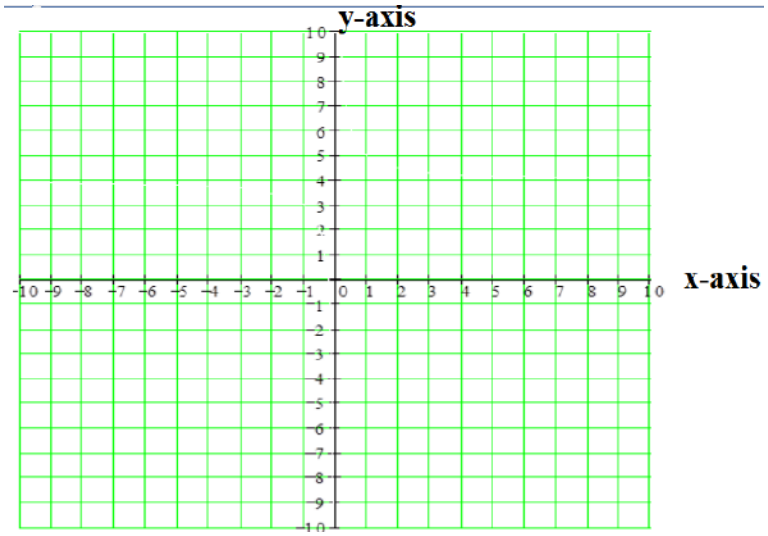
Pre-Calculus Final Exam Review… Key online …. (Optional, but highly recommended) Name: _____

Extra Credit: This review is a lot so I decided to reward you! Complete, check, and turn in the study guide before the SLO for "6" 100's for extra quiz grades (big reward since you would have to do it this weekend) …. **Or** relax and do it before the final exam for "3" 100's for extra quiz grades).
Note: Any Part Incomplete or Missing needed Work = NO EXTRA CREDIT

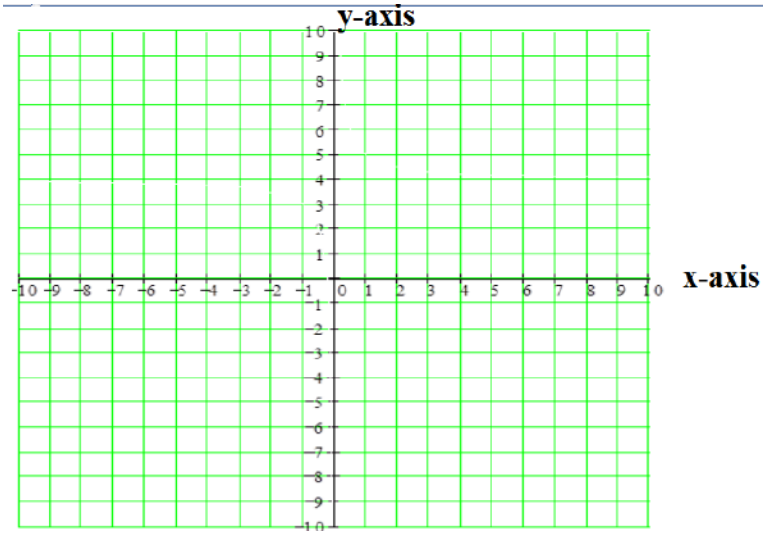
Part I: Review of Graphing from Algebra

#1. $y = \frac{-3}{x-4} + 2$



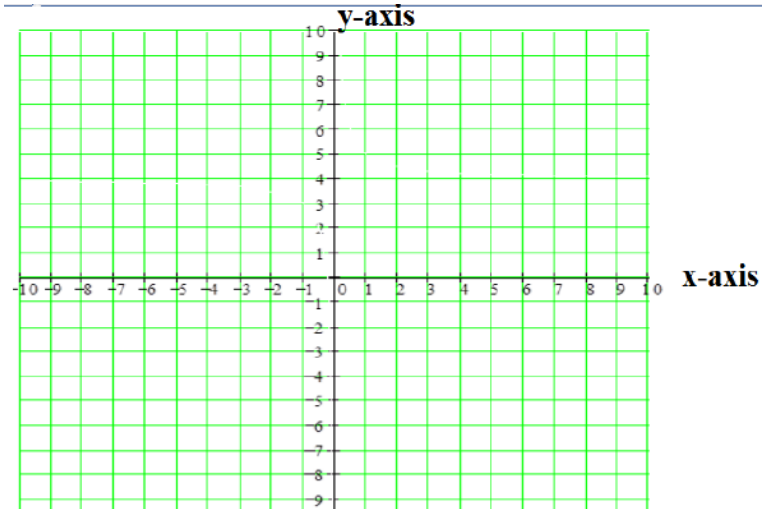
a) Implied Domain _____
b) Range _____
c) Function of x? _____
d) Function of y? _____
e) Interval(s) of increase? _____
f) Interval(s) of decrease? _____
g) Constant interval(s)? _____
h) x-intercept(s)?_____
i) y-intercept(s)?_____
j) Zeros? _____
k) Is there a Horizontal asymptote? _____
If so, the equation is _____
l) Is there a Vertical asymptote? _____
If so, the equation is _____

#2. $y = 2\sqrt{x+1} - 4$



m) Implied Domain _____
n) Range _____
o) Function of x? _____
p) Function of y? _____
q) Interval(s) of increase? _____
r) Interval(s) of decrease? _____
s) Constant interval(s)? _____
t) x-intercept(s)?_____
u) y-intercept(s)?_____
v) Zeros? _____
w) Is there a Horizontal asymptote? _____
If so, the equation is _____
x) Is there a Vertical asymptote? _____
If so, the equation is _____

#3. $y = -2 \log_3(x-4) + 2$



y) Implied Domain _____

z) Range _____

aa) Function of x? _____

bb) Function of y? _____

cc) Interval(s) of increase? _____

dd) Interval(s) of decrease? _____

ee) Constant interval(s)? _____

ff) x-intercept(s)?_____

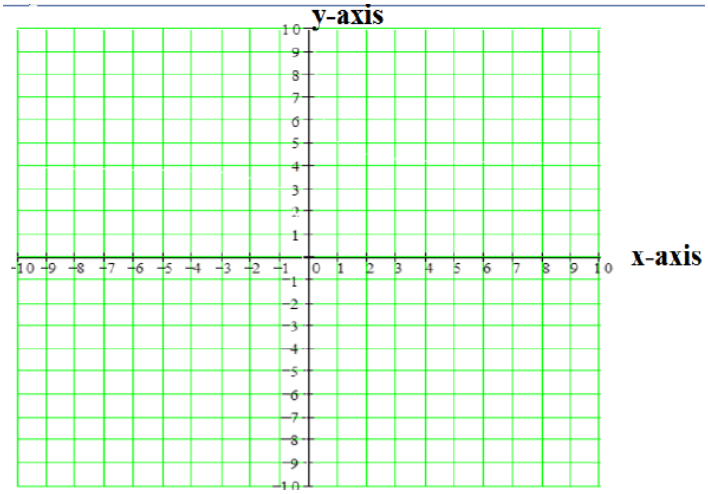
gg) y-intercept(s)?_____

hh) Zeros? _____

ii) Is there a Horizontal asymptote? _____
If so, the equation is _____

jj) Is there a Vertical asymptote? _____
If so, the equation is _____

#4. $y = \frac{1}{8}(x-4)^2 - 2$



kk) Implied Domain _____

ll) Range _____

mm) Function of x? _____

nn) Function of y? _____

oo) Interval(s) of increase? _____

pp) Interval(s) of decrease? _____

qq) Constant interval(s)? _____

rr) x-intercept(s)?_____

ss) y-intercept(s)?_____

tt) Zeros? _____

uu) Is there a Horizontal asymptote? _____
If so, the equation is _____

vv) Is there a Vertical asymptote? _____
If so, the equation is _____

ww) Focal point? (___ , ___)

xx) Equation of directrix? _____

#5. $y = -3\left(\frac{1}{3}\right)^{x-2} + 9$

ww) Implied Domain _____

xx) Range _____

yy) Function of x? _____

zz) Function of y? _____

aaa) Interval(s) of increase? _____

bbb) Interval(s) of decrease? _____

ccc) Constant interval(s)? _____

ddd) x-intercept(s)?_____

eee) y-intercept(s)?_____

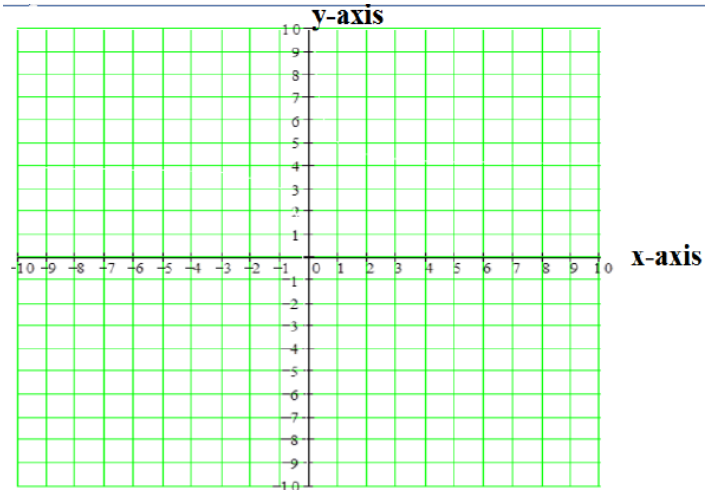
fff) Zeros? _____

ggg) Is there a Horizontal asymptote? ____

If so, the equation is _____

hhh) Is there a Vertical asymptote? _____

If so, the equation is _____



#6. $x = 2|y - 3| + 1$

(Hint: if needed, graph the inverse 1st)

iii) Implied Domain _____

jjj) Range _____

kkk) Function of x? _____

lll) Function of y? _____

mmm) Interval(s) of increase? _____

nnn) Interval(s) of decrease? _____

ooo) Constant interval(s)? _____

ppp) x-intercept(s)?_____

qqq) y-intercept(s)?_____

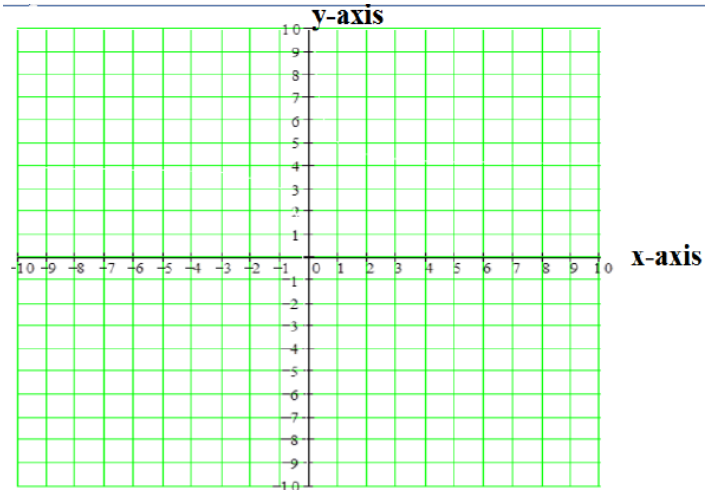
rrr) Zeros? _____

sss) Is there a Horizontal asymptote? _____

If so, the equation is _____

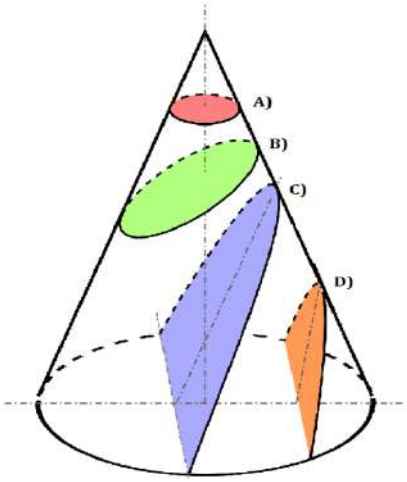
ttt) Is there a Vertical asymptote? _____

If so, the equation is _____



Conic Sections

#7. Slice "a" is a/an _____, slice "b" is a/an _____, slice "c" is a/an _____, and slice "d" is a/an _____.



#8. The solution set for the equation $\frac{(x-3)^2}{9}+\frac{(y+5)^2}{9}=1$ can best be described as

a) circle with radius 81
b) circle with radius 9
c) circle with radius 3
d) circle with radius 1
e) ellipse with center (3,-5)

#9. $\frac{(x+4)^2}{100}+\frac{(y-2)^2}{36}=1$ Where are the foci of this ellipse?

a) (-4,2) b) (-14,2) & (6,2) c) (-4, 8) and (-4, -4) d) (-12,2) & (4,2) e) not given

#10. $(y-3)^2 = 8(x+1)$ Which is NOT true?

a) graph is a parabola
b) vertex (-1,3)
c) focal point (1,3)
d) latus rectum width 2
e) domain $[-1,\infty)$

#11. $\frac{(y+4)^2}{16} - \frac{(x+1)^2}{9} = 1$ Which is NOT true?

a) graph is a hyperbola
b) center (-4,-1)
c) Asymptotes y = $\pm \frac{4}{3}$ (x+1) – 4
d) Vertices (-1,0) and (-1,-8)
e) Foci (-1,1) and (-1,-9)

#12. In y = $\frac{1}{16}$ (x + 7)^2 – 8, how far is the vertex from the directrix?

a) 16 b) 8 c) 4 d) 2 e) not given

#13. $\frac{(x+2)^2}{4} + \frac{(y-3)^2}{9} = 1$ Find the x-intercept(s).

a) (-2,0) b) (2,0) c) (2,0) or (-2,0) d) (3, 0) e) (-3, 0)

#14. $\frac{(x+3)^2}{16} - \frac{(y-2)^2}{9} = 1$ Find the domain.

a) (- ∞ , ∞) b) (- ∞ , -4] U [4, ∞) c) (- ∞ , -7] U [1, ∞) d) (- ∞ , -3] U [3, ∞) e) not given

#15. $2x^2 + 8x - y + 10 = 0$ Find the focal point of this parabola.

a) (-2,2) b) (-2, 2.125) c) (-2, 1.875) d) (-1.875, 2) e) not given

#16. An ellipse has center at (-5, 10) with horizontal minor axis of length 10 and vertical major axis of length 26.

a) Write an equation for this ellipse. _____

b) If you graph it, the vertices are at (___ , ___) and (___ , ___) but the co- vertices are at (___ ,___) and (___ ,___)

c) The domain is _____

d) The range is _____

#17. The sum of my focal radii is 8. I am in the following list. Find me.

a) $\frac{(x+2)^2}{16} - \frac{(y-3)^2}{25} = 1$ b) $\frac{(x+2)^2}{25} + \frac{(y-3)^2}{16} = 1$ c) $\frac{(x+2)^2}{16} + \frac{(y-3)^2}{9} = 1$ d) $\frac{(x+2)^2}{64} + \frac{(y-3)^2}{49} = 1$

#18. $(x+8)^2 = 20\,(y+3)$ Which is NOT true?

a) Parabola with vertex (-8,-3)

b) Latus rectum of length 20

c) Focal Point (-8, 2)

d) Directrix y = - 8

e) x-intercept (0.2, 0)

#19. A hyperbola has center at (-5, 2), turns up, and has asymptotes $y = \pm \frac{3}{4}(x - 5) + 2$.

a) Write an equation for this hyperbola. _____

b) Domain? _____ c) Range? _____

#20. A satellite dish is an example of an application of which conic section?
a) parabola b) circle c) ellipse d) hyperbola e) line

#21. The center of the conic section given by $4x^2 + 9y^2 + 16x + 18y - 11 = 0$ is at

a) (2,1) b) (-2,1) c) (2,-1) d) (-2,-1) e) not given

#22. Mathpert was thinking about the area of a circle ($A = \pi r^2$) and comparing it to an ellipse. Which of the following formulas would seem to make the most sense (knowing how a circle and ellipse are related)?

a) $A = \pi a b$ b) $A = \pi a^2$ c) $A = \pi b^2$ d) $A = 2\pi a$ e) $A = 2\pi b$

#23. Which conic equation does NOT have any real solutions? (Think about the graphs)

a) $\frac{(x+2)^2}{25}+\frac{(y-3)^2}{16}=0$

b) $\frac{(x+2)^2}{25}-\frac{(y-3)^2}{16}=-1$

c) $\frac{(x+2)^2}{25}+\frac{(y-3)^2}{16}=-1$

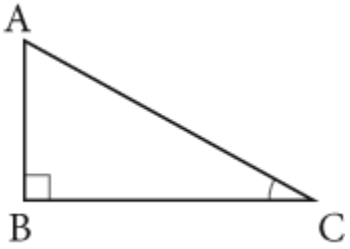
d) $\frac{(x+2)^2}{25}-\frac{(y-3)^2}{16}=0$

e) $\frac{(x+2)^2}{7}+\frac{(y-3)^2}{23}=1$

Right Triangle Trig

#24. Evaluate cos 11°, to four decimal places._____

#25. In $\triangle ABC$, $AC = 8$ cm and $BC = 11$ cm. Determine the tangent ratio of $\angle A$, to the nearest thousandth.

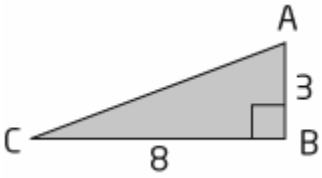


Answer:_____

#26. A school soccer field measures 45 m by 65 m. To get home more quickly, Urooj decides to walk along the diagonal of the field. What is the angle of Urooj's path, with respect to the 45-m side, to the nearest degree?

a. 55°
b. 34°
c. 2°
d. 1°

#27. . Determine the measure of $\angle C$, to the nearest degree.



a. 19°
b. 20°
c. 21°
d. 22°

#28. Determine the correct formula for the sine ratio of $\angle A$.

a. $\sin A = \dfrac{\text{Length of side opposite } \angle A}{\text{Length of side adjacent to } \angle A}$

b. $\sin A = \dfrac{\text{Length of hypotenuse}}{\text{Length of side adjacent to } \angle A}$

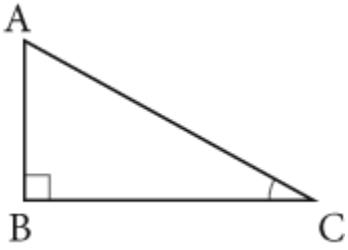
c. $\sin A = \dfrac{\text{Length of side opposite } \angle A}{\text{Length of hypotenuse}}$

d. $\sin A = \dfrac{\text{Length of side adjacent to } \angle A}{\text{Length of hypotenuse}}$

#29. An Airbus A320 aircraft is cruising at an altitude of 10 000 m. The aircraft is flying in a straight line away from Monica, who is standing on the ground. Monica observes that the angle of elevation of the aircraft changes from 70° to 33° in one minute. What is the cruising speed of the aircraft, to the nearest Kilometer per hour?

a. 463 km/h
b. 485 km/h
c. 665 km/h
d. 705 km/h

#30. In the triangle, BC = 12 cm and $\tan \angle B = 0.58\overline{3}$. What is the length of the hypotenuse, to the nearest tenth of a centimeter?



a. 14.2 cm
b. 13.9 cm
c. 7.0 cm
d. 5.1 cm

#31. In $\triangle TUV$, $UV = 8$ m, $\angle U = 90°$, and $\angle T = 38°$. Determine the measure of $\angle V$.

a. 42°
b. 52°
c. 90°
d. 128°

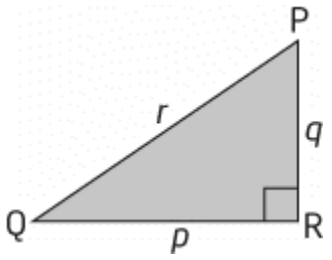
#32. Which statement is incorrect?

- **a.** You can solve for the unknown side in any triangle, if you know the lengths of the other two sides, by using the Pythagorean theorem.
- **b.** The hypotenuse is the longest side in a right triangle.
- **c.** The hypotenuse is always opposite the 90° angle in a right triangle.
- **d.** The Pythagorean theorem applies to all right triangles.

#33. In $\triangle ABC$, $AB = 10$ cm, $\angle B = 90°$, and $\angle C = 60°$. Determine the length of BC, to the nearest centimeter.

- **a.** 5 cm
- **b.** 6 cm
- **c.** 7 cm
- **d.** 8cm

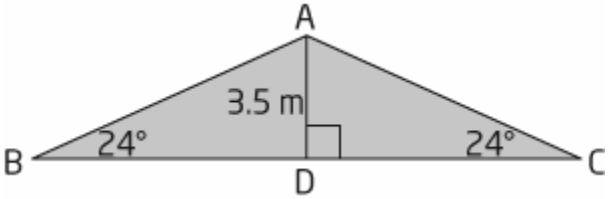
#34.



Which statement is false?

a) sin (P) = cos (Q) **b) [sin (Q)]^2 + [cos (Q)]^2 = 1** **c) r^2 = p^2 + q^2** **d) sec (Q) = r / q**

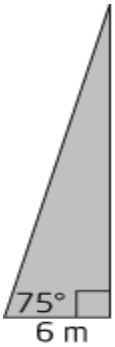
#35. A roof is shaped like an isosceles triangle. The slope of the roof makes an angle of 24° with the horizontal, and has an altitude of 3.5 m. Determine the width of the roof, to the nearest tenth of a meter.



The roof is approximately _____ meters wide.

#36. A flight of stairs has a ratio of vertical distance:horizontal distance equal to 3:5. What angle does the flight of stairs make with the ground, to the nearest degree?

#37. A telephone pole is secured with a guy-wire as shown in the diagram. The guy-wire makes an angle of 75° with the ground and is secured 6 m from the bottom of the pole. Determine the height of the telephone pole, to the nearest tenth of a meter.

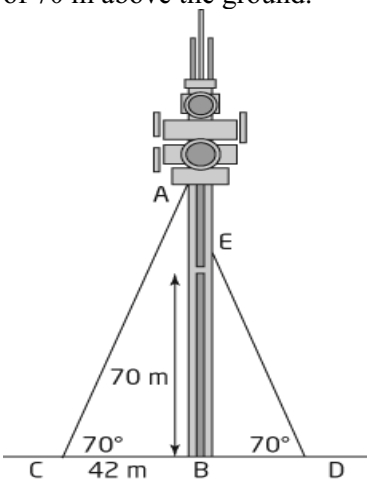


: The height of the pole is approximately _____ meters.

38. Laura is flying a kite at a local park. She lets out 60 m of her kite string, which makes an angle of 68° with the ground. Determine the height of the kite above the ground, to the nearest tenth of a meter.

The kite is approximately _____ meters above the ground.

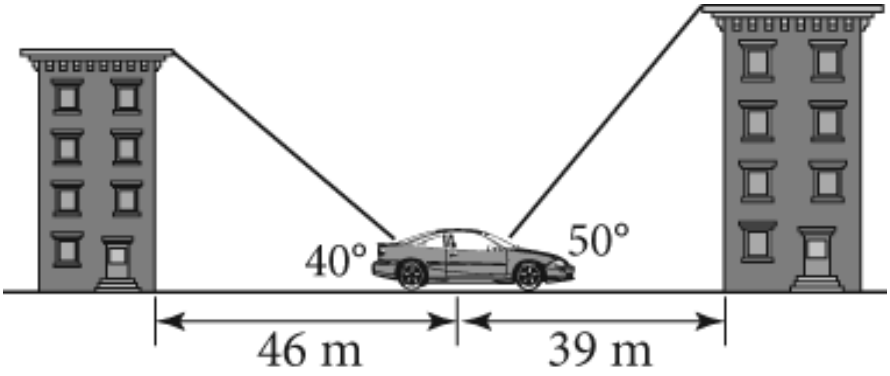
#39. A cell phone tower is supported by two guy-wires, attached on opposite sides of the tower. One guy-wire is attached to the top of the base of the tower at point A and the other is attached to the base at point E, at a height of 70 m above the ground.



Determine the length of the longer guy-wire, to the nearest meter.

The guy-wire attached to the top of the tower is approximately _____ meters long.

#40. Matthew parks his car between Karen's and Patrick's apartment buildings. The car is 46 m in front of Karen's apartment building. The angle of elevation from the car to the top of the building is 40°. Matthew's car is 39 m behind Patrick's apartment building. The angle of elevation from the car to the top of the building is 50°. State which building is taller, and by how much (nearest meter).

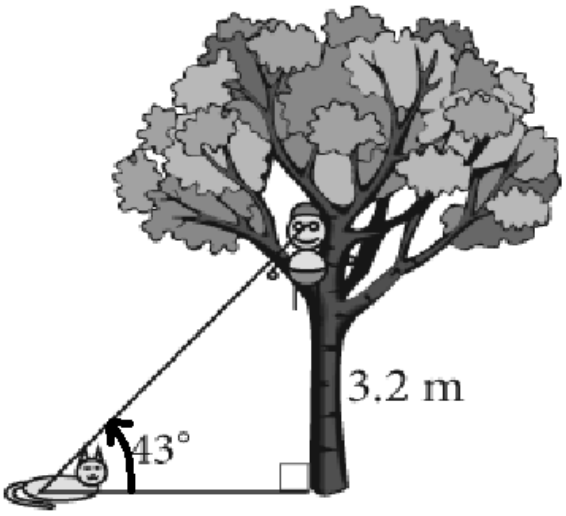


Karen's building is approximately _____ meters tall.

Patrick's building is approximately _____ meters tall

_____'s building is _____ meters taller than _____'s building.

#41. Write your own word problem to match this picture. Use your Language-Arts creative side!



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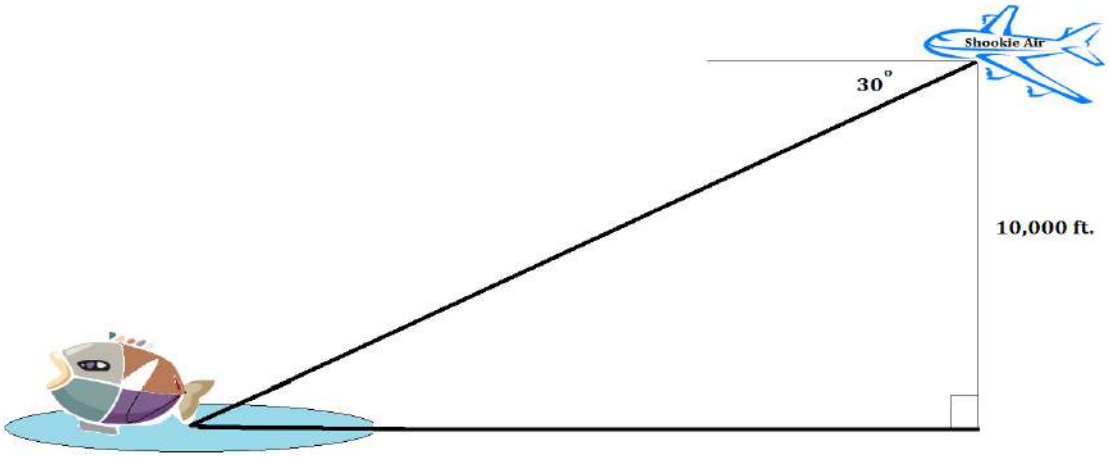
***Sample Answer*: John's cat spots him in a tree at a height of 3.2 meters and an angle of elevation of 43°. How far is the cat from the tree?**

#42. One day the pilot of Shookie Air spotted a BIG FISH *in a small pond*. The angle of depression was 30° and the plane was flying horizontal to the ground at a height of 10,000 ft. Find the distance from the plane to the tail of the BIG FISH. Round to the nearest foot.

The distance from the plane to the BIG FISH (through the air) is approximately _____ feet.

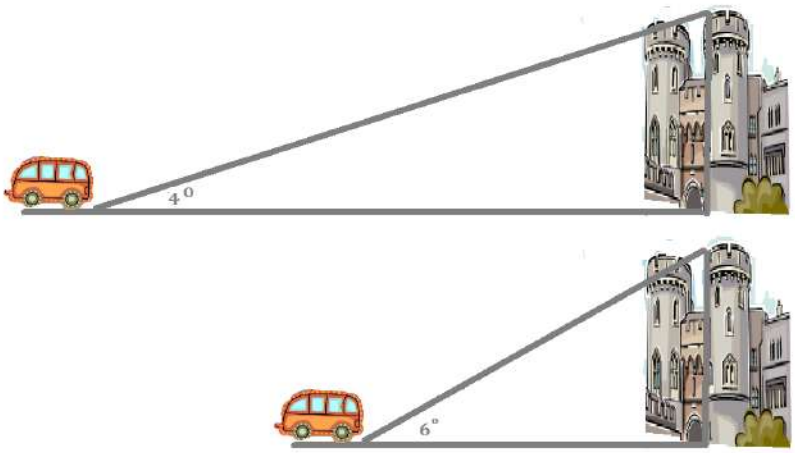


#43. The year was 2024… name a couple you would like to see married by then…

Boy's Name:_____ Girl's Name: _____

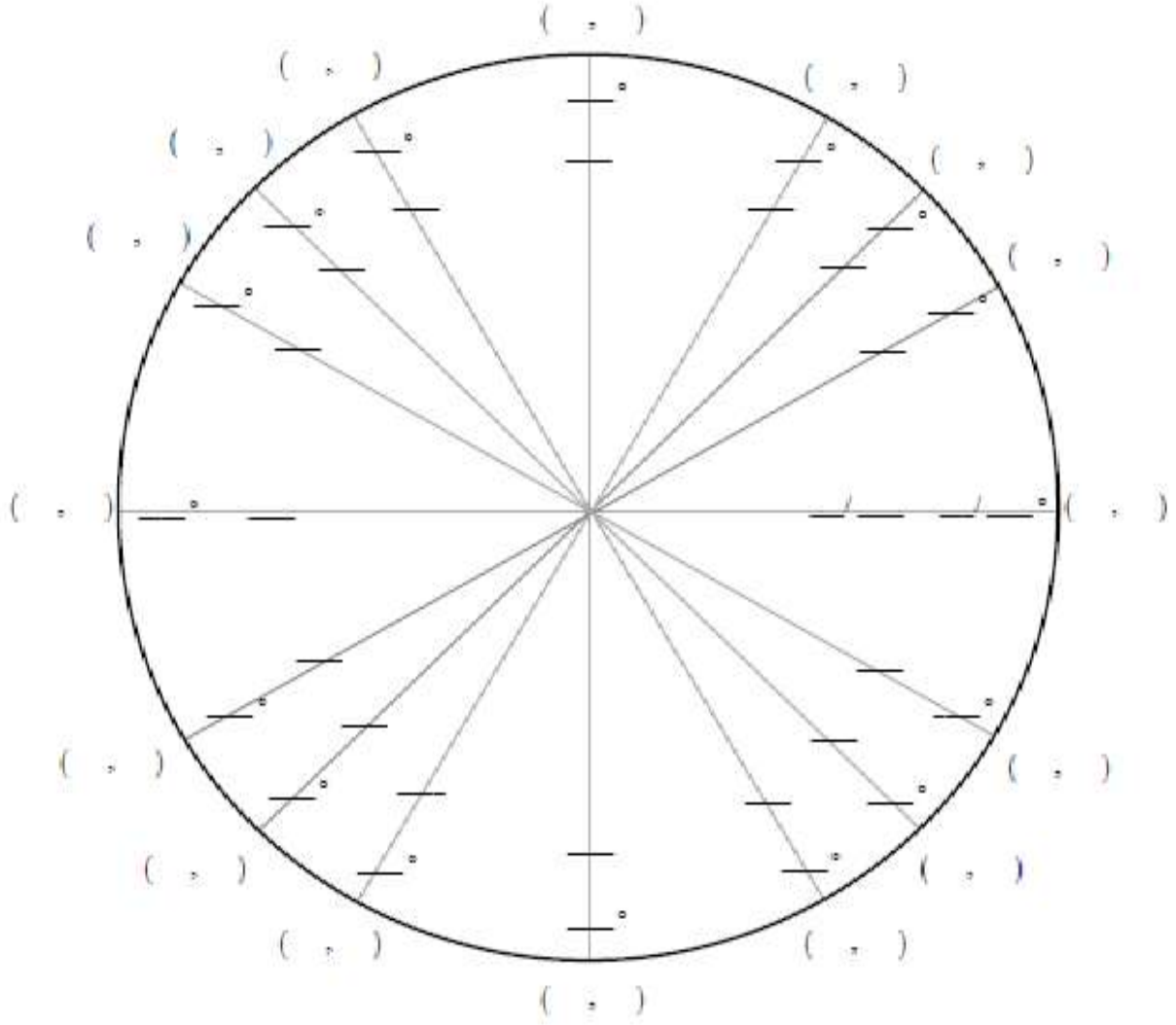
One day, _____ (insert boy name) was driving the van to see the Shookmeister's Castle. His wife, _____ (insert girl's name) asked him to stop every 2 miles to take pictures. During 2 consecutive stops, _____ (insert boy's name) decided to measure the angle of elevation from the ground to the top of the castle (see info in the pictures below). How tall is the castle (rounded to the nearest foot)? Note: 1 mile = 5,280 feet

Shookmeister Castle is approximately _____ ft. tall.



Unit Circle

#44. Complete the 17-Point Unit Circle Diagram (Inside blank is angle in radians)



Polar Coordinates and Polar equations

#45. Convert the point (12; 210°) to rectangular form. Give exact values. (_____ , _____)

#46. Convert the point (-10, $10\sqrt{3}$) to polar form. Give the angle in degrees. (____ ; ____°)

#47. The point (-7, 7) has unique coordinates in rectangular form. This is not true for polar form. Write 4 (of the many) ways to write it in the form (r ; Θ) by using

a) the (+;+) format. (_____ ; _____°)
c) the (+;-) format. (_____ ; _____°)
a) the (-;+) format. (_____ ; _____°)
d) the (-;-) format. (_____ ; _____°)

Complex Numbers

#48. (2 + 3i) + (1 – 2i) = _____

#49. (2 + 3i) - (1 – 2i) = _____

#50. (2 + 3i)(1 – 2i) = _____

#51. $\frac{2+3i}{1-2i}$ = _____

#52. | 5 – 12 *i* | = _____

#53. Write the complex number - 9 + 40 *i* in polar form. _____

#54. Write $\sqrt{2}+\sqrt{2}\ i$ in polar form (r cis Θ) . _____

#55. **[6cis(150°)] [-3cis(30°)]** = _____ (polar form) = ____ + ___ i (when you convert to a +bi form)

#56. $\frac{20\ cis\,60^o}{5\ cis\,30^o}$ = _____ (polar) = ____ + ___ i (when you convert to a +bi form)

#57. $(\sqrt{2}+\sqrt{2}\ i)^{20}$ = _____ + _____ i

#58. How do I find the square root of 16 *i* ? Follow this procedure…

$\sqrt{(16i)}=\sqrt{0+16\ i}=\sqrt{(\_\_\_\_cis\_\_\_)}$ = (____ cis ____°)$^{1/2}$ = _____ cis ____° = ____ + _____ i

#59. Solve for x over the complex numbers. Write final answers in both r cis Θ and x+yi form.

$x^3 = 8$

x_1= _____ = _____

x_2= _____ = _____

x_3= _____ = _____

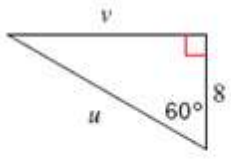
#60. Convert -6 cis (210°) to a+bi form. _____

#61. Convert the complex $-2 - 2\sqrt{3}\,i$ to polar form (r cis Θ). _____

#62. $|-8 + 15i|$ = _____

Special Right Triangles

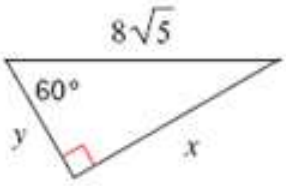
#63.



Which side is longest? ____

Find the exact length of this side (in simplest from). _____

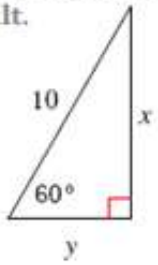
#64.



sin (30°) = _____

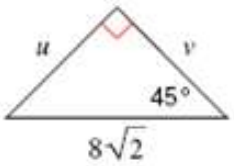
#65.

Find the perimeter of this triangle. Simplify the result.



P = _____ units

#66.

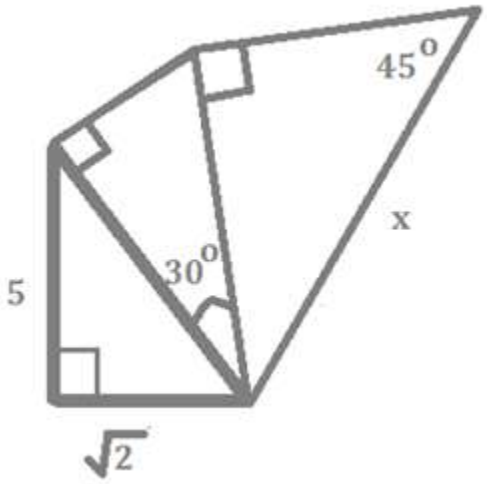


v = _____

#67.

Find the exact length of x. Simplify the result.

x = _____



Solve Trig Equation, including use of sum/Difference, half-angle & double angle formulas… YOU MUST MEMORIZE ALL FORMULAS!!!!!!

#68. Find $\sin\left(\frac{5\pi}{12}\right)$

a) Using sum/diff formula… answer in simplest form: _____

b) Using a half-angle formula… answer in simplest form:_____

#69. Simplify $16\sin(4x)\cos(4x)$ Answer:_____

#70. Verify the given Identity (proof) $12-24\sin^2(x) = 12\cos(2x)$

Step1:_____

Step 2: _____

Step 3: _____

#71. Solve for x. $2\cos^2(x) - \sin(x) = 1$ on the interval $[0, 2\pi)$

Answer:_____

#72. Solve for x. $\sin(3x)\,[\,2\cos^2(x) - 1] = 0$ on the interval $[0, 2\pi)$

Answer:_____

#73. John wanted to graph $h(x) = y = -3\sin(2x - \pi) + 4$

a) odd, even, or neither? _____ b) period: _____

c) Amplitude : _____ d) Range: _____ e) Phase Shift : _____

#74. Solve for x.

cos(x) sin(x) = cos(x) for all x on the interval $(-\infty, \infty)$

Answer:_____

#75. Given $\sin(x) = \frac{8}{17}$ for $\frac{\pi}{2} < x < \pi$

a) sin (2x) = _____ (exactly in simplest form)

b) cos (2x) = _____ (exactly in simplest form)

c) tan (2x) = _____ (exactly in simplest form)

d) Use inverse trig functions on a calculator to find the angles (to tenths)

x = _____ degrees and (2x) = _____ degrees

#76. Given $\cos(x) = \frac{-5}{12}$ for $\frac{\pi}{2} < x < \pi$

a) You wish to study the angle ($\frac{x}{2}$). Considering the given information above, what quadrant is this half-angle located in? _____ How do you know? _____

b) $\sin\left(\frac{x}{2}\right)$ = _____ (exactly in simplest form)

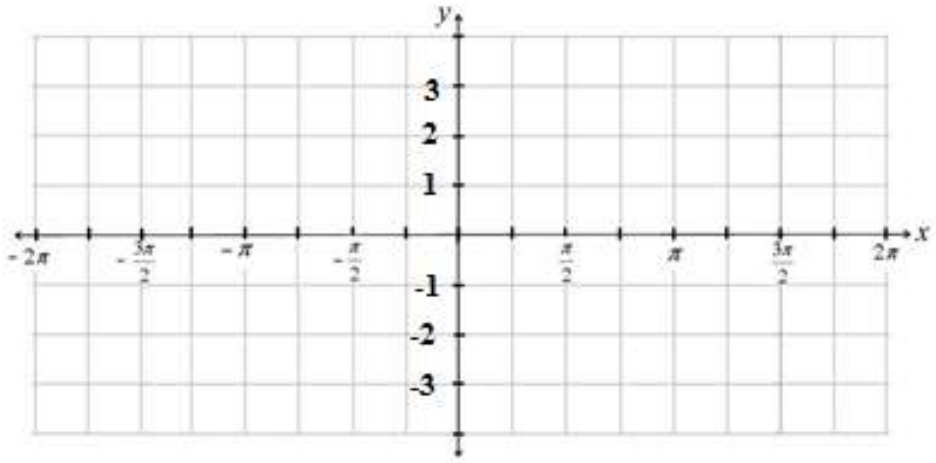
c) $\cos\left(\frac{x}{2}\right)$ = _____ (exactly in simplest form)

d) $\tan\left(\frac{x}{2}\right)$ = _____ (exactly in simplest form)

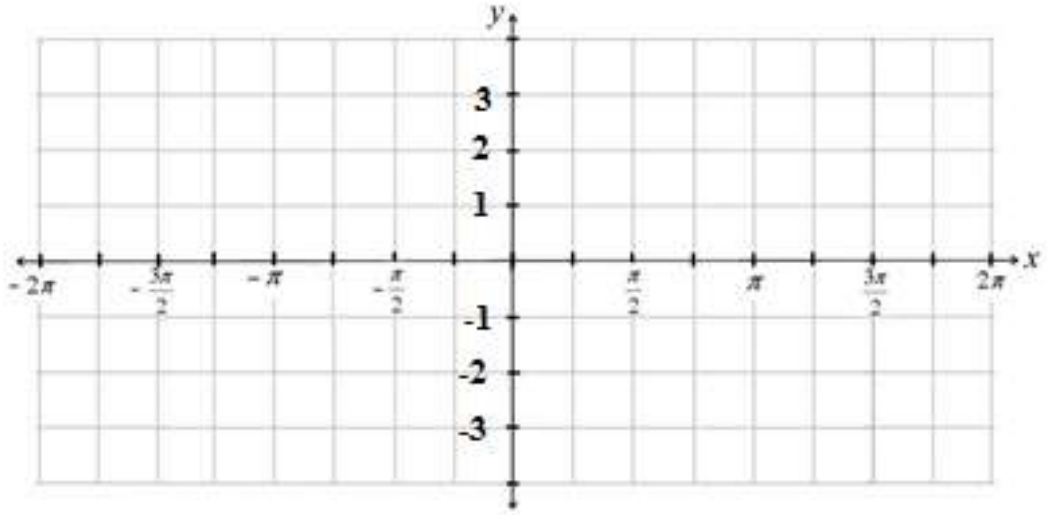
#77. Simplify $\sqrt{\frac{1+\cos(6x)}{2}}$ (Multiple Choice)

a) cos (12x) b) $|\cos(12x)|$ c) sin (3x) d) $|\sin(3x)|$ e) $|\cos(3x)|$

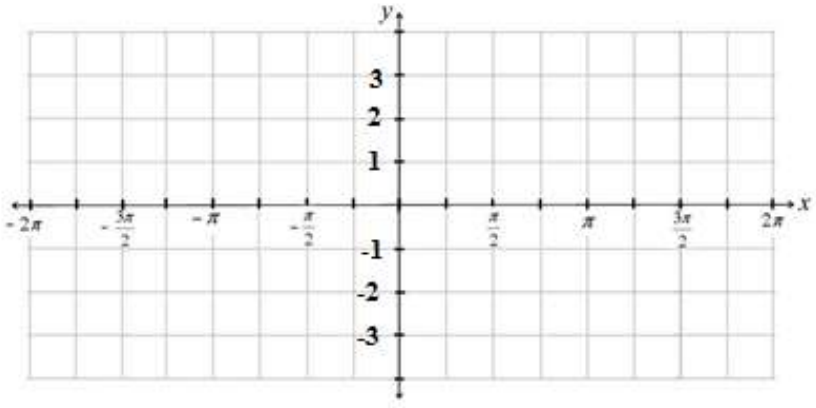
#78. Graph $y = f(x) = -3\cos\left(x + \frac{\pi}{2}\right)$



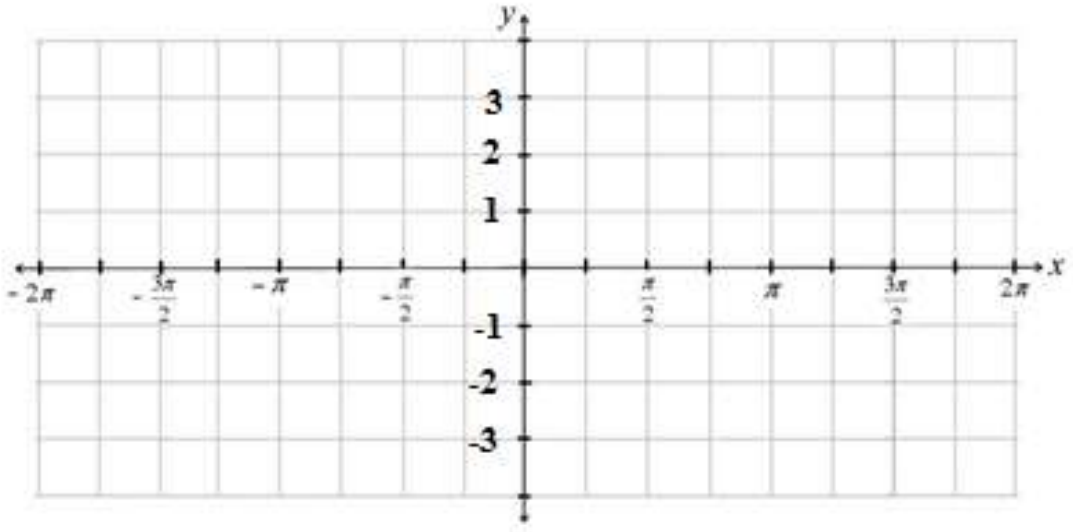
#79. Graph $y = g(x) = \sin(2x) + 1$



#80 Graph $y = h(x) = -2\tan\left(x - \frac{\pi}{2}\right)$



#81. Graph $y = j(x) = 2\csc(x) + 1$



Find the amplitude (if possible).

#82 . k(x)= y = 8 sin (3x +6) + 6
Amp = _____

#83. H(x)= y = 6.1 cos (πx +3π) + 2.9
Amp = _____

#84. J(x) = y = -3 tan (0.2x) + 6
Amp = _____

Find the period (in radians) of each function.

#85. K(x)= y = 8 sin (3x +6) + 6
Period = _____

#86. H(x)= y = 6.1 cos (πx +3π) + 2.9
Period = _____

#87. J(x) = y = -3 tan (0.2x) + 6
Period = _____

Find the Phase Shift for each function.

#88. K(x)= y = - 6 sin (2x +6) +12
Phase Shift = _____

#89. H(x)= y = 8.5 cos (πx +π) + 2.5
Phase Shift = _____

#90. J(x) = y = 3 tan (0.1x + 3.4)
Phase Shift = _____

Reference the Unit Circle and answer the following:

#90. sin (150°) = _____ #91. cos ($\frac{5\pi}{6}$) = _____ #92. tan ($\frac{4\pi}{3}$) = _____

#93. sec (2π) = _____ #94. cos (450°) = _____ #95. Cot (0) = _____

#96. [sin (60°)]^2 + [cos (60°)]^2 = _____

Answer the questions about the graph of the given function.

#97. Y = 3 sin ($\frac{\pi}{3}$ x + $\frac{\pi}{6}$) + 2 a) Domain? _____ b) Range? _____

c) y-intercept? _____ d) x-intercepts? _____

Vectors:

#98. $\vec{u}$ = < -3 , 3 > and $\vec{w}$ = < 4 ; 45° >

a) write $\vec{u}$ in polar form to see magnitude and direction. < ___ ; ____° >

b) write $\vec{w}$ in component form (rectangular). < ___ , ____ >

c) 2 $\vec{u}$ – $\vec{w}$ = < ___ , _____ >

#99. Three forces act on an object. The forces are 100N @ 45^o , 80N @ 120^o, and 90 @ 270^o. The resultant force is (in polar) given by the vector < _____ , _____ > = < _____ ; _____^{o} >

#100. Projectile motion: A ball was thrown at 60 ft/sec at 30^o angle of elevation. It was released at a height above ground level. If we place the origin at a point on the ground directly under where the ball was released then we have:

(x,y) = _____ *Vector Equation

Or parametric equations:

x = _____

y = _____

a) From what height was the object released? _____ ft.

b) When did it hit the ground? _____ sec

c) Where did it land? _____ feet away

d) What was the maximum height reached by the ball? _____ ft.

e) When was the ball at its maximum height? _____ sec

Matrices

#101. If det[A] = 104, which of the following matrices could be matrix A? (Do by hand, check on calc.)

(multiple choice, circle the correct answer)

a. $\begin{bmatrix} 5 & 3 \\ 8 & 6 \end{bmatrix}$

b. $\begin{bmatrix} -1 & 3 \\ 5 & 20 \end{bmatrix}$

c. $\begin{bmatrix} 9 & -5 \\ 10 & 6 \end{bmatrix}$

d. $\begin{bmatrix} 7 & -6 \\ -4 & 4 \end{bmatrix}$

#102. Find the value of the 3x3 determinant by hand. Show your work (enough to indicate that you understand the short-cut method). Check on a calculator.

a) det $\begin{bmatrix} 5 & 3 \\ 8 & 6 \end{bmatrix}$ = _____

b) $\begin{vmatrix} 6 & 1 & 3 \\ 2 & 0 & -1 \\ 4 & 0 & 2 \end{vmatrix}$

Answer: _____

#103. A triangle has vertices at A(0,0), B(4,0) and C(4,10). Use a determinant and a calculator to find the area of ΔABC.

Answer: _____ units

#104. You are wondering if the points (5, 7) , (7, 11) and (-3, -9) are collinear. Which statement shows correct logic for this problem? Note: You do not need to actually do the problem to answer this question. (multiple choice)

a. They are collinear if $\det\begin{bmatrix} 5 & 7 & 1 \\ 7 & 11 & 1 \\ -3 & -9 & 1 \end{bmatrix} = 1$

b. They are collinear if $\det\begin{bmatrix} 5 & 7 \\ 7 & 11 \\ -3 & -9 \end{bmatrix} = 0$

c. They are collinear if $\det\begin{bmatrix} 5 & 7 & 1 \\ 7 & 11 & 1 \\ -3 & -9 & 1 \end{bmatrix} = 0$

d. d. They are collinear if $\det\begin{bmatrix} 5 & 7 \\ 7 & 11 \\ -3 & -9 \end{bmatrix} = 1$

#105. The dimensions of [H] are given to be 2x2. The question states that you are to find the determinant of [H]. Which statement must be true?

a. det[H] = 0
b. det[H] = a real number, but I do not know what it is without seeing [H]
c. It is not possible to find det[H] because [H] is a square matrix.
d. det[H] = 2x2 = 4

#106. A line contains the points (5, 11) and (7, 17). Use a determinant to find an equation for this line (you choose the format for your final answer).

Answer: _____

#107. Find $\begin{bmatrix} 5 & 8 \\ 6 & 10 \end{bmatrix}^{-1}$ by hand and check on a calculator.

Answer: _____

#108. From #107, I see that you are an expert at finding the multiplicative inverse of a 2x2 matrix. MAKE UP A 2X2 MATRIX THAT WOULD NOT HAVE AN INVERSE.

Answer: [ ]

#109. Solve the system by using Cramer's Rule of Determinants

3x + 5y = 13
2x – 4y = -6 answer: x = _____ y = _____

Work:

#110. Solve the system by using Inverse Matrices on a calculator.

$3x + 5y = 13$
$2x - 4y = -6$ answer: x = _____ y = _____

Work:

#111. Solve the system by using Elimination or Substitution

$3x + 5y = 13$
$2x - 4y = -6$ answer: x = _____ y = _____

Work:

Law of Sines and Law of Cosines

#112. Juan and Romella are standing at the seashore 10 miles apart. The coastline is a straight line between them. Both can see the same ship in the water. The angle between the coastline and the line between the ship and Juan is 35 degrees. The angle between the coastline and the line between the ship and Romella is 45 degrees. How far is the ship from Juan?

#113. Jack is on one side of a 200-foot-wide canyon and Jill is on the other. Jack and Jill can both see the trail guide at an angle of depression of 60 degrees. How far are they from the trail guide?

#114. Tom, Dick, and Harry are camping in their tents. If the distance between Tom and Dick is 153 feet, the distance between Tom and Harry is 201 feet, and the distance between Dick and Harry is 175 feet, what is the angle between Dick, Harry, and Tom?

#115. Three boats are at sea: Jenny one (J1), Jenny two (J2), and Jenny three (J3). The crew of J1 can see both J2 and J3. The angle between the line of sight to J2 and the line of sight to J3 is 45 degrees. If the distance between J1 and J2 is 2 miles and the distance between J1 and J3 is 4 miles, what is the distance between J2 and J3?

#116. Airplane A is flying directly toward the airport which is 20 miles away. The pilot notices airplane B 45 degrees to her right. Airplane B is also flying directly toward the airport. The pilot of airplane B calculates that airplane A is 50 degrees to his left. Based on that information, how far is airplane B from the airport?

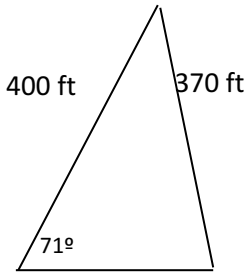
#117. A plane leaves JFK International Airport and travels due west at 570 mi/hr. Another plane leaves 20 minutes later and travels 22º west of north at the rate of 585 mi/h. To the nearest ten miles, how far apart are they 40 minutes after the second plane leaves.

#118. Flights 104 and 217 are both approaching O'Hare International Airport from directions directly opposite one another and at an altitude of 2.5 miles. The pilot on flight 104 reports an angle of depression of 17º47' to the tower, and the pilot on flight 217 reports an angle of depression of 12º39' to the tower. Calculate the distance between the planes.

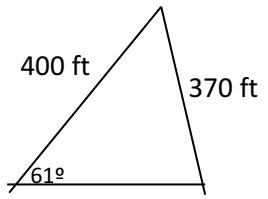
#119. Matt measures the angle of elevation of the peak of a mountain as 35º. Susie, who is 1200 feet closer on a straight level path, measures the angle of elevation as 42º. How high is the mountain?

#120. A triangular playground has sides of lengths 475 feet, 595 feet, and 401 feet. What are the measures of the angles between the sides, to the nearest tenth of a degree?

#121. A real estate agent has just take a trigonometry class at the local community college. She is considering purchasing a piece of property and is waiting for the surveyor's report before closing the deal. If the surveyor submits a drawing as in the figure below, explain why the agent will reject the sale.



#122. The surveyor admits to his mistake and revises his drawing as in the next figure. This time the real estate agent refuses to complete the deal until additional information is supplied. What additional information is the real estate agent looking for to complete her knowledge about the parcel of land?



Inverse Trig Functions

#123. $\text{Sin}^{-1}(\sin 120^{o})$ = _____ #124. $\text{Cos}^{-1}(\cos 120^{o})$ = _____

#125. a) Graph y = arcsin (x) b) domain? _____ c) range? _____

#126. a) Graph y = arccos(x) b) domain? _____ c) range? _____

#127. a) Graph y = arctan (x) b) domain? _____ c) range? _____

Proofs:

#128. **Show/prove that tan(x) sin(x) + cos(x) = sec(x)**

#129. **Show/prove by using a sum or difference formula that** $\sin\left(x + \frac{\pi}{2}\right) = \cos(x)$

#130. Show/prove that

$$\frac{1}{\tan x} + \tan x = \frac{1}{\sin x \cos x}$$

#131. Show/prove that

$$\cos(x + \pi) = -\cos(x)$$

#132. You have the goal of finding a formula for sin(2A). If you think of sin(2A) as sin(A+A) then you can use a sum formula to expand it. Show/prove that sin(2A) = 2 sin(A)cos(A).

#134. Find sin 75^0 using a sum or difference formula. _____ (no work, no credit)

Work:

#135. *Find cos* $\left(\frac{7\pi}{12}\right)$ using a sum or difference formula. _____ (no work, no credit)

Work:

#136. Find sin 75° using a half-angle formula. _____ (no work, no credit)

Work:

#137. Find tan (15°) using a sum/difference formula. _____

Work:

Counting Principles

#138. I want to make car tags that are 3 letters, followed by 2 digits. The 1st letter cannot be an O, letters can be repeated, and the last digit must be odd. How many wasy can this be done?_____

#139. I want to make car tags that are 3 letters. Followed by 2 digits. You can use any letters or digits but they cannot be repeated. How many ways can this be done?_____

#140. I want to pick a prom committee of 3 from a group of 10 people. How many ways can this be done? _____

#141. I want to pick 3 Math Team officers (President then Vice-President then Secretary) from a group of 10 people. How many ways can this be done? _____

#142. If you expand $(x+y)^{10}$ then you will see that the coefficient of the "$x^6\ y^4$" term is

a) C(10,6) **b) P(10, 6)** **c) 6!4!** **d) P(10, 4)**

#143. Find C(14, 6). _____

#144. Find P (14, 6). _____