ALGEBRA II FORMULA SHEET

This sheet contains formulas and definitions not given to you on the Regents exam. Use your class notes or go online to help you fill in the blanks.

UNIT 1. POLYNOMIALS

$(x + a)^2 =$ _____$^2 +$ _____ $+$ _____^{2} NOT $x^2 + a^2$

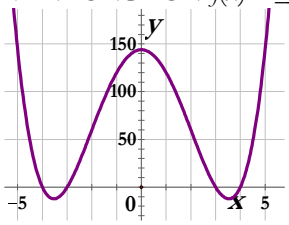
$(x - a)^2 =$ _____$^2 -$ _____ $+$ _____^{2} NOT $x^2 - a^2$

DIFFERENCE OF 2 SQUARES: $x^2 - y^2 =$ (_____)(_____)

SUM OF TWO CUBES: $x^3 + y^3 =$ (_____)(_____)

DIFFERENCE OF 2 CUBES: $x^3 - y^3 =$ (_____)(_____)

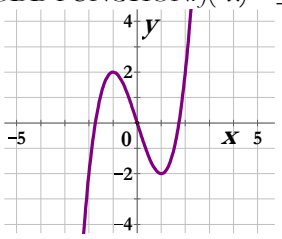
EVEN FUNCTION: $f(x) =$ _____ for all x in the domain of f.



x	$f(x)$
−3	
−2	
−1	
0	144
1	120
2	60
3	0

Even functions are symmetric over the _____.

ODD FUNCTION: $f(-x) =$ _____ for all x in the domain of f.



x	$f(x)$
−3	
−2	
−1	
0	0
1	−2
2	2
3	18

Odd functions are symmetric over the _____.

REMAINDER THEOREM: If a polynomial $P(x)$ is divided by $x - a$, where a is real, then the remainder equals $P($ ____ $)$.

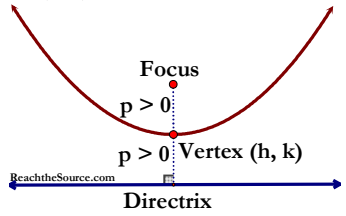
FACTOR THEOREM: If a real number a is a zero of a polynomial function $P(x)$, then _____ is a factor of $P(x)$.

EQUATION OF A PARABOLA with vertex (h, k), p is the distance between the focus and the vertex:

Horizontal directrix:

$(x-h)^2 =$ ____ (_____) or

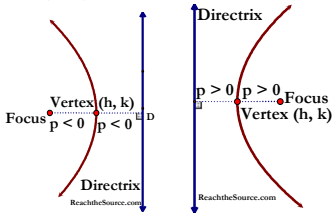
$y = \frac{1}{\square}($ _____ $)^2 +$ _____

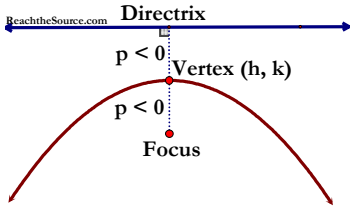


Vertical directrix:

$(y-k)^2 =$ _____ (_____) or

$x = \frac{1}{\square}($ _____ $)^2 +$ _____





COMPLEX NUMBERS:

POWERS OF i: $i = \sqrt{-1}$, $i^2 =$ _____, $i^3 =$ _____, $i^4 =$ _____

ADDITION: $(a + bi) + (c + di) =$ (_____) + (_____)i

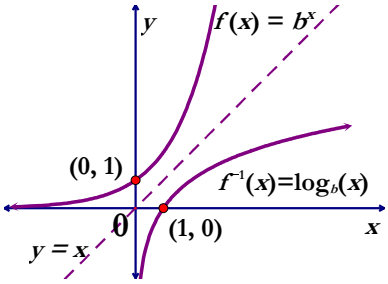
MULTIPLICATION: $(a + bi)(c + di) =$ (_____) + (_____)i

UNIT 2. RATIONAL AND RADICAL EXPRESSIONS

RULES OF EXPONENTS: $(x \neq 0)$

$x^a \bullet x^b = x^{\square}$ $\quad \frac{x^a}{x^b} = x^{\square}$ $\quad (x^a)^b = x^{\square}$ $\quad (xy)^a = x^{\square} y^{\square}$ $\quad x^0 = \square$ $\quad x^{-a} = \frac{\square}{\square}$ $\quad x^{\frac{a}{b}} = \left(\sqrt[\square]{x}\right)^{\square} = \sqrt[\square]{x^{\square}}$

UNIT 3. EXPONENTIAL AND LOGARITHMIC FUNCTIONS



The graph of a function and its inverse are symmetrical over the line $y =$ _____ .

LOGARITHM: If $b^x = y$, then $\log_{\square} \square = \square$.

NATURAL LOGARITHM: If $e^x = y$, then $\ln \square = \square$.

POWER RULE: $\log_b x^c =$ _____

CHANGE OF BASE: $\log_b x = \frac{\square}{\square}$

COMPOUND INTEREST: $A =$ _____, where

A = final amount

A_0 = initial amount

r = rate of growth or decay (expressed as decimal)

n = number of compoundings per period

t = number of periods of compounding

CONTINUOUS COMPOUNDING: $A =$ _____, where

A = final amount

A_0 = initial amount

$e \approx 2.718281828$

r = rate of growth or decay (expressed as decimal)

t = number of periods of compounding

AVERAGE RATE OF CHANGE of $f(x)$ over $[a, b] = \frac{\square}{\square}$

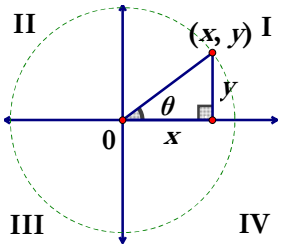
SUMMATION (SIGMA) NOTATION: $\sum_{k=1}^{n} a_k = \square + a_2 + \ldots + a_{n-1} + \square$

UNIT 4. TRIGONOMETRY

If θ is an angle measure, then:

$\sin(\theta) = \dfrac{\textit{opposite}}{\square}$ $\quad \cos(\theta) = \dfrac{\square}{\square}$ $\quad \tan(\theta) = \dfrac{\square}{\square}$

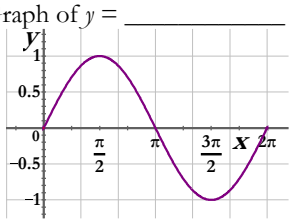
$\csc(\theta) = \dfrac{1}{\sin(A)} = \dfrac{\square}{\textit{opposite}}$ $\quad \sec(\theta) = \dfrac{1}{\cos(\theta)} = \dfrac{\square}{\square}$ $\quad \cot(\theta) = \dfrac{1}{\tan(\theta)} = \dfrac{\square}{\square}$



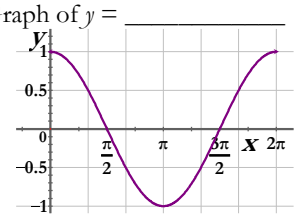
PYTHAGOREAN IDENTITY: $\sin^2(\_\_\_) + \cos^2(\_\_\_) = \_\_\_\_$

Basic sine and cosine graphs

Graph of $y =$ _____



Graph of $y =$ _____



$$\begin{cases} y = -\sin(bx) \\ \textit{or} \\ y = -\cos(bx) \end{cases} \text{ is } \begin{cases} y = \sin(bx) \\ \textit{or} \\ y = \cos(bx) \end{cases} \text{ reflected over the } \_\_\_\_\_.$$

$$\begin{cases} f(x) = a\sin\big(b(x-c)\big) + d \\ \textit{or} \\ f(x) = a\cos\big(b(x-c)\big) + d \end{cases}$$

MIDLINE: horizontal center line
AMPLITUDE: distance from midline to maximum or minimum
CYCLE: one complete repetition of a pattern
FREQUENCY: number of cycles in a given interval ("How *many* cycles?")
PERIOD: horizontal length of 1 cycle ("How *long* is one cycle?")

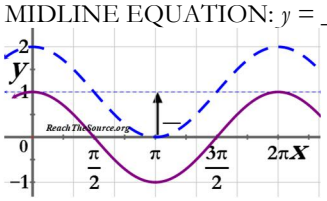
Amplitude and frequency

AMPLITUDE = |____|
FREQUENCY = |____|

$$\textit{frequency} = \frac{1\ \textit{interval}}{\textit{period}}, \quad \textit{period} = \frac{1\ \textit{interval}}{\textit{frequency}}$$

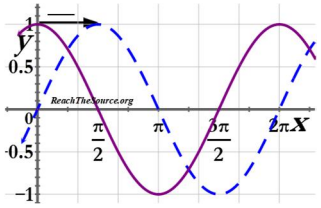
Vertical shift

MIDLINE EQUATION: $y =$ ____



+ ___ : graph shifts UP
− ___ : graph shifts DOWN

Horizontal shift



− ___ : graph shifts RIGHT
+ ___ : graph shifts LEFT

UNIT 5. PROBABILITY AND STATISTICS

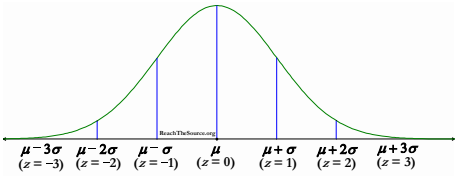
$P(A \cup B)$ = probability of A "_____" B *(in words)*
$P(A \cap B)$ = probability of A "_____" B *(in words)*
$P(A \mid B)$ = probability of A "_____" B *(in words)*

UNION: For any events A and B:
$P(A \cup B) = P(\_\_\_) + P(\_\_\_\_) - P(\_\_\_\_\_)$

INDEPENDENT EVENTS:
$P(A \mid B) = P(\_\_\_\_\_)$ or
$P(A \cap B) = P(\_\_\_) \bullet P(\_\_\_)$.

DISJOINT (MUTUALLY EXCLUSIVE) EVENTS:
$P(A \cap B) =$ _____ or
$P(A \cup B) = P(\_\_\_) + P(\_\_\_\_)$

NORMAL DISTRIBUTION



z-score (standard score):

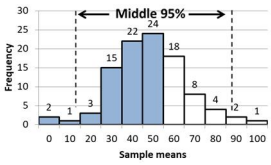
$$z = \frac{\square}{\square},$$

where
μ = mean
σ = standard deviation

INTERVAL OF MIDDLE 95% = _____ ± 2 • (_____)

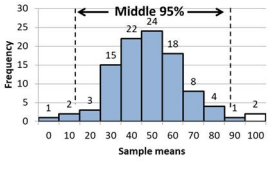
MARGIN OF ERROR = 2 • (_____)

If an observed value is _____ the interval containing the middle 95% of the sampling distribution OR if the frequency of the observed value and less likely values is _____ than 2.5%), then the observed value:



- is *not* considered unusual
- is *not* statistically significant
- probably occurred by chance
- does *not* provide evidence challenging the assumption on which the sampling distribution was based

If an observed value is _____ the interval containing the middle 95% of the sampling distribution OR if the frequency of the observed value and less likely values is _____ than 2.5%), then the observed value:



- is considered *unusual*
- is *statistically significant*
- probably did *not* occur by chance
- provides evidence challenging the assumption on which the sampling distribution was based