Name _____ School _____

SENIOR DIVISION

Category 1: Binomial Theorem

1. (2 pts) What are the coefficients for $(x+1)^9$?

1. _____

2. (3 pts) Find the 6th term of $(3x-5y)^9$. 2. _____

3. (5 pts) One partial term of $(ax^2-4y)^{11}$ has $-3,604,480x^4$ in it. Which term is it and what is the value of *a*?

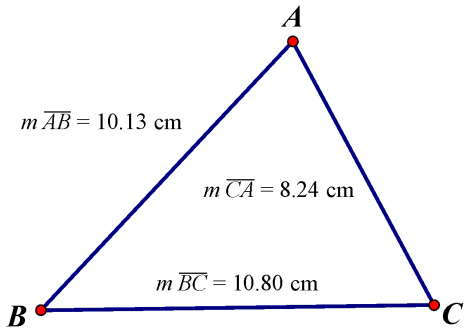
3. term: _____

3. value of *a*: _____

Name_____ School_____

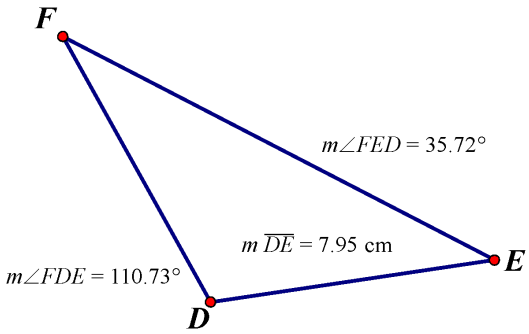
SENIOR DIVISION
Category 2: Solving Triangles

1. (2pts) Find the measure of $\angle ACB$ to the nearest thousandth of a degree.



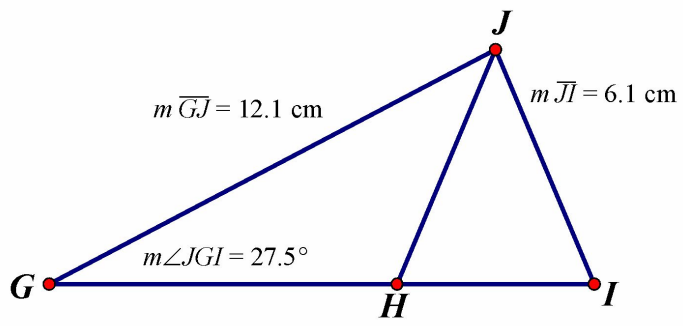
1. _____

2. (3 pts) Find *FD* to the nearest thousandth of a centimeter.



2. _____

3. (5pts) If $\overline{JH} \cong \overline{JI}$, then find the measure of $\angle GJH$ to the nearest thousandth of a degree.



3. _____

Name_____ School_____

SENIOR DIVISION
Category 3: Algebraic Functions

1. (2pts) Find $f^{-1}(x)$ in simplified form if $f(x)=\sqrt{x+5}-7$.

1. _____

2. (3pts) Find the domain and range of this function: $f(x)=-\sqrt{-x-2}-3$.

2. Domain: _____

2. Range: _____

3. (5 pts) Find $f(g(x))$ if $f(x)=2x^2-3x+7$ and $g(x)=2x-5$.

3. _____

Name_____ School_____

SENIOR DIVISION
Category 4: Matrices and Determinants

CALCULATORS NOT ALLOWED

1. (2 pts) Give the value of x for the determinant $\begin{vmatrix} 5 & 4 \\ 8 & x \end{vmatrix} = -92$.

1. _____

2. (3 pts) Multiply the matrices if possible.

$$\begin{bmatrix} 1 & 4 & 8 \\ 2 & 0 & 7 \end{bmatrix} \times \begin{bmatrix} 3 & 1 \\ -1 & 0 \\ 0 & -2 \end{bmatrix}$$

2. _____

3. (5 pts) Find $a+b+c$ if:

3. _____

$$\begin{bmatrix} 2 & -1 \\ -6 & 3 \end{bmatrix} \times \begin{bmatrix} 4 & 8 \\ -3 & a \end{bmatrix} + 3\begin{bmatrix} b & 7 \\ -1 & 0 \end{bmatrix} = \begin{bmatrix} 26 & 34 \\ c & -39 \end{bmatrix}$$