and what the answer you get actually means.
- B. Factor if necessary and use the zero product property to solve the following equations written below:
 - i. $(x + 3)(x - 11) = 0$
 - ii. $2x(x + 5)(x + 6) = 0$
 - iii. $4x^2 - 5x - 6 = 0$
 - iv. $2x^2 - x = 15$

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5.04 [Radicals and square roots] This topic comes up as a math notes (tool kit) in Chapter 5 and then as a math notes (tool kit) with rationalizing the denominator in Chapter 6. It is not formally introduced in Integrated I or as a formal introduction this year in Integrated II. Depending on your teacher the past few years you may or may not have had a lesson on how to reduce keeping answers in radical form. You may need to find a website online or meet with your teacher outside of class time to best understand how this works. The examples below build step by step on what to do in different situations. There is often only one example at each level so you may need to seek additional problems to do on your own.

Simplify each expression, if possible, and keep your answers in radical form:

A. $\sqrt{27}$

B. $\sqrt{50}$

C. $\sqrt{180}$

D. $\sqrt{9900}$

E. $\sqrt{5} + \sqrt{5}$

F. $3\sqrt{7} + 2\sqrt{7}$

G. $2\sqrt{11} - 9\sqrt{11}$

H. $\sqrt{27} + \sqrt{12}$

I. $\sqrt{75} - \sqrt{27}$

J. $8\sqrt{x} - 2\sqrt{x}$

K. $(\sqrt{11})^2$

L. $(\sqrt{2})(\sqrt{3})$

M. $\sqrt{6}\sqrt{2}$

N. $(3\sqrt{8})^2$

O. $(3\sqrt{2})(5\sqrt{3})$

P. $\frac{1}{\sqrt{11}}$ (Hint: You must rationalize the denominator)

Q. $\frac{\sqrt{75}}{\sqrt{3}}$

R. $\sqrt{\frac{3}{4}}$

S. $\frac{\sqrt{6}\sqrt{2}}{\sqrt{20}}$

T. $\frac{(2\sqrt{3})(3\sqrt{6})}{\sqrt{10}\sqrt{5}}$

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Chapter 4 : Factoring and More Trigonometry

4.01 [Factoring] Often it is convenient for us to un-multiply or “factor” a polynomial. This process involves finding a constant and/or another polynomial that evenly divides the given polynomial. We have learned many methods for factoring (using manipulatives, generic rectangles, diamond problems, diamond problems with extended factoring, perfect square trinomials, difference of squares, and the target method to name a few). In elementary algebra there are three general “types” of factoring. Use the method of your choosing to factor the following expressions:

A. Common Term (Finding the largest common factor) – Factor the following polynomials:

i. $6x+18$

ii. $x^2 + 2x$

iii. $2x^3 - 8x^2 - 50x$

iv. $2x^2(x-1)+7(x-1)$

B. Special Products (Difference of Squares and Perfect Square Trinomials)

Factor the following polynomials:

i. $x^2 - 25$

ii. $4x^2 - 9$

iii. $x^2 - y^2$

iv. $9x^2 - 4y^2$

v. $x^2 + 8x + 16$

vi. $x^2 + 2xy + y^2$

vii. $x^2 - 8x + 16$

viii. $x^2 - 2xy + y^2$

C. Trinomials (Part A: when there is a coefficient of 1 in front of the x^2 term)

Factor the following polynomials:

i. $x^2 + 8x + 15$

ii. $x^2 + 4x - 21$

iii. $x^2 - 2x - 15$

iv. $x^2 - 7x + 12$

D. Trinomials (Part B: when the coefficient in front of the x^2 term does not equal 1)

Factor the following polynomials:

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

ii. $5x^2 - 13x + 6$

iii. $6x^2 - x - 15$

iv. $2x^2 + 3xy + y^2$

E. Combinations (Sometimes we must use a combination of the three types)

Factor the following polynomials:

i. $3x^2 - 27$

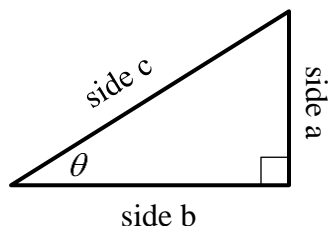
ii. $x^3 + 10x^2 - 24x$

iii. $x^4 - 16$

iv. $2x^3 - 8x^2 - 10x$

4.02 [Trigonometry: Sine & Cosine]

A. Using the triangle below, write the trigonometric ratio formula for:



i. Sine

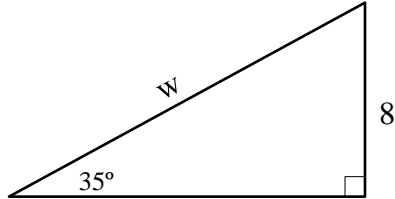
ii. Cosine

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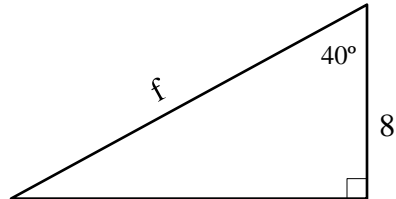
4.02 [Trigonometry: Sine & Cosine] - *Continued*

B. Choose the appropriate trigonometric ratio to solve for the missing variable:

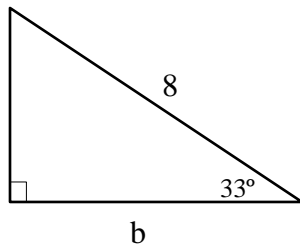
i.



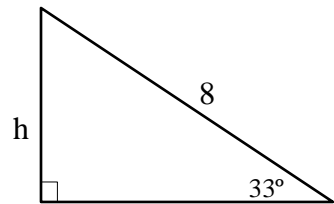
ii.



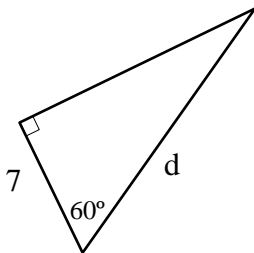
iii.



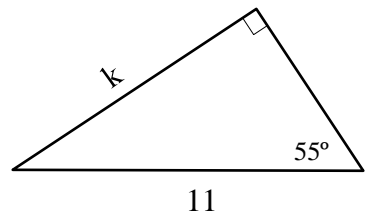
iv.



v.

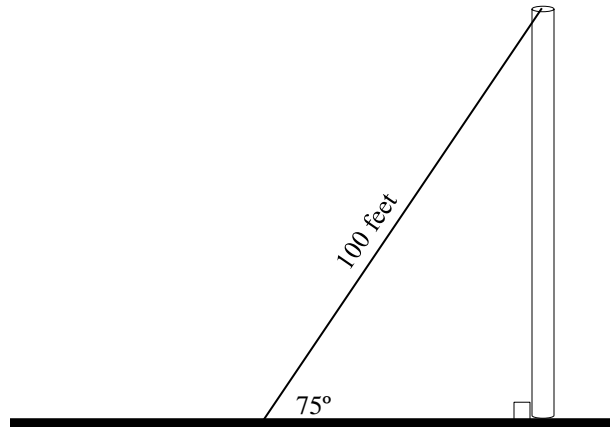


vi.



C. A 100 foot rope is attached to the top of a very tall pole and anchored to the ground forming an angle of 75° how high is the pole?

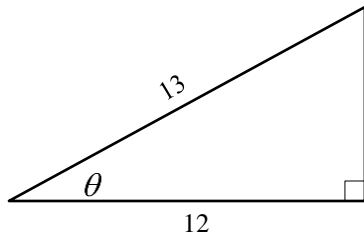
D. What if the angle formed was only 30° ? Then how high would the pole be?



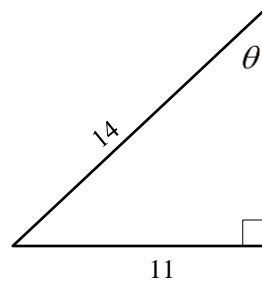
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4.03 [Trigonometry: Inverse Function for sine and cosine]
Show all proper “mathematical” steps to finding the angle variable θ :

A.

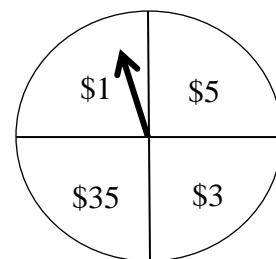


B.



Chapter 3 : Probability and Trigonometry

- 3.01 [Probability] If you flip a coin and roll a 6-sided die, what is the probability that you will flip a heads and roll a 5? *{Bonus can you solve using two different methods? Area Model and Tree Diagram}*
- 3.02 [Probability] Eddie is arguing with Tana about the probabilities of different outcomes when flipping a penny, a nickel and a dime. Draw a tree diagram that illustrates all the possibilities. Then determine:
- A. $P(\text{Three heads})$
 - B. $P(\text{One Head and three Tails})$
 - C. $P(\text{At least one Tail})$
 - D. $P(\text{Exactly two Tails})$
- 3.03 [Unions, Intersections, and Complements] Avery has been learning to play some new card games and is curious about the probabilities of being dealt different cards from a standard 52-card deck. Help him figure out the probabilities listed below:
- A. What is the $P(\text{King})$?; $P(\text{Queen})$?; and $P(\text{a Club})$?
 - B. What is $P(\text{King or a Club})$?
 - C. How does your answer in part B relate to the probabilities you calculated in part A?
 - D. What is $P(\text{King or a Queen})$?
 - E. How does your answer in part D relate to the probabilities you calculated in part A?
 - F. What is the probability of not getting a face card? Jacks, Queens, and Kings are face cards.
- 3.04 [Expected Value]
- A. What would be the expected outcome if we spun this spinner 4 times?
 - B. What is the expected outcome for just one spin?
 - C. What is the expected outcome if we spun the spinner 100 times?



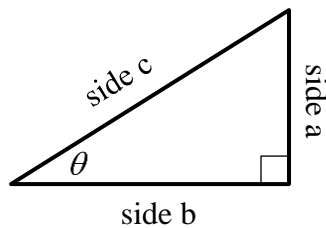
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3.05 [Probability]

- A. Explain the similarities and differences between playing games of chance in real life, probability of a game, and expected value of a game.
- B. What is a systematic list and what is the strategy for creating one?
- C. What does it mean for something to be a “fair game.”
- D. Alexis is playing the marble game. The game is that you select a marble from the first bag and then select a marble from the second bag. If the two marbles are the same color, she will win a lot of money. The first bag contains 2 white marbles, 4 blue marbles and 6 green marbles. The second bag contains 3 white marbles, 2 blue marbles, 1 green marble and 14 red marbles. What is the probability that she will win the game?
- E. Juan was leaving things to fate one day when he began to dress for school. First he picked out a pair of pants randomly from his drawer (he had 3 black and 1 pair of green pants). Next he picked out a shirt at random. Juan had 1 white, 5 black, and 4 green shirts to select from. Finally he chose some socks to wear (also at random). Juan had 4 pairs of white socks and 1 pair of green socks.
 - i. What is the probability that Juan has all three components of his outfit in green?
 - ii. What is the probability that any of his outfit contains green?
 - iii. What is the probability that he has no green at all?

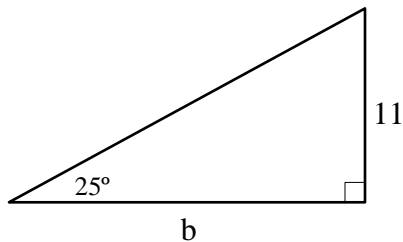
3.06 [Trigonometry: Tangent Ratio]

- A. Using the triangle below, write the trigonometric ratio formula for tangent:

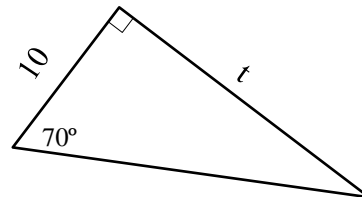


- B. Choose the appropriate trigonometric ratio to solve for the missing variable:

i.



ii.



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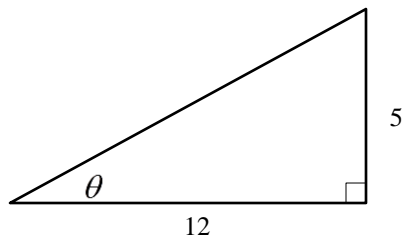
3.06 [Trigonometry: Tangent Ratio] - *Continued*

- C. Justin was at Rocknasium (a rock climbing gym) that has a simulated wall that rises perpendicular from the ground. His brother John looked up at Justin standing about 10 feet away from the base of the wall and determined that his angle of sight directly to Justin was about 77° . How high up the wall was Justin?
- D. Bill the Builder (you might know his twin brother Bob) was interested in how tall the communication tower was downtown. He was able to measure an accurate distance from the base of the tower (460 feet) and determined with his handy dandy clinometer that the angle to the top of the tower was 65.4321° . In case you were curious (like his twin brother) his eye height while using the clinometer is exactly 5 feet.
- Draw a detailed picture of this situation including any relevant right triangles.
 - How tall is the communication tower?

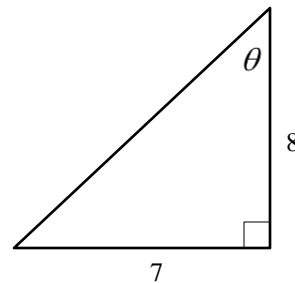
3.07 [Trigonometry: Inverse Tangent Ratio]

Show all proper “mathematical” steps to finding the angle variable θ :

A.



B.



Chapter 2 : Justification and Similarity

2.01 [Corresponding Parts] Identification of corresponding parts is critical in figure comparisons, especially in determining if the figures are “similar” or “congruent”. Possibly using diagrams to aid your explanation, write a definition of “corresponding parts” so that an Integrated II student (in the month of November) can understand.

2.02 [Congruence/Similarity] Explain what it means for two figures to be:

- Congruent.
- Similar.

2.03 [Triangle congruence properties]

A. Below are all the possibilities of “three elements” of a triangle. Circle (or list) all of the ones that prove congruency.

SSS AAA SAS ASA SSA AAS

B Hypotenuse-Leg or HL can be used to prove congruency for pairs of right triangles when one pair of corresponding legs is congruent and each hypotenuse is the same length. Which of the “three element” congruent possibilities (listed above) is this equivalent to? Please explain why?

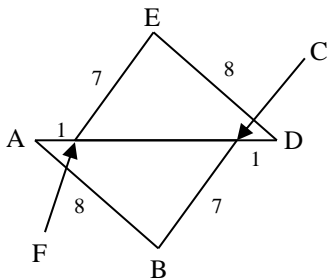
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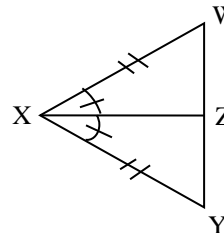
2.03 [Triangle congruence properties] - *Continued*

C. Use the knowledge of the triangle congruence properties to decide if the two triangles are congruent. If they are congruent, write which congruence property and the second triangle vertices in the correct order. Otherwise simply write “not enough information.”

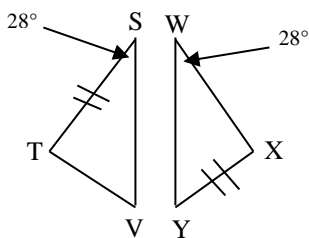
i. $\triangle ABC \cong \triangle \underline{\hspace{2cm}}$



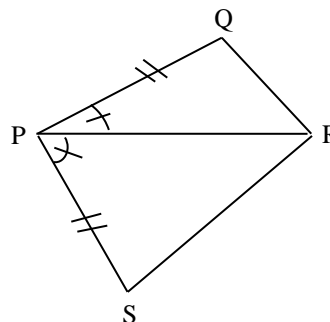
ii. $\triangle WXZ \cong \triangle \underline{\hspace{2cm}}$



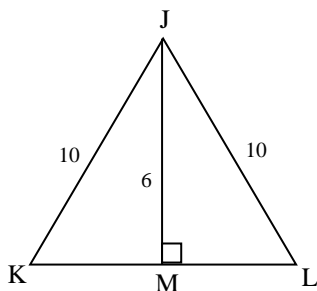
iii. $\triangle TSV \cong \triangle \underline{\hspace{2cm}}$



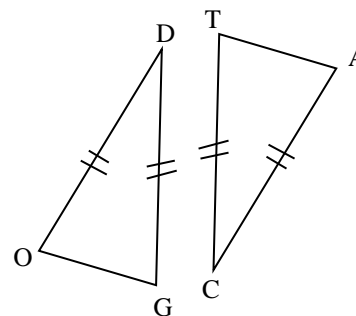
iv. $\triangle QPR \cong \triangle \underline{\hspace{2cm}}$



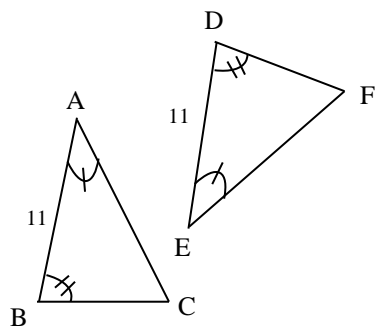
v. $\triangle JKM \cong \triangle \underline{\hspace{2cm}}$



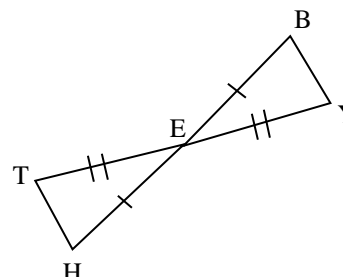
vi. $\triangle DOG \cong \triangle \underline{\hspace{2cm}}$



vii. $\triangle ABC \cong \triangle \underline{\hspace{2cm}}$



viii. $\triangle THE \cong \triangle \underline{\hspace{2cm}}$



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2.04 [Logic Games]

Coming to a theatre to you next year ... sorry!

Insert 2 Color Square game problems. One with a unique solution and one with two solutions.

Warning: Still fair game to put on any test.

2.05 [Proofs]

Coming to a theatre to you next year ... sorry!

Insert 2 simple proofs. One with a common wall and one with vertical angles (bow tie type).

Warning: Still fair game to put on any test.

2.06 [Conditional Statements] Sometimes it is easier to recognize that this is just the fancy way of describing an If-Then statement.

- A. Assume that this statement is true : **If an animal is a dog, then it has a tail.** Based on this determine if the following statements are true or false. You will need to be able to justify your position.
- If an animal has a tail, then it is a dog.
 - If an animal is not a dog, then it does not have a tail.
 - If an animal does not have a tail, then it is not a dog.
 - All dogs have tails.
- B. Assume that this statement is true : **All Dixon High School students love math.**
- Write this statement as a conditional statement.
 - Molly loves math. Is Molly a Dixon High School student?
 - Jake is a Dixon High School student. What can you conclude about Jake?

2.07 [Conditional Statements] Is the converse true or false?

- A. Statement: If a triangle has a 60° angle, it must be an equilateral triangle.
Converse: If a triangle is an equilateral triangle, it must have a 60° angle.
- B. Statement: If a polygon is a square, then it has four right angles.
Converse: if it has four right angles, then it is a square.
- C. Statement: If today is Friday, then tomorrow is Saturday.
Converse: If tomorrow is Saturday, then today is Friday.
- D. Statement: If it is Tuesday, then I play basketball.
Converse: If I play basketball, then it is Tuesday.
- E. Statement: If two triangles are congruent, then they are similar.
Converse: if two triangles are similar, then they are congruent.

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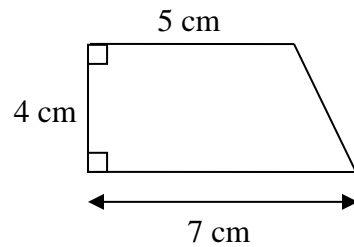
2.08 [Conditional Statements] Write a converse for each conditional statement below. Then, assuming the original statement is true, decide if the converse must be true or not.

- A. If it rains, then the ground is wet.
- B. If a polygon is a square, then it is a rectangle.
- C. If a polygon has three angles, it is a triangle.
- D. If it is a whole number, then it can be written as a decimal.

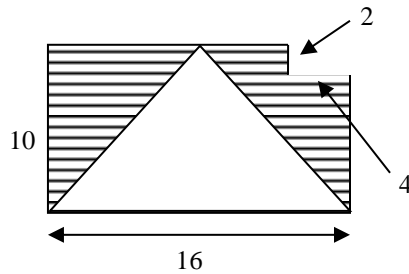
2.09 [Subproblems] The idea of “subproblems” is to break the big problem into compartmentalized components (smaller problems). You must clearly label each “subproblems”, indicate what formula you are using, show the substitution, and place a dashed box around the “subproblem” answer. A solid line box should go around any final answer. If your paper looks like one continuous problem, then you are probably not using the idea of “subproblems”. The only exception to this is if you use complete sentence transitions between each component (you will still need to state formula, show substitution, etc.). Solve each of the questions below using “subproblems”.

- A. Compute the area and the perimeter of the figure shown on the right. Don't forget the proper units at the end of your numeric answer.

Figure Not Necessarily Drawn to Scale

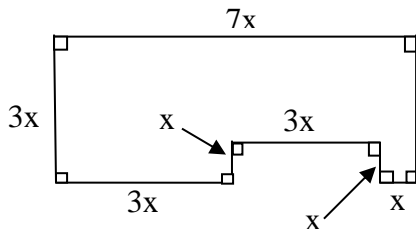


- B. Figure Not Necessarily Drawn to Scale



Find the area of the shaded region shown on the left. In this problem all units of measurement are in yards and all angles that look like right angles are indeed right angles.

- C. Figure Not Necessarily Drawn to Scale



Find the area and perimeter of the region shown on the left. Use of color pencils might prove to be helpful.

2.10 [Dilations]

Coming to a theatre to you next year ... sorry!

Insert some dilation type problems here.

Warning: Still fair game to put on any test.

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Chapter 1 : Exploring Algebraic & Geometric Relationships

1.01 [Definitions] Explain using complete sentences:

- A. A definition for “polygon.” Well thought out responses might include diagrams showing examples of what they look like as well as examples of what they are not.

1.02 [Vocabulary Galore] For each problem below draw a picture or diagram representing the vocabulary word. Be sure to clearly label everything that is needed.

- | | |
|-------------------------|------------------------------|
| A. Bisect | B. Acute Angle |
| C. Complementary Angles | D. Vertex |
| E. Obtuse Angle | F. Alternate Interior Angles |
| G. Ray | H. Corresponding Angles |
| H. Straight Angle Pair | I. Exterior Angle |
| J. Adjacent Angles | K. Perpendicular Lines |
| L. Vertical Angles | M. Isosceles Triangle |
| N. Parallel Lines | O. Supplementary Angles |
| P. Equilateral Triangle | Q. Scalene Triangle |
| R. Trapezoid | S. Linear Pair |

1.03 [Rigid Transformations]

- A. Know the definition of translation (sometimes called a slide).
- B. Know the definition of reflection (sometimes called a flip).
- C. Know the definition of rotation (sometimes called a turn).
- D. Plot the points $X(-9,2)$, $Y(-2,2)$ and $Z(-2,7)$ then connect them in order to form $\triangle XYZ$.
- Reflect $\triangle XYZ$ across the y-axis.
 - Rotate $\triangle XYZ$ 90° counterclockwise about the origin.
 - Translate $\triangle XYZ$ into the fourth quadrant so that vertex X has the new coordinates of $(3,-6)$.
- E. Plot the following points and connect them in order to form a polygon.
- $(2,2)$ $(4,2)$ $(2,7)$ $(4,7)$
- What is the shape of this polygon?
 - Reflect the polygon across the x-axis.
 - Rotate the original figure 270° clockwise about the origin.
 - Translate the original figure so that the vertex at $(2,2)$ is now at $(-7,-7)$.

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0.01 [Systems of Linear Equations] - *Continued*

C. Elimination : Sometimes called the Addition/Subtraction Method (Part A: When one of the coefficients in front of the same variable is the same whether it be negative or positive) – Solve the following systems of linear equations using the elimination method.

i. $x + y = 12$

$x - y = 4$

iii. $3x + 2y = 8$

$3x - 5y = 1$

ii. $2x + y = 11$

$x - y = 4$

iv. $x + y = 10$

$x - 2y = 5$

D. Elimination (Part B: When the coefficients in front of the same variable(s) is/are different) – Solve the following systems of linear equations using the elimination method.

i. $3x + 2y = 11$

$4x + 3y = 14$

iii. $x + 2y = 7$

$5x - 4y = 14$

ii. $5x - 2y = 6$

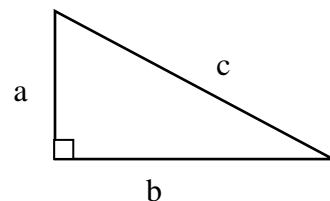
$4x + y = 10$

iv. $5y - 10x = 5$

$3y - 6x = -3$

0.02 [Pythagorean Theorem] The Pythagorean Theorem can be used for any right triangle. The two sides comprise the legs “a” and “b”, and the longest leg or the side opposite the right angle is called the hypotenuse “c”. Use the triangle to the right as a template to answer questions for problems in A and B.

Figure Not Necessarily Drawn to Scale



A. Solving for the hypotenuse (You may leave answers in radical form):

i. $a = 3$ $b = 4$

ii. $a = 12$ $b = 5$

iii. $a = 8$ $b = 12$

iv. $a = 6$ $b = 10$

B. Solving for a leg (You may leave answers in radical form):

i. $b = 12$ $c = 13$

ii. $a = 12$ $c = 15$

iii. $a = 13$ $c = 17$

iv. $b = 37$ $c = 43$

C. Application Problems – Please include a diagram/graph along with each solution:

- Could 3, 6, and 8 represent the lengths of the sides of a right triangle? Explain using complete sentences and using mathematical steps.
- Could 10, 24, and 26 represent the lengths of the sides of a right triangle? Explain using complete sentences and using mathematical steps.
- One end of an eleven foot ladder is four feet from the base of a wall. How high on the wall does the top of the ladder touch?
- In baseball, players run around bases that form a diamond (a perfect square that is tilted). The distance from home to first (any side of the square) is 90 feet. How far must the catcher throw the ball in order to reach second base? (This of course assumes you know something about baseball)
- Find the distance between the point $A(1,3)$ and the point $B(7,8)$.

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0.02 [Pythagorean Theorem] - *Continued*

C. Application Problems – Please include a diagram/graph along with each solution:

vi. Find the distance between the point $C(-2,3)$ and the point $D(1,-2)$.

vii. One could connect the points $X(-3,-2)$, $Y(9,-2)$, and $Z(-3,3)$ to form a polygon. Find both the perimeter and area of this object.

Chapter 6 : More Right Triangles

6.01 [Special Right Triangles]

Coming to a theatre to you next year ... sorry!

6.01 [Pythagorean Triples]

Coming to a theatre to you next year ... sorry!

6.01 [Fractional Exponents]

Coming to a theatre to you next year ... sorry!

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Additional Resources

- A.01 [Textbook] Checkpoint problems can be found at the back of your textbook starting on page 707. Students master skills at different speeds. No two students learn exactly the same way at the same time. At some point you will be expected to perform certain skills accurately. Checkpoint problems reflect some of those skills. If you have not mastered these skills yet, it does not mean that you will not be successful in class. However, you may need to do some work outside of class to get caught up on them. The checkpoint problems for the first semester are:
- A. Checkpoint 1 : Solving Problems with Linear and Exponential Relationships
 - B. Checkpoint 2 : Calculating Areas and Perimeters of Complex Shapes
 - C. Checkpoint 3 : Angle Relationships in Geometric Figures
 - D. Checkpoint 4 : Solving Proportions and Similar Figures
 - E. Checkpoint 5 : Calculating Probabilities.
- A.02 [Internet] CPM website (cpm.org). You can find hints and solutions to homework problems as well as resource tools like virtual manipulatives. In the “Parent Guide with Extra Practice” for Core Connections Integrated II, there are extra resources available for download free of charge.
- A.03 [Dixon High School] The DHS Learning Center is open after school and has free tutoring not only in math but all subjects. The other resource is any mathematics teacher at Dixon High School. Though they are not required to, many teachers have time during lunch as well as before and after school.
- A.04 [Internet] The website (khanacademy.com). This is a free website with video tutorials in most subjects and topics. To search for topics use the topic description in the square brackets [...].
- A.05 [People] Find a “study buddy” (classmate or peer) or host a finals study session at your house. Look to family members or hire a tutor.
- A.06 [Finals Tool Kit] At some point you will be given a “Finals Tool Kit” a single piece of paper that can be written on (front and back). Be sure to fill in this sheet with formulas, example problems, diagrams, etc. to help maximize your performance on the final since you will be able to use this sheet during your final.
- A.07 [Teacher] For the Fall of 2018, this is just a work in progress. You may get additional study questions or materials at a later time ☺. I am always willing to help students during my time at school outside of the classroom.

You can always review your tool kits and any other study materials that you have done in class throughout the semester. Be sure to get a good night sleep before the final and eat a healthy breakfast in the morning before coming to school.
