

1. Arithmetic with Literal Equations

March 2001

1. Solve $A = \frac{1}{2}h(b_1 + b_2)$ for b_1 . Express in simplest form.

Ans. _____

2. Solve $c^2m - m^2b = m^2c + b^2m$ for m . Express in simplest form.

Ans. _____

3. A merchant bought a love seat at a 20% discount sale. He tried to sell it for 40% above the cost he paid for it. He had to settle for putting a sale ticket of 30% off on the seat and sold it for \$627.20. At what price was the seat tagged before it went on sale for the merchant to buy it?

Ans. _____

1. Arithmetic with Literal Equations

March 2002

1. If $I = \frac{.05p + p}{R}$, solve for p . Express answer in simplest form with no decimals.

Ans. _____

2. Solve for D in the following equation. Express answer in simplest form. $\frac{1}{2} = \frac{\frac{A}{B} + \frac{C}{D}}{\frac{E}{F}}$

Ans. _____

3. If the legs of a right triangle are x and $3x + y$, and the hypotenuse is $4x - y$, find the ratio of x to y in simplest form.

Ans. _____

1. Arithmetic with Literal Equations

February 2003

1. Solve for a in terms of b : $\frac{1}{2}(a+b) = -7a + \frac{b}{4}$

Ans. _____

2. Find $a + b$ in base 10, if $ab_7 = ba_5$. a and b are place values in the respective bases and $a \neq 0, b \neq 0$.

Ans. _____

3. Solve for a in terms of b : $4a^2 - b^2 + 24a + 36 = 0$

Ans. _____

1. Arithmetic with Literal Equations

February 2004

1. Find the numerical value of a in simplest form, if $\frac{ap + 2p}{3m + am} = \frac{5p}{2m}$

Assume $p \neq 0$.

Ans. _____

2. There are 12 trays of eggs in a case, so $T = 12C$. There are $2\frac{1}{2}$ dozen eggs per tray, so $D = \frac{5}{2}T$. There are 3 eggs per omelet, so $O = 4D$. It takes 17 bites to eat an omelet, so $B = 17(O)$. How many bites does it take to eat 2 cases of eggs made into omelets (find B if $C = 2$)?

Ans. _____

3. Mrs. Gibbs, the seventh grade teacher, wants to give pencils to her talented and gifted math students, to start the year. If she expects 6, 7, 8, or 9 students, what is the least number of pencils she should buy to make sure that each gets the same amount?

Ans. _____

1. Arithmetic with Literal Equations

February 2005 (No Calculators)

1. Solve for t if, $A = P(1 + rt)$. Express in simplest form.

Ans. _____

2. Each of the following numbers is a base 8 number. Find the value of the expression in base 8. $27 \cdot 56 - 34$

Ans. _____

3. If $m = ap + amt$, and $n = pmt - ap$, find n in terms of a , p , and t . Express answer in simplest form with no parenthesis.

Ans. _____

1. Arithmetic with Literal Equations

February 2006 (No Calculators)

1. The area formula for a trapezoid is $A = 1/2 h(B + b)$. Solve for b . Express your answer as a single fraction in simplest form.

Ans. _____

2. If $(3a - 2b)(x + 2y) = 3ax - 2by + a$, solve for a in terms of the other variables. Express in simplest form.

Ans. _____

3. The sum of the digits of a 3-digit number is 26. The number is multiplied by 7, that number is then multiplied by 11, and finally this result is multiplied by 13. How many times will the digit 9 appear in the final product?

Ans. _____

1. Arithmetic with Literal Equations

February 2007 (No Calculators)

1. $a + b = d$ and $2d - a = 2b + 1$. Find the value of a .

Ans. _____

2. Find all value(s) of x such that $\frac{\left(x - \frac{1}{x}\right)^2 - \left(\frac{1}{x} + x\right)^2}{x} = -2$

Ans. _____

3. If Mr. Kia reduces his normal speed by 9 mph, it will take him one hour longer to travel 270 miles. Find Mr. Kia's normal speed.

Ans. _____

1. Arithmetic with Literal Equations

January 2008 (No Calculators)

1. If 14 fluid ounces of grape juice is equivalent to 414 milliliters, what fraction of a fluid ounce is equivalent to 23 milliliters?

Ans. _____

2. The total surface area of a right circular cylinder is given by the formula $A = 2\pi rh + 2\pi r^2$. Find r , if $h = 7$ and $A = 396\pi$.

Ans. _____

3. If $m^2 f - am = f^2 m$, find f in terms of a and m in simplest form.

Ans. _____

1. Arithmetic with Literal Equations

February 2009 (No Calculators)

1. If $m^2 + mt = r^2 - rt$, express t in terms of m and r in simplest form.

Ans. _____

2. If $a = b - 3mp$ and $t = mb + 2p$, solve for a in terms of b , p , and t . Express in simplest form.

Ans. _____

3. Find the sum of the numbers between 200 and 400 which when divided by 8 have a remainder of 7 and when divided by 6 have a remainder of 5.

Ans. _____

2. Logs and Log Equations

February 2000

1. Find the value of $\log_8 \sqrt[3]{16}$.

Ans. _____

2. Simplify completely for positive x and y : $\frac{\log(x^2y) - \log y}{2} + \log\left(\frac{1}{x}\right)$

Ans. _____

3. Find all value(s) of x such that $2\log_7(x+3) = \log_7(x^2-9) + \log_7(x-1)$

Ans. _____

2. Logs and Log Equations

February 2001

1. Find the value of P , if $P = \log_2 8 - \log_8 2 - \log_3 9 + \log_9 3$.

Ans. _____

2. Let $A = \log_7 10$. In terms of A , find $\log_{10} 49$.

Ans. _____

3. Solve for x , if $x^{\log x} = 100x$.

Ans. _____

2. Logs and Log Equations

February 2002

1. Express $\log_5 5\sqrt{5} + \log_5 10\sqrt{5} - \log_5 2$ in simplest form.

Ans. _____

2. If $3\log_6 2.1 - 2\log_6 .7 - 1/2\log_6 1.44 = \log_6 x$, find the decimal value of x .

Ans. _____

3. If $\log^{\log_{10} 9} = \log_5 (x^2 + 8x + 20)^3$, find all possible values of x .

Ans. _____

2. Logs and Log Equations

February 2003

1. Simplify $3\log_4 2 - 3\log_2 4$.

Ans. _____

2. Solve for x : $(\log x)^2 = \log(x^2)$.

Ans. _____

3. If $\log_a 2 = \log_b 4$. Solve for a in terms of b .

Ans. _____

2. Logs and Log Equations

February 2004

1. Let F = the future flow rate of the Bridal Veil Falls, R = the flow rate of the Falls in 2003, and t = the number of elapsed years since 2003. The log equation giving the future flow rate is $\log F = \log R + t \cdot \log(.9)$
In terms of R , find the flow rate in 2005 ($t = 2$).

Ans. _____

2. Find N if $\log_{13} N < 3$, $\log_3 N > 7$, and N is a multiple of 10.

Ans. _____

3. Let $A = \log_2 2$ and $B = \log_2 3$. Express the following in simplest terms using A and B , without using logs or exponents.

Ans. _____

$$\frac{\log\left(\left(\frac{3}{2}\right)^{\left(\log\frac{256}{243}\right)}\right)}{\log\frac{2}{3}}$$

2. Logs and Log Equations

February 2005 (No Calculators)

1. Express the following in simplest form:
 $8\log_{16} 2 - 6\log_{16} 4 + 4\log_{16} 8$

Ans. _____

2. Solve the following equation for x :
 $\log_3(9x + 6) - \log_3(12x - 4) = 1$

Ans. _____

3. Find all value(s) of x such that:
 $6(\log_2 x)^2 - \log_2 x^7 = 3$

Ans. _____

2. Logs and Log Equations

February 2006 (No Calculators)

1. Simplify: $\log_5 625 + \log_3 \left(\frac{1}{81} \right)$

Ans. _____

2. Solve for x : $\log_7(x+1) + \log_7(x-5) = 1$

Ans. _____

3. If $\log_b a = k$ and $c = a^2$, find $\log_b c$ in terms of k .

Ans. _____

2. Logs and Log Equations

February 2007 (No Calculators)

1. If $\log_a b = 1.5$, find $\log_b \sqrt{a}$.

Ans. _____

2. Given that $\log 5 = .6990$ and $\log 3 = .4771$, find the value of $\log 1.5$ to the same accuracy.

Ans. _____

3. Find all real value(s) for x if $\log_x(x+1) + \log_{x^2} 4 = 2$.

Ans. _____

2. Logs and Log Equations

January 2008 (No Calculators)

1. Find the value of $\log_2[\log_B(B^4)]^3$.

Ans. _____

2. If $ab^c = \frac{d}{e}$, $\log a = W$, $\log c = X$, $\log d = Y$, and $\log e = Z$, find $\log b$ in terms of W , X , Y , and Z .

Ans. _____

3. Find B , if $\log_B\left(\frac{5}{8}\right) = \frac{\frac{8}{5}\log_{16}B^{\frac{5}{2}} - 3}{\log_2 B}$. Express in simplest form.

Ans. _____

2. Logs and Log Equations

February 2009 (No Calculators)

1. Express $\log_8 \sqrt[3]{16} - \log_{16} \sqrt{8}$ in simplest form.

Ans. _____

2. If $\log_5 10 = 1.43$, find $\log_{10} 5$. Express answer to nearest 100th.

Ans. _____

3. Find all values of x such that: $2\log_4(3x + 5) - \log_4(3x + 11) = 1.5$

Ans. _____

3. Linear Coordinate Geometry

February 2000

1. Find the equation of a line such that it satisfies the following conditions:
 - 1) It is parallel to the line which passes through the points $(-2, 3)$ and $(15, -1)$
 - 2) It contains the point $(17, 19)$

Express answer in standard form or slope-intercept form.

Ans. _____

2. The medians of a triangle all meet at the same point called a centroid. Find the centroid of $\triangle ABC$, if $A = (2, 3)$, $B = (5, 10)$ and $C = (0, 1)$.

Ans. _____

3. The line $5x + 2y = 7$ is
 - 1) Reflected across the main diagonal $y = x$.
 - 2) Reflected across the y-axis
 - 3) Rotated 90° , clockwise, about the origin.

Ans. _____

3. Linear Coordinate Geometry

February 2001

1. Find the slope of the line passing through the point $(-1, 6)$ and the midpoint of the segment with endpoints $(-1, 0)$ and $(5, 10)$.

Ans. _____

2. Line A has x-intercept $+5$ and y-intercept $+6$.
Line B has x-intercept -9 and y-intercept -8 .

Find the y-coordinate of the intersection of A and B .

Ans. _____

3. The line segment directed from $A(-7, -3)$ to $B(5, 2)$ is extended through B 65 units to C . Find the coordinates of point C .

Ans. _____

3. Linear Coordinate Geometry

February 2002

1. Find k so that the lines $5x + 2y = 13$ and $3x - ky = -5$ are parallel.

Ans. _____

2. Parallelogram $ABCD$ has coordinates $A(3, 2)$, $B(-5, 6)$, $C(x, y)$ and $D(5, -5)$. Find the coordinate of C so that parallelogram $ABCD$ has a vertex in each of the four quadrants.

Ans. _____

3. Find the orthocenter (the point of concurrency of the altitudes) of the triangle whose vertices are $(4, 3)$, $(-2, -3)$ and $(12, 1)$.

Ans. _____

3. Linear Coordinate Geometry

February 2003

1. The point $(4, 3)$ is reflected about the x -axis to a point P . Then P is reflected about the y -axis to a point Q . What is the sum of the coordinates of Q ?

Ans. _____

2. $\triangle ABC$ exist such that $A(-3, -5)$, $B(13, -1)$ and $C(-9, 19)$. Find the point (x, y) where the perpendicular bisector of side AB intersects side BC .

Ans. _____

3. Compute the maximum value of $x + y$ for all positive integer pairs (x, y) that satisfy the equation $15x + 55y = 2000$.

Ans. _____

3. Linear Coordinate Geometry

February 2004

1. Find the equation of the line in slope-intercept form which crosses the y-axis at 10 and is perpendicular to the line $y = -\frac{2}{5}x + 3$.

Ans. _____

2. Triangle ABC has vertices $A(1,4)$, $B(5,2)$, and $C(-2,9)$. Find the equation of the line which contains the median to AC . Express your answer in $Ax + By = C$ form, where A , B , and C are relatively prime.

Ans. _____

3. Line A crosses the y-axis at $1/4$ and the x-axis at $1/3$. Line B is parallel to line A and has positive x and y-intercepts whose sum is 70. Find the distance between line A and line B .

Ans. _____

3. Linear Coordinate Geometry

February 2005 (No Calculators)

1. Find the y-intercept of the line passing through $(-3/2, -3)$ that has slope of -14 .

Ans. _____

2. What is the x-coordinate of the intersection between the line $2x + 3y = 12$ and the line through the origin that is perpendicular to the line $2x + 3y = 12$?

Ans. _____

3. Square $ABCD$ is drawn on a Cartesian coordinate system with vertex A at the origin and vertices B , C , and D above the x-axis. If the slope of segment AD equals m where $m > 0$ and $m \neq 1$, find the slope of the diagonal AC . Express your answer in terms of m .

Ans. _____

3. Linear Coordinate Geometry

February 2006 (No Calculators)

1. Find the slope of the line which passes through the point (5, 2) and is perpendicular to the line $3x - 5y = -7$.

Ans. _____

2. Three of the vertices of a parallelogram are (-5,15), (12, 7) and (-9, -4), find the fourth vertex, which is in the first quadrant.

Ans. _____

3. The triangle ABC has vertices at $A(-6, 2)$, $B(3, 7)$ and $C(8, -4)$. Find the equation of the line containing the median to side BC . Express your answer in the form $Ax + By = C$ where A , B , and C are integers, A is positive, and A , B , and C are relatively prime.

Ans. _____

3. Linear Coordinate Geometry

February 2007 (No Calculators)

1. Find the equation, in $y = mx + b$ form, for the line perpendicular to the line $3x - 2y = 8$ passing through (4,-1).

Ans. _____

2. If a parallelogram is to be formed using $A(-3,2)$, $B(-5,-3)$ and $C(2,-1)$ as three of its vertices, find all possible coordinates of the fourth vertex.

Ans. _____

3. If a kite with area 15 sq. units is plotted on the coordinate plane with three vertices located at (4,0), (4,3) and (1, 3), find the equation for the line containing the longer diagonal. State your answer in $ax + by = c$ form.

Ans. _____

3. Linear Coordinate Geometry

January 2008 (No Calculators)

1. The ordered pair $(2, 3)$ is reflected across the x -axis. The image is then reflected across the line $y = x$ to become (a, b) . Find the numerical values for a and b . Express the answer as an ordered pair.

Ans. _____

2. One leg of a right triangle is on the line $3x - 4y = 12$. The hypotenuse is on the y -axis. The vertex of the right angle is on the x -axis. Find the equation of the line on which the remaining leg of the right triangle lies. Express the answer in the form $Ax + By = C$, where A , B , and C are all relatively prime integers and A is positive.

Ans. _____

3. Find the equation(s) of the angle bisector(s) of the lines $3x + 4y = 15$ and $5x - 12y = 16$. Express answer(s) in the form $Ax + By = C$, where A , B , and C are relatively prime integers and $A \geq 0$.

Ans. _____

3. Linear Coordinate Geometry

February 2009 (No Calculators)

1. Find the value of the slope of the perpendicular bisector to the line segment with endpoints $(a, 2a)$, to $(b, 2b)$, for any values of a and b , provided $a \neq b$

Ans. _____

2. Line A passes through the origin and point P in the first quadrant. Line B passes through the origin and the reflection of P about the line $y = x$. If the slope of A is m , find the slope of B .

Ans. _____

3. On a mechanical graph, a straight metal rod representing the line $y = 2x - 18$ is nailed to its x -intercept so that it is free to turn about the nail. If the rod is then turned so that it has a slope of m on the graph, what is its y -intercept?

Ans. _____

4. Functions**February 2000**

1. Suppose $f(x) = 2x - 1$ and $g(x) = 6 - 4x$ for all x . Suppose further that there exist a function, $h(x)$ such that $f(g(h(x))) = 3x$ for all x . Find $h(2)$.

Ans. _____

2. $f(x)$ has a domain of the natural numbers 1 through 8 and obeys the following chart:

x	1	2	3	4	5	6	7	8
$f(x)$	8	1	2	3	4	5	6	7

$f^{-1}(x)$ is the inverse function of $f(x)$.

Find $f^{-1}\left(f\left(f\left(f^{-1}\left(f\left(f^{-1}(3)\right)\right)\right)\right)\right)$

Ans. _____

3. If $f(x) = \frac{4}{x^2 - x - 6}$ and $g(x) = \frac{1}{x + 1}$, find the domain of $g \circ f(x)$.

Ans. _____**4. Functions****February 2001**

1. If $f(x) = \frac{2x^3 - x^2 + x}{1 - 3x^3}$, find $f\left(\frac{1}{3}\right)$.

Ans. _____

2. Let $f(x) = \frac{1}{2x}$, $g(x) = 2x - 4$, and $h(x) = 4 - 2x$. Find $f^{-1}\left(g^{-1}\left(h^{-1}(-4)\right)\right)$.

Ans. _____

3. $P(x)$ is the only quadratic function satisfying the following ordered pairs: $(1, -7)$, $(2, -13)$, $(5, -91)$. Find $P(-1)$.

Ans. _____

4. Functions

February 2002

1. Determine the range of the function $p(x)$, if $p(x) = \sqrt{x^2 + 4}$.

Ans. _____

2. Determine the value of k so that $f \circ g(x) = g \circ f(x)$, when $f(x) = 3x - 5$ and $g(x) = 2x + k$.

Ans. _____

3. If $f(2x - 5) = 4x^2 - 24x + 38$, find $f(3x + 8)$

Ans. _____

4. Functions

February 2003

1. Find the value of $10f(1)[60f(3) - 40f(-4)] + f(2)$ if $f(x) = \begin{cases} x + 3, & \text{if } x < -2 \\ x + 1, & \text{if } -2 \leq x \leq 2 \\ x - 2, & \text{if } x > 2 \end{cases}$

Ans. _____

2. Given $s(x) = x - 1$ and $t(x) = x^2 + 2$, find all value(s) of a so that $s(t(a)) = t(s(a))$.

Ans. _____

3. Solve for a in terms of any other constants b, c and/or d , so that the function defined by $f(x) = \frac{ax + b}{cx + d}$ (where $ad - bc \neq 0$, $x \in \text{reals}$, and $x \neq -\frac{d}{c}$) is its own inverse.

Ans. _____

4. Functions

February 2004

1. The domain of a function has six distinct elements. What is the maximum number of distinct elements in the range?

Ans. _____

2. Find the inverse of the function f , if $f(x) = \frac{x+5}{x-10}$.

Ans. _____

3. If $f(x) = \frac{1}{x-5}$, $g(x) = \sqrt{5-x}$, and $h(x) = \sqrt{x^2-9}$, find the domain of $f(g(h))(x)$.

Ans. _____

4. Functions

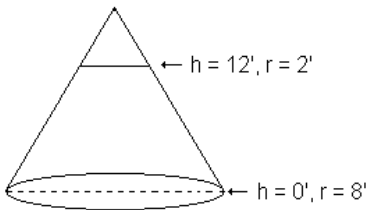
February 2005 (No Calculators)

1. If $f(1) = 2$ and $f(x+2) = x \cdot f(x-2)$, find $f(9)$.

Ans. _____

2. A church steeple has the shape of a right circular cone, as shown. At the base ($h = 0$), the radius is 8 feet. At $h = 12$ feet, the radius is 2 feet. Find the function of $r(h)$ that gives the radius in terms of the height.

Ans. _____



3. Let $f(x) = 2x - 1$ and $g(x) = \frac{1}{x}$. If $h^{-1}(x) = f(g(x))$, find the sum of all values of x for which $h(x)$ is an integer.

Ans. _____

4. Functions

February 2006 (No Calculators)

1. Find the range of the function f if $f(x) = x^2 + 9$.

Ans. _____

2. If $f(x) = \frac{x-3}{x+2}$ and $g(x) = \frac{x+2}{x-3}$, find the value(s) of x such that $g \circ f(x) = 0$.

Ans. _____

3. M , N , and P are functions defined by ordered pairs. M is the set of ordered pairs $\{(3,5), (5,4), (7,-3), (8,2)\}$. N is the set of ordered pairs $\{(7,3), (6,7), (9,5), (8,4)\}$. P is the set of ordered pairs $\{(5,9), (8,3), (4,-3), (6,5)\}$. Find the value of the expression:
 $P \circ M \circ P(6) + P \circ M \circ N(7) - M \circ N \circ N(6) + M \circ N \circ P(5)$.

Ans. _____

4. Functions

February 2007 (No Calculators)

1. Find the range of the function f , if $f(x) = x^2 - 4x$.

Ans. _____

2. Define a function f by $f(x) = \frac{1}{1-x}$, where $x \neq 0$ or $x \neq -1$. What is $f(f(f(a)))$ in simplest form?

Ans. _____

3. Let f_n be a positive integer, such that $f_n = f_{n-1}(f_{n-1} - 2) + 2$ where $f_0 = 3$. Find f_4 .

Ans. _____

4. Functions

January 2008 (No Calculators)

1. Find the domain of the function f , if $f(x) = \sqrt{9 - x^2}$.

Ans. _____

$$f(x) = 2x + A$$

2. Given the following: $g(x) = A - 2x$ Find A .

$$f(g(4)) = -7.$$

Ans. _____

3. Find the range of f , if $f(x) = x^4 + 2x^3 - 11x^2 - 12x + 36$.

Ans. _____

4. Functions

February 2009 (No Calculators)

1. If $f(x) = \begin{cases} 3x + 5 & \text{for } x < -3 \\ 2x - 3 & \text{for } -3 \leq x \leq 2 \\ 5x + 1 & \text{for } x > 2 \end{cases}$, find $\frac{f(8) + f(-4)}{f(-1) - f(f(-3))}$

Ans. _____

2. If $f(1 - x) = -2x - 1$, find $f(7)$.

Ans. _____

3. Let $f(x) = \sqrt{4 - \sqrt{2 - x}}$. How many integers are in the domain of $f(x)$?

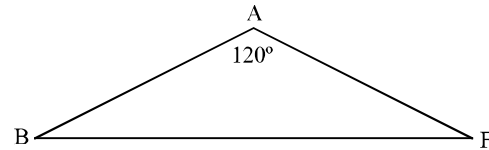
Ans. _____

5. Trig Mechanics

February 2000

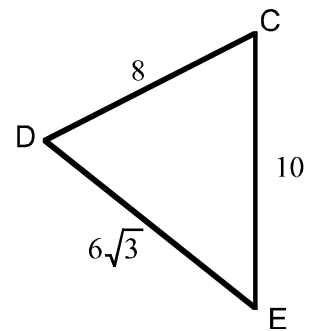
1. Find the exact length of segment BF , given $AB = AF = 6$.

Ans. _____



2. Find the degree measure of angle D to the nearest 10^{th} of a degree.

Ans. _____



3. A surveyor uses a transit, which is setting on a 5-foot tripod at the edge of a river, to estimate, to the nearest 10^{th} of a foot, the height a tree on the edge of the opposite shore. The angle of elevation to the top of the tree is $13^{\circ}40'$. He then makes an acute triangle ABC , where C is where the tripod sits, A is a spot on the water's edge 210 feet downstream, and B is the tree. If $m\angle ACB = 72^{\circ}50'$ and $m\angle CAB = 65^{\circ}30'$, find the surveyor's answer.

Ans. _____

5. Trig Mechanics

February 2001

1. Two buildings on level ground are 60 feet apart. The angle of elevation from the bottom of one to the top of the second is 34° . The angle of elevation from the bottom of the second to the top of the first is 68° . How much higher is the taller building than the shorter? Give answer to the nearest foot.

Ans. _____

2. A ship passed through the Strait of Gibraltar. At its closest point to a radar station there the ship was 2400 meters away. Later the ship was 2650 meters away from the radar station. If the ship stayed on course, by what bearing did the ship's angle from the radar station change? Give answer to the nearest minute.

Ans. _____

3. A helicopter is 6400m above the ocean. Directly ahead at an angle of depression of 8° is a ship. Directly out of the pilot's left-side window at an angle of depression of 16° is another ship. To the nearest meter, how far apart are the two ships?

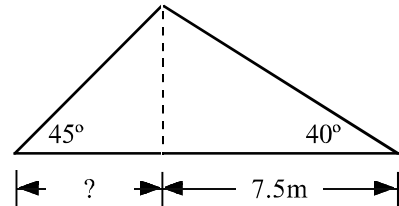
Ans. _____

5. *Trig Mechanics*

February 2002

1. The pitches of the front and back roofs of a salt box house are 45° and 40° , respectively. If the width of the back section is 7.5m(as shown), what is the width of the front section? Round answer to the nearest hundredth of a meter.

Ans. _____



2. A baseball diamond is a square with side length 90 feet. The center of the pitcher's rubber is 60 feet 6 inches from the furthest point of home plate, which is a vertex of the square of the baseball diamond. The center of the pitcher's rubber from which to pitch from lies on a line between the furthest point of home plate and the center of second base. How far is the center of the pitcher's mound from the center of first base (another vertex of the square)? Give your answer to the nearest tenth of a foot.

Ans. _____

3. The altitudes of a parallelogram have lengths of 8 and 10 and intersect at an angle whose sine is $\frac{1}{4}$. Compute the area of the parallelogram.

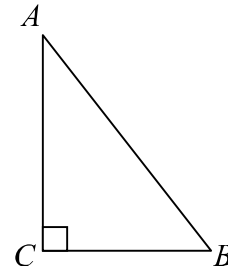
Ans. _____

5. Trig Mechanics

February 2003

1. In the figure $\tan A = \frac{1}{2}$ and the area of triangle $ABC = 9$ square units. Find the unit measure of segment AB .

Ans. _____

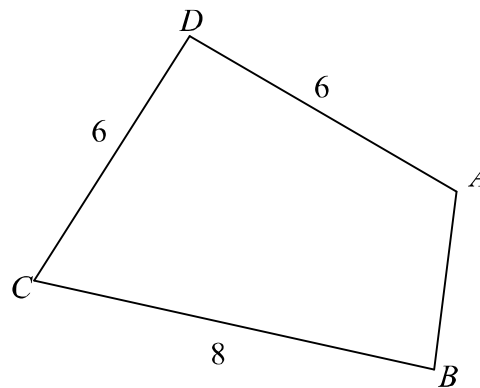


2. In one complete stroke, the tip of a bird's wing travels .78m. The wing is .3m long. Through what angle does the wing move in one complete stroke? Give answer to nearest minute.

Ans. _____

3. Given: $m\angle A = 100^\circ$ and $m\angle C = 60^\circ$, $DC = AD = 6$ units, $CB = 8$ units. Find the unit measure of AB to the nearest 100th of a unit.

Ans. _____



5. Trig Mechanics

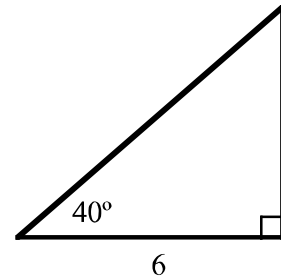
February 2004 (You may use a Calculator)

1. Convert 2.5 radians to degree measure, rounded to the nearest 1000th of a degree.

Ans. _____

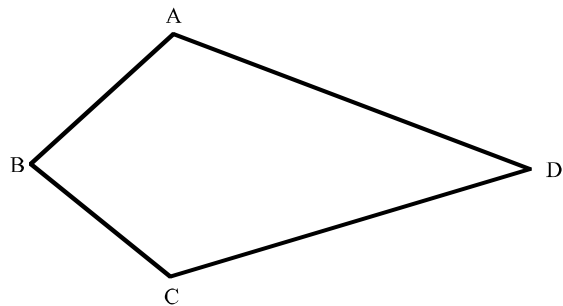
2. Find the perimeter of the triangle at right. Express your answer to the nearest thousandth of a unit.

Ans. _____



3. Find the area of the kite $ABCD$, given that $m\angle A = m\angle B = m\angle C = 80^\circ$ and $AB = 8$. The figure may be distorted. Give answer to nearest 10th.

Ans. _____



5. *Trig Mechanics*

February 2005 (You may use a Calculator)

1. In right triangle ABC , find $(\cot \theta)(\sec \theta)$ in terms of a , b , and/or c .

Ans. _____

2. For small values of θ , $\tan \theta$ approximately equals $\sin \theta$. Find the greatest positive integer value of θ in degrees, where $\theta < 45^\circ$, such that $\tan \theta - \sin \theta < 1/50$.

Ans. _____

3. While riding at 6000 feet altitude over flat ground in a hot air balloon, Elmer spots his own house at a 3° angle of depression 28° to the right of the balloon's heading. If Elmer's balloon continues at the same altitude and heading, what will be the greatest angle of depression to Elmer's house? Express your answer in degrees, rounded to the nearest tenth of a degree.

Ans. _____

5. Trig Mechanics

February 2006 (You may use a Calculator)

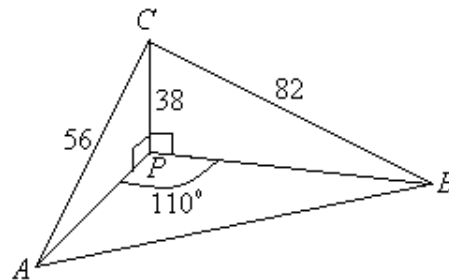
1. A tree cast a shadow 86 feet long when the angle of elevation to the sun is 27° . How tall is the tree? Give answer to the nearest tenth of a foot.

Ans. _____

2. From a window 55 feet above the ground level in the Sheraton Motel, the angle of depression to the base of the Hirsh Building is 37° . The angle of elevation from this window to the top of the Hirsh Building is 63° . To the nearest tenth of a foot, how tall is the Hirsh Building?

Ans. _____

3. In the 3-dimensional figure at right,
 $AC = 56, CP = 38, BC = 82, m\angle APB = 110^\circ$
 $\overline{PC} \perp \overline{AP}$ and $\overline{CP} \perp \overline{PB}$. To the nearest 100th
determine the length of segment AB .



Ans. _____

5. *Trig Mechanics*

February 2007 (You may use a Calculator)

1. A safety regulation states that the maximum angle of elevation for a rescue ladder is 72° . If a fire department's longest ladder is 110 feet long, what is the maximum safe rescue height for this ladder? Give answer to the nearest 10^{th} of a foot.

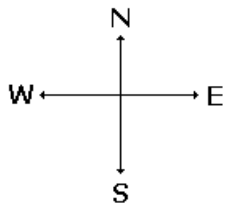
Ans. _____

2. To measure the distance between A and B on different sides of a lake, a surveyor measures from point A to point C, and then measures from point B to point C. If these distances are 80 yds and 110 yds respectively, and if the angle formed by the segments CA and CB is 98° , how far is it from A to B. Round your answer to the nearest 10^{th} of a yard.

Ans. _____

3. At what bearing and speed should a pilot head, if he wants to fly due south at 520 mph, when the wind is blowing from the east at 40 mph. Round your answers to the nearest tenth. Due north is 0° .

Ans. _____



5. *Trig Mechanics*

January 2008 (You may use a Calculator)

1. $\triangle ABC$ is a right triangle, $m\angle A = 90^\circ$, $BC = 7$, $m\angle B = 40^\circ$. Find the length of segment AB .

Ans. _____

2. The rotation of $\frac{4\pi}{5}$ radians of the point $(2, 0)$ counterclockwise about the origin results in the new ordered pair (a, b) . Find the ordered pair (a, b) and give the answer in ordered pair form.

Ans. _____

3. In $\triangle ABC$, $AB = 7.362$, $m\angle B = 63^\circ 38'$ and $BC = 4.781$. Find the measure of angle A to the nearest second.

Ans. _____

5. Trig Mechanics

February 2009 (You may use a Calculator)

1. Consider the six trig functions \sin , \cos , \tan , \cot , \sec , and \csc on the domain $0^\circ \leq \theta \leq 180^\circ$. How many of the six functions can have a value of 0.8 as a result of this domain?

Ans. _____

2. θ is an angle in a right triangle. If $\tan \theta = 2\cot \theta$, find $\sin \theta$. Give the exact answer.

Ans. _____

3. A surveyor, at the water's edge, sighted the top of a tree directly across a river at an angle of elevation of $6^\circ 25'$. He then walked 260 ft. downstream and sighted the top of the tree at $5^\circ 26'$. If the instrument used for the sighting is 5 ft. from the ground, how tall is the tree. Give answer to the nearest 10^{th} of a foot.

Ans. _____