Catholic Central High School

Algebra II
Practice Examination II

Instructions:

1. Show all work on the test copy itself for every problem where work is required. Points may be deducted if insufficient or inaccurate work is shown.

2. ***Read all directions very carefully.*** In several problems, you are asked to use a specific method of solution. Points may be deducted if inaccurate method is shown.

3. Circle or box in final answers.

4. Although not necessary, you may use a graphing utility for all problems. You must, however, show the requested amount of work to receive full credit for each.

5. You may tear off the formula sheet at the end of the exam to use.

6. Check and re-check final answers before submitting your exam.

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Solve for x in each of the following.

1) $2^{x-5} = 32$

2) $\log_5(3x) = 4$

Convert the equation from logarithmic form to exponential form.

3) $\log_6 216 = 3$

Evaluate the logarithm. Show all work.

4) $\log_7 \frac{1}{343}$

Complete the following interest problem.

5) After searching far and wide, Martin located a very rare coin that he purchased for $2010. The coin is so rare and made of such an unusual combination of metals that it is said to increase in value at a rate of 5.3% per year. Approximately how many years should Martin keep the coin in order for it to double in value?

Condense each of the following expressions into a single logarithm.

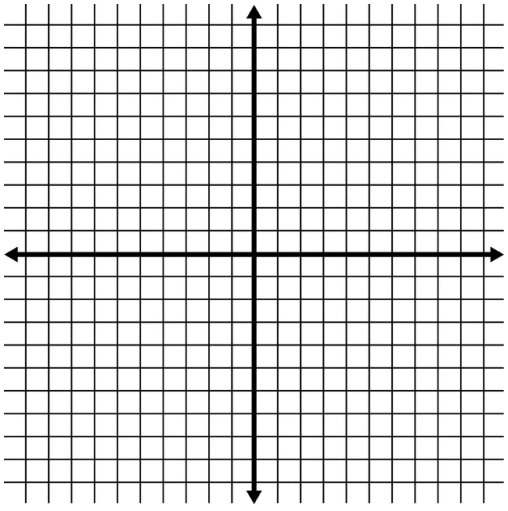
6) $\log_7 5 - 3\log_7 x + 2\log_7 y$

7) $\frac{1}{2}(3\ln x - \ln 5)$

Graph the logarithmic or exponential function. You do not need to graph the parent.

8) $f(x) = e^{x-1} + 3$

$\mathbf{x}$	$\mathbf{f(x)}$



Express the following in common log form. Leave as a fraction. In other words, do not give a decimal approximation.

9) $\log_{12} 33$

Solve the exponential equation. Round to two decimal places if necessary.

10) $5^x = 93$

Simplify the following rational expressions.

11) $\frac{(x^2-9)(2x-10)}{(x^2+x-6)(x-5)}$

12) $\frac{s^2+5s+4}{s^2+9s+20} \div \frac{s^2-3s-4}{s+5}$

Simplify.

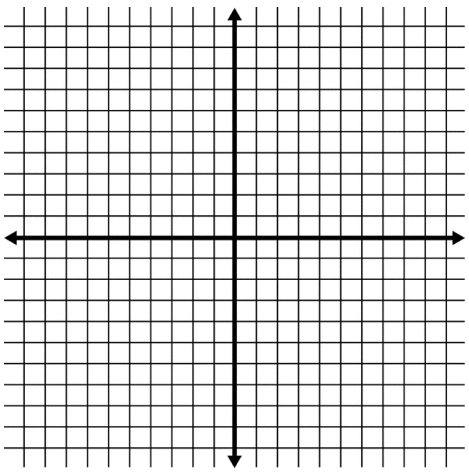
13) $\frac{6}{x-1} - \frac{5x}{4}$

Solve the rational equation for y.

14) $\frac{a-2}{a-3} - 1 = \frac{3}{a+2}$

State any vertical and horizontal asymptotes and zeroes then sketch the function.

15) $f(x) = \frac{x-4}{-4x-16}$



Determine the discriminant then identify which kind of conic the equation represents.

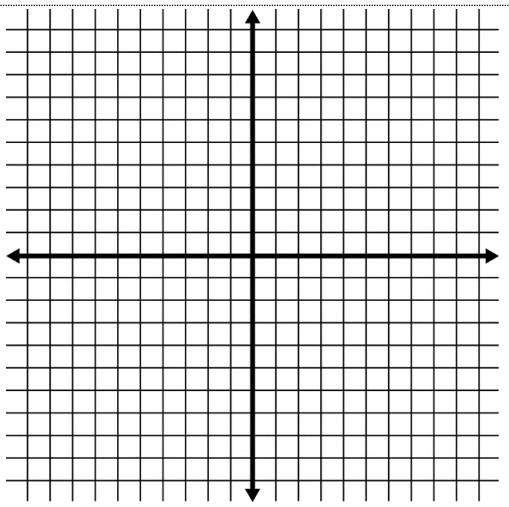
16) $8x^2 - 18y^2 - 4x + 9y - 4 = 0$

Write the equation of the conic in standard form then state which kind it represents.

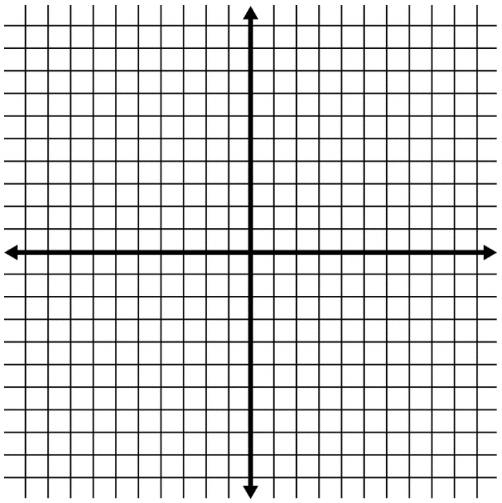
17) $-x^2 + y^2 - 18x - 14y - 132 = 0$

Graph the following conics. Be sure to label all vertices and/or co-vertices, focal points, and the center.

18) $\frac{(y-8)^2}{64} - \frac{(x-1)^2}{36} = 1$



19) $x = (y + 4)^2 - 8$



Determine if the sequence is arithmetic or geometric then write a rule, or equation for the sequence.

20) $-7, -9, -11, -13, \ldots$

Find the sum of each of the following finite arithmetic or geometric series.

21) $6 + 11 + 16 + \cdots + 36$ (Arithmetic)

22) -2, -12, -72, …, -2592 (Geometric)

Given the sigma notation for each, find the sum for each of the following arithmetic or geometric series, if it exists. If sum does not exist, write NO SUM.

23) $\sum_{k=1}^{35} 3k - 13$ (Arithmetic)

24) $\sum_{k=1}^{\infty} 6(\frac{-7}{6})^{k-1}$ (Geometric)

Complete the following word problem involving arithmetic or geometric series.

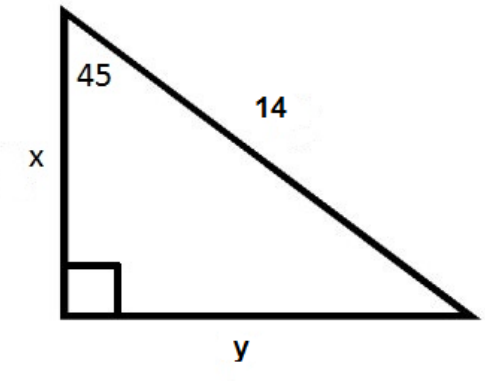
25) A ball bounces to 65% of its previous height after each bounce. If the ball is dropped from a height of 15 meters what is the total vertical distance travelled when it hits the floor *after* its seventh bounce (hits for the eighth time)?

If $\tan\theta = \frac{18}{29}$, find the exact values of the five remaining trigonometric functions of θ. You must construct a right triangle to receive full points.

26)

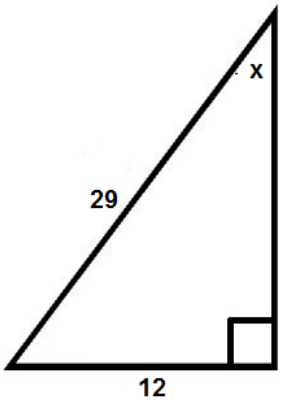
Using your knowledge of special right triangles, find the exact values of x and y.

27)

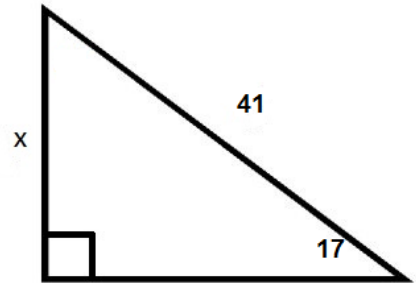


For each of the following, find x. Round angles to the nearest degree and side lengths to the nearest tenth.

28)



29)



Give the exact values of all six trigonometric functions for each of the following angles.

30) $135°$

31) $270°$

Solve each of the following triangles using the Law of Sines and/or the Law of Cosines. Round angles to the nearest degree and side lengths to the nearest tenth. If there is no solution, you must explain why.

32) $\triangle ABC$ with $a = 9, b = 7, c = 12.$

33) $\triangle ABC$ with $\angle A = 93°, \angle B = 29°, b = 16.$

Convert the angle from degrees into radian form.

34) $280°$

Convert the angle from radians into degree form.

35) $\frac{-\pi}{12}$

Formulas Sheet

Interest Rates	
Compound Interest	**Continuously Compounded Interest**
$A(t) = P\left(1 + \frac{r}{n}\right)^{nt}$	$A(t) = Pe^{rt}$

Standard Form of Conic Sections		
Conic Section	**Standard Form of Equation**	
Circle	$(x - h)^2 + (y - k)^2 = r^2$	
	Horizontal Axis (Opens along x)	**Vertical Axis (Opens along y)**
Parabola	$x = a(y - k)^2 + h$	$y = a(x - h)^2 + k$
Ellipse	$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$	$\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$
Hyperbola	$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$	$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$

Classifying Conic Sections Using the Discriminant	
Standard Form of Equation: $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$	
Discriminant	**Conic Section**
$B^2 - 4AC < 0$ and $A = C$	**Circle**
$B^2 - 4AC < 0$ and $B \neq 0$ or $A \neq C$	**Ellipse**
$B^2 - 4AC = 0$	**Parabola**
$B^2 - 4AC > 0$	**Hyperbola**

Trig Laws	
LAW OF SINES	**LAW OF COSINES**
$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$ $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$	$a^2 = b^2 + c^2 - 2bc\cos A$ $b^2 = a^2 + c^2 - 2ac\cos B$ $c^2 = a^2 + b^2 - 2ab\cos C$

Sequences and Series			
n^{th} Term of a Finite Arithmetic Sequence $a_n = a_1 + (n-1)d$	**Partial Sum of a Finite Arithmetic Series** $S_n = n\left(\frac{a_1 + a_n}{2}\right)$	**Partial Sum of a Finite Geometric Series** $S_n = \frac{a_1 - a_n r}{1 - r}$	**Sum of an Infinite Geometric Series** $S = \frac{a_1}{1 - r}$
n^{th} Term of a Finite Geometric Sequence $a_n = a_1 r^{n-1}$	**Partial Sum of a Finite Arithmetic Series** $S_n = \frac{n}{2}[2a_1 + (n-1)d]$	**Partial Sum of a Finite Geometric Series** $S_n = \frac{a_1 - a_1 r^n}{1 - r}$	