

**Pre-Calculus 110 – Exam Review**

**Trigonometry** *(Reference: Chapter 2, Sections 2.1 & 2.2)*

*Outcomes:*

* *Demonstrate an understanding of angles in standard position,* 
* *Solve problems, using the three primary trigonometric ratios, for angles from* to *in*

*standard position.*

**Short Response:**

1. Sketch an angle of in standard position.

2. In which quadrant does the terminal arm of a 140o angle in standard position lie?

3. Which angle in standard position has a different reference angle than all the others?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| a. | 1250 | b. | 1550 | c. | 2050 | d. | 3350 |

4. Determine the exact value of

a. cos 150o b.  c. 

5. Illustrate/explain how you would determine (without the use of a calculator) that .  
  
**Extended Response:**

1. The point (–12, –15) is on the terminal arm of angle  in standard position.

* 1. Determine the exact values of the sine, cosine and tangent of .
  2. Determine the value of  if .

2. Consider  such that 

a. In which possible quadrant(s) is the terminal arm of this angle?

b. If the sine of  is negative, in which quadrant is the terminal arm of the angle?

c. Write exact values for the other two primary trigonometric ratios for  in this quadrant.

3. Solve for all values of  if  and:

a.  b.  c. 

**Quadratics** *(Reference: Chapters 3 & 4)*

*Outcomes:*

* *Factor polynomials such as:* , , , 
* *Analyze quadratic functions of the form*  *and determine the vertex, domain and range, direction of opening, axis of symmetry, x-and y-intercepts.*
* *Analyze quadratic functions of the form*  *to identify characteristics of the corresponding graph, including the vertex, domain and range, direction of opening, axis of symmetry, x-and y-intercepts, and to solve problems.*
* *Solve problems that involve quadratic equations.*

**Short Response:**

1. Write the equation of the axis of symmetry for f(x) = –6 (x – 3)2 – 7?
2. What are the domain and range of y = 7 (x – 6)2 + 9?
3. State the vertex and direction of opening of the quadratic function f(x) = –3(x + 2)2 – 9.
4. What is the standard form of the function y = 2(x – 4)2 – 2?
5. State whether y = 4x2 – 36x – 43 has a maximum or minimum value and identify the vertex coordinates.
6. Solve (x+4)(2x-9) = 0
7. Determine the number and nature of the roots of 

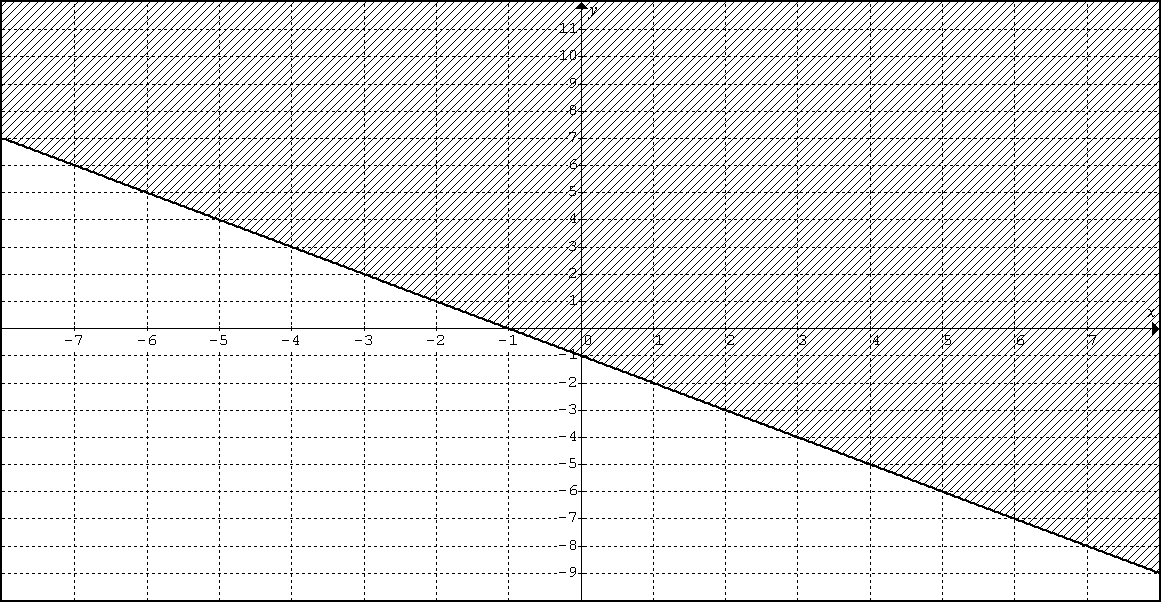
**Extended Response:**

1. Determine the vertex form of the quadratic function y = x2 + 24x + 29?
2. Determine the roots of the quadratic equation 0 = 0.2x2 – 1.4x + 2?
3. Determine the exact, simplified, solutions to .
4. A rectangle with an area of  is x cm wide and (x+8) cm long. Find, to the nearest tenth of a centimeter, the width and length.
5. Sketch the graph of the quadratic function . Identify the vertex, domain, range, axis of symmetry, x-and y-intercepts.
6. Factor 
7. Factor 
8. Use completing the square to convert  to vertex form.
9. On a forward somersault dive, Joanelle’s height, *h*, in metres, above the water is approximately modeled by the function where *t* is the time in seconds after she leaves the board.
   1. Find Joanelle’s maximum height above the water.
   2. How long does it take her to reach the maximum height.
   3. How long is it before she enters the water?
   4. How high is the board above the water?
10. Two whole numbers differ by 3. The sum of their squares is 89. What are the numbers?
11. A garden measures 12 m by 8 m. A walkway of uniform width is to surround the garden. How wide should the walkway be so that the walkway has the same area as the garden?
12. Determine the quadratic function in vertex form that has a maximum value located at (–3, –5) and passes through (–1, –21).

**Systems of Equations and Inequalities** *(Reference: Chapters 8 & 9)*

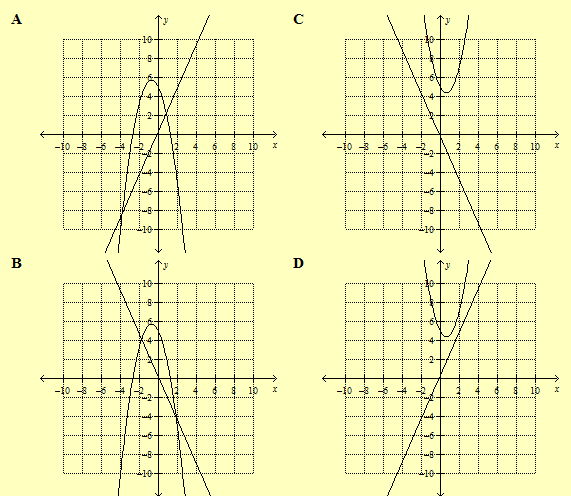
*Outcomes:*

* *Solve, algebraically and graphically, problems that involve systems of linear-quadratic and quadratic-quadratic equations in two variables.*
* *Solve problems that involve linear and quadratic inequalities in two variables.*
* *Solve problems that involve quadratic inequalities in one variable*

**

**Short Response:**

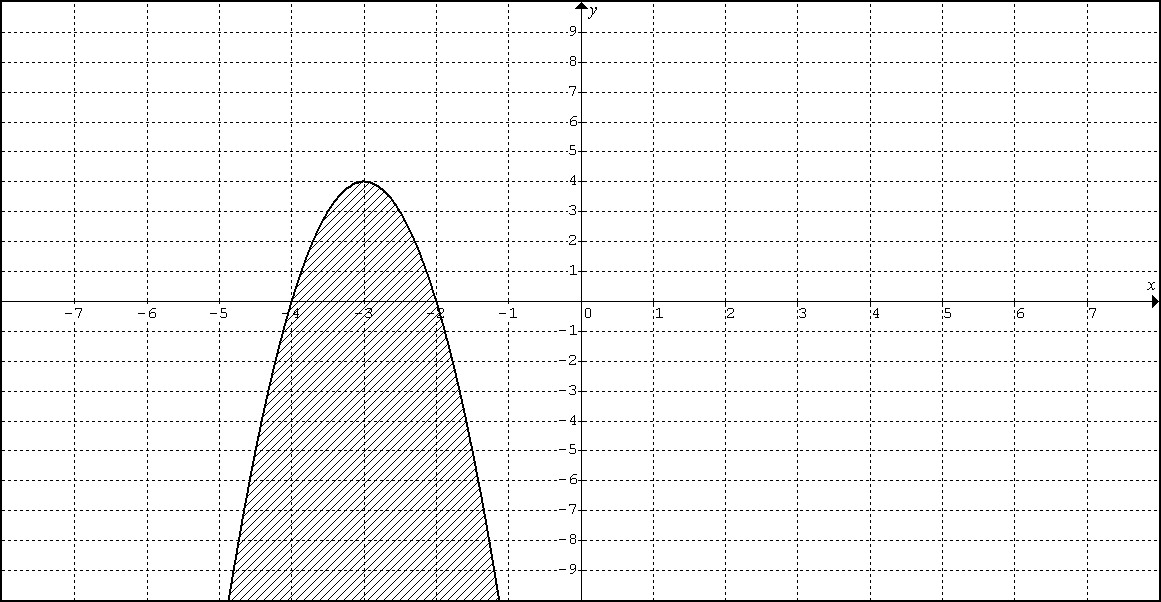
1. Write the inequality that represents the graph shown.

1. The line y = 9x – 4 intersects the quadratic function y = x2 + 7x – 3 at one point. What are the coordinates of this point of intersection?
2. Which graph represents the system of equations:

y = –1.5x2 – 2x + 5

y = 2.3x + 0.2

**Extended Response :**

1. Solve algebraically each system of equations.
   1. 
   2. 
2. Solve the inequality .
3. Write the inequality represented by the graph to the right. Express your final answer in standard form.
4. Graph the inequality .

**Radical Expressions and Equations** *(Reference: Chapter 5)*

*Outcomes:*

* *Solve problems that involve operations on radicals and radical expressions with numerical and variable radicands.*
* *Solve problems that involve radical equations.*

**Short Response:**

1. State the side length of a square with an area of in simplified radical form.
2. Write  in simplest form. Identify the values of the variable for which the radical represents a real number.
3. Simplify .
4. Simplify 
5. State the restrictions on x in  if the radical is a real number.

**Extended Response:**

1. Simplify each of the following. Rationalize any denominators if necessary.
   1.  e. 
   2.  f. 
   3.  g. 
   4. 
2. Solve each radical equation. Remember to check for extraneous roots.
3.  b. 

**Rational Expressions and Equations** *(Reference: Chapter 6)*

*Outcomes:*

* *Determine equivalent forms of rational expressions (limited to numerators and denominators that are monomials, binomials or trinomials).*
* *Perform operations on rational expressions (limited to numerators and denominators that are monomials, binomials or trinomials).*
* *Solve problems that involve rational equations (limited to numerators and denominators that are monomials, binomials or trinomials).*

**Short Response:**

1. State the non-permissible value(s) for the rational expression .
2. What is the simplified version of the rational expression ?
3. Simplify 

**Extended Response:**  
1. Simplify in lowest terms and identify the non-permissible values.   
  
2. Simplify in lowest terms and identify the non-permissible values for each of the following.

1. 
2. 
3. 
4. 
5. Solve 
6. A ski resort can manufacture enough machine-made snow in 12 h to open its steepest run, whereas it would take naturally falling snow 36 h to provide enough snow. If the resort makes snow at the same time that it is snowing naturally, how long will it take until the run can open?

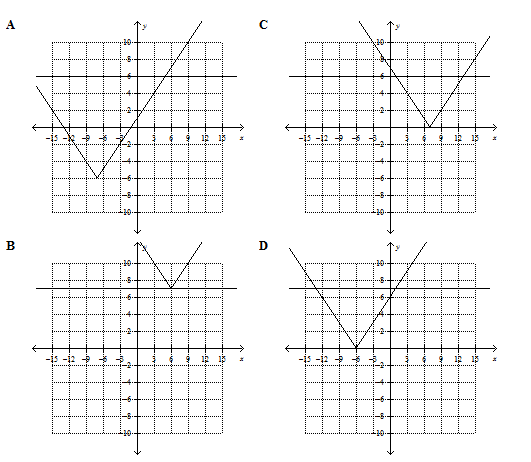
1. A marketing executive travelled 810 miles on a corporate jet in the same amount of time it took to travel an additional 162 miles by helicopter. The rate of the jet was 360 mph greater than the rate of the helicopter. Find the speed of the jet.

**Absolute Value Functions** *(Reference: Chapter 7, Sections 7.1 - 7.3)*

*Outcomes:*

* *Demonstrate an understanding of the absolute value of real numbers.*
* *Graph and analyze absolute value functions (limited to linear and quadratic functions) to solve problems.*

**Short Response:**

1. Evaluate .
2. Determine the solution .
3. Which graph represents the solution to ?

**Extended Response:**

1. Given the function  
   
   1. Sketch the graph of f(x).
   2. State the domain and range of the function.
   3. Express f(x) as a piecewise function.
2. Given the function f(x) = |x2 + 4x+ 2|
   1. Sketch the graph of the function.
   2. State the domain and range of the function.
   3. Express f(x) as a piecewise function.
3. Solve the absolute value equations. Remember to check for extraneous solutions.

a. |4x + 8| = –8x + 3 b.