# Reasoning and Proof Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# U1 Cumulative Review

**Lesson 1:**

Know how to: Identify the hypothesis and conclusion of a claim – Write conjectures in if-then form – Determine whether conclusions can be drawn from certain known facts and given information – Understand the difference between, and provide examples of deductive and inductive arguments

**Lesson 2:**

Know how to: Use counter examples to show that an algebraic expression is not true – Use deductive reasoning to show that an algebraic expression is true

**Lesson 3:**

Know how to: Identify the characteristics of a well-designed experiment – Given an experiment, determine whether all elements of a well-designed experiment are present and identify them – Determine whether an experiment is subject blind, evaluator blind, or double blind – Identify lurking variables in a study

**1.** The following statement is true:

If a student at Western Michigan University is   
on the volleyball team, then the student is at least 5’7”

**a.** Identify the hypothesis and conclusion of the statement

**b.** Write the converse of the statement. Is the converse of the statement necessarily true?

**c.** If Samantha is on the WMU volleyball team, what conclusion, if any, can be made?

**d.** If Jaclyn, a student at WMU, is 5’9”, what conclusion, if any, can be made?

**2.** Rewrite each of the following statements in if…then form

**a.** All seniors at Black River must complete a senior project to graduate

**b.** The product of two negative numbers is always a positive number

**3.** Use Inductive reasoning to explore the result of the following procedures. Then use deductive reasoning to prove that the pattern you observe will always work.

|  |
| --- |
| Pick a number.  Double it.  Add 3 to the result.  Multiply that result by 5.  Subtract 7 from that result. |

**4.** Prove or disprove each of the following statements

**a.** The sum of two odd numbers is an odd number

**b.** The product of two odd numbers is an odd number

**c.** The sum of three consecutive numbers is divisible by 3

# Inequalities and Linear Programming Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Unit 2 Cumulative Review

**Lesson 1:**

Know how to: Solve an inequality given the graph of a function – solve quadratic inequalities using sketches of the graph and algebraic reasoning – solve complex inequalities using sketches of the graph and algebraic reasoning. Represent solutions to inequalities symbolically – with a number line graph – and with interval notation.

**Lesson 2:**

Know how to: Graph and solve systems of linear inequalities – identify and write inequalities to model linear programming problems – identify and write objective functions of linear programming problems – use graphs to solve linear programming problems.

**1.** Use information from this graph of the function *f*(*x*) to answer the following questions.

|  |  |
| --- | --- |
| **a.** Find *f*(*x*) = 3  **b.** Describe the values of *x* for which *f*(*x*) ≥ 3 using words, symbols, a number line graph, and interval notation.  **c.** Find *f*(–2) | http://www.wtamu.edu/academic/anns/mps/math/mathlab/col_algebra/col_alg_tut31ex5i.gif |

**2.** For each inequality below:

* Make a sketch to show how the functions and constants in the inequality are related
* Use algebraic reasoning to locate the key intercepts and points of intersection
* Combine what you learn from your sketch and algebraic reasoning to solve the inequality
* Describe each solution set using symbols, a number line graph, and interval notation

**a.** 8 – *x*2 ≤ 6 **b.** *x*2 + 4*x* + 4 < –3*x* – 8



**c.** 7 + *x* > 2 + 3*x* – *x*2 **d.** 3 – *x*2 ≥ *x*2 + 5

**e.**  **f.** 

**3.** Describe each of the following solution sets using symbols, a number line graph, and interval notation. (One of the three is provided for you.)

**a.** *x* < –3 or *x* > 8 **b.** *x* ≥ –1 and *x* ≤ 5

**c.** [3, 6] **d.** (–∞, –2) ∪ [7, ∞)

**e.** **f.**

–2

5

4

8

**4.** Use algebraic reasoning to solve the following inequalities. Represent the solutions using symbols and a number line graph.

**a.** 4*x* – 3 > –7*x* + 8 **b.** 2*x* + 4 ≤ 8*x* + 12

**5.** Graph solutions to each of the following systems of linear equations. Remember to use solid lines for solutions that include the line and dashed lines for points on the boundary that are excluded from the solution. (you will want to use a separate piece of graph paper and/or your calculator.)

**a.** 3*x* – 2*y* ≤ –1 **b.** *x* + *y* ≥ 4  
*x* + 4*y* ≥ –12 2*x* – *y* > 2

**c.** *x* + 3*y* < 3 **d.** 3*x* – 4*y* > 18  
*x* – 2*y* ≥ 4 5*x* + 2*y* ≤ 15

**6.** The drama club is selling tickets to its play. An adult tickets costs $15 and a student ticket costs $11. The auditorium will seat 300 ticket holders. The drama club wants to collect at least $3,360 from ticket sales. Write and graph a system of inequalities that describes how many of each type of ticket the club must sell to meet its goal.

**7.** The Dutch Flower Bulb Company bags a variety of mixtures of bulbs. There are two customer favorites – the Moonbeam and Sunshine mixtures – each containing a mixture of daffodils and jonquils.

* The Moonbeam mixture contains 30 daffodils and 50 jonquils
* The Sunshine mixture contains 60 daffodils and 20 jonquils
* The company imports 300,000 daffodils and 260,000 jonquils for sale each year
* The profit for each bag of Moonbeam mixture is $2.30, while the profit for each bag of Sunshine mixture is $2.50

**a.** Write inequalities and an objective function to help decide how many bags of each mixture the company should make in order to maximize profit without exceeding available supplies.

**b.** Use graphs to solve this linear programming problem.

# Similarity and Congruence Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Geometric Reasoning and Proof

# Unit 3 Cumulative Review

**Lesson 1:**

Know how to: Identify special pairs of angles of intersecting lines – Identify special pairs of angles of parallel lines – Solve problems related to angles of intersecting lines and parallel lines

**Lesson 2:**

Know how to: Recognize similar triangles – Determine which similarity statement applies to similar triangles – Find the scale factor and side lengths of similar triangles – Use similar triangles to solve problems

**Lesson 3:**

Know how to: Recognize congruent triangles – Determine which congruency statement applies to congruent triangles – Use congruent triangles to prove properties of triangles and special quadrilaterals

**1.** In the diagram below *j* || *k*

|  |  |
| --- | --- |
| **a.** Which line is the transversal?  **b.** Name a pair of vertical angles and state their relationship to each other.  **c.** Name all pairs of alternate interior angles and state their relationship to each other. | http://www.regentsprep.org/regents/math/geometry/GP8/PracPa1.gif |

**d.** Name a pair of corresponding angles and state their relationship to each other.

**e.** Name a pair of alternate exterior angles and state their relationship to each other.

**f.** Name a pair of interior angles on the same side of the transversal and state their relationship to each other.

**g.** Name a pair of exterior angles on the same side of the transversal and state their relationship to each other.

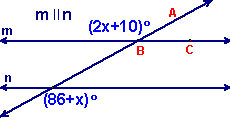
**2.** In the diagram below *m* || *n*.

|  |  |
| --- | --- |
| **a.** Find m∠1  **b.** Find m∠2  **c.** Find m∠3 | http://www.regentsprep.org/regents/math/geometry/GP8/PracPa2.gif |

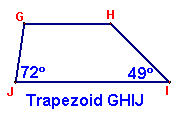
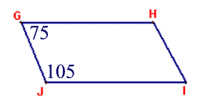
**3.** In each of the diagrams below *m* || *n*. Find the measure of *x*.

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| --- | --- | --- | --- | --- |
| **a.** | http://www.regentsprep.org/regents/math/geometry/GP8/PracPa4.gif |  | **b.** | http://www.regentsprep.org/regents/math/geometry/GP8/PracPa14.gif |

**4.** In the diagram *m* || *n*. Find the measure of *x* **and** the measure of ∠*ABC*.

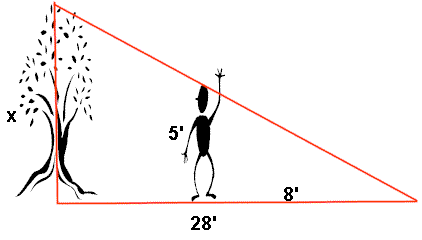


**5.** Quadrilateral GHIJ is a trapezoid. **6.** In quadrilateral GHIJ, m∠G = 75° and  
Find m∠G **and** m∠H. m∠J = 105°. Is GH || JI? Explain.

|  |  |  |  |  |
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| **7.** | In the diagram DE || AC, BD = 4, DA = 6, and EC = 8. Find BC.  http://www.regentsprep.org/regents/math/geometry/GP11/triorg.gif |  | **8.** | Two ladders are leaned against a wall such that they make the same angle with the ground. The 10' ladder reaches 8' up the wall. How much further up the wall does the 18' ladder reach?  http://www.regentsprep.org/regents/math/geometry/GP11/wall.gif |

**9.** At a certain time of the day, the shadow of a 5' boy is 8' long. The shadow of a tree at this same time is 28' long. How tall is the tree?



**11.** For each of the following pairs of triangles, determine whether they are similar. If so, state the similarity condition that proves they are similar. If not, explain why not.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **a.** | http://www.regentsprep.org/regents/math/geometry/GP11/SIMILAR5.gif |  | **b.** | http://www.regentsprep.org/regents/math/geometry/GP11/SIMILAR6.gif |
| **c.** | http://www.regentsprep.org/regents/math/geometry/GP11/SIMILAR7.gif |  | **d.** | Provide an example of two triangles that are not similar and explain why not. |

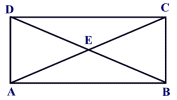
**12.** For each of the following pairs of triangles determine whether the given information can be used to prove the triangles congruent. If so, state the congruency theorem, if not, explain why not.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **a.** | E is the midpoint of BD, AE ≅ EC  http://www.regentsprep.org/regents/math/geometry/GP4/prepro11.gif |  | **b.** | ∠1 ≅ ∠2, ∠A ≅ ∠E, AC ≅ EC  http://www.regentsprep.org/regents/math/geometry/GP4/Practri1.gif |
|  |  |  |  |  |
| **c.** | MO ≅ QP, ∠M ≅ ∠Q  http://www.regentsprep.org/regents/math/geometry/GP4/Practri4.gif |  | **d.** | KT bisects ∠IKE and ∠ITE  http://www.regentsprep.org/regents/math/geometry/GP4/Practri7.gif |

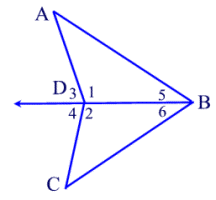
**13.** Prove that the diagonals of a parallelogram divide the parallelogram into two congruent triangles.

**14.** Given: ABCD is a rectangle;

Prove: ΔCEB is isosceles



**15.** Given: AD ≅ CD and ∠3 ≅ ∠4; Prove: DB bisects ∠ABC



**16.** State whether the following are true or false, and, if false, give a counterexample.

1. If a quadrilateral has one pair of opposite sides parallel and congruent, then the quadrilateral is a parallelogram.
2. If a quadrilateral has a diagonal that divides it into two congruent triangles, then the quadrilateral is a parallelogram.
3. If a quadrilateral has two distinct pairs of consecutive sides congruent, then the quadrilateral is a parallelogram.
4. If a quadrilateral has diagonals that bisect each other, then the quadrilateral is a parallelogram.
5. If a quadrilateral has four congruent angles, then the quadrilateral is a parallelogram.
6. If a quadrilateral has two pair of sides that are parallel, then the quadrilateral is a parallelogram.

**17.** If a quadrilateral has 2 pair of opposite sides congruent and parallel, what is the *most specific* conclusion you can make?

1. The quadrilateral is a square
2. The quadrilateral is a rectangle
3. The quadrilateral is a parallelogram
4. The quadrilateral is a rhombus

**18. Study your Quadrilaterals Precedents sheet.**

**Integrated Advanced Algebra/Geometry Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Unit 8 Lesson 1 Review**

1. On the grid below, draw a graph of a function that does not have an inverse. Then explain why your function does not have an inverse.

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1. Find an algebraic rule for the inverse of each function.
2. Suppose a message was first coded by assigning numbers to letters as shown below.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| A | B | C | D | E | F | G | H | I | J |
|  |  |  |  |  |  |  |  |  |  |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| K | L | M | N | O | P | Q | R | S | T |
|  |  |  |  |  |  |  |  |  |  |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |  |  |  |
| U | V | W | X | Y | Z |  |  |  |  |

Brad then encrypted a message using the function .

* 1. If the received message is given in encrypted form by 24, 8, 8, 38, 52, 14, 16, 24 what was the message that was sent?
  2. Explain in words how you could decode any message encrypted by the function .
  3. What function would decode any message encrypted by ?
  4. Sarah wants to use a more complicated function for encrypting messages. She suggests using . What problems might arise if Sarah used this function? Be as specific as possible.
  5. Suggest a different quadratic function that would be better for Sarah to use. Explain why your function does not have the same problems as Sarah’s function does.

1. The amount of time (in hours) it will take to prepare a mass mailing of a newsletter when there are *x* people working on the job is determined by the equation .
   1. Find and explain its meaning in this situation.
   2. . Explain what this tells you about the situation.
   3. Find a formula for .

Int. Adv. Alg/Geo

Lesson 8.2 Exam Review Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**No Calculator Section:**

1. Use your understanding of common logarithms to help complete the following tasks WITHOUT A CALCULATOR.

Find these common (base 10) logarithms *without* using technology.

a.  b.  c.  d. 

2. Given that  and , approximate each of the following expressions using properties of logarithms.

a.  b.  c.  d. 

3. Use what you know about properties of logarithms to answer the following True or False statements. If a statement is False, fix the part of the statement in bold to make the statement true.

\_\_\_\_ i.

\_\_\_\_ ii. 

\_\_\_\_ iii.

\_\_\_\_ iv.

Int. Adv. Alg/Geo

Lesson 8.2 Exam Review *calculator portion* Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Suppose that the decay of a radioactive substance is modeled by the function , where *x* is measured in years and *h*(*x*) is measured in grams.

a. How much of the substance is there initially?

b. How much substance is left after 20 years?

c. How many years will the substance take to decay to 25 grams?

e. What is the half-life of this radioactive substance?

5. Solve each of the following equations algebraically. Show your work.

a.  b. 

6. The younger you are when you start investing makes an exponentially large difference. The average interest on a high risk stock investment can yield as much as 12% annually. Assume you invest $1500 in the stock market this year in 2012

a. Write a function  will give the amount of money in the investment *t* years after opening the account. (This assumes the rate doesn’t change and no additional funds are added to the account).

b. How much money would be in the account after 10 years?

c. How many years would you need to keep the money in the investment to double your investment?

d. If you could retire on $2,500,000 , how many years will it before your $1500 is enough to retire?

7. Solve each of the following exponential equations algebraically.

a.  b. 

c.  d. 