For a given function, it is found that f(t) = f(-t). What type of symmetry does f(t) have?

A. Odd symmetry
B. Even symmetry
C. Rotational symmetry
D. Quarter-wave symmetry

Which number has four significant figures?

A. 0.0014
B. 0.01414
C. 0.141
D. 1.4140

Naperian logarithm have a base closest to which number?

A. 2.17
B. 2.72
C. 3.14
D. 10

If the second derivative of the equation of a curve is equal to the negative of the equation of that same curve, the curve is

A. An exponenential
B. A sinusoid
C. A tangent
D. A parabola

To find the angle of a triangle, given only the lengths of the sides, on would use

A. The law of cosines
B. The law of sines
C. The law of tangents
D. The inverse-square law

Which is true regarding the signs of the natural functions for angles between 90° and 180°?

A. The tangent is positive
B. The cotangent is positive
C. The cosine is negative
D. The sine is negative

What is the inverse natural function of the cosecant?

A. Secant
B. Sine
C. Cosine
D. Cotangent

The graphical presentation of a cumulative frequency distribution in a set of statistical data is called _____.

A. Histogram
B. Kurtosis
C. Lepticurtic
D. Ogive

A statement of truth of which follows with little or no proof from a theorem.

A. Axiom
B. Hypothesis
C. Corollary
D. Conclusion

It is a sequence of numbers such that the successive terms differ by a constant.

A. Arithmetic progression
B. Infinite progression
C. Geometric progression
D. Harmonic progression

A frequency curve which is composed of series of rectangles constructed with the steps as the base and the frequency as the height.

A. Histogram
B. Ogive
C. Frequency distribution
D. Bar graph

If the roots of an equation are zero, then they are classified as

A. Hyperbolic solution
B. Zeros of function
C. Extraneous roots
D. Trivial solution

Convergent series is a sequence of decreasing number or when the succeeding term is _____ the preceding term.

A. Greater than
B. Equal to
C. Lesser than
D. None of the above

If a = b then b = a. This illustrates what axiom in algebra?

A. Symmetric axiom
B. Reflexive axiom
C. Transitive axiom
D. Replacement axiom

A and B are independent events. The probability that event A will occur is Pa and the probability that A and B will occur is Pab. From these two statements, what is the probability that event B will occur?

A. Pa – Pab
B. Pb – Pab
C. Pa x Pb
D. Pab / Pa

Two or more equations are equal if and only if they have the same

A. Solution set
B. Degree
C. Order
D. Variable set

In any square matrix, when the elements of any two rows are exactly the same, the determinant is

A. Zero
B. Positive integer
C. Negative integer
D. Unity

The ratio or product of two expressions in direct or inverse relation with each other is called

A. Ratio and proportion
B. Means
C. Extremes
D. Constant of variation

Is a sequence of terms whose reciprocals from an arithmetic progression?

A. Geometric progression
B. Harmonic progression
C. Algebraic progression
D. Ratio and proportion

An array of m x n quantities which represent a single number system composed of elements in rows and columns is known as

A. Transposed matrix
B. Cofactor of a matrix
C. Matrix
D. Determinant

Binary number system is a system of notation for real number that uses the place value method with 2 as a base. What us another name of the binary number system?

A. Binary digits
B. Binumber system
C. Dyadic number system
D. Bits

The number 0.123123123... is a/an

A. Irrational number
B. Surd
C. Rational number
D. Transcendental

MCMXCIV is the Roman numeral equivalent to

A. 1974
B. 1964
C. 1994
D. 2994

A sequence of numbers where the succeeding term is greater than the preceding term is called

A. Dissonant series
B. Convergent series
C. Divergent series
D. Isometric series

Terms that differs only in numeric coefficients are known as

A. Unlike terms
B. Unequal terms
C. Like terms
D. Similar equations

In complex algebra, we use diagram to represent complex plane commonly called

A. Argand diagram
B. Venn diagram
C. Maxwell diagram
D. Cartesian diagram

7 + 0i is

A. An irrational number
B. Real number
C. Imaginary number
D. A variable

The number of successful outcomes divided by the number of possible outcomes is

A. Odd
B. Combination
C. Permutation
D. Probability

If a two digit number has x for its unit digit and y for its tens digit, the number is represented as

A. x + y
B. y – x
C. 10y + x
D. 10x - y

A statement of truth which is admitted without proof

A. Axiom
B. Theorem
C. Postulate
D. Corollary

The part of theorem which is assumed to be true.

A. Corollary
B. Hypothesis
C. Postulate
D. Conclusion

A statement of truth which follows with little or no proof from the theorem.

A. Corollary
B. Axiom
C. Postulate
D. Conclusion

Refers to the construction of drawing of lines and figures the possibility of which is admitted without proof.

A. Corollary
B. Theorem
C. Postulate
D. Hypothesis

A mathematical statement which has neither been proved nor denied by counterexamples

A. Fallacy
B. Conjecture
C. Theorem
D. Paradox

A proved proposition which is useful mainly as a preliminary to the proof of a theorem.

A. Lemma
B. Hypothesis
C. Postulate
D. Corollary

Axioms are propositions of a general logical nature (about equal or unequal) while _____ are propositions concerning objects and constructions.

A. Theorems
B. Corollaries
C. Conclusions
D. Postulates

A _____ is an ancillary theorem whose result is not target for the proof.

A. Postulate
B. Lemma
C. Hypothesis
D. Conclusion

Statements that are accepted without discussion or proof are called axioms. The word “axiom” comes from the Greek “axioma” which means

A. Worth
B. Correct
C. True
D. Perfect

In mathematical and other fields of logical reasoning, axioms are used as a basis for the formulation of statements called

A. Lemma
B. Hypothesis
C. Postulate
D. Theorem

"The product of two or more number is the same in whatever order they are multiplied." This refers to

A. Associative law of addition
B. Associative law of multiplication
C. Commutative law of multiplication
D. Distributive law of multiplication

If a = b, then b can replace a in any equation. This illustrates what law of identity?

A. Reflexive law
B. Law of symmetry
C. Transitive law
D. Substitution law

If a = a, then it illustrates what law of identity?

A. Reflexive law
B. Law of symmetry
C. Transitive law
D. Substitution law

If a = b, and b = c, then a = c. This illustrates

A. Reflexive law
B. Law of symmetry
C. Transitive law
D. Substitution law

The axiom which relates addition and multiplication is the _____ law.

A. Commutative
B. Associative
C. Distributive
D. None of the above

Any combination of symbols and numbers related by the fundamental operation of algebra is called a/n

A. Equation
B. Algebraic expression
C. Term
D. Algebraic sum

The algebraic expression consisting a sum of any number of terms is called a

A. Multinomial
B. Summation
C. Binomial
D. Monomial

An equation which is satisfied by all values of the variable for which the members of the equation defined is known as

A. Linear equation
B. Rational equation
C. Conditional equation
D. Irrational equation

An equation in which some or all of the known quantities are represented by letters is called

A. Redundant equation
B. Literal equation
C. Linear equation
D. Defective equation

An equation in which the variable appear under the radical symbol

A. Irradical equation
B. Irrational equation
C. Quadratic equation
D. Linear equation

An equation which, because of some mathematical process, has required an extra root is sometimes called as

A. Redundant equation
B. Literal equation
C. Linear equation
D. Defective equation

Any equation which, because of some mathematical process, has fewer roots than its original is sometimes called as

A. Redundant equation
B. Literal equation
C. Linear equation
D. Defective equation

An algebraic expression which can be represented as a quotient of two polynomials.

A. Irrational algebraic expression
B. Reduced algebraic expression
C. Rational algebraic expression
D. Complex algebraic expression

A statement containing one or more variables and having the property that it becomes either true or false when the variables are given specific values from their domains.

A. Solution
B. Problem
C. Open sentence
D. Worded problem

Any algebraic term is a/an _____ term in certain representing numbers if it consists of the product possible integral powers of these numbers and a factor not containing them.

A. Integral
B. Rational
C. Irrational
D. Integral rational

An equation in x and y which is not easily solved for y in terms of x is called

A. Explicit
B. Implicit function
C. Discontinuity
D. Quadratic

The numbers which are represented with letters.

A. Variables
B. Unkowns
C. Literal numbers
D. Terms

Equations whose members are equal only for certain or possibly no value of the unknown.

A. Conditional equations
B. Inequalities
C. Unconditional equations
D. Temporary equations

An algebraic expression consisting of one term.

A. Monomial
B. Binomial
C. Linear
D. Monomode

In algebra, this consists of products and quotients of ordinary numbers and letters which represent numbers.

A. Expression
B. Term
C. Equation
D. Coefficient

An expression of two terms is called

A. Polynomial
B. Duomial
C. Binomial
D. All of the above

The degree of a polynomial or equation is the

A. Maximum exponent
B. Maximum sum of exponents
C. Exponent of the first variable
D. Maximum exponent of x

What is the degree of the polynomial 3 x^4 y + 2 x^3 z^3 – 4 y z^2 ?

A. 6^{th}
B. 5^{th}
C. 4^{th}
D. 3^{rd}

Any fraction which contains one or more fractions in either numerator or denominator, or both is called

A. Compound fraction
B. Composite fraction
C. Complex fraction
D. All of the above

A common fraction with unity for numerator and a positive integer as denominator (i.e. 1/n).

A. Ordinary fraction
B. Unit fraction
C. Common fraction
D. Improper fraction

If the absolute value of the numerator of a fraction is smaller than the denominator, it is called

A. Proper fraction
B. Improper fraction
C. Decimal fraction
D. Mixed number

A number that consists of an integer part (which may be zero) and a decimal part less than unity that follows the decimal marker, which may be a point or a comma.

A. Proper fraction
B. Improper fraction
C. Decimal fraction
D. Mixed number

Considered as the "counting numbers"

A. Integers
B. Rational numbers
C. Irrational numbers
D. Natural numbers

A number represented by a non-terminating, non-repeating decimal.

A. Irrational number
B. Rational number
C. Natural number
D. Integer

The completeness axiom proved that the real number system has numbers other than

A. Integers
B. Rational numbers
C. Natural numbers
D. Irrational numbers

The concept of spread of a random variable or a set of observations.

A. Variance
B. Standard deviation
C. Dispersion
D. Range

A number containing a non-terminating but repeating decimal is a/an

A. Integer
B. Rational number
C. Natural number
D. Irrational number

A positive integer which has no perfect-square factor greater than 1.

A. Radical expression
B. Square integer
C. Square integer
D. Square-free integer

Numbers are used to describe a

A. Magnitude
B. Postion
C. Magnitude and position
D. None of the above

Are symbols or combinations of symbols which describe a number.

A. Numerals
B. Digits
C. Terms
D. Notations

Which of the following is not classified as an integer?

A. Negative number
B. Positive number
C. Zero
D. Imaginary numbers

When an imaginary number is raised to an even exponent, it

A. Becomes infinite
B. Becomes negative imaginary number
C. Becomes relatively small number
D. Becomes real number

The complex number is in the form of a + bi, if a = 0, what do you call the resulting number?

A. Absolute value of the complex number
B. Pure imaginary number
C. Argument
D. Irrational number

For a complex number a + bi, the real number sqrt(a^2+b^2) is _____ of the complex number.

A. Absolute value
B. Magnitude
C. Modulus
D. All of the above

The _____ of two complex number is found by multiplying each term of the one by every term of the other.
A. Sum
B. Difference
C. Product
D. Quotient

A number which can be expressed as a quotient of two integers (division of zero excluded) is called

A. Irrational number
B. Rational number
C. Imaginary number
D. Real number

A prime number has exactly how many divisors?

A. 1
B. 2
C. 3
D. 4

A prime number is an integer greater than 1 which has

A. 1 as its only positive divisor
B. Itself as its only positive divisor
C. 1 and itself as its only positive divisors
D. 1 and its additive inverse as its only positive divisor

An integer which is the product of two integers, both different from 1 and -1 is called

A. Prime number
B. Composite number
C. Rational number
D. Compound number

A composite number has a least _____ divisors.

A. 1
B. 2
C. 3
D. 4

Two natural numbers a and b are _____. If their greatest common divisor is 1.

A. Relatively prime
B. Relatively composite
C. Equal
D. Reciprocal

Numbers used to count the objects or ideas in a given collection

A. Cardinal numbers
B. Irrational numbers
C. Ordinal numbers
D. Numerals

Numbers which is used to state the position of individual objects in a sequence

A. Cardinal numbers
B. Irrational numbers
C. Ordinal numbers
D. Numerals

An integer that is equal to the sum of al its possible divisors except the number itself is called

A. Amicable number
B. Perfect number
C. Defective number
D. Redundant number

An integer the sum of all its possible divisors except the number itself is greater than the integer is called

A. Abundant number
B. Amicable number
C. Friendly number
D. Defective number

An integer the sum of all its possible divisors except the number itself is less than the integer is called

A. Abundant number
B. Amicable number
C. Friendly number
D. Defective number

What is the smallest perfect number possible?

A. 1
B. 6
C. 12
D. 8

All perfect numbers are

A. Even numbers
B. Odd numbers
C. Prime numbers
D. Composite numbers

Two integer numbers are said to be _____ if each is the sum of all possible divisors of the other.

A. Perfect numbers
B. Defective numbers
C. Amicable numbers
D. Fermat's numbers

What is another name for amicable numbers?

A. Compatible numbers
B. Friendly numbers
C. Fermats numbers
D. Inconsistent numbers

What is the smallest pair of friendly number?

A. 180 and 190
B. 200 and 120
C. 220 and 284
D. 220 and 264

Prime numbers that appear in pair and differ by 2 (e.g. 3 and 5, 11 and 13 etc.) are called

A. Mersenne primes
B. Prime number theorem
C. Twin primes
D. Pseudo primes

"Every even integer greater than 2 can be written as the sum of two primes." This is known as

A. Fermat's last theorem
B. Goldbach conjecture
C. Prime number theorem
D. Mersenne primes

"Every positive integer greater than 1 is a prime or can be expresses as a unique product of primes and powers." This is known as

A. Fundamental theorem of arithmetic
B. Pseudo prime theorem
C. Prime number theorem
D. Mersenne's theorem

"Every sufficiently large off number can be expresses as a sum of three prime numbers". This is known as

A. Goldbach conjecture
B. Vinogradov's theorem
C. Pascal's law
D. Mersenne's theorem

The term "ratio" comes from Latin verb "ratus" meaning

A. To divide
B. To estimate
C. To get the mean
D. To make a proportion

In the proportion of four quantities, the first and fourth terms are referred to as the

A. Means
B. Extremes
C. Denominators
D. Numerators

The first term of a ratio is called

A. Antecedent
B. Consequent
C. Mean
D. extreme

The second term of a ratio is called

A. antecedent
B. mean
C. consequent
D. extreme

The _____ is the square root of the product of the extremes.

A. Antecedent
B. Consequent
C. Mean proportional
D. Mean

If the means of a proportion are equal, their common value is called

A. Mean
B. Extreme
C. Mean proportional
D. Extreme proportional

The theorem that in every arithmetic progression a, a + d, a = 2d….. where a and d are relatively prime.

A. Fibonacci theorem
B. Gauss theorem
C. Lejeune theorem
D. Dirichlet theorem

A statement that one mathematical expression is greater than or less than another is called

A. Absolute condition
B. Non-absolute condition
C. Inequality
D. Conditional expression

If an equality is true for all values of the variable, it is a/an

A. Conditional inequality
B. Equivalent inequality
C. Absolute inequality
D. Non-conditional inequality

If the same number is added to both sides of an inequality, the inequality

A. Becomes negative
B. Becomes positive
C. Is reversed
D. Is preserved

An inequality is preserved if both sides are multiplied by

A. Zero
B. -1
C. A positive number
D. A negative number

An inequality is reversed if both sides are multiplied by

A. Zero
B. -1
C. A positive number
D. A negative number

Division of a population or same into two groups based either on measurable variables (e.g. age under 18, age over 180) or on attributes (e.g. male, female).

A. Decomposition
B. Denomination
C. Deviance
D. Dichotomy

A 3 x 2 matrix can be multiplied to a

A. 3 x 2 matrix
B. 3 x 2 matrix
C. 2 x 5 matrix
D. Row matrix

If there are as many equations as unknowns, the matrix of the coefficient is a

A. Row matrix
B. Column matrix
C. Square matrix
D. Rectangular matrix

A method of solving linear equation with several unknowns simultaneously using determinants

A. Simpson's rule
B. Cramer's rule
C. Trapezoidal rule
D. Chain rule

Using Cramer's rule, the determinant of the coefficient is always is always the

A. Numerator of a quotient
B. Denominator of a quotient
C. The quotient itself
D. None of the above

In any square matrix, when the elements of any tow rows are exactly the same (i.e. row 1 = row 2 or row 1 = row 3, or row 2 = row 3…), the determinant is

A. Zero
B. Positive integer
C. Negative integer
D. Unity

When the corresponding elements of two rows of a determinant are proportional, then the value of the determinant is

A. One
B. Indeterminate
C. Infinite
D. Zero

An array of mxn quantities which represent a single number and is composed of elements in rows and columns is known as

A. Transpose of a matrix
B. Determinant
C. Co-factor of a matrix
D. Matrix

When two rows are interchanged in position, the value of the determinant will

A. Remain unchanged
B. Be multiplied by -1
C. Becomes zero
D. Becomes infinite value

If every elements of a row (or column) are multiplied by a constant, k, then the value of the determinant is

A. Multiplied by –k
B. Zero
C. One
D. Multiplied by k

If two rows of a determinant are interchange, the determinant

A. Changes sign
B. Changes sign and value
C. Remain unchanged
D. Becomes the inverse of the former

Which of the following cannot be an operation of matrices?

A. Addition
B. Subtraction
C. Multiplication
D. Division

An irrational number which is a root of a positive integer of fraction is called

A. Radical
B. Radix
C. Surd
D. Radicant

The symbol (n)^√(b) means the principal nth root. “n” is called the

A. Radicand
B. Radical
C. Radix
D. Index

In the preceding item, “b” is called the

A. Radicand
B. Radical
C. Radix
D. Index

The symbol √ is called

A. Radical
B. Radical symbol
C. Index
D. A or B

The rules of combining radicals follow the rules for

A. Signed numbers
B. Logarithm
C. Fractional exponents
D. factoring

When a number has both a positive and negative nth root, the principal nth root is

A. the positive root
B. the negative root
C. both the positive and the negative root
D. none of the above

Every positive number as _____ nth root

A. zero
B. two
C. two
D. three

The principal nth root of a negative number is the negative root if n is

A. even
B. odd
C. positive
D. negative

To eliminate a surd, multiply it by its

A. square
B. cube
C. reciprocal
D. conjugate

A radical which is equivalent to a non-terminating and non-repeating decimal.

A. Irrational number
B. Natural number
C. Surd
D. Transcendental number

A radical expressing an irrational number is called a

A. Surd
B. Radix
C. Index
D. Complex number

A surd which contains at least one rational term.

A. Pure surd
B. Mixed surd
C. Binomial surd
D. Conjugate surd

A surd that contains no rational number, that is, all its factors or terms are surds, example: √3 or √3 + √2

A. Mixed surd
B. Pure surd
C. Binomial surd
D. Conjugate surd

The process of removing surd from a denominator is to

A. Rationalize the denominator
B. Invert the divisor and proceed to multiplication
C. Get its multiplicative inverse
D. Multiply it why its additive inverse

A quadratic equation of the form ax^2 + c = 0, without the coefficient of the first degree term is a/an

A. General quadratic equation
B. Pure quadratic equation
C. Quadratic polynomial
D. Incomplete quadratic equation

In the quadratic equation Ax^2 + Bx + C = 0 , when the two roots are multiplied, the result is

A. C/A
B. –B/A
C. –C/A
D. A/C

In the quadratic equation Ax^2 + Bx + C = 0 , when the two roots are added, the result is

A. C/A
B. –B/A
C. –C/A
D. A/C

If the discriminant of a quadratic equation of a quadratic equation is less than zero, the equation has

A. No real root
B. One root only
C. Two real roots
D. None of the above

When can we say that the two roots of a quadratic equation are equal?

A. When the discriminant is greater than 1
B. When discriminant is zero
C. When the coefficient of the second degree term is equal to the coefficient of the first degree term
D. None of the above

What is the discriminant of the quadratic equation Ax^2 + Bx + C = 0?

A. √(B^2 – 4AC)
B. B^2 – 4AC
C. B^2 + 4AC
D. √(B^2 + 4AC)

What determines the nature of the roots of a quadratic equation?

A. Coefficient
B. Discriminant
C. Factors
D. All of the above

The real roots of a cubic equation are the

A. Points of inflection of the graph of the equation
B. Points of intersection of the graph of the equation with the x-axis
C. Points of intersection of the graph of the equation with the y-axis
D. Obtained by using the quadratic formula

For a cubic equation, if the discriminant is equal to zero, we produce

A. Three equal roots
B. One real root and two conjugate complex roots
C. Three distinct real roots
D. Three real roots, of which two are equal

For a cubic equation, we produce three distinct real roots only if the discriminant is

A. Equal to zero
B. Less than zero
C. Greater than zero
D. Either less than or greater than zero

For a cubic equation, the discriminant is found to be greater than zero. The roots are

A. One real and two conjugate complex roots
B. Three distinct roots
C. Three real roots, which two are equal
D. None of these

A succession of numbers in which one number is designated as first, another as second, another as third and so on is called

A. Series
B. Arrangement
C. Arrangement
D. Sequence

An indicated sum a_1 + a_2 + a_3 + … is called

A. Series
B. Sequence
C. Arrangement
D. Partial sum

The repeating decimal 0.333… is a geometric sequence of a_1 = 0.3 and r =

A. 3/10
B. 1/10
C. 10
D. 5

A progression whose reciprocal forms an arithmetic progression

A. Arithmetic means
B. Harmonic means
C. Geometric progression
D. Harmonic progression

The number between two geometric terms.

A. Means
B. Arithmetic means
C. Geometric means
D. Median

The sum of the first n terms of a series is called the nth _____.

A. Sum
B. Sequence
C. Arrangement
D. Partial sum

The sum of the terms of an arithmetic progression

A. Arithmetic means
B. Arithmetic sequence
C. Arithmetic series
D. All of the above

The harmonic mean between a and b

A. (a+b)/2
B. 2ab/(a+b)
C. (a+b)/ab
D. ab/(a+b)

The arithmetic mean of a and b is

A. (a + b)/2
B. 2ab/(a+b)
C. (a+b)/ab
D. ab/(a+b)

The geometric mean of a and b is

A. (a + b)/2
B. 2(a + b)
C. ab/ (a + b)
D. √(ab)

Are numbers which can be drawn as dots and arranged in triangular shape (i.e. 1, 3, 6, 10, 15, 21…)

A. Triangular number
B. Square numbers
C. Pentagonal numbers
D. Tetrahedral numbers

A figure numbers which can be drawn as dots and arranged in square shape (i.e. 1, 4, 9, 16, 25…)

A. Cubic numbers
B. Square numbers
C. Pyramid numbers
D. Pentagon numbers

A sequence 1, 5, 12, 22, 35… is known as

A. Oblong numbers
B. Pentagonal numbers
C. Cubic numbers
D. Pyramid numbers

A sequence 1, 8, 27, 64, 125, 216… is known as

A. Pyramid numbers
B. Cubic numbers
C. Tetrahedral numbers
D. Square numbers

(Note: Answer C if the same choices)

A sequence 1, 4, 10, 20, 35, 56… is known as

A. Pyramid numbers
B. Cubic numbers
C. Tetrahedral numbers
D. Square numbers

A sequence of numbers where every term is obtained by adding all the preceding terms a square number series such as 1, 5, 14, 30, 55, 91…

A. Pyramid numbers
B. Tetrahedral numbers
C. Euler's numbers
D. Triangular number

A sequence of numbers where the number is equal to the sum of the two preceding numbers such as 1, 1, 2, 3, 5, 8, 13, 21… is called

A. Fermat's numbers
B. Fibonacci's numbers
C. Gaussian numbers
D. Archimedean numbers

What is the multiplicative inverse of the integer 5?

A. 1
B. 5
C. -5
D. 1/5

What is the additive identity element?

A. 0
B. 1
C. -1
D. infinity

What is the multiplicative identity element?

A. 0
B. 1
C. -1
D. infinity

The number 0 such that 0 + a = a for all a is called the

A. additive inverse
B. additive identity
C. commutative law of addition
D. associate law of addition

The additive inverse of a complex number a + bi is

A. a – bi
B. a + bi
C. –a – bi
D. –a + bi

All real numbers have additive inverse, commonly called

A. Reciprocals
B. Opposites
C. Addends
D. Equivalent

All real numbers except zero have multiplication inverses, commonly called

A. Equivalents
B. Factors
C. Opposites
D. Reciprocals

The number zero has no

A. Multiplicative inverse
B. Additive inverse
C. Multiplicative identity
D. Additive identity

What is the additive inverse of a + bi?

A. bi
B. –a – bi
C. 1/(a + bi)
D. a - bi

What is the multiplicative inverse of a + bi?

A. 0
B. 1
C. –a – bi
D. (a/(a^2 + b^2)) – bi/(a^2 + b^2)

Which of the following is NOT a property of a binomial expansion of (x+y)^n ?

A. Power of x is decreasing
B. Power of y is increasing
C. Sum of exponents in each term = n
D. Number of terms = n-1

A triangular array numbers forming the coefficient of the expansion of a binomial is called

A. Egyptian triangle
B. Golden triangle
C. Pascal's triangle
D. Bermuda triangle

The coefficient of the second term of the expansion of (x + y)^n is always equal to

A. n
B. n -1
C. n + 1
D. n/2

How is a number in the Pascal's triangle obtained?

A. By getting the product of the two numbers directly above it.
B. By getting the sum of the two numbers directly above it.
C. By getting the difference of the two numbers directly above it.
D. By getting the mean of the two numbers directly above it.

If the sign between the terms of the binomial is negative, its expansion will have signs which are

A. All positive
B. All negative
C. Alternate starting with positive
D. Alternate starting with negative

In the absence of the Pascal's triangle, the coefficient of any term of the binomial expansion can be obtained by dividing the product of coefficient of the preceding term and exponent of x of the preceding term by _____ of the preceding term.

A. The exponent of y
B. The exponent of y + 1
C. The exponent of y – 1
D. The square root of y

The fundamental principle of counting states that id one thing can be done in "m" different ways and another thing can be done in "n" different ways, then the two things can be done in _____ different ways.

A. m + n
B. m x n
C. m! + n!
D. m^n

Is the arrangement of the objects in specific order

A. Permutation
B. Combination
C. Probability
D. Any two of the above

Is the arrangement of objects regardless of the order they are arranged.

A. Permutation
B. Combination
C. Probability
D. Any two of the above

The shifting of the entire order sequence of elements one or more steps forwards to backward – the first element taking the position of the last, or vice versa without changing the order of the elements in the sequence is called

A. Inversion
B. Cyclic permutation
C. Transposition
D. Identical elements

The number of elements in the collection being permuted is the _____ of the permutation.

A. Degree
B. Sum
C. Index
D. All of the above

The ratio of the successful outcomes over the total possible outcomes is called

A. Combination
B. Permutation
C. Probability
D. Speculation

The value of probability of any outcome will never be equal to nor exceed

A. 0.1
B. 0.5
C. 0.75
D. 1

If two events A and B are mutually exclusive events and the probability that A will happen is P_a and the probability that B will happen is P_b, then the probability that A or B happen is

A. P_a + P_b
B. P_a x P_b
C. P_a / P_b
D. P_b / P_a

A and B are two independent events. The probability that A can occur is p and that for both A and B to occur is q. The probability that event B can occur is

A. p + q
B. p – q
C. p / q
D. q / p

If the probability of occurrence of a is P_a, what is the probability that will not occur?

A. 1 / P_a
B. 1 – P_a
C. 1 + P_a
D. √(P_a)

In statistics, a pictorial description of the probability concepts of independent and dependent events is called

A. Venn diagram
B. Histogram
C. Frequency polygon
D. Ogive

The difference between the highest score and the lowest score in the distribution

A. Deviation
B. Range
C. Median
D. Mode

The second power of the standard deviation is called

A. Mode
B. Central tendency
C. Variance
D. Dispersion

A graph of cumulative frequency distribution plotted at class marks and connected by straight lines

A. Histogram
B. Venn diagram
C. Ogive
D. Scattergram

A point in the distribution of scores at which 50 percent above of the scores fall below and 50 percent of the scores fall above

A. Mode
B. Mean
C. Median
D. Range

A number that occurs most frequent in a group of numbers

A. Median
B. Mode
C. Means
D. Standard deviation

The difference between an approximate value of a quantity and its exact value or true vale

A. Relative error
B. Absolute error
C. Mistake
D. Relative error

It is the quotient of the absolute error divided by the true value.

A. Relative error
B. Relative change
C. Absolute error
D. Mistake

Refers to a value which is not exact but might be accurate enough for some specific considerations

A. Approximate value
B. Absolute value
C. Relative value
D. Accurate value

If the absolute error does not exceed a half unit in the last digit, this digit is usually referred to as the

A. Significant digit
B. Leading digit
C. Reliable digit
D. Relative digit

The most significant digit of the number 0.2015 is

A. 0
B. 1
C. 2
D. 5

The _____ is stated in the magnitude of the absolute or relative error of the approximated value.

A. Precision
B. Accuracy
C. Mistake
D. Error

The first non-zero digit from the left of the number

A. Whole number
B. Leading digit
C. Tens digit
D. Units digit

It is any one of the digit from 1 to 9 inclusive, and 0 except when it is used to place a decimal

A. Leading digit
B. Significant figure
C. Decimal number
D. Numerals

In algebra, the operation of the root extraction is called

A. Evolution
B. Involution
C. Revolution
D. Indexing

The operation of raising to the integral power known as

A. Evolution
B. Involution
C. Revolution
D. Indexing

Each of two or more numbers which is multiplied together to form a product are called

A. Terms
B. Expression
C. Dividends
D. Factors

When the factors of a product are equal, the product is called a _____ of the repeated factor.

A. Coefficient
B. Identity
C. Power
D. Algebraic form

A relation in which every ordered pair (x, y) has one and only one value of y that corresponds to the value of x is called

A. Term
B. Coordinates
C. Function
D. Domain

Indicate the false statement

A. The objects in a set are called its elements
B. Ever number is either rational or irrational
C. The additive inverse of number "a" is 1/a
D. The negative of zero is zero

A symbol holding a place for an unspecified constant is called

A. Arbitrary constant
B. Parameter
C. Variable
D. All of the above

Which of the following is NOT true about significant figures?

A. All non-zero digits are significant
B. Any zero between non-zero digits are significant
C. Any zero not needed for placing a decimal point is not significant
D. Zeros used for the purpose of placing a decimal point are not significant

The sum of any point number and its reciprocal is

A. Always less than 2
B. Always equal to 2
C. Always greater than 2
D. Always equal to the number's additive inverse

What is the absolute value of a number less than one but greater than negative one raised to exponent infinity?

A. Infinity
B. Zero
C. One
D. Indeterminate

If a is an odd number and b is an even number, which of the following expression must be even?

A. a + b
B. a – b
C. ab
D. a/b

In the equation n x m = q, n is called

A. multiplier
B. minuend
C. multiplicand
D. product

Any one of the individual constants of an expressed sum of constant is called

A. addend
B. multiple
C. factor
D. summation

In the equation of 5 + 2 = 7, 5 is known as

A. augend
B. minuend
C. dividend
D. addend

A number of the form a + bi with a and b real constant and i is the square root of -1

A. imaginary number
B. complex number
C. radical
D. compound number

The absolute value of a non-zero number is

A. always zero
B. always negative
C. always positive
D. sometimes zero and sometimes positive

A polynomial which is exactly divisible by two or more polynomials is called

A. least common denominator
B. common multiple
C. factors
D. binomial

A polynomial with real coefficient can be factored into real linear factors and irreducible _____ factors

A. linear
B. quadratic
C. cubic
D. repeated

If the degree of the numerator is one more than the degree of the denominator, the quotient is _____ polynomial

A. linear
B. quadratic
C. cubic
D. quantic

Which of the following statements is NOT true?

A. The sum of even number is even
B. The difference of even number is even
C. The product of even numbers is even
D. The quotient of even numbers is even

For every law of addition and subtraction, there is a parallel law for multiplication and division, except division by

A. Negative values
B. Zero
C. One
D. Positive values

Indicate the FALSE statement

A. The multiplicative identity is 1
B. The product of a positive number and a negative number is negative
C. ab = ba is the associative law for multiplication
D. x^2 – y^2 = (x + y)(x – y)

For any two rational number a/b and c/d, which of the following relations is true?

A. a/b + c/d = ab/cd
B. a/b + cd = (ab + cd)/ad
C. a/b + c/d = (ad + bc)/bd
D. ab + cd = ac/bd

Two rational numbers a/b and c/d are said to be equal if

A. ad = bc
B. ac = bd
C. ab = cd
D. a + b = c + d

Any number divided by infinity equals

A. 0
B. 1
C. Infinity
D. indeterminate

A study of the properties of positive integer is known as

A. Number of Theory
B. Theory of equation
C. Sat Theory
D. Arithmetic

Indicate the FALSE statement

A. A quotient of two polynomials is called as rational algebraic expression
B. a^2 – b^2 = (a+b)(a^2 – ab + b^2)
C. The equation ax + b = 0 has exactly one root
D. The equation 3x^2 + 2y^2 – 3x + 2y = 0

A number is said to be in _____ when it is written as the product of a number having the decimal point just after the leading digit, and a power of 10

A. Scientific notation
B. Exponential
C. Irrational
D. Logarithm

A number which cannot be a root of an integral rational equation is called

A. Transcendental number
B. Euler's number
C. Irrational number
D. Natural number

Refers to the numbers which are not the roots of any algebraic equation

A. Irrational numbers
B. Transcendental numbers
C. Imaginary numbers
D. Composite

All number multiplied by _____ equals unity.

A. Negative of the number
B. One
C. Conjugate
D. Its reciprocal

The number denoted as "e" and equal to 2.718… is called the

A. Einstein constant
B. Euler's number
C. Fibonacci number
D. Fermat's number

A notation that represent the product of all positive integers from 1 to a number, n, inclusive

A. Factorial
B. Exponent
C. Summation
D. All of the above

Simplify (n!)/(n-1)!

A. n + 1
B. n – 1
C. (n + 1)!
D. n

The factorial symbol (!) was introduced in 1808 by

A. Christian Goldbach
B. Christian Kramp
C. Christian Leatner
D. Robert Hooke

The conjecture that every even number (except 2) equals the sum of two prime numbers

A. Goldbach conjecture
B. Fibonacci series
C. Number conjecture
D. Fermat's last theorem

The unending sequence of integers formed according to the rule that each integer is the sum of the preceding two.

A. Fermat's last theorem
B. Fibonacci numbers
C. Goldbach conjecture
D. Triangular numbers

It was a conjecture that the number in the form F_p = 2^(p+1) will always result to a prime number, however proved wrong. What do you call the numbers obtained using the said formula?

A. Mersene numbers
B. Fermat numbers
C. Euler numbers
D. Pseudo prime

A theorem which states that if n > 2, the equation x^n + y^n = z^n cannot be solved in positive integers x, y, and z

A. Pythagorean theorem
B. Mersenne theorem
C. Goldbach conjecture
D. Fermat's theorem

The number pi = 3.141592563… If only four decimals are required, it becomes 3.1415 This process is called

A. Rounding off
B. Truncation
C. Rounding up
D. Rounding down

A set of all subsets of a given set, containing the empty set and the original set

A. Empty
B. Null
C. Power set
D. Union

A set containing the elements that is common to the original sets

A. Union
B. Intersection
C. Normal set
D. Subset

If an infinite series has a finite sum, it is referred to as a

A. Convergent series
B. Divergent series
C. Geometric series
D. None of the above

If an infinite series has no sum, it is referred to as a

A. Convergent series
B. Divergent series
C. Geometric series
D. None of the above

The sum of the factorial infinite 1 + 1/1! + ½! + 1/3! + ¼! + …. Is

A. Pi
B. e
C. √2
D. √3

Refers exclusively to equations with integer solutions

A. Determinate equations
B. Indeterminate equations
C. Diophantine equations
D. L'Hospital's equations

"My Dear Aunt Sally" is the basic rule used in operation of algebra. Which is used in determining the signs of trigonometric functions in all quadrants?

A. All chemists thick solution
B. All students can think
C. All students take chemistry
D. All teachers can sing

The investigation of numbers, space and many generalizations of these concepts created by the intellectual genius of man

A. Science
B. Arts
C. Mathematics
D. Astronomy

QED is often written at the end of a proof to indicate that its conclusion has been reached. This means

A. quod erat daciendum
B. duod erat demonstradum
C. quod erat dacientrandum
D. none of the above

A sequence of numbers where the succeeding term is greater than the preceding term

A. Isometric series
B. Divergent series
C. Dissonant series
D. Convergent series

The process of reasoning wherein a final conclusion is obtained by experimental method

A. Mathematical deduction
B. Mathematical opposition
C. Mathematical conversion
D. Mathematical induction

The set of all subsets of a given set, containing the empty set and the original set

A. Intersection
B. Power set
C. Proper subset
D. Improper subset

A sequence having a defined first and last terms is called

A. Infinite sequence
B. Convergent sequence
C. Divergent sequence
D. Finite sequence

A series is said to be _____ if it converges when the terms are replaced by their absolute value

A. Absolute convergent
B. Conditional convergent
C. Infinite convergent
D. Finite convergent

A convergent series is said to be _____ if it diverges when the terms are replaces by their absolute values

A. Absolute convergent
B. Conditional convergent
C. Infinite convergent
D. Finite convergent

Refers to the product of the several prime numbers occurring in the denominations, each taken with its greater multiplicity

A. Least Common Denominator
B. Least common multiple
C. Least square
D. A or B

The sum of the exponents of the several variables of the term is referred to as the _____ of the term

A. Power
B. Degree
C. Partial product
D. Absolute power

Venn diagram is a pictorial representation which helps us visualize the relations and operation with sets. This was introduced by

A. John Venn
B. Jan Michael Venn
C. James Venn
D. Stephen Venn

The symbol of equality (=) was introduced in 1557 by

A. Bhaskara
B. Brahmagupta
C. Leonhard Euler
D. Robert Recorde

Sin A cos B – cos A sin B is equivalent to:

A. Cos (A-B)
B. Sin (A-B)
C. Tan (A-B)
D. Cos2 (A-B)

The angular distance of a point on the terrestrial sphere from the north pole is called

A. Coaltitude
B. Latitude
C. Altitude
D. Codeclination

Csc 520° is equal to

A. Cos 20°
B. Csc 20°
C. Tan 45°
D. Sin 20°

What is the sine of 820°?

A. 0.984
B. 0.866
C. -0.866
D. -0.5

The logarithm of the negative number is

A. Imaginary
B. Irrational
C. Real
D. Rational

The sum of the squares of the sine and cosine of an angle.

A. 0
B. 1
C. 2
D. 3

The logarithm of a number to the base e (2.7182….) is called

A. Napierian logarithm
B. Characteristic
C. Mantissa
D. Briggsian logarithm

The characteristic is equal to the exponent of 10, when the number is written in

A. Exponential form
B. Scientific notation
C. Logarithmic form
D. Irrational number

Napierian logarithms have a base closest to which number?

A. 2.72
B. 2.82
C. 2.92
D. 10

The logarithm of 1 to any base is

A. Indeterminate
B. Zero
C. Infinity
D. One

Sin (270° + B) is equal to

A. –cos B
B. sin B
C. –sin B
D. cos B

The sum of the angles in an octant spheric triangle is

A. 180°
B. 270°
C. 360°
D. 540°

The median of a triangle is the line connecting the vertex and the midpoint of the opposite side. For a given triangle, these medians intersects at a point which is called the

A. Orthocenter
B. Circumcenter
C. Centroid
D. Incenter

The altitudes of the sides of the triangle intersects at the point known as

A. Orthocenter
B. Circumcenter
C. Incenter
D. Centroid

The angle which the line of sight to the object makes with the horizontal which is above the eye of the observer is called

A. Angle of depression
B. Angle of elevation
C. Acute angle
D. Bearing

Log M – log N id equal to

A. Log MN
B. Log (M-N)
C. Log M/N
D. Log (N-M)

The other form of log_a N = b is

A. N = b^a
B. N = a^b
C. N = ab
D. N = a/b

The point of concurrency of the altitude of the triangle.

A. Orthocenter
B. Centroid
C. Metacenter
D. Incenter

The point of concurrency of the perpendicular bisector of the sides of the triangle.

A. Orthocenter
B. Circumcenter
C. Centroid
D. Incenter

The point of concurrency of the angle bisector of the triangle is called

A. Orthocenter
B. Circumcenter
C. Centroid
D. Incenter

The inverse function of a logarithm is known as

A. Antilogarithm
B. Cologarithm
C. Antiderative
D. Antecedent

The cologarithm of a number is the _____ of the logarithm of a number.

A. Positive
B. Absolute value
C. Negative
D. Reciprocal

The first table logarithms with 10 as base was developed in 1615 by

A. James Naismith
B. Henry Briggs
C. John Napier
D. John Wallis

Who invented logarithms in 1614?

A. John wallis
B. Henry Briggs
C. John Napier
D. L'Hospital

The number log_a b is called the _____ of the system of a base a with respect to the system of base b.

A. Coefficient
B. Logarithm
C. Modulus
D. Exponent

Napierian logarithm has a base of

A. Pi
B. 10
C. 1
D. e

Log x = _____ ln x.

A. 0.434
B. 10
C. 2.303
D. e

ln x = _____ log x

A. 0.434
B. 10
C. 2.303
D. e

Which of the following cannot be a base for a logarithm?

A. 10
B. Pi
C. 1
D. e

The integral part of a common logarithm is

A. 10
B. E
C. Mantissa
D. Characteristic

The mantissa of a logarithm is a

A. Positive value only
B. Negative value only
C. Positive value, negative value or zero
D. Positive value or zero

For 0 < x < 1, ln x is

A. Positive
B. Zero
C. Negative
D. Between 0 and 1

If 1 < N < 10, then

A. 1 < log N < 2
B. 0 < log N < 1
C. 2 < log N < 3
D. -1 < log N < 0

To change log_a to log_b N, multiple log_a N by

A. Log_a b
B. Log_b a
C. Log_N a
D. Log_N b

The numbers log_a b and log_b a are

A. Equal
B. Equal but different in signs
C. Reciprocal to each other
D. Negative reciprocal to each

Logarithm using 10 as base.

A. Decimal logarithm
B. Scientific logarithm
C. Common logarithm
D. Natural logarithm

The logarithm of a product is the _____ of the logarithms, and the logarithm of a quotient is the _____ of the logarithms.

A. Sum, difference
B. Difference, sum
C. Quotient, product
D. Product, quotient

When a logarithm is expressed as an integer plus a decimal (between 0 and 1), the integer is called

A. Briggsian logarithm
B. Napierian logarithm
C. Mantissa
D. Characteristic

The characteristic of a logarithm is 3. The number between

A. 1 and 10
B. 10 and 100
C. 100 and 1000
D. 1000 and 10000

The characteristics of the common logarithm of a number greater than 1 is

A. Zero
B. Positive
C. Negative
D. Zero or positive

The characteristic is _____ the exponent of 10, when the number is written in scientific notation.

A. Equal to
B. Greater than
C. Less than
D. None of the above

If logarithm to base 10 (denoted as log_10) is called common logarithm is called natural logarithm, what do you call the logarithm of base 2 (denotes as lb)?

A. Binary logarithm
B. Bit logarithm
C. Bilogarithm
D. All of the above

If the unknown is a conditional equation occurs as an exponent, the best way to solve the unknown is by

A. Raising the power of both sides
B. Taking the logarithm of both sides
C. Extracting the root of both sides
D. Applying the Newton's method

Angles of rotation with the same initial side and terminal side

A. Terminal angles
B. Conjugate angles
C. Coterminal angle
D. Supplementary angles

An angle equal to one revolution of 360°

A. Perigon
B. Explement angle
C. Reflex angle
D. Supplement angle

The angle which the line of sight to the object makes with the horizontal is above the eye of an observer

A. Angle of depression
B. Angle of elevation
C. Acute angle
D. Bearing

The angle which the line of sight to the object makes with the horizontal is below the eye of an observer

A. Angle of depression
B. Angle of elevation
C. Acute angle
D. Bearing

A triangle inscribed in a given triangle whose vertices are the feet of the three perpendiculars to the sides from the same point inside, the given triangle.

A. Inscribed triangle
B. Primitive triangle
C. Pedal triangle
D. Obtuse triangle

The triangle with minimum perimeter but maximum area inscribed in another triangle is known as

A. Pedal triangle
B. Euclid's triangle
C. Primitive triangle
D. None of the above

A right triangle whose length of sides may be expressed as ratio of integral units

A. Pedal triangle
B. Isosceles triangle
C. Scalene triangle
D. Primitive triangle

A triangle with no side equal is known as

A. Acute triangle
B. Oblique triangle
C. Equilateral triangle
D. Scalene triangle

If two triangles have congruent bases, then the ratio of their areas equals the ratio of

A. Their perimeters
B. The lengths of their altitudes
C. Their sides
D. None of the above

In an isosceles right triangle, the hypotenuse is _____ times as long as each of the legs.

A. Sqrt(2)
B. Sqrt(3)
C. 2
D. 3

Which of the following is not a secondary part of a triangle?

A. Altitudes
B. Medians
C. Exterior angles
D. Sides

Which of the following is not a property of a triangle?

A. The sum of the three angles is always equal to two right angles
B. The sum of two sides is less than the third side
C. If the two sides are equal, the angles opposite are unequal.
D. The altitudes of the triangle meet in a point.

Given the sides of a triangle as 3 m and 5 m. The third side is

A. Between 3 m and 8 m
B. Greater than 8 m
C. From 3 m to 7 m
D. From 2 m to 8 m

A straight from the vertex of a triangle to the midpoint of the opposite side is known as

A. Altitude
B. Median
C. Height
D. A or B

Indicate the false statement

A. An altitude of a triangle is a perpendicular drop from any vertex to the opposite side
B. Three or more lines which have one point in common and said to be coplanar
C. The altitudes of a triangle meet in a point
D. A locus is a figure containing all the points and only those which fulfill a given requirement.

The case of the solution of the triangle in the plane where the given data lead to two solutions

A. Axioms of Euclid
B. Absurb case
C. Ambigous case
D. All of the above

The most proved theorem in Mathematics

A. Gauss lemma
B. Fermat's theorem
C. Ptolemy's theorem
D. Pythagorean theorem

The least proved theorem in Mathematics.

A. Goldbach conjecture
B. Fermat's last theorem
C. Mersenne's proportion
D. Pappus proportions

Equations used for checking the solution to a plane triangle using law of sine's are as follows: (Equation) and (Equation). These equations are called

A. Diophantine equations
B. Mollweide's equations
C. Mohr equations
D. Gauss equations

Napier's rule states that the sine of any middle part is equal to the product of the _____ of the opposite parts.

A. Sine
B. Cosine
C. Tangent
D. Secant

Napier's rule states that the sine of any middle part is equal to the product of the _____ of the adjacent parts.

A. Sine
B. Cosine
C. Tangent
D. Cotangent

How many formulas may be derived from using the Napier's Rules?

A. 5
B. 6
C. 8
D. 10

The sum of all interior angles in a spherical triangle is always

A. Greater than 180° but less than 270°
B. Greater than 180° but less than 360°
C. Greater than 180° but less than 540°
D. Greater than 270° but less than 540°

The maximum value for the longitude is

A. 90°
B. 180°
C. 45°
D. 360°

The maximum value for a latitude is

A. 90°
B. 45°
C. 180°
D. 360°

If R is the radius of a sphere and E is an spherical excess (in radians), then the area of a spherical triangle is

A. Pi R^2 E
B. R^2 E
C. ½ R^2 E
D. R^2 / E

One minute of the great circle arc on the surface of the earth is equivalent to

A. 1 statute mile
B. 1 nautical mile
C. 60 statute mile
D. 60 nautical mile

A spherical triangle with all angles equals to a right triangle is called _____ spherical triangle.

A. Birectangular
B. Quandrantal
C. Trirectangular
D. Right

A spherical triangle with at least one side is a quarter of a great circle is called _____ spherical triangle.

A. Octant
B. Quadrantal
C. Trirectangular
D. Birectangular

One of the two great circles intersecting at right angle at the piles and dividing equinoctial points and ecliptic into 4 parts

A. Nadir
B. Zenith
C. Declination
D. Colure

The radius of the earth used in spherical trigonometry is

A. 3989 statute miles
B. 3979 statute miles
C. 3969 statute miles
D. 3959 statute miles

The difference between a nautical mile and a statute mile

A. 800 feet
B. 900 feet
C. 1000 feet
D. 500 feet

Manila has a longitude of 121°05'E. What is the time difference between Manila and Greenwich, England which is at prime meridian?

A. 8 hours and 40 minutes
B. 8 hours and 34 minutes
C. 8 hours and 14 minutes
D. 8 hours and 4 minutes

The earth is divided into how may time zone?

A. 24
B. 18
C. 16
D. 12

In a spherical triangle, two angles (or sides) are on the same species if they are both

A. Between 0° and 180°
B. Between 0° and 90°
C. Between 90° and 180°
D. Between 0° and 90° or both between 90° and 180°

Spherical degree is a unit of a spherical area taken as 1/720 of the surface of the sphere. How many spherical degrees a hemisphere have?

A. 360°
B. 720°
C. 180°
D. 270°

Which of the following statements is false about spherical trigonometry?

A. If two angles of a spherical triangle are equal, the sides opposite are equal and conversely
B. If two angles of a spherical triangle are unequal, and the greater side lies opposite the greater angle, and conversely.
C. The sum of two sides of a spherical triangle is greater than the third sides.
D. The sum of all interior angles of a spherical triangles is 360°

The sum of the sides of a spherical triangles is always less than

A. 270°
B. 360°
C. 540°
D. 180°

The sum of any two angles of a spherical triangle is

A. Greater than 180°
B. Less than 180°
C. Less than 180° + the third angle
D. Greater than 180° + the third angle

Refers to the angular distance from the equator measured along a meridian.

A. Longitude
B. Latitude
C. Meridian
D. Declination

Refers to the angle at either pole between the meridian passing through a point and some fixed meridian known as the prime meridian.

A. Longitude
B. Latitute
C. Declination
D. Equinox

Is half of a great circle terminated by the North Pole and South Pole

A. Longitude
B. Latitude
C. Declination
D. Meridian

When the hypotenuse of a right spherical triangle is less than 90°

A. The two legs are on the same quadrant
B. The two legs are on the different quadrant
C. One leg is one the first quadrant and the other on the second quadrant
D. None of the above

When the hypotenuse of a right spherical triangle is greater than 90°.

A. The two legs are on the same quadrant
B. The two legs are on the different quadrant
C. One leg is one of the first quadrant and the other on the second quadrant
D. None of the above

The point where a ray from the center of the earth through an observer's position on it intersects the celestial sphere is call the observer's

A. Zenith
B. Nadir
C. Pole
D. Equinox

The point that is diametrically opposite the zenith is called

A. Pole
B. Equinox
C. Nadir
D. Celestial meridian

The great circles through the north and south celestial poles are called

A. Hour circles
B. Celestial meridians
C. Elevated poles
D. A and B

An oblique equilateral parallelogram:

A. Square
B. Rectangle
C. Rhombus
D. Trapezoid

Mil is a unit of

A. Angle
B. Length
C. Angle and length
D. Weight

The perpendicular segment from a vertex of the triangle to the line containing the opposite side

A. Altitude
B. Median
C. Angle bisector
D. Apothem

The angle which the line of sight to the object makes with the horizontal is below the eye of the observer

A. Angle of depression
B. Angle of elevation
C. Acute angle
D. Bearing

A pair of equal angles form by parallel lines and a third line intersecting the parallel lines.

A. Alternate angles
B. Vertical angles
C. Oblique angles
D. Adjacent angles

The point at the top of a pyramid or triangle

A. Apex
B. Helix
C. Vertex
D. Convex

The theorem that shows the relation between the three sides of the triangle and the length the medium of the triangle from one vertex to the opposite sides of the triangle.

A. Apponias theorem
B. Bramagupthas theorem
C. Descartes theorem
D. Pythagoras theorem

The inverse of cosine function or arc cosine is known as

A. Acosec
B. Acosech
C. Acosh
D. Acos

The inverse of hyperbolic cosine or arcosh is known as

A. Acosec
B. Acosech
C. Acosh
D. Acos

The logarithm having a base 2 is known as

A. Binary logarithm
B. Briggsian logarithm
C. Naperian logarithm
D. Natural logarithm

The perpendicular bisector of the sides of a triangle pass through a common point which is equivalent from the three vertices of the triangle is called

A. Excenter
B. Circumcenter
C. Incenter
D. Orthocenter

The circle circumscribing a triangle has its center at the intersection of the perpendicular bisector of the triangle.

A. Excircle
B. Incircle
C. Escribed circle
D. Circum circle

Any line segment joining a vertex of a triangle to a point on the opposites side

A. Median
B. Secant line
C. Cevian
D. Euclidian line

The logarithm of the reciprocal of a number equal to the additive inverse of its logarithm

A. Antilogarithm
B. Cologarithm?
C. Natural logarithm
D. Reciprocal logarithm

Another term for radius of an escribed circle of a triangle

A. Inradius
B. Circumradius
C. Orthoradius
D. Eradius

The center of an escribed circle of a triangle

A. Ecenter
B. Incenter
C. Orthocenter
D. Circumcenter

An angle whose vertex is a point on the circle and whose sides are chords

A. Circumscribed angle
B. Escribed angle
C. Inscribed angle
D. Reflex angle

The decimal part of the logarithm of a number

A. Characteristic
B. Mantissa
C. Base
D. Exponent

The square of the hypotenuse of a right triangle is equal to the squares of the squares of the other two sides or legs

A. Pythagorean theorem
B. Ptolemy's theorem
C. Aristotle's theorem
D. Euclid's theorem

The triangle formed inside a triangle by connecting the points where the altitudes of the triangle touches the opposite sides as drawn from each vertices

A. Inscribed triangle
B. Median triangle
C. Pedal triangle
D. Ortho triangle

The trigonometric function equal to one minus the cosine function

A. Versed sine
B. Co-versed sine
C. Arcsine
D. Arcsine

Numbers between 0 and 1 have

A. Positive logarithms
B. Negative logarithms
C. Complex logarithms
D. Zero logarithm

The logarithm of 1 to the base 8 is

A. 1
B. 1/8
C. 0
D. 8

The logarithm of one is

A. Indeterminate
B. Zero
C. Infinity
D. undefined

The space between two lines meeting at a point called vertex

A. angle
B. plane
C. distance
D. altitude

A path consisting of two or more straight lines

A. curve line
B. locus
C. trial
D. broken line

The longest side of a right triangle or the side opposite to the right angle.

A. Slant height
B. Leg
C. Hypotenuse
D. Base

The distance between a center and a vertex of a regular polygon.

A. Apothem
B. Median
C. Long radius
D. Hypotenuse

The perpendicular bisector of a line segment

A. Mediator
B. Divider
C. Altitude
D. Orthobisector

The angular distance of an astronomical body above or below an observer's horizon.

A. Altitude
B. Slant height
C. Azimuth
D. Normal

The angle between any two radii is

A. Inscribed angle
B. Central angle
C. Polar angle
D. Dihedral angle

Refers to a line of symmetry of a given figure

A. Reference
B. Symmetry
C. Boundary
D. Axis

A single line which forms a tangent to two or more separate curves.

A. Common secant
B. Common tangent
C. Chord
D. Normal

An angle that is half the straight angle

A. Acute angle
B. Right angle
C. Reflex angle
D. Oblique angle

A line drawn between any two non-adjacent vertices of a polygon

A. Altitude
B. Median
C. Bisector
D. Diagram

The procedure for estimating intermediate value that are not listed in a table of numerical values.

A. Interpolation
B. Manipulation method
C. Telescoping process
D. Trial and error method

The operation of root extraction

A. Involution
B. Evolution
C. Rationalization
D. Manipulation

The operation of raising to an integral power x^n

A. Involution
B. Evolution
C. Rationalization
D. Expansion

A plane surface of a geometric figure

A. Base
B. Plane
C. Face
D. Surface

Each interior angle of an equilateral triangle is equal to

A. 30°
B. 60°
C. 90°
D. 45°

The difference between an approximate value and the true value which it approximates

A. Error
B. Balance
C. Residue
D. Correction factor

A unit of angle measurement with one revolution equivalent to 400 gradians

A. Gradian
B. Degree
C. Mil
D. Revolution

A right triangle whose length of sides may be expressed as ratio of integral units.

A. Pedal triangle
B. Isosceles triangle
C. Scalene triangle
D. Primitive triangle

A triangle with no side equal is known as

A. Acute triangle
B. Oblique triangle
C. Equilateral triangle
D. Scalene triangle

If two triangles have congruent bases, then the ratio of their areas equals the ratio of

A. Their perimeter s
B. Their sides
C. The lengths of their altitudes
D. None of the above

In an isosceles right triangle, the hypotenuse is _____ times as long as each of the legs.

A. Sqrt(2)
B. Sqrt(3)
C. 2
D. 3

Which of the following is not a secondary part of a triangle?

A. Altitudes
B. Medians
C. Exterior angles
D. Sides

An annulus is a plane figure which is composed of two concentric circles. The area of the annulus can be calculated by getting the difference between the area of the larger circle and the area of the smaller circle. Also, its area can be calculated by removing the hole. This method is called

A. Law of extremities
B. Law of reduction
C. Law of deduction
D. Sharp theorem

Each of the faces of a regular hexahedron is a

A. Square
B. Triangle
C. Rectangle
D. Hexagon

It is a polyhedron of which two faces are equal polygons in parallel planes and other faces are parallelograms

A. Tetrahedron
B. Prism
C. Frustum
D. Prismatoid

The apothem of a polygon is _____ or its inscribed circle.

A. Radius
B. Circumference
C. Diameter
D. Length

Each angle of regular dodecagon is equal to

A. 135
B. 150
C. 125
D. 105

The area bounded by two concentric circles is called

A. Ring
B. Disk
C. Annulus
D. Sector

One-fourth of a great circle is called

A. Cone
B. Sector
C. Quadrant
D. Arc

Points that lie on the same plane are called

A. Coplanar
B. Parallel
C. Collinear
D. Oblique

The volume of a circular cylinder is equal to the product of its base and altitude

A. Axiom
B. Postulate
C. Theorem
D. Corollary

The study of properties of figures in three dimensions.

A. Physics
B. Plane trigonometry
C. Solid geometry
D. Trigonometry

A plane closed curve, all points of which are the same distance from a point within, called the center.

A. Polyhedron
B. Polygon
C. Circle
D. Ellipse

What is the angle of pi and less than 2pi?

A. Straight line
B. Obtuse angle
C. Oblique angle
D. Acute angle

What is the value in degrees of 1 radian?

A. 90°
B. 57.3°
C. 60°
D. 33°

Prisms are named according to their

A. Diagonals
B. Sides
C. Vertices
D. Bases

In plane geometry, two circular arcs that together make up a full circle are called

A. Coterminal arcs
B. Conjugate arcs
C. Congruent arcs
D. Half arcs

Polygons are classified according to the number of _____

A. Vertices
B. Sides
C. Diagonals
D. Angles

When two planes intersect with each other, the amount of divergence between the two plans is expressed by measuring the

A. Dihedral angle
B. Plane angle
C. Polyhedral angle
D. Reflex angle

An angular unit equivalent to 1/4000 of the circumference of a circle is called

A. Mil
B. Degree
C. Radian
D. Grad

Express 45° in mils

A. 80
B. 800
C. 1600
D. 2700

The arc length equal to the radius of the circle is called

A. Radian
B. Quarter sector
C. Sector
D. Semicircle

A five-pointed star is also known as

A. Pentagon
B. Pentatron
C. Pentagram
D. Quintagram

If two or more lines have a single point which lies on all of them, then they are

A. Collinear
B. Coplanar
C. Concurrent
D. Conjugate

The action of bringing one geometric figure into coincidence with another is called

A. Transposition
B. Translation
C. Superposition
D. Projection

A line that intersect two or more lines at distinct points

A. Tangent line
B. Transversal
C. Bisector
D. Median

An arc length equal to the radius of a circle

A. Grad
B. Radian
C. Degree
D. Mil

An angle which is 1/400th of the full revolution.

A. Gon
B. Mil
C. Degree
D. Radian

Another term for gon

A. Grad
B. Mil
C. Centesimal degree
D. A and C

An angle whose vertex is a point on the circle and whose sides are chords is known as

A. Interior angle
B. Vertical angle
C. Acute angle
D. Inscribed angle

An angle greater than the right angle but less than a straight angle

A. Acute angle
B. Obtuse angle
C. Reflex angle
D. Oblique angle

Any angle greater than a straight angle but less than two straight angles is known as _____ angle

A. Compliment
B. Supplement
C. Complex
D. Reflex

The angle formed by the prolongation of one side and the adjacent side of the polygon

A. Interior angle
B. Acute angle
C. Exterior angle
D. Explementary angle

Two angles which have the same vertex and the sides of one are form by extending the sides one are form by extending the sides of the other.

A. Adjacent angles
B. Vertical angles
C. Vertical angles
D. Deflection angles

Another term for exterior angle

A. Vertical angle
B. Inscribed angle
C. Reflex angle
D. Deflection angle

What is the sum of all deflection angles in given polygon?

A. Always less than 360°
B. Always equal to 360°
C. Always greater than 360°
D. Always equal to 180°

The coterminal angle is 120° is

A. 240°
B. -240°
C. 480°
D. -480°

Two planes intersect each other. What is the term for the angle formed perpendicular to the intersection of two planes?

A. Solid angle
B. Plane angle
C. Base angle
D. Dihedral angle

When a terminal side of an angle coincides with an axis, the angle is a

A. Co-terminal angle
B. Right angle
C. Quandrantal angle
D. Reflex angle

If the exterior angle of a polygon is obtuse, its corresponding interior angle is

A. An acute angle
B. Also an obtuse angle
C. A reflex angle
D. Always greater than 180°

The measure of 2.25 revolutions counterclockwise is

A. 835°
B. 805°
C. 810°
D. 815°

Solid angles are measured in

A. Mil
B. Radians
C. Steradians
D. Circular mils

What is the largest measure (in steradians) of a solid angle

A. 2pi
B. 4pi
C. 8pi
D. pi

Steradians measure in space in analog of _____ measured in the plane

A. radians
B. degrees
C. mils
D. grads

A part of a circle is called

A. sector
B. segment
C. chord
D. arc

It is a union of the chord of a circle and the intercepted arc

A. Sector
B. Segment
C. Lune
D. Zone

A _____ of a circle in the figure bounded by two radii and the intercepted arc.

A. Major arc
B. Minor arc
C. Segment
D. Sector

The apothem of a polygon is the _____ of its inscribed circle

A. Radius
B. Circumference
C. Diameter
D. Length

As the area of the circle increases, the ratio of its circumference to its diameter

A. Increases
B. Remains constant
C. Decreases
D. Will be equal to 1

A circle is said to be _____ to a polygon having the same perimeter with that of the circle

A. Congruent
B. Isoperimetric
C. Proportional
D. Convex

Which of the following is NOT a property of a circle?

A. Through 3 points not in a straight line, only one circle can be drawn.
B. A tangent to a circle is perpendicular to the radius at the point of tangency and conversely.
C. An inscribed angle is measured by one half of the intercepted arc.
D. The arcs of two circles subtended by equal central angles are always equal.

All circles having the same center but of unequal radii are called

A. Concentric circles
B. Eccentric circles
C. Inner circles
D. Pythagorean circles

Two chords of a circle which joints a point on the circle to the end points of a diameter and forms a right angle.

A. Complementary chords
B. Supplementary chords
C. Focal chords
D. Chords of contrast

The center of the inscribed circle of a triangle is known as known as _____ of the triangle.

A. Circumcenter
B. Incenter
C. Excenter
D. Orthocenter

Supplementary chords are two chords which join a point on the circle to the endpoints of a diameter. The supplemental chords subtend a/an angle.

A. Acute
B. Right
C. Obtudse
D. Reflex

A circle of radius R has a curvature of

A. R^2
B. 1/R
C. 2R
D. Sqrt(R)

A polygon is _____ when no side, when extended will pass through the interior of the polygon.

A. Convex
B. Equilateral
C. Isoperimetric
D. Similar

A polygon is said to be a regular polygon if its is

A. Convex
B. All sides are congruent
C. All angles are congruent
D. All of the above

Polygon inscribed in the same circle is called

A. Concentric polygons
B. Ocentric polygons
C. Concyclic polygons
D. Orthocentric polygons

If n is the number of sides of a polygon, then the sum of all interior angles of a polygon is expressed as

A. (n+2)180°
B. (n/2)180°
C. (n-2)180°
D. (n/2)(n-3)

If n is the number of sides of a polygon, then the number of diagonals of a polygons is expressed as

A. n!
B. (n-1)!
C. (n/2)(n-3)
D. (n/3)(n-2)

What do you call a polygon with 11 sides?

A. Unagon
B. Unogon
C. Undecagon
D. Dodecagon

Pentagon is to 5 sides as _____ is to 11 sides

A. Heptagon
B. Septagon
C. Unidecagon
D. Hendecagon

A polygon having 12 sides is called

A. Bidecagon
B. Dodecagon
C. Nonagon
D. Pentedecagon

A polygon of 100 sides is called

A. Chilliagon
B. Ennagon
C. Perigon
D. Milliagon

The highest point of a figure relative to a baseline or plane is called

A. Summit
B. Summit
C. Highest ordinate
D. Terminal point

Indicate the false statement

A. A trapezoid is a quadrilateral two and only two of whose sides are parallel
B. The sum of two sides of a triangle is greater than the third side and their difference is less than the third side.
C. A diagonal of a polygon is a line joining any non-consecutive vertices.
D. Two angles are complementary if their sum is equal to 180°

Which of the following statements is correct?

A. All right-angles triangles are similar.
B. All isosceles triangles are similar.
C. All equilateral triangles are similar.
D. All rectangles are similar.

A quadrilateral with no sides parallel

A. Trapezoid
B. Rhombus
C. Rhomboid
D. Trapezium

Which of the following BEST describes Ptolemy's theorem?

A. It is use only for quadrilaterals.
B. It is just a modification of Brahmagupta's theorem
C. It is used only for cyclic quadrilaterals
D. The sum of the square of the sides is equals to the square of the diagonals of a given quadrilateral

The five pointed star described by the diagonal of a regular pentagon.

A. Perigon
B. Pentagram
C. Penacle
D. Pentagram or penacle

The geometric figure remaining after a parallelogram has been removed from the corner of a large similar polygon.

A. Google
B. Gnomon
C. Gaussian plane
D. Lozenge

An oblique-angled parallelogram with for sides equal is called

A. Rhombus
B. Diamond
C. Lozenge
D. All of the above

A non-convex quadrilateral with two pairs of adjacent equal sides is called

A. Trapezium
B. Kite
C. Deltroid
D. Diamond

What is another term for parallelogram?

A. Rectangle
B. Quadrangle
C. Diamond
D. Rhomboid

Prisms are classified according to their

A. Bases
B. Prism
C. Truncated prism
D. Prismatoid

A Solid cut of a given solid by two non parallel planes is called

A. Frustum
B. Prism
C. Truncated prism
D. Prismatoid

A polyhedron having bases two polygons in parallel planes and for lateral faces triangles or trapezoids with one side lying on the other base of the polyhedron.

A. Pyramid
B. Cone
C. Prismatoid
D. Truncated prism

Portion of the regular solid left after cutting off the upper part by a plane parallel to the base.

A. Frustum
B. Ungula
C. Truncated solid
D. Prismatoid

Body or space bounded by surface every point of which is equidistant from a point within

A. Circle
B. Sphere
C. Spheroid
D. Ellipsoid

A solid bounded by a zone and the planes of the zone's base.

A. Spherical sector
B. Spherical segment
C. Lune
D. Spherical excess

The intersection of the sphere and the plane through the center is called

A. Great circle
B. Small circle
C. Poles
D. Polar distance

The portion of a sphere enclosed between two great semi-circles having common end points, including the semi-circle

A. Spherical excess
B. Spherical segment
C. Zone
D. Lune

A portion of the surface of a sphere included between two parallel planes.

A. Spherical excess
B. Spherical segment
C. Zone
D. Lune

If R is the radius of the sphere and h s the distance between two parallel plane, the area of the zone is

A. 2 pi R h
B. 4 pi R h
C. pi h^2 (3R-h)/3
D. 4 pi (R-h)

The solid bounded by two great circles and the surface of a sphere is known as

A. Spherical zone
B. Spherical segment
C. Spherical cone
D. Spherical wedge

A cone or cylinder with its top cut off by a plane oblique to the base.

A. Frustum
B. Prismoid
C. Prismatoid
D. Ungula

A term given to cylinder with elliptical cross-section

A. Cylindroid
B. Cylindoid
C. Ovaloid
D. Deltroid

A doughnut-like surface of revolution generated b rotating the circle through 360° in space about a line in its place but now passing through the circle.

A. Torus
B. Annulus
C. Anchor
D. All of the above

A regular solid star in a shape that is radiating from center like rays of star.

A. Pentagram
B. Pentagon
C. Stellated solid
D. Archimedean solid

Formed by intersection of rays from one point reflected or refracted from a curvature surface.

A. Envelop
B. Caustic
C. Evolute
D. Pencil

The regular polyhedron is a solid with all its face identical regular polygons. The regular polyhedrons are also known as

A. Euclidian solids
B. Pythagorean solids
C. Platonic solids
D. Newtonian solids

There are how many regular polyhedral known to man?

A. 5
B. 3
C. 7
D. 10

An icosahedron is a regular polyhedron of _____ faces.

A. 12
B. 14
C. 16
D. 20

A regular polyhedron with 6 sides is called

A. Dodecahedron
B. Hexahedron
C. Tetrahedron
D. Octahedron

The face of a regular tetrahedron is a

A. Square
B. Pentagon
C. Hexagon
D. Triangle

The face of a regular octahedron is a

A. Square
B. Pentagon
C. Hexagon
D. Triangle

The face of a regular dodecahedron is a

A. Square
B. Pentagon
C. Hexagon
D. Triangle

The face of a regular Icosahedron is a

A. Square
B. Pentagon
C. Hexagon
D. Triangle

Which regular polyhedron does not have a face a triangle?

A. Tetrahedron
B. Octahedron
C. Icosahedron
D. Dodecahedron

How many edges are there in a dodecagon?

A. 6
B. 12
C. 30
D. 8

A tetrahedron has _____ vertices.

A. 4
B. 3
C. 6
D. 5

Given two solids and a plane. Supposed that every plane parallel to the given plane intersecting one of the two solids, also interacts the other and gives cross-sections with the same area, then the two solids have the same volume. This is known as the

A. Unit postulate
B. Plane postulate
C. Parallel postulate
D. Cavalieri's postulate

Who formulated the Cavalieri's Principle?

A. Harold Cavalieri
B. Buenventura Cavalieri
C. Joefry Cavalieri
D. Carl Cabalieri

A line segment that is divided into two segments, a greater a and a smaller b such that the length of a + b is to a and a is to b. Such division is known as

A. Golden segment
B. Golden ratio
C. Golden proportion
D. All of the above

The volume of a paraboloid is equal to _____ the volume of circumscribing cylinder.

A. 1/3
B. 1/2
C. 1/4
D. 2/3

The portion of a sphere included between two parallel planes.

A. Spherical wedge
B. Spherical pyramid
C. Spherical segment?
D. Spherical sector

The portion of a sphere generated by the revolution of a circular sector about any diameter of the circle of which the sector is a part.

A. Spherical wedge
B. Spherical pyramid
C. Spherical segment
D. Spherical sector?

A solid bounded by a surface all points of which are equidistant from a point call the center.

A. Ellipsoid
B. Sphere?
C. Paraboloid
D. Hyperboloid

The portion of a sphere bounded by a spherical polygon and the planes of its sides.

A. Spherical wedge
B. Spherical segment
C. Spherical pyramid?
D. Spherical sector

The intersection of a sphere and a plane not passing through the center.

A. Great circle
B. Small circle?
C. Poles of circle
D. Hair circle

The ends of a diameter of a sphere which is perpendicular to the plane of a circle of the sphere.

A. Great circle
B. Small circle
C. Poles of a circle?
D. Hair circle

The opening between two great circle arcs

A. Spherical polygon
B. Spherical distance
C. Spherical angle?
D. Spherical arc

The portion of a spherical surface bounded by three or more great circle arcs.

A. Spherical polygon?
B. Spherical distance
C. Spherical angle
D. Spherical arc

A spherical polygon of the three sides.

A. Spherical polygon
B. Spherical wedge
C. Spherical triangle?
D. Spherical angle

The portion of a cone included between the base and a section parallel to the base.

A. Circle
B. Parallelepiped
C. Right prism
D. Truncated cone?

In general quadratic equation, if the discriminant is zero, the curve is a figure that represent a/an

A. Parabola
B. Circle
C. Ellipse
D. Hyperbola

Equations relating x and y that cannot readily be solved explicitly for y as a function of x or for x as a function of y. Such equations may nonetheless determine y as a function of x or vice versa, such function is called

A. Logarithmic function
B. Implicit function
C. Explicit function
D. Continuous function

In polar coordinates system, the length of the ray segment from a fixed origin is known as _____.

A. Amplitude
B. Radius vector
C. Hypotenuse
D. Minimum point

Given the equations 3x^2 + 2x – 5y + 7 = 0. Determine the curve

A. Ellipse
B. Parabola
C. Hyperbola
D. Circle

If eccentricity is less than one, then the curve is

A. Parabola
B. Ellipse
C. Hyperbola
D. Circle

Of what quadrant is A, if sec A and csc A is negative?

A. IV
B. I
C. III
D. II

If the general equation of the conic is Ax^2 + 2Bxy + Cy^2 + Ey + F = 0, and B^2 – 4AC > 0, then the conic is a/an

A. Circle
B. Parabola
C. Hyperbola
D. Ellipse

What type of conic has equation of Ax^2 + Cy^2 + Dx + Ey + F = 0?

A. Circle
B. Parabola
C. Ellipse
D. Hyperbola

4x^2 – 256 = 0 is the equation of a/an

A. Parabola
B. Parallel lines
C. Circle
D. ellipse

The graph of r = a + b cosθ is a

A. Lemniscate
B. Lituus
C. Limacon
D. Cardioid

In an ellipse, a chord which contains a focus and is in line perpendicular to the major axis is called

A. Focal width
B. Conjugate axis
C. Focal chord
D. Latus rectum

If all the y-terms have even exponents, the curve is symmetric with respect to the _____.

A. X-axis
B. Origin
C. Y-axis
D. Line 45° with the x-axis

It can be defined as the set of all points in the plane the sum of whose distances from two fixed points is a constant.

A. Circle
B. Hyperbola
C. Parabola
D. Ellipse

If the equation is unchanged by the substitution of –x to x, its curve is symmetric with respect to the

A. X-axis
B. Y-axis
C. Origin
D. Line 45° with the axes

What type of curve is generated by a point which moves in uniform circular motion about an axis, while travelling with a constant speed parallel to the axis?

A. Spiral of Archimedes
B. Epicycloid
C. Cycloid
D. Helix

What is the graph of the equation Ax^2 + Bx + Cy^2 + Dy + Ex + F = 0?

A. Circle
B. Ellipse
C. Parabola
D. Hyperbola

It represents the distance of a point from the y-axis.

A. Ordinate
B. Abscissa
C. Coordinates
D. Polar distance

A line passing through the focus and perpendicular to the directrix of a parabola is called

A. Axis of parabola
B. Tangent line
C. Secant line
D. Latus rectum

Locus of points on a side which rolls along a fixed line.

A. Cardioid
B. Epicycloid
C. Cycloid
D. Hypocycloid

What is the length of the latus rectum of the curve x^2 = 20y?

A. 5
B. 20
C. Sqrt(20)
D. Sqrt(5)

If the product of the slopes of any two straight lines is negative 1, one of these is said to be _____ to the other.

A. Parallel
B. Skew
C. Non-intersecting
D. Perpendicular

What is the curve represented by the equation r = aθ ?

A. Spiral of Archimedes
B. Rosette
C. Cardioid
D. Lemniscate

Is the locus of a point that moves in a plane so that the difference of the distances from two fixed points of the locus is constant.

A. Ellipse
B. Circle
C. Parabola
D. Hyperbola

The semi-conjugate axis of the hyperbola (x^2/9) – (y^2/4) = 1

A. 3
B. -3
C. -2
D. 2

The length of the latus rectum of the parabola y = 4px^2 id

A. 4p
B. 2p
C. 1/4p
D. -4p

The tangent function is negative in what quadrants?

A. I and III
B. IV
C. II and IV
D. III

The Cartesian or rectangular coordinates system was first introduces by

A. Newton
B. Galileo
C. Descartes
D. Euclid

Also known as the x-coordinate

A. Abscissa
B. Ordinate
C. Polar ordinate
D. Radius vector

The x-coordinate of a point is positive in what quadrants?

A. I and II
B. II and IV
C. I and IV
D. II and III

The y-coordinate of a point is positive in what quadrants?

A. II and III
B. I and II
C. III and IV
D. II and IV

State the quadrants in which the coordinates (15, -2) lies.

A. I
B. II
C. III
D. IV

The rectangular coordinates system used to represent a complex number.

A. Argand diagram
B. Venn diagram
C. Complex diagram
D. Maxwell's diagram

A Cartesian coordinates system in which the axes are not perpendicular.

A. Parallelogram coordinates system
B. Oblique coordinates system
C. Polar coordinates system
D. Argand diagram

The angle of rotation about the origin of the positive x-axis into the point with rectangular coordinates (a, b), representing the complex number a + bi is called _____ of the complex number.

A. Amplitude
B. Argument
C. Phase angle
D. All of the above

The rectangular coordinates system in space is divided into eight compartments called

A. Quadrants
B. Octants
C. Cubicles
D. Octodrants

The angle of inclination of a straight line is the angle it makes with the

A. Positive x-axis
B. Negative x-axis
C. Positive y-axis
D. Negative y-axis

The points where the curve crossed the coordinates axes are called the _____ with the axes.

A. Asymptotes
B. Intercepts
C. Intersections
D. Tangent and normal

A line which is perpendicular to the x-axis has slope equal to

A. Zero
B. One
C. Infinity
D. Either zero or infinity

A horizontal line has a slope of

A. Zero
B. Negative
C. Infinity
D. Positive

A line parallel to the y-axis at a directed distance x_1 has the equation

A. y = y_1
B. x = x_1
C. y = x_1
D. x = y_1

Let m_1 and m_2 be the respective slopes of two perpendicular lines. Then

A. m_1 + m_2 = 1
B. m_1 + m_2 = 0
C. (m_1)(m_2) = 1
D. (m_1)(m_2) = -1

If all the y-terms have even exponents, the curve is symmetric with respect to the

A. Line 45 ° with the axis
B. X-axis
C. Y-axis
D. Origin

If the equation is unchanged by the substitution of –x for x and –y for y simultaneously, its curve is symmetric with respect to the

A. X-axis
B. Y-axis
C. Line 45° with the axes
D. Origin

If all of the terms of an equation have an exponenets of if all of the terms have odd exponents, the curve is symmetric with respect to the

A. X-axis
B. Y-axis
C. Line 45° with the axes
D. Origin

If two linear equations, the x-coefficient of the first is equal to the y-coefficient of the send and the y-coefficient of the first is numerically equal but of opposite sign to the x-coefficient of the second, or vice-versa, the lines represented are

A. Parallel to each other
B. Perpendicular to each other
C. At 45° with each other
D. None of the above

A cubic equation has either three real roots or one real root and two conjugate imaginary roots. The real roots are the points of intersection with

A. The x-axis
B. The y-axis
C. The z-axis
D. The line 45° with the x-axis

If two equations have the same line as their graph, the equations are said to be

A. Dependent
B. Consistent
C. Independent
D. Linear

The points (a, 1), (b, 2), (c, 3) are collinear. Which of the following is TRUE?

A. c – b = c – a
B. c – b = b – a
C. c – a = a – b
D. c – a = b – a

In a linear equation Ax + By + C = 0, if B = 0, then the equation has the form of x = -C/A. This line is

A. 45 ° with the axis
B. Intersecting the origin
C. Parallel to the x-axis
D. Parallel to the y-axis

The straight lines 4x – y + 3 = 0 and 8x – 2y + 6 = 0 are

A. Perpendicular to each other
B. Intersecting but not perpendicular
C. Parallel to each other
D. Are coincident

Which of the following is the intercept form of an equation for straight lines?

A. y = mx + b
B. (x/a) + (y/b) = 1
C. y – y_1 = m (x – x_1)
D. (x – a) + (y – b) = 1

A straight line where the curve approaches more and more closely but never touches it except at a limiting point of infinity.

A. Asymptotes
B. Axis of symmetry
C. Tangent
D. Normal

Who coined the word “asymptote”?

A. John Venn
B. John Navier
C. Thomas Hobbes
D. John Wallis

The path of a point which moves according to a given law or equation.

A. Cycloid
B. Asymptote
C. Locus
D. Directrix

The curve traced by a point moving in a plane is shown as the _____ of the point.

A. Parameter
B. Pattern
C. Formula
D. Locus

A conic section is curve which is the intersection of

A. Two cones
B. A cone and a line
C. A cone and a plane
D. A cone and an axis

When the ellipse approaches a circle as a limiting shape, its eccentricity approaches

A. 0
B. 1
C. -1
D. infinity

The set of points in a plane, the sum of whose distances from a fixed points is constant, is

A. circle
B. parabola
C. hyperbola
D. ellipse

If a right circular cone is cut by a plane parallel to its bas, it would reveal a/an

A. circle
B. parabola
C. ellipse
D. hyperbola

A _____ to a circle is a line that has exactly one point in common with the circle.

A. Diameter
B. Secant
C. Normal
D. Tangent

A conic section whose eccentricity is always less than 1.

A. Parabola
B. Circle
C. Ellipse
D. Hyperbola

A locus of appoint which moves so that the sum of the distances from two fixed points (foci) is constant and is equal to the length of the major axis.

A. Parabola
B. Circle
C. Ellipse
D. Hyperbola

If the distance from the center to the focus of an ellipse is c, from the center to the vertex is a and from the center to the directrix is D, its eccentricity, is

A. D/c
B. D/a
C. c/D
D. c/a

A locus of a point which move so that it is always equidistant from a fixed point (focus) and from a fixed straight line (directrix)

A. circle
B. ellipse
C. parabola
D. hyperbola

The angle between the tangents at the end points of the latus rectum of a parabola is

A. 45°
B. 75°
C. 75°
D. 90°

The tangents to the parabola at the end points of its latus rectum intersect

A. At a distance equal to the length of the latus rectum from the focus
B. At the vertex
C. At the directrix
D. None of the above

In general equation of a conic section Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0, if A and C have different signs, then the curve is a/an

A. Circle
B. Parabola
C. Ellipse
D. Hyperbola

If the discriminant of a quadratic equation is greater than zero, the graph is a/an

A. Circle
B. Parabola
C. Ellipse
D. Hyperbola

A chord passing through the focus of a parabola and perpendicular to the axis of symmetry

A. Directrix
B. Translated axis
C. Latus rectum
D. Axis

The graph of the equation r = a cos 2θ is a

A. Limacon
B. Lemniscate
C. Rosette
D. spiral

The locus of a point which rolls on a straight line (x-axis)

A. Cycloid
B. Epicycloid
C. Astroid
D. Trochoid

The equation r = a (1+cosθ) is a polar equation of

A. Hypocycloid
B. Cycloid
C. Cardioids
D. Spiral

The equation r^2 = a^2 cosθ is a

A. Rosette
B. Limacon
C. Lemniscate
D. spiral

The equation r = a cosθ is a

A. rosette
B. limacon
C. lemniscate
D. spiral

The equation r – aθ = 0 is a

A. rosette
B. limacon
C. lemniscate
D. spiral

The equation r = a cosθ + b is a

A. rosetter
B. limacon
C. lemniscate
D. spiral

The equation r = a(secθ – tanθ) is a

A. rosetter
B. strophoid
C. trisectrix
D. lemniscate

The equation r = a(4cosθ – secθ) is a

A. cardioid
B. trisectrix
C. strophoid
D. fishmouth

The equation (x^2 + 2ay – a^2) = y^2 (a^2 – x^2) is a

A. rosette
B. cocked hat
C. fishmouth
D. spiral

The equation x^2 + y^2 = a^2

A. cocked hat
B. fishmouth
C. trisectrix
D. lames quartic

The equation ax^2 = y^2 (2a – y) is the equation of

A. the top
B. cocked hat
C. fishmouth
D. lames quartic

The equation (x^2 _ y^2) = a x^2 y^2 is an equation of

A. bifolium
B. cocked hat
C. spiral
D. limacon

The equation y^2 = (x^2 + 1^2)^2 (2 – x^2)^3 is an equation of

A. cocked hat
B. fishmouth
C. spiral
D. lemniscate

A curve or surface that is tangential to each of the family of curves or surfaces.

A. Envelope
B. Pencil
C. Family
D. Cusp

A curve that describes the locus of the centers of curvatures of another curve to which its tangents are normal.

A. Involute
B. Evolute
C. Cusp
D. Lemniscate

_____ is formed by intersection of rays from the point reflected or refracted from a curve surface.

A. Envelope
B. Evolute
C. Caustic
D. Parabola

When f"(x) is negative the curve of y = f(x) is concave _____.

A. Downward
B. To the right
C. Upward
D. To the left

If the second derivative of the equation of a curve is equal to the negative of the equation of that same curve, the curve is

A. A paraboloid
B. A sinusoid
C. A cissoid
D. An exponential

A function F(x) is called _____ of f(x) if F'(x) = f(x).

A. Explicit function
B. Derivative
C. Implicit function
D. Antiderivative

Points of derivatives which do not exists (and so equals zero) are called _____.

A. Stationary points
B. Minimum points
C. Maximum points
D. Minimum and maximum

At the point of inflection where x = a,

A. f"(a) ≠ 0
B. f"(a) = 0
C. f"(a) > 0
D. f"(a) < 0

At the minimum point, the slope of the tangent line is

A. negative
B. infinity
C. positive
D. zero

What is the point where the second derivative is zero?

A. Maxima
B. Minima
C. Inflection point
D. Point of intersection

The point on the curve where the second derivative of a function is equal to zero is called

A. Maximum
B. Minima
C. Point of inflection
D. Critical point

The point of the curve where the first derivative of a function is zero and the second derivative is positive is called

A. Maxima
B. Minima
C. Point of inflection
D. Critical point

Evaluate the integral of tanh u du.

A. ln sinh u + c
B. ln cos h u + c
C. cosh u + c
D. coth u + c

The derivative of a^u with respect to x is

A. a^u ln a(du/dx)
B. a^u ln u(du/dx)
C. u^a ln a(du/dx)
D. u^a ln u(du/dx)

If y = tanhx, find dy/dx.

A. sech^2 x
B. –sech^2 x
C. sech x tanh x
D. –sech x tanh x

The field of mathematics which rest on upon the fundaments concept of limits and was created by Newton and Leibniz

A. Physics
B. Calculus
C. Boolean Algebra
D. Quantum Mechanics

The _____ of a relation is the set of second elements of the pair in the relation

A. Domain
B. Range
C. Graph
D. Function

A relation in which there is exactly one range element associated with each domain element

A. Graph
B. Set
C. Formula
D. Function

The _____ of a relation is the set of first elements of pairs in the relation.

A. Domain
B. Range
C. Graph
D. Function

Any set of ordered pair is called a

A. Relation
B. Range
C. Domain
D. Graph

Any pair of elements (x, y) having a first element x and a second element y is called

A. Range
B. Domain
C. Coordinates
D. Ordered pair

The operation of finding the derivative of a function

A. Differentiating
B. Differentiation
C. Differential
D. Integrating

The derivative of a function is identical to the _____ of the graph of the function

A. Tangent
B. Secant
C. Slope
D. Normal

The _____ derivative of the function is the rate of change of the slope of the graph

A. First
B. Second
C. Third
D. Fourth

A point on the graph where the tangent line is either horizontal or vertical is known as

A. Point of inflection
B. Critical point
C. Stationary point
D. All of the above

The critical points of a graph occur when the derivative of a function is

A. Zero
B. Approaches infinity
C. Zero or approaches infinity
D. Either 1 or -1

At point of inflection,

A. y' = 0
B. y" = 0
C. y" is negative
D. y" is positive

At a point where y' = 0, if y changes from positive to negative as x increases

A. y is minimum
B. x is minimum
C. y is maximum
D. x is maximum

The point where the second derivative of a function is zero

A. Maximum point
B. Minimum point
C. Point of intersection
D. Point of inflection

The point where the first derivative of a function is zero and the second derivative is positive

A. Maximum point
B. Minimum point
C. Point of inflection
D. Critical point

A point at which the curve changes from concave upward to concave downward and vice versa is known as

A. Point of intersection
B. Point of deflection
C. Point of inflection
D. Yield point

At a point where y' = 0, if y changes from positive to negative as x increases

A. y is maximum
B. y is minimum
C. x is maximum
D. y is minimum

At maximum point,

A. the curve is concave downward
B. y" is negative
C. y' = 0
D. all of the above

_____ is also known as the composite function rule

A. L'Hospital rule
B. Trapezoidal rule
C. Simpson's rule
D. Chain rule

The L'Hospital rule was formulated by

A. Marquis de l'Hospital
B. Marrione de l'Hospital
C. J. Bernoulli
D. I. Newton

A collective term for maxima or minima, whether absolute of relative is called

A. Infinitium
B. Extrema
C. Domain
D. None of the above

Which of the following is not determinate form?

A. ∞.∞
B. ∞ + ∞
C. -∞ -∞
D. ∞ / ∞

Which of the following is determinate?

A. 0/0
B. 0.∞
C. ∞.∞
D. ∞^0

The derivative of csc θ is

A. sec θ tan θ
B. –csc^2 θ
C. –csc θ cot θ
D. –csc θ tan θ

Catenary is the shape assumed by perfectly flexible uniform cable hanging between supports. It is a graph of

A. Parabola
B. y = sinh x
C. y = cosh x
D. x = cosh y

The quantity 2/(e^x – e^-x) is equal to

A. cosh x
B. tanh x
C. csch x
D. sech x

What is 1 – tan h^2 x equal to?

A. sec h^2 x
B. cos h^2 x
C. cot h^2 x
D. csc h^2 x

In calculus, all functions are classified as either algebraic or transcendental. Which of the following is NOT an algebraic function?

A. Rational integral function
B. Irrational function
C. Rational fractional function
D. Exponential logarithmic function

The integral of sin^m θ cos^n θ dθ can easily be determined by using Wallis formula provided the limits are form

A. 0 to π
B. 0 to π/2
C. 0 to π/4
D. 0 to 2 π

The integral of any quotient whose numerator is the difference of the denominator is the _____ of the denominator

A. Reciprocal
B. Product
C. Logarithm
D. Derivative

Many integrals may be evaluated by introducing a new variable of integration in place of the original variable, the two variables being connected by some suitable formulas. This process is called

A. Integration by parts
B. Integration by substitution
C. Partial derivatives
D. The chain rule

The variable inside the integral is called variable of integration or integration variable. It is sometimes referred to as

A. Calculus variable
B. Dummy variable
C. Limits variable
D. Limits range

The value of x in trigonometric substitution with an integrand involving (a^2 – x^2) is

A. a sec θ
B. a tan θ
C. a cos θ
D. a sin θ

The area of the surface generated by rotating any plane curve about a certain axis in its plane id equal to the product of the length of the arc and the distance traveled by its centroid.

A. Varignon's theorem
B. First proposition of Pappus
C. Method of section
D. Second proposition of Pappus

The volume of any solid revolution is equal to the generating are times the circumference of the circle described by the centroid of the area. This is known as

A. First proposition of Pappus
B. Cavalieri's theorem
C. Second proposition of Pappus
D. Simpson's Rule

Newton was inspired by an apple. Pappus propositions were inspired by what fruits?

A. Apple and pear
B. Lemon and orange
C. Apple and Lemon
D. Apple and banana

When the ellipse is rotated about is shorter axis, the ellipsoid is

A. Paraboloid
B. Prolate
C. Spheroid
D. Oblate

When the ellipse is rotated about its longer axis, the ellipsoid is

A. Paraboloid
B. Prolate
C. Spheroid
D. Oblate

When a catenary (y = cosh x) is rotated about its axis of symmetry, it generates a solid called

A. Paraboloid
B. Conoid
C. Catenoid
D. Hyperboloid

A solid of revolution of a parabola is known as

A. Paraboloid
B. Hyperboloid
C. Catenoid
D. Conoid

A _____ section of a surface of revolution is the section containing the axis of revolution

A. Right
B. Central
C. Median
D. Meridian

An infinite series in which successive terms are of the form of constant times successive integral power of the variable. It takes the form of a_0 + a_1 x + a_2 x^2 + a_3 x^3 + ….

A. Fourier series
B. Taylor's series
C. McClaurin series
D. Power series

Who invented the symbol "∞" for infinity?

A. John Stockton
B. John Venn
C. John Wallis
D. John Napier

Calculus was invented by

A. Newton
B. Leibniz
C. Gauss
D. Newton and Leibniz

Varignon's theorem is used to determine

A. Location of centroid
B. Moment of inertia
C. Mass moment of inertia
D. Moment of area

In Physics, if Lf and Lv are the latent heat of fusion and vaporization, respectively, which of the following equations apply in determining the amount of energy needed to freeze a liquid?

A. Q = -mLf
B. Q = -mlV
C. Q = mLv
D. Q = mLf

_____ is the quality of being physically elongated

A. Flexibility
B. Ductility
C. Malleability
D. Plasticity

When the total kinetic energy of a system is the same as before and after collision of two bodies, it is called

A. Plastic collision
B. Inelastic collision
C. Elastic collision
D. Static collision

Momentum is a property related to the object's _____

A. Motion and mass
B. Mass and acceleration
C. Motion and weight
D. Weight and velocity

The amount of heat needed to change solid to liquid is

A. Condensation
B. Cold fusion
C. Latent heat of fusion
D. Solid fusion

The energy stored in a stretched elastic material such as a spring is

A. Mechanical energy
B. Elastic potential energy
C. Internal energy
D. Kinetic energy

According to this law, "The force between two charges varies directly as the magnitude of each charge and inversely as the square of the distance between them".

A. Law of universal gravitation
B. Coulomb's Law
C. Newton's Law
D. Inverse square law

A free falling body is a body in rectilinear motion and with constant _____

A. Acceleration
B. Speed
C. Deceleration
D. Velocity

Centrifugal force _____

A. Directly proportional to the radius of the curvature
B. Directly proportional to the square of the tangential velocity
C. Inversely proportional to the square of the tangential velocity
D. Directly proportional to the square of the weight of the object

The fluid pressure is the same in all directions. This is known as

A. Pascal's Principle
B. Bernoulli's Theorem
C. Ideal Fluid Principle
D. Archimedes principle

The reciprocal of bulk modulus of any fluid is called

A. Volume stress
B. Compressibility
C. Shape elasticity
D. Volume strain

Momentum is the product of mass and

A. Acceleration
B. Velocity
C. Force
D. Time

One horsepower is equivalent to

A. 746 watts
B. 7460 watts
C. 74.6 watts
D. 7.46 watts

What is the latent heat fusion required to turn ice to liquid?

A. 2, 256 kJ/kg
B. 970 BTU/lbm
C. 334 kJ.kg
D. 168 BTU/lbm

What is the value of the work done for a closed reversible, isometric system?

A. Positive or negative
B. Negative
C. Positive
D. Zero

The sum of the pressure head, elevation head and the velocity head remains constant. This is known as

A. Boyle's Law
B. Torrecelli's theorem
C. Archimedes principle
D. Bernoulli's theorem

A leak from a faucet comes out in separate drops. Which of the following is the main cause of this phenomenon?

A. Surface tension
B. Air resistance
C. Gravity
D. Viscosity of the fluid

Absolute viscosity is essentially independent of pressure and is primarily dependent on

A. Temperature
B. Density
C. Specific gravity
D. Velocity

In describes the luminous flux incidence per unit area and is expressed in lumens per square meter

A. Illuminance
B. Luminance
C. Luminous intensity
D. Radiance

When two waves of the same frequency, speed and amplitude traveling gin opposite directions are superimposed,

A. Standing waves are produces
B. Constructive interference always results
C. The phase difference is always zero
D. Destructive interference always results

Linear momentum is the product of mass and velocity and this can be expressed also as a function of

A. Force, acceleration, time
B. Force, velocity, time
C. Force, time
D. Force, displacement

The transmission of heat from one place to another by fluid circulation between the spots of different temperature is called

A. Convection
B. Radiation
C. Conduction
D. Conservation

It is the measure of randomness of the molecules of a substance

A. Entropy
B. Enthalpy
C. Internal energy
D. Kinetic energy

The amount of heat needed to raise the temperature of one pound of that substance one degree Fahrenheit is

A. Specific heat
B. BTU
C. Latent heat
D. Calorie

What is the gage used to measure 0.001 to 1 atm pressure?

A. Bourdon
B. Water manometer
C. Mercury manometer
D. Metallic diaphragm

One of the types of non-material nuclear radiation is

A. Transmission radiation
B. Walton radiation
C. Gamma radiation
D. Betatron radiation

The flower pot falls of a ledge of a 5th floor window, just as it passes the third floor window, someone accidentally drops a glass of water from the window. Which of the following is true?

A. The flower pot hits the ground at the same time as the glass
B. The glass hits the ground before the flower pot
C. The flower pot hits the ground first and with a higher speed that the glass
D. The flower pot and the glass hits the ground at the same time

Whenever a net force acts on a body, it produces an acceleration in the direction of the resultant force, an acceleration which is directly proportional to the resultant force and inversely proportional to the mass of the body. This theory is popularly known as

A. Newton's First Law of Motion
B. Faraday's Law of Force
C. Newton's Second Law of Motion
D. Hooke's Law

Any two points along a streamline in an ideal fluid in steady state flow, the sum of pressure, the potential energy per unit volume and the kinetic energy per unit volume has the same value. This concept is known as the

A. Pascal's theorem
B. Bernoulli's Energy Theorem
C. Fluid Theorem
D. Hydraulic Theorem

Inelastic collision is a collision in which the total kinetic energy after the collision is _____ before collision

A. Equal to zero
B. Equal
C. Less than
D. Greater than

The property by virtue of which a body tends to return to its original size of shape after a deformation and when the deformation forces have been removed

A. Elasticity
B. Malleability
C. Ductility
D. Plasticity

When two waves of the same frequency, speed and the amplitude traveling in opposite directions superimposed,

A. destructive interference always results
B. standing waves are produced
C. constructive interference always results
D. the phase difference is always zero

What is the name of a vector that represents the sum of two vectors?

A. Scalar
B. Tensor
C. Resultant
D. Reaction

The standard acceleration due to gravity is

A. 32.2 ft/s^2
B. 980 ft/s^2
C. 9.81 ft/s^2
D. 23.3 ft/s^2

Ivory soap floats in water because

A. all matter has mass
B. the specific gravity of ivory soap is less than of water
C. the density of ivory soap is unity
D. the specific gravity of ivory soap is less than that of water

One gram of ice at 0°C is place on a container 2,000,000 cubic meters or water at 0°C. Assuming no heat loss, what will happen

A. ice will become water
B. some parts of ice will not change
C. the volume of ice will not change
D. all of the above

Melting point of ice is

A. 373 K
B. 273 K
C. 100 °C
D. 4 °C

The standard meter is defines as _____ wavelengths in a vacuum of the orange-red line of the spectrum of krypton 86

A. 1,560,763.73
B. 1,650,763.73
C. 1,750,763.73
D. 1,850,763.73

Originally defined as the fraction 1/86400 of the mean solar day and now defined as the duration of 9,192,631,770 periods of he radiation of a certain state of the cesium-133 atom

A. Second
B. Minute
C. Hour
D. Day

The ratio of the density of the substance to the density of water

A. Specific weight
B. Relative weight
C. Specific gravity
D. Mass

The _____ of a substance is its density relative to that of pure water.

A. density
B. specific weight
C. specific gravity
D. pressure

What is another name for specific gravity?

A. Density
B. Relative density
C. Specific weight
D. Mass

What is the specific gravity of water?

A. 1.0
B. 1000
C. 62.4
D. 0.8

What is another term for density?

A. Specific gravity
B. Specific weight
C. Inertia
D. Malleability

Which of the following is NOT a density of water?

A. 1000 kg/m^3
B. 9.81 kN/m^3
C. 1 gram/cc
D. 64.2 lb/ft^3

What is the specific gravity of mercury?

A. 1.0
B. 0.8
C. 7.5
D. 13.6

Absolute zero temperature is

A. 32 °F
B. 0 °C
C. 4 °C
D. 0 °K

At what temperature readings do the Fahrenheit and Celsius have the same value?

A. -30°C
B. -35°C
C. -40°C
D. -45°C

Densed condition of water is at what temperature?

A. 0 °C
B. 2 °C
C. 4 °C
D. 100 °C

Indicate the FALSE statement about temperature.

A. Boiling point of centigrade scale is 100°
B. Fahrenheit scale was invented by a German
C. Absolute temperature scale is expressed in °K
D. Absolute temperature in Fahrenheit scale is -273°

Standard atmospheric pressure.

A. 9810 N/m^2
B. 13.7 psi
C. 0.5 bar
D. 760 mm of Hg

Absolute pressure equals

A. Gauge pressure
B. Atmospheric pressure
C. Gauge pressure + atmospheric pressure
D. Barometric pressure

The difference between the absolute pressure and the atmospheric pressure is called

A. Gauge pressure
B. Barometric pressure
C. 1 torr
D. All of the above

Under normal condition, the gauge pressure at water surface is

A. Less than zero
B. Equal to zero
C. Greater than zero
D. Half the atmospheric pressure

An instrument used to measure air pressure is the

A. Thermometer
B. Barometer
C. Wind vane
D. Pitot tube

The atmospheric pressure at mean sea level is known as the standard atmospheric pressure and is equal to how many psi?

A. 13.7
B. 14.7
C. 15.7
D. 16.7

"At constant pressure, the volume is directly proportional to temperature." This is known as

A. Boyle's Law
B. Charles' Law
C. Gay-Lussac law
D. Ideal gas law

"At constant temperature, the volume is inversely proportional to the pressure." This is known as

A. Boyle's Law
B. Charles' Law
C. Gay-Lussac Law
D. Ideal Gas Law

All are scalar quantities except

A. Acceleration
B. Speed
C. Energy
D. Temperature

All are vector quantities except

A. Displacement
B. Electric field intensity
C. Torque
D. Mass

A vector is a straight line segment that has a definite

A. length and direction
B. direction and sense
C. length and sense
D. length, direction and sense

The scalar product of two vectors are sometimes known as

A. dot product
B. resultant
C. cross product
D. magnitude

Which of the following is incorrect?

A. All vector quantities have magnitudes
B. All scalar quantities have directions
C. All scalar quantities have magnitudes
D. All vector quantities have directions

The _____ of two vectors is obtained by adding one vector to the negative of the other.

A. magnitude
B. sum
C. product
D. difference

The distance per unit time

A. Speed
B. Velocity
C. Acceleration
D. Motion

The displacement per unit time

A. Speed
B. Velocity
C. Acceleration
D. Motion

Defined as the gravitational force exerted on an object because of its attraction to some other masses such as the earth

A. Weight
B. Mass
C. Inertia
D. Either mass or weight

Defined quantitatively as the amount of matter of which the object is made. It also refer to the measure of the object's inertia

A. Weight
B. Mass
C. Relative density
D. Specific weight

Which of the following statements is TRUE?

A. The weight and mass of a body depends upon its location
B. The mass of the body is dependent on its location
C. The weight of a body id independent on its location
D. The weight of a body depends on its location while the mass is independent of its location

Which of the following is true about the weight of an object?

A. It is the force with which it is attracted to the earth
B. It is the same as the mass of the object
C. It is equivalent to the mass of the object divided by the gravitational acceleration
D. It is constant anywhere in the universe

A measure of inertia of a body, which is its resistance to a change in velocity

A. Force
B. Mass
C. Acceleration
D. Moment of inertia

A quantitative measure of inertia

A. Weight
B. Mass
C. Force
D. Acceleration

Indicate the FALSE statement

A. Weight of body is a gravitational force
B. Mass is the measure of the response of the body to an applied force
C. Weight of the body varies with its location
D. Weight of the body is always equal to its mass

A cart is loaded with gravel is hard to get started rolling because of its large

A. Mass
B. Weight
C. Density
D. Volume

The mass to which a force of one pound will give an acceleration of one foot per second per second

A. Slug
B. Dyne
C. Erg
D. Joule

The tendency of any object to remain at rest or to continue in motion is called

A. Equilibrium
B. Mass
C. Inertia
D. Static

Any influence capable of producing change in the motion of an object is called

A. Force
B. Velocity
C. Acceleration
D. Vector

Which of the following is NOT a unit of force?

A. Pound
B. Erg
C. Dyne
D. Newton

The unit of force which is equivalent to 1 gram-cm/sec^2

A. Joule
B. Slug
C. Dyne
D. Newton

The product of force and displacement is called

A. energy
B. power
C. work
D. momentum

Which of the following is NOT a unit or work?

A. Joules
B. Kilowatt-hour
C. Erg
D. Slug

What is the SI unit of work?

A. Joule
B. Kg – m
C. N – cm
D. Foot – pound

The work done by the external force on particles is equal to the _____ of the particle.

A. change in momentum
B. impulse
C. change in kinetic energy
D. change in potential energy

The work done by all forces except the gravitational force is always equal to the _____ of the system.

A. Total potential energy
B. Total impulse
C. Total mechanical energy
D. Total momentum

There is no work done when

A. the force is parallel to the displacement
B. the force is perpendicular to the displacement
C. there is an angle between the force and the displacement
D. all of the above

The work done by a force of 1 newton acting through a distance of 1m is known as

A. watt
B. erg
C. joule
D. Btu

The work done in lifting an object of mass "m" to a height "h" is

A. mh
B. mgh
C. mh/g
D. mgh/2

Indicate the false statement about work.

A. Work = force x distance
B. Work is a scalar quantity
C. The unit of work in the SI system is joules and erg in the English system
D. Work = power x time

The force due to gravity does not work on objects that

A. fall to the ground
B. is moved vertically upward
C. is moved parallel to the surface of the earth
D. all of the above

The rate of doing work

A. Force
B. Energy
C. Power
D. Momentum

What is the SI unit of power?

A. joule
B. kilowatt-hour
C. horsepower
D. watt

All are units of power except

A. watt
B. horsepower
C. Newton-meter/second
D. joules

Joule is an SI unit of

A. work
B. inertia
C. power
D. momentum

Why it is that the power delivered by any machine is always less than the power supplies to it?

A. due to its efficiency
B. due to the presence of the potential energy
C. due to its speed
D. due to the presence of friction

The capacity to do work is called

A. power
B. energy
C. momentum
D. impulse

Kinetic energy equals

A. ½ mass x velocity
B. mass x velocity
C. mass x acceleration
D. ½ mass x velocity^2

An energy by virtue of the object's motion is called

A. rest energy
B. potential energy
C. thermal energy
D. kinetic energy

An energy by the virtue of the object's position of elevation is called

A. rest energy
B. potential energy
C. thermal energy
D. kinetic energy

An energy by the virtue of the object's mass is called

A. rest energy
B. potential energy
C. thermal energy
D. kinetic energy

The energy of an object due to its vertical separation from the earth's surface

A. Thermal energy
B. Rest energy
C. Gravitational potential energy
D. Elastic potential energy

The energy stored in a stretched or compressed elastic material such as a spring is called

A. thermal energy
B. elastic potential energy
C. kinetic energy
D. elastic kinetic energy

The kinetic energy of the atoms and molecules due to their random motion is called

A. thermal energy
B. elastic potential energy
C. rest energy
D. heat energy

The change in gravitational potential energy depends on the _____ of the object

A. initial and final vertical position
B. path followed in moving between two positions
C. initial and final velocity
D. all of the above

Kinetic means that it is

A. in motion
B. subjected to a force
C. is in equilibrium
D. is subjected to friction

What will happen to the kinetic energy of the body if its velocity doubled?

A. Doubled
B. Quadrupled
C. Tripled
D. Remains the same

Thermal energy refers to the random kinetic energy of all _____ in a substance

A. atoms
B. molecules
C. masses
D. atoms and molecules

A vector quantity which is a product of mass and velocity of the body

A. Momentum
B. Impulse
C. Energy
D. Displacement

The product of a force and the time during which it acts is known as

A. momentum
B. impulse
C. coefficient of restitution
D. impact

Momentum is the product of mass and

A. acceleration
B. velocity
C. force
D. time

Change of momentum is equal to

A. displacement
B. impulse
C. power
D. kinetic energy

What is the SI unit of Impulse?

A. N-s
B. kg-m/s
C. Slugs/s
D. N-m/s

What is the SI unit of momentum?

A. N-s
B. kg-m/s
C. Slugs/s
D. N-m/s

If the velocity of the body doubled in value, its _____ will also doubled

A. acceleration
B. impulse
C. momentum
D. kinetic energy

The negative ration of the relative velocity after a collision to a relative velocity before a collision

A. Coefficient of friction
B. Coefficient of sliding
C. Coefficient of kinetic friction
D. Coefficient of restitution

A collision in which he total kinetic energy after collision is less than that before collision

A. Elastic collision
B. Inelastic collision
C. Straight line collision
D. Off center collision

When the colliding bodies stick together on impact which results in the maximum possible loss in kinetic energy, it is said to be _____ collision

A. elastic
B. inelastic
C. completely inelastic
D. none of the above

Which of the following is true about collision?

A. In elastic collision, no kinetic energy is lost
B. In elastic collision, the two colliding bodies stick together after impact
C. In completely inelastic collision, no kinetic energy is lost
D. Kinetic energy is not conserved in an elastic collision

At what situation when the colliding objects stops and the target moves off with the same speed after collision?

A. When their masses are equal to the target is stationary
B. When the target is stationary even if their masses are not equal
C. When their masses are equal and the target is moving with a speed less than that of the colliding body
D. When their masses are equal and the target is moving with a speed greater than that of the colliding body

If the colliding object has a mass less than that of the stationary target, after impact, the;

A. colliding object stops
B. the colliding object continues its motion in the same direction with reduced speed
C. the colliding object continues its motion in the same direction with the same speed
D. the lighter object bounces off the heavier one

If the colliding object has a mass greater than that of the stationary target, after impact, the

A. colliding object stops
B. the colliding object continues its motion in the same direction with reduced speed
C. the colliding object continues its motion in the same direction the same speed
D. the lighter the object bounces off the heavier one

For perfect elastic collision, the coefficient of restitution, e, is equal to

A. 0
B. 1
C. Negative value
D. Infinity

For perfect inelastic collision, the coefficient of restitution, e, is equal to

A. 0
B. 1
C. Negative value
D. Infinity

In an elastic collision,

A. The kinetic energy is conserved
B. The kinetic energy is not conserved
C. The objects stick together after impact
D. The loss of kinetic energy is maximum

"For every action, there is always an equal and opposite reaction". This is known as

A. Newton's first law
B. Newton's second law
C. Newton's third law
D. Law of inertia

"Every body continues in its state of rest or at constant speed in a straight line motion, it is compelled to change that state because of forces acting on it". This is known as

A. Newton's first law
B. Newton's second law
C. Newton's third law
D. Kepler's law

"An unbalanced force acting on an object will cause the object to accelerate in the direction of the force". This is known as

A. Newton's first law
B. Newton's second law
C. Newton's third law
D. Kepler's law

Newton's second law of motion states that the rate of change of momentum with respect to time is

A. Force
B. Energy
C. Power
D. Work

The accurate formulation of the law of motions, as well as of gravitational was made by

A. Galelio
B. Kepler
C. Varignon
D. Newton

The law which describes the motion of stars, planets and comets

A. Law of universal gravitation
B. Newton's law of motions
C. Kepler's laws
D. Big bang and black hole

Which of the following does not describe that object as observed from earth?

A. Apogee
B. Perigee
C. Eccentricity
D. Focus

If an external pressure is applied in a confined fluid, the pressure will be increased at every point in the fluid by the amount of external pressure. This is known as

A. Archimedes principle
B. Pascal's law
C. Boyle's law
D. Bernoullis theorem

According to this law: "The force between two charges varies directly as the magnitude of each charge and inversely as the square of the distance between them"

A. Law of universal gravitation
B. Coulomb's law
C. Newton's law
D. Inverse-square law

"At any two points along a streamline in an ideal fluid in a steady flow, the sum of the pressure, the potential energy per unit volume and the kinetic energy per unit volume has the same value". This concept is known as

A. Pascal's Theorem
B. Bernoulli's theorem
C. Hydraulic theorem
D. Ideal fluid theorem

"Whenever a net force acts on a body, it produces an acceleration in the direction of the resultant force, an acceleration that is directly proportional to the mass of the body. This theory is popularly known as

A. Faraday's law of forces
B. Newton's second law of motion
C. Newton's first law of motion
D. Hooke's law of equilibrium

A measure of the resistance of a body it offers to any changes in its angular velocity, determined by its mass and distribution of its mass about the axis of rotation is known as

A. moment of inertia
B. friction
C. torsion
D. angular acceleration

In the equation E = mc^2, c is

A. the distance between the neutral axis to the outermost fiber
B. Einstein constant
C. speed of light
D. speed of sound

The range of a projectile depends on

A. initial velocity only
B. initial velocity and weight of the body
C. initial velocity and angle of projection
D. initial velocity, weight of the body and angle of projection

In a trajectory, air resistance decreases

A. the speed
B. the maximum height
C. the range of projectile
D. all of the above

In the absence of air resistance, a projectile sent off at an angle of θ above the horizontal with an initial velocity of V has a horizontal range of

A. $R = (V^2/g) \sin 2\theta$
B. $R = (2V\sin\theta)/g$
C. $R = (V/g)\sin 2\theta$
D. $R = (2V\sin\theta)/g$

In the preceding question, the time of flight is

A. $t = (2V \sin^2 \theta)/g$
B. $t = (V^2 \sin^2 \theta)/g$
C. $t = (V^2 / g) \sin 2\theta$
D. $t = (2V\sin\theta)/g$

The trajectory of a projectile is a graph of

A. circle
B. parabola
C. ellipse
D. hyperbola

If an object is thrown vertically upward, its acceleration

A. is smaller than that of the object thrown vertically downward
B. is equal to that of an object thrown vertically downward
C. greater than that of the object thrown vertically downward
D. zero until the object reaches maximum point

The acceleration is _____ the resultant force on this object

A. directly proportional to
B. inversely proportional to
C. directly proportional to the square of
D. inversely proportional to the square of

The acceleration is _____ the mass of the object

A. directly proportional to
B. inversely proportional to
C. directly proportional to the square of
D. inversely proportional to the square of

Refers to the vertical speed at which the force of air resistance is just sufficient to balance the body's weight

A. Gravitational acceleration
B. Terminal speed
C. Drag
D. Lift

Objects falling in air from the same height will not reach the ground at the same time because:

A. air resistance increases with velocity
B. falling body will eventually reaches terminal velocity
C. if it reaches terminal velocity, it cannot fall any faster than that
D. all of the above

A point on the object from which it can be suspended in any orientation without tending to rotate

A. Center of gravity
B. Barycenter
C. Centroid
D. All of the above

What is another term for centroid?

A. Center of gravity
B. Center of mass
C. Barycenter
D. All of the above

Centrifugal force is directly proportional to

A. the square of the tangential velocity
B. the tangential velocity
C. radius of curvature
D. the weight of an object

The amount of heat required to change the temperature of 1 pound of water at 1°F

A. Calorie
B. Thermal energy
C. Specific heat
D. British Thermal Unit (BTU)

Calorie is defined as the amount of heat required to raise a temperature of _____ of water at 1°C

A. 1 gram
B. 1 kilogram
C. 1 pound
D. 1 ton

The amount of heat needed to change the temperature of a unit quantity of it by 1°

A. BTU
B. Heat transfer
C. Temperature
D. Specific heat capacity

What is specific heat?

A. A temperature of 1 kg sample reported in °C
B. The heat needed to raise the temperature of 1 pound of water 1°F
C. The energy needed to raise the temperature of 1 gram of a substance 1°C
D. Any of the above

What is the specific heat capacity of water in kJ/kg °C?

A. 4.19
B. 3.89
C. 2.19
D. 1.49

The amount of heat must be supplied to change 1 kg of the substance at its boiling point from the liquid state to the gaseous state

A. Heat of fusion
B. Heat of evaporation
C. Specific heat
D. BTU

The amount of heat that must be supplied to change 1 kg of the substance at its melting point from the solid to the liquid state

A. Heat of fusion
B. Heat of evaporation
C. Specific heat
D. BTU

"Any body immersed in a fluid is subjected to a buoyant force which is equal to the weight of the fluid displaced." This is known as

A. Pascal's Law
B. Bernoulli's theorem
C. Archimedes principle
D. Venturi's principle

The total hydrostatic force on plane area is directly proportional to

A. Density of fluid
B. Square of the pressure head
C. Square of the area
D. Cube of the area

Buoyant force is equal to

A. density of fluid x total volume
B. density of fluid x volume above the surface
C. density of fluid x volume submerged
D. specific gravity of fluid x volume submerged

Refers to the tendency of the liquid surface to contact to the minimum possible area in any situation

A. Ductility
B. Viscosity
C. Surface tension
D. Capillarity

Refers to the measure of the fluid's internal friction

A. Capillary
B. Viscosity
C. Surface tension
D. Laminar flow

The _____ of a machine equals to the ratio between its actual and its theoretical mechanical advantage

A. output
B. input
C. efficiency
D. power

Actual mechanical advantage is the ratio between

A. output force to input force
B. input distance to output distance
C. output work to input work
D. power output to power input

Study of motion with reference to the force which causes the motion is

A. statics
B. dynamics
C. kinetics
D. kinematics

An impulse causes

A. the object's momentum to change
B. the object's momentum to decrease
C. the object's momentum to increase
D. the object's momentum to remain constant or be conserved

Momentum is a property related to the objects _____

A. motion and mass
B. mass and acceleration
C. motion and velocity
D. weight and velocity

Centrifugal force is _____

A. directly proportional to the radius of the curvature
B. directly proportional to the square of the tangential velocity
C. inversely proportional to the square of the tangential velocity
D. directly proportional to the square of the weight of the object

A measure of the resistance of a body it offers to any change in its angular velocity, determined by the mass and distribution of its mass about the axis of rotation is known as

A. moment of inertia
B. torsion
C. friction
D. angular acceleration

Momentum is the product of mass and

A. acceleration
B. velocity
C. force
D. time

The moment of inertia of a plane figure, _____

A. increases as distance of the axis moves farther from the centroid
B. is maximum at the centroidal axis
C. is zero at the centroidal axis
D. decreases as the distance of the axis moves farther from the centroid

To maximize the horizontal range of the projectile, which of the following applies?

A. Maximize velocity
B. Maximize the angle of elevation
C. Maximize the angle of elevation
D. The tangent function of the angle and velocity of trajectory must be equal to 1

Moment of inertia of any plane figure is expressed in units of length of the

A. first power
B. second power
C. third power
D. fourth power

A branch of physical science which deals with state of rest or motion of bodies under the action of forces

A. Mechanics
B. Kinematics
C. Kinematics
D. Statics

A branch of mechanics which deals with bodies at rest

A. Statics
B. Dynamics
C. Kinetics
D. Kinematics

Branch of mechanics which deals with bodies in motion

A. Statics
B. Dynamics
C. Kinetics
D. Kinematics

The action of a force is characterized by

A. its magnitude
B. the direction of its action
C. point of application
D. all of the above

For a system to be in equilibrium,

A. the force polygon must close
B. all forces must be concurrent, if not acting parallel
C. it must satisfy the 3 static equations
D. all of the above

A pair of forces equal in magnitude, opposite in direction, and not in the same line is called

A. moment
B. torque
C. couple
D. all of the above

The _____ exerted by a force on a body is the measure of its effectiveness in turning the body about a certain pivot

A. couple
B. torque
C. moment arm
D. all of the above

A body is said to be in "rotational equilibrium" when

A. no net torque acts on it
B. no net force acts on it
C. its vector sum of the forces is zero
D. the forces acting on the body are non-concurrent

A couple consists of two forces, _____ in magnitude, parallel and oppositely directed

A. directly proportional
B. equal
C. unequal
D. inversely proportional

The _____ of the body or system is the point about with the product of the mass and moment arm sums up to zero

A. center of gravity
B. center of mass
C. centroid
D. all of the above

The point through which the resultant of the distributed gravity force passes regardless of the orientation of the body is space

A. Center of inertia
B. Center of mass
C. Centerpoint
D. Center of gravity

If an object exerts a normal force on a surface, then its normal force is

A. equal to the weight of the object
B. less than the frictional force
C. parallel to the surface
D. perpendicular to the surface

Whenever the surfaces of two bodies are in contact, there will be a limiting amount of resistance to sliding between them. This is known as

A. friction
B. coefficient of friction
C. angle of friction
D. coefficient of sliding

The moment of inertia of a triangle with respect to the base b is

A. bh^3 / 12
B. bh^3 / 6
C. bh^3 / 36
D. bh^3 / 3

The moment of inertia f a triangle with respect to the base is _____ time its moment of inertia with respect to its centroidal axis?

A. 2
B. 3
C. 4
D. 5

What is the moment of inertia of a circle of

A. πr^4 / 16
B. πr^4 / 2
C. πr^4 / 24
D. πr^4

The moment of inertia of the circle with respect to its tangent is _____ times its centroidal moment of inertia

A. 2
B. 3
C. 4
D. 5

The moment of inertia of a rectangle with respect to the base is _____ times its moment of inertia with respect to the centroid

A. 2
B. 3
C. 4
D. 5

What is the mass moment of inertia of a sphere of mass m and radius r?

A. ½ mr^2
B. ¼ mr^2
C. 1/3 mr^2
D. 2/5 mr^2

Given a cylinder of radius r, altitude h and mass m. What is its mass of inertia?

A. ½ mr^2
B. ¼ mr^2
C. 1/3 mr^2
D. 2/5 mr^2

A structure is called _____ if at least one of its individual members is a multiforce member

A. Truss
B. frame
C. three-hinged arch
D. bridge

Another term of moment of inertia

A. Moment of area
B. Second moment of area
C. Moment of mass
D. All of the above

The diagram of an isolated body with the representation of all external forces acting on it is called

A. Maxwell diagram
B. stress-strain diagram
C. free body diagram
D. shear and moment diagram

A framework composed of members joined at their ends to form a rigid structure

A. Machine
B. Truss
C. Joist
D. Purlin

The moment of the resultant of two concurrent forces with respect to a center of their planes is equal to the algebraic sum of the moments of the components with respect to the same center

A. Law of reaction
B. Varignon's theorem
C. Mass moment of inertia
D. Law of inertia

The condition exist I structures where the reactive forces exceed the number of independent equations for equilibrium. Such case is called

A. statically determine
B. statically indeterminate
C. static equilibrium
D. none of the above

Two lengths of a steel wire are used to support a chandelier of weight A. The tension in the wire must

A. each be W/2
B. each be W
C. have a vector sum of magnitude W
D. have a vector sum of magnitude >W

The built-in or fixed support is capable of supporting

A. an axial load
B. a transverse load
C. a bending moment
D. all of the above

Which of the following BEST describes d'Alembert's principle?

A. F = ma
B. First law of motion
C. Stress is directly proportional to strain
D. F = kx

The theorem which is closely related to d'Alembert's theorem is the

A. Newton's first law of motion
B. Newton's third law of motion
C. Newton's second law of motion
D. Bernoulli's theorem

_____ is the quality of being plastically elongated

A. Flexibility
B. Plasticity
C. Malleability
D. Ductility

It is the ratio of the ultimate stress to the allowable stress

A. Proportionality constant
B. Strain
C. Factor of safety
D. Modulus

The greatest unit pressure the soil can continuously stand is called

A. bearing strength
B. yield strength
C. ultimate strength
D. fatigue strength

The distance that the top surface is displaced in the direction of the force divided by the thickness of the body is known as

A. longitudinal strain
B. linear strain
C. shear strain
D. volume strain

The ratio of the tensile stress to tensile strain

A. Shear modulus
B. Modulus of elasticity
C. Bulk modulus
D. Hooke's law

Another term for modulus of elasticity

A. Bulk modulus
B. Shear modulus
C. Young's modulus
D. Moment of inertia

What is the value of the modulus of elasticity of steel?

A. 200 GPa
B. 200 MPa
C. 150 MPa
D. 150 Gpa

The slope of the stress-strain diagram in the linearly elastic region is called

A. yield strength
B. proportional limit
C. elastic limit
D. modulus of elasticity

The modulus of elasticity in shear is commonly called as

A. modulus of rigidity
B. Young's modulus
C. bulk modulus
D. deformation

A kind of stress caused by forces acting along a parallel to the area resisting the forces

A. Tangential
B. Compressive mass
C. Shearing stress
D. Tensile stress

A kind of stress caused by forces acting perpendicular to the area resisting the forces

A. Tangential stress
B. Shearing stress
C. Diagonal stress
D. Bearing stress

Refers to the highest ordinate on the stress-strain diagram

A. Rapture strength
B. Ultimate strength
C. Yield strength
D. Allowable strength

At highest or lowest point on the moment diagram

A. shear is maximum
B. shear is zero
C. shear is half the maximum moment
D. shear is negative

For symmetrically loaded simple bam the maximum shear occurs at

A. the midspan
B. the support
C. 1/3 from the support
D. ¼ from the support

For symmetrically loaded simple beam, the maximum moment occurs at

A. the midspan
B. the support
C. 1/3 from the support
D. ¼ from the support

Poisson ratio is

A. the ratio of the stress to strain
B. the other term for slenderness ratio
C. the other term for factor of safety
D. the ratio of the unit lateral deformation to the unit longitudinal deformation

Which of the following is NOT a method of determining the bar force of a truss member

A. Method of joints
B. Method of section
C. Method of virtual work
D. Maxwell diagram

The actual stress the material ahs when under load

A. Allowable stress
B. Ultimate stress
C. Working stress
D. Factor of safety

The ratio of the volume stress to the volume strain is called

A. Young's modulus
B. Shear modulus
C. Bulk modulus
D. Hooke's Law

A kind of stress that is caused by forces acting along or parallel to the area resisting the force

A. Tensile stress
B. Bearing stress
C. Shearing stress
D. Tangential stress

Stress is proportional to strain. The constant of proportionality is called as Young's modulus. Who introduced this in 1807?

A. Sean Young
B. Neil Young
C. James Young
D. Thomas Young

Obtained by dividing the differential load dP by the differential area dA over which it acts

A. Stress
B. Strain
C. Elongation
D. Elasticity

What is the SI unit for stress?

A. Pascal
B. Joules
C. psi
D. kg/cm^2

Unit strain is

A. inversely proportional to the unit stress
B. expressed in pascals
C. unitless
D. directly proportional to the length of the object

The ratio of the unit deformation or strains in a transverse direction is constant for stresses within the proportional limit. This is known as

A. Hooke's law
B. Mohr's circle
C. Poisson ratio
D. Slenderness ratio

The stress beyond which the material will not return to its original shape when unloaded but will retain a permanent deformation

A. Proportional limit
B. Elastic limit
C. Yield limit
D. Yield strength

A simple beam carrying a uniform load of w throughout it entire length L has maximum moment of

A. (wL) / 2
B. (wL^2) / 2
C. (wL^2) / 4
D. (wL^2) / 8

The moment of inertia of a rectangular whose base is B and height H, about its base is

A. (bh^3) / 12
B. (bh^2) / 4
C. (bh^3) / 3
D. (bh^3) / 36

In general design, stress and factor of safety are related as follows:

A. Design stress = ultimate stress x factor of safety
B. Factor of safety = Design stress / Ultimate stress
C. Design stress = Ultimate stress / Factor of safety
D. Ultimate stress = Factor of safety / Design stress

The dimensions of "Acceleration x Mass" is the same as that to

A. Power
B. Length
C. Work
D. Weight

Galvanized iron is a term referring to iron coated with

A. Aluminum
B. Magnesium
C. Tin
D. Zinc

In a cantilever beam with a concentrated load at the free end, the moment is

A. maximum at the wall
B. ¼ maximum half way out on the beam
C. constant along the beam
D. maximum at the free end

The coefficient of friction for dry surfaces

A. depends on the composition of the materials only
B. depends on the materials and the finish condition of the surfaces
C. depends only on the finish condition of the surfaces
D. does not depend on the materials

Which one of the following contains only items which are considered fixed charges?

A. Interest, taxes, amortization, insurance, rent
B. Amortization, Insurance, steam cost, painting, cleaning
C. Interest, taxes, replacements, labor for repairs
D. Interest, taxes, rent, power cost, oil cost

An economic study is made of the total amount cost (C) for a series of alternative investment (P) for a given project. If C is plotted as the ordinate versus P, the most desirable occurs when

A. dC/dP = 1
B. dC/dP = CO
C. dC/dP = 0
D. dC/dP = +1

Reduction in the level of national income and output usually accompanied by the fall in the general price level

A. devaluation
B. deflation
C. inflation
D. depreciation

It is a series of equal payments occurring at equal interval of time

A. Annuity
B. Debt
C. Amortization
D. Deposit

The place where buyers and sellers come together

A. Market
B. Business
C. Recreation center
D. Buy and sell section

A market whereby there is only one buyer of an item for which there are no good substitute

A. Monopsony
B. Oligopoly
C. Monopoly
D. Oligopsony

It is a series of equal payments occurring at equal interval of time where the first payment is made after several periods, after the beginning of the payment

A. Perpetuity
B. Ordinary annuity
C. Annuity due
D. Deferred annuity

The total income equals the total operating cost

A. Balanced sheet
B. In-place value
C. Check and balance
D. Break even-no gain no loss

Kind of obligation which has no condition which has no condition attached

A. Analytic
B. Pure
C. Gratuitous
D. Private

Direct labor cost incurred in the factory and direct material cost are the costs of all materials that go into production. The sum of these two direct costs is known as

A. GS and A expenses
B. Operating and maintenance costs
C. Prime cost
D. O and M cost

An index of short term paying ability is called

A. receivable turn-over
B. profit margin ratio
C. current ratio
D. acid-test ratio

An artificial expenses that spreads the purchase price of an asset or another property over a number of years

A. Depreciation
B. Sinking fund
C. Amnesty
D. Bond

Estimated value at the end of the useful life

A. Market value
B. Fair value
C. Salvage value
D. Book value

Consists of the actual counting or determination of the actual quantity of the materials on hand as of a given date

A. Physical inventory
B. Material update
C. Technological assessment
D. Material count

Additional information of prospective bidders on contract documents issued prior to bidding date

A. Delict
B. Escalatory
C. Technological assessment
D. Bid bulletin

An evil wrong committed by a person damaged another person's property or reputation is

A. tort
B. material breach
C. negligence
D. fraud

A series of uniform accounts over an infinite period of time

A. Depreciation
B. Annuity
C. Perpetuity
D. Inflation

The quantity of a certain commodity that is offered for sale at a certain price at a given place and time

A. Demand
B. Supply
C. Stocks
D. Goods

Work-in process is classified as

A. an asset
B. a liability
C. an expenses
D. an owner's equity

What is the highest position in the corporation?

A. President
B. Board of Directors
C. Chairman of the Board
D. Stockholders

Type of ownership in business where individuals exercise and enjoy the right in their own interest

A. Equitable
B. Public
C. Private
D. Pure

Decrease in value of a physical property due to the passage of time

A. Inflation
B. Depletion
C. Recession
D. Depreciation

An association of two or more individuals for the purpose of operating a business as co-owners for profit

A. Sole proprietorship
B. Company
C. Partnership
D. Corporation

We may classify an interest rate, which specifies the actual rate of interest on the principal for one year as

A. nominal rate
B. rate of return
C. exact interest rate
D. effective rate

Parties whose consent or signature in a contract is not considered intelligent

A. Dead persons
B. Senior citizens
C. Demented persons
D. Minors

It is defined to be the capacity of a commodity to satisfy human want

A. Discount
B. Luxury
C. Necessity
D. Utility

It is the amount which a willing buyer will pay to a willing seller for a property where each has equal advantage and is under no compulsion to buy or sell

A. Fair value
B. Market value
C. Book value
D. Salvage value

This occurs in a situation where a commodity or service is supplied by a number of vendors entering the market

A. Perfect competition
B. Oligopoly
C. Monopoly
D. Elastic demand

These are products or services that are designed by human and will be purchased it money is available after the required necessities have been obtained

A. Utilities
B. Necessities
C. Luxuries
D. Product goods and services

These are the products or services that are required to support human life and activities, that will be purchased in somewhat the same quantity even though the price varies considerably

A. Utilities
B. Necessities
C. Luxuries
D. Product goods and services

A condition where only few individuals produce a certain product and that any action of one will lead to almost the same action of the others

A. Oligopoly
B. Semi-monopoly
C. Monopoly
D. Perfect competition

Grand total of the assets and operational capability of a corporation

A. Authorized capital
B. Investment
C. Subscribed capital
D. Money market

The worth of the property equals to the original cost less depreciation

A. Scrap value
B. Face value
C. Market value
D. Book value

Money paid for the use of borrowed capital

A. Discount
B. Credit
C. Interest
D. Profit

Liquid assets such as cash and other assets that can be converted quickly into cash, such as accounts receivable and merchandise are called

A. total assets
B. fixed assets
C. current assets
D. none of the above

The length of time which the property may be operated at a profit

A. Physical life
B. Economic life
C. Operating life
D. All of the above

The provision in the contract that indicates the possible adjustment of material cost and labor cost

A. Secondary clause
B. Escalatory clause
C. Contingency clause
D. Main clause

The present worth of all depreciation over the economic life of the item is called

A. book value
B. capital recovery
C. depreciation recovery
D. sinking fund

Gross profit, sales less cost of good sold, as a percentage of a sales is called

A. profit margin
B. gross margin
C. net income
D. rate of return

Worth of property as shown in the accounting records of an enterprise

A. Fair value
B. Market value
C. Salvage value
D. Book value

Those funds that are required to make the enterprise or project a going concern

A. Initial investment
B. Current accounts
C. Working capital
D. Subscribed capital

A market situation where there is only one seller with many buyer

A. Monopoly
B. Monopsony
C. Oligopolu
D. Oligopsony

A market situation where there are few sellers and few buyers

A. Oligopoly
B. Oligopsony
C. Bilateral oligopoly
D. Bilateral oligopsony

A market situation where there is only one seller and one buyer

A. Monopoly
B. Monopsony
C. Bilateral monopoly
D. Bilateral monopsony

A market situation where there are only two buyers with many sellers

A. duopoly
B. oligopoly
C. duopsony
D. oligopsony

The cumulative effect of elapsed time on the money value of an event, based on the earning power of equivalent invested funds capital should or will earn

A. Present worth factor
B. Interest rate
C. Time value of money
D. Yield

Defined as the future value minus the present value

A. interest
B. discount
C. discount
D. capital

The flow back of profit plus depreciation from a given project is called

A. capital recovery
B. cash flow
C. economic return
D. earning value

The profit derived from a project or business enterprise without consideration of obligations to financial contributions or claims of other based on profit

A. Economic return
B. Yield
C. Earning value
D. Expected yield

The payment for the use of borrowed money is called

A. loan
B. maturity value
C. interest
D. principal

The interest rate at which the present work of the cash on a project is zero of the interest earned by an investment

A. Effective rate
B. Nominal rate
C. Rate of return
D. Yield

The ratio of the interest payment to be principal for a given unit of time and usually expressed as a percentage of the principal

A. interest
B. interest rate
C. investment
D. all of the above

The true value of interest rate computed by equations for compound interest for a 1 year period is known as

A. expected return
B. interest
C. nominal interest
D. effective interest

The intangible item of value from the exclusive right of a company in a stated region of the country

A. Market value
B. Book value
C. Goodwill value
D. Franchise value

The recorded current value of an asset is known as

A. scrap value
B. salvage value
C. book value
D. present worth

Scrap value of an asset is sometimes known as

A. book value
B. salvage value
C. replacement value
D. future value

Sometimes called second hand value

A. Scrap value
B. Salvage value
C. Book value
D. Going value

An intangible value which is actually operating concern has due to its operation

A. Book value
B. Fair value
C. Goodwill value
D. Going value

The value which has a disinterested third party, different from the buyer and seller, will determine in order to establish a price acceptable to both parties

A. Market value
B. Goodwill value
C. Fair value
D. Franchise value

A type of annuity where the payments are made at the end of each payment period starting from the first period

A. Ordinary annuity
B. Annuity due
C. Deferred annuity
D. Perpetuity

It is a series of equal payments occurring at equal intervals of time where the first payment is made after several periods, after the beginning of the payment

A. Deferred annuity
B. Delayed annuity
C. Progressive annuity
D. Simple annuity

A type of annuity where the payments are made at the start of each period, beginning from the first period

A. Ordinary annuity
B. Annuity due
C. Deferred annuity
D. Perpetuity

Which is NOT an essential element of an ordinary annuity?

A. The amounts of all payments are equal
B. The payments are made at equal interval of time
C. The first payment is made at the beginning of each period
D. Compound interest is paid on all amounts in the annuity

A is a periodic payment and I is the interest rate, then present worth of a perpetuity =

A. A I
B. A I^n
C. A^n / I
D. A / I

A mathematical expression is also known as the present value of a n annuity of one called

A. load factor
B. demand factor
C. sinking fund
D. present worth factor

As applied to a capitalized asset, the distribution of the initial cost by a periodic changes to operation as in depreciation of the reduction of a debt by either periodic or irregular prearranged program is called

A. Annuity
B. capital recovery
C. annuity factor
D. amortization

The reduction of the value of an asset due to constant use and passage of time

A. Scrap value
B. Depletion
C. Depreciation
D. Book value

A method of computing depreciation in which the annual change is a fixed percentage of the depreciation book value at the beginning of the year to which the depreciation applies

A. Straight lime method
B. Sinking fund method
C. SYD method
D. Declining balance method

A method of depreciation whereby the amount to recover is spread uniformly over the estimated life of the asset in terms of the periods or units of output

A. Straight line method
B. Sinking fund method
C. Declining balance method
D. SYD method

Which of the following depreciation methods cannot have a salvage value of zero?

A. Straight line method
B. Sinking fund method
C. Declining balance method
D. SYD method

A method of depreciation where a fixed sum of money is regularly deposited at compound interest in a real or imaginary fund in order to accumulate an amount equal to the total depreciation of an asset at the end of the asset's estimated life

A. Straight line method
B. Sinking fund method
C. Declining balance method
D. SYD method

The function of interest rate and time that determines the cumulative amount of a sinking fund resulting from specific periodic deposits

A. Sinking fund factor
B. Present worth factor
C. Capacity factor
D. Demand factor

The first cost of any property includes

A. the original purchase price and freight and transportation charges
B. installation expenses
C. initial taxes and permits fee
D. all of the above

In SYD method, the sum of years digit is calculated using the formula with n = number of useful years of the equipment

A. [n(n-1)] / 2
B. [n(n+1)] / 2
C. n(n+1)
D. n(n-1)

Capitalized cost of any property is equal to the

A. annual cost
B. first cost + interest of the first cost
C. first cost + interest of perpetual maintenance
D. first cost + salvage value

The lessening of the value of an asset due to the decrease in the quantity available (referring to the natural resources, coal, oil, etc.)

A. Depreciation
B. depletion
C. inflation
D. incremental cost

Is the simplest form a business organization

A. Sole proprietorship
B. Partnership
C. Enterprise
D. Corporation

An association of two or more persons for a purpose of engaging in a profitable business

A. Sole proprietorship
B. Enterprise
C. Partnership
D. Corporation

A distinct legal entity which can practically transact any business transaction which a real person could do

A. Sole of proprietorship
B. Enterprise
C. Partnership
D. Corporation

Double taxation is a disadvantage of which business organization?

A. Sole partnership
B. Partner
C. Corporation
D. Enterprise

Which is NOT a type of business organization?

A. Sole of proprietor
B. Corporation
C. Enterprise
D. Partnership

What is the minimum number of incorporators in order that a corporation be organized?

A. 3
B. 5
C. 10
D. 7

In case of bankruptcy of a partnership

A. the partners are not liable for the liabilities of the partnership
B. The partnership assets 9excluding the partners personal assets) only will be used to pay the liabilities
C. The partners personal assets are attached to the debt of the partnership
D. The partners may sell stock to general additional capital

Which is TRUE about partnership?

A. It has a perpetual life
B. It will be desolved if one of the partners ceases to be connected with the partnership
C. It can be handed down from one generation of partners to another
D. Its capitalization must be equal for each partner

Which is true about corporation?

A. It is the not best form of business organization
B. The minimum number of incorporators to start a corporation is three
C. Its life is dependent on the lives of the incorporators
D. The stockholders of the corporation are only liable to the extent of their investments

Represent ownership, and enjoys certain preferences than ordinary stock

A. Authorized capital stock
B. Preferred stock
C. Common stock
D. Incorporator's stock

Represent the ownership of stockholders who have a residual claim on the assets of the corporation after all other claims have been settled

A. Authorized capital stock
B. Preferred stock
C. Incorporators stock
D. Common stock

The amount of company's profit that the board of directors of the corporation decides to distribute to ordinary shareholders

A. Dividend
B. Return
C. Share stock
D. Par value

A certificate of indebtness of a corporation usually for a period not less than 10 years and guaranteed by a mortgage on certain assets of the corporation

A. Bond
B. T-bill
C. Preferred stock
D. Common stock

A form of fixed-interest security issued by central or local government, companies, banks or other institutions. They are usually a form of long-term security, buy may be irredeemable, secured or unsecured

A. Bond
B. T-bills
C. Certificate of deposit
D. All of these

A type of bind where the corporation pledges securities which it owns (I,e, stocks, bonds of its subsidiaries).

A. Mortgage
B. Registered bond
C. Coupon bond
D. Collateral trust bond

A type of bond which does not have security except a promise to pay by the issuing corporation

A. Mortgage bond
B. Registered bond
C. Collateral trust bond
D. Debenture bond

A type of bond issued jointly by two or more corporations

A. Joint bond
B. Debenture bond
C. Registered bond
D. Collateral trust bond

A type of bond whose guaranty is in lien on railroad equipment

A. Equipments' obligations bond
B. Debenture bond
C. Registered bond
D. Infrastructure bond

If the security of the bond is a mortgage on certain specified asset of a corporation, this bond is classified as

A. Registered bond
B. Mortgage bond
C. Coupon bond
D. Joint bond

A type of bond where the corporation's owners name are recorded and the interest is paid periodically to the owners with their asking for it

A. Registered bond
B. Preferred bond
C. Incorporators bond
D. All of these

Bond to which are attached coupons indicating the interest due and the date when such interest is to be paid

A. Registered bond
B. Coupon bond
C. Mortgage bond
D. Collateral trust bond

An amount of money invested at 12% interest per annum will double in approximately

A. 4 years
B. 5 years
C. 6 years
D. 7 years

The 72 rule of thumb is used to determine

A. how many years money will triple
B. how many years money will double
C. how many years to amass 1 million
D. how many years to quadruple the money

To triple the principal, one must use

A. integration
B. derivatives
C. logarithms
D. implicit functions

A currency traded in a foreign exchange market for which the demand is consistently high in relation to its supply

A. Money market
B. Hard currency
C. Treasury bill
D. Certificate of deposit

Everything a company owns and which has a money value is classified as an asset. Which of the following is classified as an asset

A. Intangible assets
B. Fixed assets
C. Trade investments
D. All of these

Which an example of an intangible asset?

A. Cash
B. Furniture
C. Investment in subsidiary companies
D. Patents

Land, buildings, plant and machinery are examples of

A. current assets
B. trade investments
C. fixed assets
D. intangible assets

An increase in the value of a capital asset is called

A. profit
B. capital gain
C. capital expenditure
D. capital stock

The reduction in the money value of a capital asset is called

A. capital expenditure
B. capital loss
C. loss
D. deficit

Is a negotiable claim issued by a bank in lieu of a term deposit

A. Time deposit
B. Bond
C. Capital gain
D. Certificate of deposit

Any particular raw material or primary product (e.g. cloth, wool, flour, coffee..) is called

A. utility
B. necessity
C. commodity
D. stock

It denotes the fall in the exchange rate of one currency in terms of others. The term usually applies to floating exchange rates

A. currency appreciation
B. currency devaluation
C. currency float
D. currency depreciation

The deliberate lowering of the price of a nation's currency in terms of the accepted standard (Gold, American dollar or the British pound)

A. currency appreciation
B. currency devaluation
C. currency float
D. currency depreciation

The residual value of a company's assets after all outside liabilities (shareholders excluded) has been allowed for

A. Dividend
B. Equity
C. Return
D. Per value

A saving which takes place because goods are not available for consumption rather than the consumer really want to save

A. compulsory saving
B. consumer saving
C. forced saving
D. all of these

A document that shows proof of legal ownership of a financial security

A. bond
B. bank notes
C. coupon
D. check

Defined as the capacity of commodity to satisfy human want

A. Discount
B. Necessity
C. Luxuries
D. Utility

It is the profit obtained by selling stocks at a higher price than its original purchase price

A. Debenture
B. Goodwill
C. Capital gain
D. Internal rate of return

The quantity of a certain commodity that is offered for sale at a certain price at a given time and place

A. Demand
B. Supply
C. Utility
D. Market

The quantity of a certain commodity that is bought at a certain price at a given time and place

A. Demand
B. Supply
C. Market
D. Utility

"When free competition exists, the price of a product will be that value where supply is equal to the demand".

A. Law of diminishing return
B. Law of supply
C. Law of demand
D. Law of supply and demand

"When one of the factors or production is fixed in quantity or is difficult to increase, increasing the other factors of production will result in a less than proportionate increase in output".

A. Law of diminishing return
B. Law f supply
C. Law of demand
D. Law of supply and demand

The place where sellers and buyers come together

A. Department store
B. Market
C. Mall
D. Shopping center

GATT stands for

A. General Agreement of Tariff and Trade
B. General Arrangement of Tariff and Trade
C. Global Agreement of Tariff and Trade
D. Global Arrangement of Tariff and Trade

The letter D in the Roman numerals is

A. 50
B. 100
C. 500
D. 1000

To comply with the requirement of the Mechanical Engineering Law on the minimum complement of mechanical engineers, a mechanical plant with a combine prime movers rating of 373 KW must have in its employ the following:

A. 1 PME, 1 RME, and 1 CPM
B. 1 RME, 2 CPM
C. 1 PME, 2 RME
D. 1 RME is charge of every shift

Note: The plant is operating in 3 shifts

Mechanical Plant Engineer (MPE) may be allowed to take the licensure examination for PME if

A. he has 4 years practice as MPE
B. if he graduated with a BSME degree and has a 4 years of practice as a RME
C. if he has a BSME degree, passed the examinations for RME and has 4 years practice as RME
D. none of these

The only country that recognizes the mechanical engineering licensure of Filipinos issued by the Professional Regulation Commission and allowed to used the practice as RME

A. America
B. Canada
C. Japan
D. none of these

The ratio between the average load and total available capacity

A. load factor
B. power factor
C. demand factor
D. Capacity factor

In Roman numerals, the doorframe written with the letter indicates that the number equivalent to the letter is to be multiplied by

A. 100
B. 1,000
C. 100,000
D. 1,000,000

In Roman numerals, the bar written above the letter indicates that number equivalent to the letter is to be multiplied by

A. 100
B. 1,000
C. 10,000
D. 100,000

Indicate the false statement about rules of divisibility

A. The number is divisible by 9 if the sum of its digits is divisible by 9
B. The number is divisible by 12 if it is divisible by 4 and 3
C. The number is divisible by 4 if the number formed by the last 2 digits by the last 2 digits is divisible by 3
D. The number is divisible is divisible by 5 if it ends with 5 or 0

The base number of the number system

A. Index
B. Radix
C. Cologarithm
D. Logarithm

What is another name of octal number system?

A. Octonary number system
B. Octenary number system
C. Octonumber system
D. Octonumerals

A number system using a plane value or base of 20

A. Sexagesimal number system
B. Duodecimal number system
C. Bidecimal number system
D. Vigesimal number system

A number system using a place value (or base) of 60

A. Sexagesimal number system
B. Septenary number system
C. Senary number system
D. Sexadecimal number system

A number system using a place value (or base) of 10

A. Decimal number system
B. Denary number system
C. Denary number system
D. All of the above

What is the radix of the binary number system?

A. 10
B. 16
C. 8
D. 2

A number system which needs sixteen symbols, the 10 numerals and the letters A, B, C, D, E and F is called

A. Octal number system
B. Duodecimal number system
C. Vigesimal number system
D. Hexadecimal number system

The terms “dozen” and “gross” used what number system?

A. Decimal number system
B. Duodecimal number decimal
C. Bidecimal number system
D. Vigesimal number system

1 gross is equivalent to

A. 10 dozens
B. 144 pieces
C. 5 dozens
D. 100 pieces

The number 1 followed by 100 zeros or 10^100 is called

A. centillion
B. chiliagon
C. milliagon
D. google

The speed of 10 exponent google or 10^google is called

A. miligoogle
B. centigoogle
C. googleplex
D. myriad

The speed of light is nearly

A. 3 x 10^5 km/s
B. 3 x 10^6 km/s
C. 3 x 10^4 km/s
D. 30,000,000 m/s

If deka means 10^1 and kilo means 10^3, then 10^2 is

A. Deci
B. tera
C. hector
D. atto

1 cubic meter is equivalent to 1 _____

A. span
B. section
C. scruple
D. stere

The number 1 followed by 15 zeros is known as

A. one billion
B. one trillion
C. one quadrillion
D. one quintillion

100 kilograms is equivalent to 1

A. ton
B. quintal
C. section
D. stere

One section is equivalent to 1 _____

A. square foot
B. square meter
C. square nautical mile
D. square statute mile

One foot is equivalent to how many hands?

A. 2
B. 3
C. 4
D. 5

The radius of the Earth's orbit around the Sun (the average distance between the Sun and Earth) is known as

A. lightyear
B. astronomical orbit
C. astronomical unit
D. steradian

An astronomical unit is approximately equal to

A. 100 million km
B. 125 million km
C. 150 million km
D. 175 million km

Absolute zero is

A. 0°C
B. 0°F
C. 0 R
D. 0 K

The gravitational constant G is equivalent to _____ (N.m^2)/kg^2

A. 6.67 x 10^-8
B. 6.67 x 10^-10
C. 6.67 x 10^-11
D. 6.67 x 10^-12

1 Btu is equivalent to how many Joules?

A. 1054
B. 1045
C. 1036
D. 1064

The pressure of 1 torr is equivalent to how many Pascals?

A. 100.0
B. 133.3
C. 166.7
D. 200.0

1 horsepower is equivalent to how many Watts?

A. 764
B. 476
C. 674
D. 746

1 electron volt is equivalent to how many Joules?

A. 1.603 x 10^-19
B. 1.602 x 10^-16
C. 1.602 x 10^-14
D. 1.602 x 10^-12

Which is not equivalent to 1 atm?

A. 1.013 x 10^6 Pa
B. 1.013 bar
C. 14.7 psi
D. 1000 kg/cm^2

The value of (3^3)^3 is

A. 54
B. 81
C. 243
D. 729

The number of board feet in a plank 3 inches thick, 1 foot wide and 20 foot length is

A. 60
B. 120
C. 360
D. 720

The following type item, which is common to both the fixed and operating cost of an enterprise is

A. interest
B. depreciation
C. taxes
D. supplies

The center of gravity of an isosceles triangle whose height H is on the median line

A. 2/3 from the vertex
B. 1/3 H from the vertex
C. 2/3 H from the vertex
D. 3/4 H from the vertex

The number of board feet in a plank 2 inches thick, one foot wide and 20 feet long is

A. 400
B. 20
C. 40
D. power

The nearest whole number to the value of 2/3 (700)^(2/3) is:

A. 312
B. 1,243
C. 12,433
D. 54

Ninety degrees is equal to

A. 1,500 radians
B. 3.142 rad
C. 1.57 rad
D. 1,000 rad

The standard acceleration due to gravity, g is equal to:

A. 64.34 ft/sec^2
B. 32.2 ft^2/sec
C. 980 ft/sec
D. 35.30 km/hr/sec

Point "A" in an irregular shaped rotating body is 10 ft. from an instantaneous axis. At the same instant a point "B" in the body is to have twice the velocity

A. 5 ft.
B. 240 inches
C. 305 cm
D. 6.2 meters

Circular pitch times diametral pitch equals

A. π
B. 1/π
C. 1.0
D. π^2

A general principle in the motion of a body can be stated as follows (F = force, M = mass, V = velocity, Δ = change, T = time)

A. FT = MV
B. FΔT = MV^2
C. FT = MΔV
D. FΔV = MΔT

In mechanics, if mass (M), length (L), and time (T) are selected as primary units, force (F) will have the following equation

A. F = M L T
B. F = M T^2 L^-1
C. F = M L T^-2
D. F = M L^-1 T^-2

For a simple beam supported at each end and which is uniformly loaded

A. the shear at the center of the beam is zero
B. the moment diagram is a straight line
C. the shear at the reaction is a minimum
D. the maximum moment occurs at the reaction

The use of carbon in steel

A. increases the hardness
B. increases the ductility
C. increases the resistance to shock
D. decreases the resistance to fatigue

The loss of the weight of the body submerged in a fluid is

A. proportional to the depth of submergence
B. equal to the weight of the fluid displaced
C. independent of the specific gravity of the liquid
D. proportional to the weight of the body

The difference between the book value and the actual lower resale value is

A. sunk cost
B. salvage value
C. fixed cost
D. resale value

It occurs when a unique product or service is available only from a single supplier and entry of all other possible suppliers prevented:

A. inventory
B. monopoly
C. competition
D. profitability

Two triangles are congruent if two angles and the included side of one are equal respectively to two angles and the included side of the other

A. theorem
B. corollary
C. axiom
D. postulate

The side opposite the right angle of a right triangle

A. median
B. apothem
C. quadrilateral
D. hypotenuse

An instrument for measuring specific density of fluids

A. hygrometer
B. flowmeter
C. clinometer
D. hydrometer

Output over input

A. annuity
B. efficiency
C. rate of return
D. bond

The volume of a circular cylinder is equal to the product of its base and altitude

A. corollary
B. postulate
C. axiom
D. theorem

A statement of equality between two ratios:

A. theorem
B. proportion factor
C. valuation
D. power

A plane closed curve, all points of which are the same distance from a point within, called the center is

A. radius
B. circle
C. arc
D. chord

Which of the following is the definition of the Joule?

A. a unit of power
B. a Newton meter
C. a kg m/s^2
D. a rate of change of energy

What is the equivalent expression for sin2x?

A. 1/2 sinx cosx
B. 2sinx cos(1/2 x)
C. 2sinx / secx
D. -2 sinx cosx

The series expansion for cos x contains which power of x?

A. 0, 2, 4, 6, 8, …
B. 1, 3, 5, 7, 9, …
C. 1, 2, 3, 4, 5, …
D. 1/2, 3/2, 5/2, 7/2, …

All of the following statements about photons are correct, EXCEPT:

A. Photons are small quanta of electromagnetic energy
B. Energy of photons varies according to E = hf, where h is Planck's
C. Photon energy varies with source intensity, i.e. a bright light source emits photons of higher energy than a dim source
D. Velocity of photons in vacuum is c, the speed of light, 3 x 10^10 cm/sec

A one-candle power light source radiates luminous flux at the rate of

A. 1 lumens
B. 2 lumens
C. π lumens
D. 4π lumens

A principal sum P is invested at a normal interest rate r, compounded m times a year, for n years. The accumulated amount at the end of this period will be

A. P(1 + r/m)^r
B. P(1 + r/m)^(n/m)
C. P(1 + r/m)^m
D. none of these

In the formula P = F(1 + i)^-n the factor (1 + i)^-n is called the

A. sinking fund factor
B. single payment present worth factor
C. single payment compound amount factor
D. capital recovery factor

A fund established to produced a desired amount at the end or a given period by means of series of payments throughout the period is called a sinking fund, and is represented by the formula:

A. A = F [i / ((1 + i)^n -1)]
B. A = P (1 + i)^-n
C. A = F [((1 + i)^n -1) / (i (1 + i)^n)]
D. A = F [((1 + i)^n) / i]

Which of the following relationships between compound interest factors is NOT correct?

A. Single payment compound amount factor and single payment present worth factor are reciprocals
B. Sinking fund factor and uniform series compound amount factor are reciprocals
C. Capital recovery factor and sinking fund factor are reciprocals
D. Capital recovery factor equals sinking fund factor plus the interest rate

In determining the average annual cost of a project, the formula (P-S)/n + (P-S)(i/2)((n+1)/n) + Si represents the economic method of

A. Sinking fund depreciation plus interest on first cost
B. Straight line depreciation plus interest on first cost
C. Straight line depreciation plus average interest
D. Capital recovery with a return

An "annuity" is defined as

A. Earned interest due at the end of each interest period
B. Cost of producing a product or rendering a service
C. A series of equal payments occurring at equal periods of time
D. Total annual overhead assigned to a unit of production

If the sine of angle A is given as K, what would be the tangent of angle A?

A. aK/h
B. hK/a
C. ha/K
D. oK/a

In finding the distance, d, between two points, which equation is the appropriate one to use?

A. d = √ (x1 – x2)^2 + (y1 – y2)^2
B. d = √ (x1^2 – x2^2) + (y1^2 – y2^2)
C. d = √ (x1 – y1)^2 + (x2 – y2)^2
D. d = √ (x2 – x1)^2 + (y2 – y1)^2

The equation y = a1 + a2.x is an algebraic expression for which the following choices?

A. a cosine expansion series
B. projectile motion
C. projectile energy
D. a straight line

What is the name for a vector that represents the sum of two vectors?

A. scalar
B. resultant
C. tensor
D. moment

What type of curve is generated by a point which moves in uniform circular motion about an axis, while travelling with a constant speed, v, parallel to the axis?

A. a cycloid
B. an epicycloid
C. a hypocycloid
D. a helix

All of the following statements about the electron structure of atom are correct, EXCEPT:

A. Electrons of highest energy are located in the outer orbitals
B. Each orbital can contain one electron
C. K, L, M, etc. shells are designation representing the principal quantum number n = 1, 2, 3 etc.
D. Each shell may contain up to n^2 orbitals, but not exceeding

All of the following are characteristics of waves, EXCEPT:

A. Energy of a wave varies with the square of its amplitude
B. Interference is interaction of waves. The observed effect is based on the principle of superposition
C. Wave frequency changes on entering a medium where the velocity of propagation is changed
D. Diffraction, or bending of a wave, occurs around the edges of obstacles

All of the statements about electromagnetic waves are correct, EXCEPT:

A. Electromagnetic waves are transverse waves that consist of mutually coupled, changing eclectic and magnetic fields
B. Directions of the electric field, of the magnetic field, and of propagation are mutually perpendicular
C. Field intensity changes take place, but no displacement of mass occurs in the path of electromagnetic waves
D. Electric field maxima and minima occur out of phase with those of the associated magnetic field

All of the following statements about sound are correct. EXCEPT:

A. Sound is propagated by longitudinal compressional waves
B. Velocity of sound in solids may be calculated from their elastic modulus and density
C. Velocity of sound in gases is independent of pressure
D. Sound waves do not exhibit refraction in passing between media

Frequency f of monochromatic yellow light which as a wavelength λ of 589 nm (nanometers) in vacuum is nearest to:

A. 295, 000 Ghz
B. 510, 000 Ghz
C. 589, 000 Ghz
D. 1, 020, 000 Ghz

What is a possible outcome of an experiment called?

A. a sample space
B. a random point
C. an event
D. a finite set

In probability theory, what is the set of all possible outcomes of an experiment called?

A. a set of random events
B. a fuzzy set
C. a cumulative distributive
D. a sample space

How can the values of a random variable defined over a sample space be described?

A. always continuous
B. always numerical
C. strictly nonzero
D. defined only over a finite horizon

If two random variables are independently distributed, what is their relationship?

A. They are not identically distributed
B. They are mutually exclusive
C. They are uncorrelated
D. (A) or (B)

Which of the following probability is not valid?

A. The probability of an event is always positive and less than or equal to one
B. If E_0 is an event which cannot occur in the sample space, the probability of E_0 is zero
C. If events E_1 and E_2 are mutually exclusive, then the probability of both events occurring is zero
D. If events E_1 and E_2 are mutually exclusive, then P (E_1 + E_2) = P(E_1) + P(E_2) – P(E_1 E_2)

If y = cos x, what is dy/dx?

A. sec x
B. –sec x
C. csc x
D. –sin x

Which of the following does not illustrate the effect of temperature or pressure on gas solubility?

A. Air bubbles form on the sides of a warm glass of water
B. Soda pop is bottled under pressure
C. Boiling frees water of gases
D. Air is more humid on rainy days

The chemical process which occurs when water is added to cement is

A. oxidation
B. Brownian movement
C. plastic flow
D. hydration

An amphoteric hydroxide is one which:

A. has a valence of -2
B. has been craed by bombardment with high energy protons
C. reacts violently with water
D. may act as either a base or an acid in chemical reactions

The element tin has ten different stable isotopes. The atomic nuclei of all isotopes have the same:

A. number neutrons
B. number of protons
C. radius
D. mass

If the second derivative of the equation of a curve is proportional to the negative of the equation of the same curve, what is the curve?

A. a hyperbola
B. a square wave
C. a sinusoid
D. a cycloid

Consider a strictly convex function of one variable, x, with a lower bound and upper bound on x. For what value(s) of x will the function be minimized?

A. at the upper bound of x
B. strictly between the upper and lower bounds of x
C. at the lower bound of x
D. (A) or (B) or (C)

Consider a strictly concave function in one variable, x, with a lower bound an upper bound on x. For what value(s) of x will the function be minimized?

A. at the upper bound of x
B. at the lower bound of x
C. strictly between the upper and lower bounds of x
D. (A) or (B)

Which of the following metals has the highest specific heat capacity at 100°C?

A. aluminum
B. bismuth
C. copper
D. iron

Which of the following is a member of the halogen family?

A. sodium
B. fluorine
C. hydrogen chloride
D. phosphorus

A sample of a substance, to which a chemical formula can be assigned, whose weight is equal to its formula weight is termed:

A. molecule
B. mole
C. gram equivalent weight
D. one normal solution

Hydrogen is common to all

A. acids
B. salts
C. oxides
D. metals

The integral of a function between certain limits divided by the difference in abscissas between those limits gives _____ of the function

A. average
B. middle
C. intercept
D. asymptote

How can the differential equation a (d^2 x)/(d t^2) + B (t) dx/dt + C = D(t) best described?

A. linear, homogeneous, and first order
B. homogeneous and first order
C. linear, second order, and nonhomogeneous
D. linear, homogeneous and second order

The differential equation given is correctly described by which one of the following choices?

a (d^2 y / d x^2) + bxy dy/dx = f(x)

A. Linear, second order, homogeneous
B. Nonlinear, second order, homogeneous
C. Linear, second order, non homogeneous
D. Nonlinear, second order, nonhomogeneous

How is the capital recovery factor (A/P, i, n) related to the uniform series sinking fund factor (A/F, i, n)? i is the effective annual rate of return, and n is in years

A. (A/P, i, n) = (A/F, i, n) + i
B. (A/P, i, n) = (A/F, i, n) / i
C. (A/P, i, n) = (A/F, i, n) - i
D. (A/P, i, n) = [(A/F, i, n) + i] / n

To determine the chemical formula of a compound, we need o know all of the following except the:

A. elements that compose the compound
B. density of the compound
C. molecular weight of the compound
D. atomic weights of the elements in the compound

The number of molecules in 22.4 liters (under standard conditions) of a substance in its gaseous state, is called

A. Dulong's number
B. Petit's number
C. Avogadro's number
D. Gay-Lussac's number

Which of the following metals is the best heat conductor?

A. aluminum
B. copper
C. gold
D. silver

When exposed to the atmosphere, which of the following liquids is coldest?

A. oxygen
B. argon
C. nitrogen
D. helium

Hard water is water which contains soluble salts of which of the following elements?

A. Sodium
B. Sulfur
C. Calcium
D. chlorine

What is an annuity?

A. the future worth of a present amount
B. a series of uniform amounts over a period of time
C. an annual repayment of a loan
D. a lump sum at the end of the year

Which of the following expression is incorrect?

A. the future worth of a present amount, (F/P, i, n) = 1 / (P/F, i, n)
B. the future worth of an annuity, (F/A, i, n) = 1 / (A/F, i, n)
C. the present worth of an annuity, (P/A, i, n) = 1 / (A/P, i, n)
D. (A/F, i, n) - i = (A/P, i, n)

When using net present worth calculations to compare two projects, which of the following could invalidate the calculation?

A. Differences in the magnitudes of the projects
B. Evaluating over different time periods
C. Mutually exclusive projects
D. Nonconventional cash flows

Assuming i = annual rate of return, n number of years, F = future worth, and P = present worth, what is the future worth of a present amount P (F/P, i, n)?

A. P (1 + i)^n
B. P (1 + i)^(n-1)
C. P (1 + i)^-n
D. P (1 + i)^i

What must two investments with the same present worth and unequal lives have?

A. identical salvage values
B. identical equivalent uniform annual cash flows
C. different salvage values
D. different equivalent uniform annual cash flows

What is the formula of a straight-line depreciation rate?

A. (100% - % Net Salvage Value) / (Estimated Service Life)
B. (% Net Salvage Value) / (Estimated Service Life)
C. (100% Net Salvage Value) / (Estimated Service Life)
D. (Average Net Service Value) / (Estimated Service Life)

Which of the following statements about stagnation properties is least correct?

A. For a compressible fluid, KE change is converted to stagnation temperature rise, and pressure rise is isentropically calculated
B. Stagnation temperature is related to aerodynamic heating of leading edges of aircraft wings
C. In a fluid at Mach number greater than 1, an isentropic calculation of stagnation properties is valid
D. For an incompressible fluid impacting a pitot tube, KE change may be converted to pressure rise

Which of the following statements about Mach number (M) is FALSE?

A. Mach number is the ratio of velocity to sonic velocity
B. Mach number has the dimensions of velocity
C. Mach 1 is the maximum attainable velocity in a nozzle throat
D. Mach angle (alpha), or angle the shock front makes with the velocity factor of a moving source, and Mach number are related by Msin(alpha) = 1

During combustion of hydrocarbon fuels with less than stoichiometric air, the products depend on the amount of air supplied and could be all of the following EXCEPT

A. Unburned fuel, C, CO2 and H2O
B. Unburned fuel, C CO and H2O
C. C, CO, CO2 and H2O
D. C, CO and H2O

The rate of heat transfer through a given section of a uniform wall for a given temperature difference is:

A. Directly proportional to the thermal conductivity and to the thickness of the wall
B. Inversely proportional to the thermal conductivity and directly proportional to the thickness of the wall
C. Directly proportional to the thermal conductivity and inversely proportional to the thickness of the wall
D. Inversely proportional to the thermal conductivity and to the thickness of the wall

Which of the following is true regarding the minimum attractive rate of return used in judging proposed investments?

A. It is the same for every organization
B. It is larger than the interest rate used to discount expected cash flow form investments
C. It is frequently a policy decision made by an organization's management
D. It is not relevant in engineering economy studies

Which of the following situation has a conventional cash flow so that an interest rate of return can be safely calculated and used?

A. You purchase a house and pay the bank in monthly installments
B. You lease a car and pay by the month
C. Your company undertakes a mining project in which the land must be reclaimed at the end of the project
D. You invest in a safe dividend stock and receive dividends each year

The Economic Order Quantity (EOQ) is defined as the order quantity which minimizes the inventory cost per unit time. Which of the following is not an assumption of the basic EOQ model with no shortages?

A. The demand rate is uniform and constant
B. There is a positive cost on each unit inventoried
C. The entire reorder quantity is delivered instantaneously
D. There is an upper bound on the quantity ordered

Which of the following events will cause the optimal lot size, given by the classic EOQ model with no shortages, to increase?

A. a decrease in inventory carrying cost
B. a decrease in demand
C. an increase in demand
D. (A) or (C)

Which of the following statements is FALSE concerning the deviations of real gases from ideal gas behavior?

A. Molecular attraction interactions are compensated for in the ideal gas law
B. Deviations from ideal gas behavior are large near the saturation curve
C. Deviations from ideal gas behavior become significant at pressures above the critical point
D. Molecular volume becomes significant as specific volume is decreased

All of the following statements about wet bulb temperature are true EXCEPT:

A. wet bulb temperature equals adiabatic saturation temperature
B. wet bulb temperature lies numerically between dewpoint and dry bulb temperature for unsaturated system
C. wet bulb temperature equals both dry bulb and dewpoint temperature at 100% relative humidity
D. wet bulb temperature is the only temperature necessary to determine grains of water per lb. of dry air

A small plastic bat is filled with moist air at 50% relative humidity, sealed and placed in an environmental chamber whose temperature and pressure may be independently varied. The relative humidity in the bag will be lowered under which of the following conditions?

A. pressure is increased
B. temperature is decreased
C. pressure is decreased
D. temperature is decreased and pressure is increased

What is a borrower of a particular loan almost always required to do during repayment?

A. pay exactly the same amount of interest each payment
B. repay the loan over an agreed – upon amount of time
C. pay exactly the same amount of principal each payment
D. (A) or (C)

What work-in-process classified as?

A. an asset
B. a liability
C. an expense
D. a revenue

What is the indirect product cost (IPC) spending variance?

A. the difference between actual IPC and IPC absorbed
B. the difference between actual IPC and IPC volume adjusted budget
C. the IPC volume adjusted budget (fixed + volume (variable IPC rate))
D. the IPC volume adjusted minus the total IPC absorbed

Film A uses full absorption costing while firm B uses variable product costing. How will the financial statements of these companies differ?

A. Firm A has a higher cost of goods sold and therefore, a smaller profit
B. Firm A has a higher cost of goods sold, higher inventory value, and higher retained earnings
C. Firm A has a smaller cost of goods sold and a larger profit
D. Firm A has a smaller cost of goods sold, no change in inventory value, and no change in retained earnings

Power may be expressed in units of

A. ft – lbs
B. BTU/hr
C. HP – hours
D. kw-hours

Which of the following thermodynamic cycles is the most efficient?

A. Carnot
B. Brayton
C. Otto
D. Diesel

Which air-standard power cycle do the P – V and T – S diagrams on the next page represent?

A. Otto cycle
B. Reheat cycle
C. Carnot cycle
D. Brayton cycle

Equilibrium conditions exist in all EXCEPT which of the following

A. in reversible processes
B. in processes where driving forces are infinitesimals
C. along ideal frictionless, nondissipative paths where forward and reverse processes occur at equal rates
D. in an steady state flow process

Name the process that has no heat transfer

A. Isentropic
B. Isothermal
C. Quasistatic
D. Reversible

Enthalpy of ideal gas is function only of:

A. internal energy
B. entropy
C. the product of pressure and specific volume
D. temperature

How is the material purchase price variance defined?

A. (quantity purchased x actual price) – (quantity purchased x standard price)
B. (quantity issued – standard quantity) (standard price)
C. (actual price – standard price) (quantity used)
D. (quantity purchased – standard quantity) (actual price)

Which of the following does not affect owner's equity?

A. dividends paid
B. invested capital
C. license to start business
D. expense to get license of start business

Companies A and B are identical except for their inventory accounting systems. Company A uses the last-in, first-out convention while company B uses the first-in n first-out convention. How will their financial statements differ in an inflationary environment?

A. Company A's profits will be higher and the book value of their inventory will be higher than for company B
B. Company A's profits will be higher and the book value of their inventory will be lower than for company B
C. Company B's profits and inventory book value will be higher than for company A
D. Company B's profits will be higher than A's, but inventory book value will be lower

What is the acid test ratio?

A. the ratio of owner's equity to total current liabilities
B. the ratio of all assets to total liabilities
C. the ratio of current assets (exclusive of inventory) to total current liabilities
D. the ratio of gross margin to operating, sales, and administrative expenses

Which of the following is not a unit of work?

A. N.m
B. erg
C. kg.m^2/s^2
D. dyne

If heat transfer of the previous problem were reversible, and if the turbine operated isentropically, what is the entropy gained or lost by the low temperature reservoir?

A. Indeterminate
B. 0
C. +0.240 BTU/°R
D. +0.250 BTU/°R

For spontaneously occurring natural process in an isolated system which expression best expresses dS?

A. ds = dQ/T
B. dS = 0
C. dS > 0
D. dS < 0

Which of the following statements about entropy is FALSE?

A. Entropy of a mixture is greater than that of its components under the same conditions
B. An irreversible process increases entropy of the universe
C. Entropy has the units of heat capacity
D. Entropy of a crystal at 0°F is zero

Work or energy can be a function of all of the following EXCEPT:

A. force and distance
B. torque and angular rotation
C. power and time
D. force and time

Energy changes are represented by all EXCEPT which one of the following?

A. $-\int VdP$
B. Tds – PdV
C. TdS + VdP
D. dQ_rev / T

(U + PV) is a quantity called

A. flow energy
B. shaft work
C. entropy
D. enthalpy

In flow process, neglecting KE and PE changes, $-\int VdP$ represents which item?

A. heat transfer
B. shaft work
C. closed system work
D. flow energy

The hydraulic formula $CA\sqrt{2gh}$ is used to find the

A. quantity of discharge through an orifice
B. velocity of low in a closed conduit
C. length of pipe in a closed network
D. friction factor of a pipe

The hydraulic radius of an open-channel section is defined as:

A. the wetted perimeter divided by the cross sectional area
B. the cross sectional area divided by the total perimeter
C. the cross sectional area divided by the wetted perimeter
D. one-fourth the radius of a circle with the same area

Which of the following is true for a fluid?

A. it cannot sustain a shear force
B. it cannot sustain a shear force at rest
C. it is a liquid only
D. it has a very regular molecular structure

Which of the following is not a basic component of motion of a fluid element?

A. twist
B. rotation
C. angular distortion
D. volume distortion

Which of the following must be satisfied by the flow of any fluid, real or ideal?

I. Newton's second law of motion
II. the continuity equation
III. the requirement of uniform velocity distribution
IV. Newton's law of viscosity
V. The principle of the conservation of energy

A. I, II, and III
B. I, II, and IV
C. I, II, and V
D. I, II, III, and IV

What is the definition of pressure?

A. area / force
B. lim(force → o) [force / area]
C. lim(area → o) [force / area]
D. lim(force → o) [area / force]

For a fluid, viscosity is defined as the constant of proportionality between shear stress and what other variable?

A. the time derivative of pressure
B. the spatial derivative of velocity
C. the time derivative of density
D. the spatial derivative of density

In the design of waterways, the "hydraulic jump" is sometimes used for

A. energy dissipation
B. elimination of turbulence
C. prevention of sedimentation
D. measurement of flow

The rate of laminar water flow in a saturated soil can be calculated using:

A. a Moody diagram
B. the Bernoulli equation
C. Darcy's law
D. the Hazen-Williams formula

Surface tension has which of the following properties?

I. It has units of force per unit length
II. It exists whenever there is a density discontinuity
III. It is strongly affected by pressure

A. I only
B. II only
C. III only
D. I and II

A leak from a faucet comes out in separate drops. Which of the following is the main cause of this phenomenon?

A. gravity
B. air resistance
C. viscosity of the fluid
D. surface tension

Equation of state for a single component can be any of the following, EXCEPT:

A. the ideal gas law, Pv = RT
B. the ideal gas law modified by insertion of a compressibility factor, Pv = ZRT
C. any relationship interrelating 3 or more states
D. A mathematical expression defining a path between states

The state of thermodynamic system is always defined by its

A. absolute temperature
B. process
C. properties
D. temperature and pressure

Which of the following describes shear stress in a moving fluid?

A. it is proportional to the absolute viscosity
B. it is proportional to the velocity
C. it is non-existent
D. both A and B gradient at the point of interest

If the shear stress in a fluid varies linearly with the velocity gradient, which of the following describes the fluid?

A. It is inviscid
B. It is a Newtonian gas
C. It is perfect gas
D. It is an constant temperature

How are the lines of constant pressure in a fluid related to the force field?

A. They are parallel to the force field
B. They are perpendicular to the force field
C. They are at 45° angles to the force field
D. They are perpendicular only to the force of gravity

Which of the following is the most accurate about a streamline?

A. It is a path of a fluid particle
B. It is a line normal to the velocity vector everywhere
C. It is fixed in space in steady flow
D. It is defined for non-uniform flow only

Which of the describes a streamline?

I. It is a mathematical concept
II. It cannot be crossed by the flow
III. It is a line of constant entropy

A. I only
B. I and II
C. II only
D. I and III

Mathematically, a thermodynamic property is which of the following?

A. a point function
B. a path function
C. an inexact differential
D. discontinuous

In finding the distance between two points P1 (x1, y1) and P2 (x2, y2), the most direct procedure is to use:

A. The translation of the axes
B. The slope of the line
C. The Pythagorean theorem
D. The derivative

To cut a right circular cone in such a was as to reveal a parabola, it must be cut:

A. perpendicular to the axis of symmetry
B. at any acute angle to the axis of symmetry
C. at any obtuse angle to the axis of symmetry
D. none of these

Naperian logarithms have a base of:

A. 3.1416
B. 10
C. 2.171828
D. 2.71828

For a given curve f(x, y) = 0, it is found that f(x, y) = f(x, -y). This means that:

A. The curve is unsymmetrical
B. The curve is symmetrical to both axes
C. The curve is symmetrical to the x – axis
D. The curve is symmetrical to the y – axis

Under what condition is mass conserved in fluid flow?

A. The fluid is baratropic
B. It is always conserved
C. The flow is isentropic
D. The flow is adiabatic

What is the absolute velocity of a real fluid at a surface?

A. the same as the bulk fluid velocity
B. the velocity of the surface
C. zero
D. proportional to the smoothness of the surface

What is the origin of the energy conservation equation used in flow system?

A. Newton's first law of motion
B. Newton's second law of motion
C. the first law of thermodynamics
D. the second law of thermodynamics

Which of the following is the basis for Bernoulli's law for fluid now?

A. the principle of conservation of mass
B. the principle of conservation of energy
C. the continuity equation
D. Fourier's Law

Under which of the following conditions is Bernoulli's equation valid?

A. the fluid must be incompressible
B. all points evaluated must be on the same streamline
C. the fluid must be inviscid
D. all of the above

In statistics, the standard deviation measures:

A. a standard distance
B. central tendency
C. a normal distance
D. dispersion

If a right circular cone is cut parallel with the axis of symmetry, you would reveal:

A. circle
B. ellipse
C. hyperbola
D. parabola

If the first derivative of the equation of a curve is a constant, the curve is a:

A. circle
B. parabola
C. hyperbola
D. straight line

What are the units of Reynolds numbers for pipe flow?

A. m/s
B. ft^2/sec
C. lbm/ft-sec^2
D. none of the above

Which of the following ratios is correct in providing a physical meaning for the Reynolds number, Re?

A. Re = buoyant forces / inertial force
B. Re = drag force / viscous forces
C. Re = viscous forces / inertial forces
D. Re = inertial forces / viscous forces

Which of the following statements is incorrect?

A. The Reynolds number is the ration of the viscous forces to the inertial force
B. Steady flows do not change with time at any point
C. The Navier-Stroke equation is the equation of motion for a viscous Newtonian fluid
D. Bernoulli's equation only holds on the same streamline

An angle between 90° and 180° has:

A. A positive sine and cosine
B. A negative cotangent and cosine
C. A negative secant and tangent
D. All its trigonometric functions negative

The following is a characteristic of all trigonometric functions:

A. The values of all functions repeat themselves every 45 degrees
B. All functions are units of length or angular measure
C. The graphs of all functions are continuous
D. All functions are dimensionless units

Where does the Moody diagram for friction factors for pipe flow come from?

A. calculations based on potential flow
B. experimental results for inviscid fluids
C. applying the principle of conservation of mass
D. experimental results for viscous fluids

What is the friction factor for fully developed flow in a circular pipe where Reynolds number is 1000?

A. 0.008
B. 0.064
C. 0.08
D. 0.10

For pipe flow in laminar flow region, how is the friction factor related to the Reynolds number?

A. f alpha (64/Re)
B. f alpha (1/Re)
C. f alpha (Re)
D. f alpha (Re^2)

Which of the following flow meters measure the average fluid velocity in a pipe rather than a point or local velocity?

I. venture meter
II. pitot tube
III. impact tube
IV. orifice meter
V. hot wire anemometer

A. I only
B. II only
C. I and IV
D. II and IV

For fully developed laminar flow of fluids through pipes, the average velocity is what fraction of the maximum velocity in the pipe?

A. 1/8
B. 1/4
C. 1/2
D. 3/4

Which of the following is not true regarding the Blasius boundary layer solution?

A. It is valid only for potential flow
B. It is an approximate solution
C. It is valid for laminar flow
D. It permits one to calculate the skin friction on a flat plate

For a system to be in equilibrium, the sum of the external forces acting on the system must be:

A. equal to unity
B. indeterminate
C. a maximum
D. zero

The mass moment of inertia of a cylinder about its central axis perpendicular to a circular cross section is:

A. directly proportional to its radius
B. independent of its radius
C. directly proportional to its length
D. independent of its length

Which of the following properties are intensive properties?

I. temperature
II. pressure
III. composition
IV. mass

A. I only
B. IV only
C. I and II
D. I, II , and III

How many independent properties are required to completely fix the equilibrium state of a pure gaseous compound?

A. 0
B. 1
C. 2
D. 3

Which of the following thermodynamic relations is incorrect?

A. TdS = dU – pdV
B. TdS = dH – Vdp
C. U = Q – W
D. H = U – pV

The moment of inertia of any plane figure can be expressed in units of length to the:

A. First power
B. Third power
C. Second power
D. Fourth power

The vector which represents the sum of a group of force vectors is called the:

A. magnitude
B. sum
C. resultant
D. phase angle

Which of the following is <u>not</u> a vector quantity?

A. velocity
B. acceleration
C. speed
D. displacement

The stress in an elastic material is:

A. inversely proportional to the material's yield strength
B. inversely proportional to the force acting
C. proportional to the displacement of the material acted upon by the force
D. inversely proportional to the strain

The "SLENDERNESS RATIO" of a column is generally defined as the ratio of its:

A. length of its minimum width
B. unsupported length to its maximum radius of gyration
C. length to its moment of inertia
D. unsupported length to its least radius of gyration

The relationship between the extension of a spring and the force required to produce the extension is:

A. F = ma
B. F = mv^2 / R
C. F = μN
D. F = kx

The linear portion of the stress-strain diagram of steel is known as the:

A. modulus of elongation
B. irreversible range
C. plastic range
D. elastic range

Principal stresses occur on these planes:

A. where the shearing stress is zero
B. which are 45 degrees apart
C. where the shearing stress is a maximum
D. which are subjected only to tension

The ratio of the moment inertia of the cross section of a beam to the section modulus is:

A. equal to the radius of gyration
B. equal to the area of the cross section
C. a measure of distance
D. multiplied by the bending moment to determine the stress

When an air entrainment agent is introduced into a concrete mix:

A. the strength will increase
B. the strength will decrease
C. the strength will not be affected
D. the water/cement ratio must be reduced from 10 – 15%

Structural steel elements subjected to torsion develop:

A. tensile stress
B. shearing stress
C. compressive stress
D. bending stress

Which of the following relations defines the enthalpy?

A. h = u + P/T
B. h = u + pV
C. h = u + P/V
D. h = pV + T

The deflection of a beam is:

A. directly proportional to the modulus of elasticity and moment of inertia
B. inversely proportional to the modulus of elasticity and length of the beam cubed
C. inversely proportional to the modulus of elasticity and moment of inertia
D. inversely proportional to the weight and length

The differential of the shear equation is which one of the following?

A. load on the beam
B. tensile strength of the beam
C. bending moment of the beam
D. slope of the elastic curve

A homogeneous round bar of diameter D, length L, and total weight W is hung vertically from one end. If E is the modulus of elasticity, what is the total elongation of the bar?

A. WL / πD^2E
B. WL / 2πD^2E
C. 2WL / πD^2E
D. 2WLE / πD^2

Which of the following is true for water at reference temperature where enthalpy is zero?

A. Internal energy is negative
B. Entropy is non-zero
C. Specific volume is zero
D. Vapor pressure is zero

In an ideal gas mixture of constituents i and j, what is the mole fraction x, equal to?

A. Ti / Ti + Tj
B. Zi / Zi + Zj
C. pi / pi + pj
D. piVi / RT

The compressibility factor, z, is used for predicting the behavior of non-ideal gases. How is the compressibility factor defined relative to an ideal gas? (Subscript "c" refers to critical value)

A. z = p / pc
B. z = pV / RT
C. z = T / Tc
D. Z = (T/Tc)(pc/p)

On what plane is the Mollier diagram plotted?

A. p – V
B. p – T
C. h – s
D. s – u

How is the quality, x, of a liquid-vapor mixture defined?

A. the fraction of the total volume that is saturated vapor
B. the fraction of the total volume that is saturated liquid
C. the fraction of the total mass that is saturated vapor
D. the fraction of the total mass that is saturated liquid

What is the expression for the heat of vaporization?
hg = enthalpy of the saturated vapor
hf = enthalpy of the saturated liquid

A. hg
B. hf
C. hg – hf
D. hg^2 – hf^2

A vertically loaded beam, fixed at one end and simply supported at the other is indeterminate to what degree?

A. First
B. Third
C. Second
D. Fourth

A thin walled pressurized vessel consists of a right circular cylinder with flat ends. Midway between the ends the stress is greatest in what direction?

A. Longitudinal
B. Circumferential
C. Radial
D. At an angle 45° to the longitudinal and circumferential direction

During an adiabatic, internally reversible process, what is true about the change in entropy?

A. It is always zero
B. It is always greater than zero
C. It is always less than zero
D. It is temperature-dependent

For irreversible process, what is true about the total change in entropy of the system and surroundings?

A. dS = dQ / T
B. dS = 0
C. dS > 0
D. dS < 0

For which type of process does the equation dQ = TdS hold?

A. irreversible
B. isothermal
C. reversible
D. isobaric

Which of the following is true for any process?

A. $\Delta S_{surroundings} + \Delta S_{system} \geq 0$
B. $\Delta S_{surroundings} + \Delta S_{system} \leq 0$
C. $\Delta S_{surroundings} + \Delta S_{system} < 0$
D. $\Delta S_{surroundings} + \Delta S_{system} > 0$

The bending moment at a section of a beam is derived from the

A. Sum of the moments of all external forces on one side of the section
B. Difference between the moments on one side of the section and the opposite side
C. Sum of the moments of all external forces on both sides of the section
D. Sum of the moments of all external forces between supports

The stress concentration factor

A. is a ratio of the average stress on a section to the allowable stress
B. cannot be evaluated for brittle materials
C. is the ratio of areas involved in an sudden change of cross section
D. is the ratio of the maximum stress produced in a cross section to the average stress over the section

Poisson's Ratio is the ratio of the

A. Unit lateral deformation to the unit longitudinal deformation
B. Unit stress to unit strain
C. Shear strain to compressive strain
D. Elastic limit to proportional limit

Hooke's Law for an isentropic homogeneous medium experiencing on-dimensional stress is:

A. Stress = E(strain)
B. (Force)(area) = (change in length) / (length)
C. Strain = E (stress)
D. Force / Area = length / change in length

Which of the following thermodynamic cycles is the most efficient?

A. Carnot
B. Rankine
C. Brayton
D. combine Brayton-Rankine

The ideal, reversible Carnot cycle involves four basic processes. What type of processes are they?

A. all isothermal
B. all adiabatic
C. two isothermal and two isentropic
D. two adiabatic and two isentropic

What is the temperature difference of the cycle if the entropy difference is ΔS, and the work done is W?

A. $W - \Delta S$
B. $W / \Delta S$
C. $\Delta S / W$
D. $W (\Delta S)$

The modulus of rigidity of a steel member is:

A. a function of the length and depth
B. defined as the unit shear stress divided by the unit shear deformation
C. equal to the modulus of elasticity divided by one plus Poisson's ratio
D. defined as the length divided by the moment of inertia

A thin homogeneous metallic plate containing a hole is heated sufficiently to cause expansion. If the coefficient of surface expansion is linear, the area of the hole will:

A. increase at twice the rate the area of the metal increases
B. increase at the same rate as the area of the metal increases
C. decrease at twice the rate the area of the metal increases
D. decrease at the same rate as the area of the metal increases

The linear portion of the stress – strain diagram of steel is known as the:

A. modulus of elasticity
B. plastic range
C. irreversible range
D. elastic range

The maximum bending moment of a beam simply supported at both ends and subject to a total load W uniformly distributed over its length L is expressed by the formula:

A. WL / 8
B. WL^2 / 8
C. WL / 2
D. WL^2 / 2

In a long column (slenderness ratio > 160 which of the following has the greatest influence on its tendency to buckle under a compressive load

A. The modulus of elasticity of the material
B. The compressive strength of the material
C. The radius of gyration of the column
D. The length of the column

The area of the shear diagram of a beam between any two points on the beam is equal to the:

A. Change in shear between the two points
B. Total shear beyond the two points
C. Average moment between the two point
D. Change in moment between the two points

Poisson's ratio is principally used in:

A. The determination of the capability of a material for being shaped
B. The determination of capacity of a material
C. Stress-strain relationships where stresses are applied in more than one direction
D. The determination of the modulus of toughness

Young's modulus of elasticity for a material can be calculated indirectly from which of the following properties of the material?

A. Temperature coefficient of expansion and dielectric constant
B. Temperature coefficient of expansion and specific heat
C. Density and velocity of sound in the material
D. Density and inter – atomic spacing in the material

The difference between the starting and the ending inventory valuations, a term that represents an inventory account adjust is called:

A. cost of good sold
B. perpetual inventory system
C. physical inventory system
D. periodic inventory system

How is the material purchase price variances defined?

A. (quantity issued – std. quantity)(std. price)
B. (actual price – std. price)(quantity used)
C. (quantity purchased – quantity used)(actual price)
D. (quantity purchased x actual price) – (quantity purchased x std. price)

How many significant digits to 10.097 have?

A. 2
B. 3
C. 4
D. 5

Angles are measured from the positive horizontal axis, and the positive direction is counterclockwise. What are the values of sin B and cos B in the 4th quadrant?

A. sin B > 0 and cos B < 0
B. sin B > 0 and cos B > 0
C. sin B < 0 and cos B < 0
D. sin b < 0 and cos B > 0

Modulus of Resilience is:

A. the same as the modulus of elasticity
B. a measure of a materials ability to store strain energy
C. the reciprocal of the modulus of elasticity
D. a measure of the deflection of a member

Imperfections within metallic crystal structures may be all of the following, EXCEPT:

A. lattice, vacancies, or extra interstitial atoms
B. ion pairs missing in ionic crystals (Shotky imperfections)
C. displacement to form mirror images along a low energy boundary or crystal plane
D. Linear defects, or slippage dislocations caused by shear

All of the following statements about strain energy are correct, EXCEPT:

A. It is caused by generation and movement of dislocations through shear or plastic deformation
B. It results from trapped vacancies in the crystal lattice
C. It is proportional to length of dislocation, shear modulus, and shortest distance between equivalent lattice sites (points)
D. It is less for sites at grain boundaries than for internal sites within the crystal structure

For a heat engine operating between two temperatures (T2 > T1), what is the maximum efficiency attainable?

A. 1 – T2/T1
B. 1 – T1/T2
C. T1/T2
D. 1 – (T1/T2)^r

Which of the following is not an advantage of a superheated, closed Rankine cycle over an open Rankine cycle?

A. lower equipment costs
B. increased turbine work output
C. increase efficiency
D. increased boiler life

Which of the following statements regarding Rankine cycles is not true?

A. Use of a condensable vapor in the cycle increases the efficiency of the cycle
B. The temperatures at which energy is transferred to and from the working liquid are less separated than in a Carnot cycle
C. Superheating increases the efficiency of a Rankine cycle
D. In practical terms, the susceptibility of the engine materials to corrosion is not a key limitation on the operating efficiency

Which of the following set of reversible process describes an ideal Otto cycle?

I. adiabatic compression, isometric heat addition, adiabatic expansion, isometric heat rejection
II. isothermal compression, isobaric heat addition, isothermal expansion, isobaric heat rejection

A. I only
B. II only
C. I and II in succession
D. II and I in succession

All of the following statements about diffusion and grain growth are correct, EXCEPT

A. Vacancies and interstitial atoms affect diffusion, whose net result is movement of atoms to produce a structure of less strain and of uniform composition
B. Diffusion is irreversible and requires an activation energy; its rate increases exponentially with temperature. It follows the diffusion equation where flux equals diffusivity times concentration gradient
C. Activation energy for diffusion through structures is inversely proportional to atomic packing factor in the lattice
D. Atoms can diffuse both within crystal and across grain (crystal) boundaries

All of the following statements about slip are correct. EXCEPT:

A. Slip, or shear along crystal planes, results in an irreversible plastic deformation or permanent set
B. It involves only a few atoms at a time in a series of small dislocation movements
C. Slip planes lie in the direction of the longest distance between neighboring sites in the crystal lattice
D. Ease of slippage in directly related to number of low energy slip planes existent in the lattice structure

When a metal is cold worked all of the following generally occur EXCEPT:

A. Recrystallization temperature decreases
B. Ductility decreases
C. Grains become equi-axed
D. Tensile strength increases

All of the following statements about strain hardening are correct, EXCEPT:

A. Strain hardening strengthens metals. Resistance to deformation increases with the amount of strain present
B. Strain hardening is relieved during softening, annealing above the recrystallization temperature
C. Strain hardening is produced by cold working (deformation below the recrystallization temperature)
D. More strain hardening requires more time-temperature exposure for relief

A Carnot operates between two reservoirs. One reservoir is at a higher temperature, TH, and the other is a cooler is a cooler temperature, TC. What is the coefficient of performance, COP, of the refrigerator?

A. TH / TC
B. TH – TC/TH
C. 1 – TC/TH
D. TC / (TH-TC)

All of the following processes strengthen metals, EXCEPT:

A. Annealing above the recrystallization temperature
B. Work hardening by mechanical deformation below the recrystallization temperature (cold working)
C. Heat treatment such as quenching and tempering, for production of a finer microstructure
D. Precipitation processes, such as age hardening, which produce high strength by formation of sub microscopic phases during low temperature heat treatment

The valence hand model used to explain metallic conduction is based on all the following statements, EXCEPT:

A. Each valence band may contain up to 2n electrons/n atom: each electron lies at a discretely different level
B. Fermi energy level, Ef, is essentially temperature independent, and is the energy at which 50% of available energy states are occupied
C. A conduction bad lies at the next higher set of electronic energy levels above those occupied at the ground state
D. Conduction occurs when an electron remains in its existent valence band

Intrinsic silicon becomes extrinsically conductive with electrons as majority carriers, when doped with which of the following?

A. nothing
B. antimony
C. boron
D. germanium

Which of the following is standard temperature and pressure (STP)?

A. 0 K and one atmosphere pressure
B. 32 °F and zero pressure
C. 0 °F and zero pressure
D. 0 °C and one atmosphere pressure

When the emitter to base of an npn transistor is forward biased, and base to collector is reverse biased, all of the following are correct EXCEPT:

A. Electrons are majority carries in the n – emitter and n – collector regions
B. Electrons are minority carries in the p – base region
C. Holes are majority carries in the p – base region
D. The emitter is positive with respect to the collector

All of the following statements about solid solution are correct, EXCEPT:

A. Solid solutions can result when basic structure of the solvent can accommodate solute additions
B. In solid solution larger solute atoms occupy the interstitial space between solvent atoms that are located at the lattice sites
C. Solid solutions may result by substitution of one atomic species for another, provided radii and electronic structure are compatible
D. Order – disorder transitions that occur at elevated temperature in solid solutions involve changes due to thermal agitation from preferred orientation to random occupancy of lattice sites

All of the following statements about ferromagnetism are correct EXCEPT:

A. Magnetic domains are small volumes existent within a single crystal where atomic magnetic moments are unidirectionally aligned
B. Domains are randomly oriented when unmagnetized. On magnetization, domains oriented with the external field grow at the expense of unaligned domains
C. Impurities, inclusions and strain hardening interfere with change of domain boundaries, and add to the permanency of a magnet
D. High magnetic susceptibility of ferromagnetic materials disappears below the Curie temperature

All of the following statements about steels are correct, EXCEPT:

A. Yield strength of commercially available heat treated alloy steels does not exceed 200,000 psi
B. High temperature alloys used in jet engine turbine blades can withstand 2000°F continuously over extended period
C. Intergranular corrosion of chromium – nickel stainless steels is reduced when stabilized by addition of columbium (niobium), titanium or tantalum to preferentially form carbides and prevent chromium depletion and chromium carbide precipitation is grain boundary areas
D. Abrasion resistance of extra strength steels may be obtained by increasing hardness to 225 – 400 Brinell at the expense of some ductility and toughness

Steels can be strengthened by all of the following practices, EXCEPT:

A. annealing
B. work hardening
C. quenching and tempering
D. grain refinement

All of the following statements about the austenite – martensite – bainite transformation in steel are correct, EXCEPT:

A. Martensite is fine grained alpha-ferrite, supersaturated with carbon, in a metastable body centered tetragonal structure. It forms by shear (slippage) during the rapid quench of face centered cubic austenite (- ferrite)
B. Martensite is strong and hard, but brittle, Tampering toughens it and reduces brittleness
C. Tempering of martensite is done by judicious reheating to produce, by diffusion, a fine – grained tough, strong microstructures
D. Bainite and tempered martensite have distinctively different microstructures

All of the following statements about mechanical failure are true, EXCEPT:

A. Brittle fracture occurs with little plastic deformation and relatively small energy absorption
B. Ductile fracture is characterized by significant amounts of energy absorption and plastic deformation (evidenced by elongation and reduction in cross-sectional area)
C. Ductile – brittle transition in failure mode occurs at reduced temperatures for most materials, because fracture strength remains constant with temperature while yield strength increases as temperature is reduced. At high temperatures yield strength is least; at low temperatures fracture strength is least
D. Fatigue failure due to cyclic stress frequency dependent

All of the following statements about rusting of iron are correct, EXCEPT:

A. Contact with water, and oxygen are necessary for fursting to occur
B. Contact with a more electropositive metal reduces rusting
C. Halides aggravate rusting, a process which involves electrochemical oxidation-reduction reactions
D. Pitting occurs in oxygen – rich anodic areas, and the rust is deposited nearby

Which statement about area moments of inertia is false?

A. I = ∫ d^2 (dA)
B. The area moment of inertia arises whenever the magnitude of the surface forces varies linearly with distance
C. The moment of inertia of a large area is equal to the summation of the inertia of the smaller areas within the larger area
D. The area closest to the axis of interest are the most significant

Which of the following affects most of the electrical and thermal properties of materials?

A. the atomic weight expressed in grams per gram-atom
B. the electrons, particularly the outermost ones
C. the magnitude of electrical charge of the protons
D. the weight of the atoms

Which of the following is not a method of non-destructive testing of steel casting and forgings?

A. radiography
B. magnetic particle
C. ultrasonic
D. chemical analysis

Compressive strength of fully cured concrete is most directly related to:

A. sand-gravel
B. water-cement ratio
C. aggregate gradation
D. absolute volume of cement

According to the ACI code, the modular ratio, n, of structural concrete with a 28 – day ultimate compressive strength, fc, of 3000 is nearest to

A. 7
B. 8
C. 9
D. 10

What are valence electrons?

A. the outershell electrons
B. electrons with positive charge
C. the electrons of the complete quantum shells
D. the K-quantum shell electrons

What is the strong bond between hydrogen atoms known as?

A. the ionic bond
B. ionic and metallic bond
C. the metallic bond
D. the covalent bond

What are Van der Waals forces?

A. weak secondary bonds between atoms
B. primary bonds between atoms
C. forces between electrons and protons
D. forces not present in liquids

All of the following statements about air entrained concrete are correct, EXCEPT:

A. Air entrained is recommended when concrete is exposed to severe frost action
B. With air entrainment, the quantity of water to produce a given consistency (slump) is reduced
C. With air entrainment, the quantity of water to produce a specified 28 day compressive strength is reduced
D. Air entrainment reduces resistance to the freeze – that that occurs when salt is used to melt ice or snow

In the design of a reinforced concrete structure, tensile strength of the concrete is normally

A. Assumed to be 1/10 of the 28-day compressive strength
B. Determined by beam tests
C. Neglected
D. Assumed to be 200 psi

All of the following groups of plastics are thermoplastic, EXCEPT:

A. Polyvinylchloride (PVS) and polyvinyl acetate
B. Polyethylene, polypropylene, and polysterene
C. Tetrafluorothylene (Teflon) and other fluorocarbons
D. Phenolics, melamine and epoxy

Compare the metallic iron atom Fe and the ferric ions Fe^3+ and Fe^3+. Which has the smallest atomic radius? (Assume all are at the same temperature)

A. Fe
B. Fe^2+
C. Fe^3+
D. They have the same radii

Cesium (Cs) and sodium (Na) both have the same valence (+1), yet with chlorine (Cl), cesium has a coordination number of 8 in CsCl, while sodium has a coordination number of only 6 in NaCl. What is the main reason for this difference?

A. The atomic weight of Cs is larger
B. Cs contains more electrons than the weight of Na
C. Cs forms covalent bonds in CaCl
D. Cs is too large to be coordinated by only 6 chloride ions

Which of the following statements is false?

A. Ceramics are inorganic, nonmetallic solids that are processed or used at high temperature
B. Metals are chemical elements that form substances that are opaque, lustrous, and good conductors of heat and electricity.
C. Oxides, carbides, and nitrides are considered to be within the class of materials known as glasses
D. Most metals are strong, ductile, and malleable. In general, they are heavier than most other substances

Kinematic viscosity may be expressed as:

A. ft^2 / sec
B. sec^2 / ft
C. slug sec^2 / ft
D. slugs / sec

Absolute viscosity of a fluid varies with pressure and temperature and is defined as a function of

A. Density and angular deformation rate
B. Density, shear stress and angular deformation rate
C. Density and shear stress
D. Shear stress and angular deformation rate

Total energy of a compressible or incompressible fluid flowing across any section in a pipeline is a function of:

A. pressure and velocity
B. pressure, density, and velocity
C. flow energy, kinetic energy, height above datum, and internal energy
D. pressure density, velocity and height above datum

Which of the following is not a viscoelastic material?

A. plastic
B. metal
C. rubber
D. glass

In molecules of the same composition, what are the variations of atomic arrangements known as?

A. polyemers
B. isomers
C. monomers
D. crystal system

Which of the following accurately describes differences between crystalline polymers and simple crystals?

I. Crystalline polymers are made of folded chains of atoms unlike simple crystals
II. Crystal size can be increased by raising the crystallization temperature only in polymers
III. While a simple crystal may be totally crystallized, a polymer can reach only partial crystallization

A. I only
B. II only
C. III only
D. I and III

Polymers that favor crystallization are least likely to have which of the following?

A. small side groups
B. only one repeating unit
C. an atactic configuration of side groups
D. small chain lengths

The locus of the elevations to which water will rise in a piezometer tube is termed:

A. stagnation pressure
B. the enegy gradient
C. the hydraulic gradient
D. friction head

Which of the following statements most nearly approximates condition in turbulent flow?

A. Fluid particles move along smooth, straight paths
B. Energy loss varies linearly with velocity
C. Energy loss varies as the square of the velocity
D. Newton's law of viscosity governs the flow

For turbulent flow of a fluid in a pipe, all of the following are true EXCEPT:

A. The average velocity will be nearly the same as at the pipe center
B. Energy lost due to turbulence and friction varies with kinetic energy
C. Pipe toughness affects the friction factor
D. Reynolds number will be less than 2000

In fluid flow, if the fluid travels parallel to the adjacent layers and the paths of individual particles do not cross , the flow is said to be:

A. laminar
B. turbulent
C. critical
D. dynamic

Flow nets are drawn to show all of the following EXCEPT:

A. Streamlines spaced to bound streamtubes of equal volume flow rate, q
B. Flow and pressure drops in distribution systems
C. Paths of particles in 2-and 3-dimensional flow
D. Equipotential lines perpendicular to streamlines

Which of the following constitutes a group of parameters with the dimensions of power?

A. ρ A V
B. DV ρ / μ
C. PAv
D. ρv^2 / P

At or below critical velocity in small pipes or at very low velocities, the loss of head due to friction

A. varies directly as velocity
B. can be ignored
C. is infinitely large
D. varies as the velocity squared

At constant pressure P all of the following statements about low rate, q in turbulent flow in a pipe are true, EXCEPT:

A. q varies approximately as (diameter, D)^2
B. q decreases as pipe surface roughness ratio, ∈/D increases
C. q varies as (velocity, V)^2
D. q decreases inversely as (fluid density, ρ)^1/2

What is the atomic packing factor for a simple cubic crystal?

A. 0.48
B. 0.52
C. 1.00
D. 1.05

Which of the following statements is false?

A. Both copper and aluminum have a face-centered crystal structure
B. Both magnesium and zinc have a hexagonal close-packed crystal structure
C. Iron can have either a face-centered or a body-centered cubic crystal structure
D. Both lead and cadmium have a hexagonal close-packed crystal structure

Which of the following statements is false?

A. The coordinates of the unique lattice points for a boy-centered cubic unit cell are: 0, 0, 0 and 1/2, 1/2, 1/2.
B. The coordinates of the unique lattice points for a face-centered cubic unit cell are: 0, 0, 0; 1/2, 1/2, 0, 1/2, 0, 1/2; and 0, 1/2, 1/2.
C. The coordinates of the unique lattice points for a simple cubic unit cell are 0, 0, 0.
D. The coordinates of the unique lattice points for a rhombohedral unit cell are 1/2, 1/2, 1/2.

Which crystal structure possesses the highest number of close-packed planes and close-packed direction?

A. simple cubic
B. body-centered cubic
C. face-centered cubic
D. close-packed hexagonal

What are the most common slip planes for face-centered cubic and body-centered cubic structures, respectively?

A. face-centered: (111), body-centered: (110)
B. face-centered: (100), body-centered: (110)
C. face-centered: (110), body-centered: (111)
D. face-centered: (111), body-centered: (100)

Entrance losses between tank and pipe, or losses through elbows, fittings and valves are generally expressed as functions of

A. kinetic energy
B. pipe diameter
C. friction factor
D. volume flow rate

The vena contracta of a sharp hydraulic orifice usually occurs:

A. At the geometric center of the orifice
B. At a distance of about 10% of the orifice diameter upstream from the plane of the orifice
C. At a distance equal to about two orifice diameters downstream from the plane of the office
D. At a distance equal to about one-half the orifice diameter downstream from the plane of the orifice

Modes of extinguishing obligations when an auditor abandons his right to collect:

A. condonation
B. forfeiture
C. debt cancellation
D. liquidated damages

With regard to corrosion of metals, passivation is the process that:

A. intensifies deterioration temporarily
B. inhibits further deterioration
C. changes the composition of the metal
D. alter the grain size of the metal

Cavitation is the result of

A. static pressure in a fluid becoming less than fluid vapor pressure
B. rivets under load impact
C. exposure of concrete to salt water
D. heat treatment of a low carbon steel

On doubling the speed, N, of a centrifugal pump, all of the following are true, EXCEPT:

A. Head, H is increased by a factor of 4
B. Horsepower, P is increased by a factor of 8
C. Head, horsepower and volume flow rate are independently variable
D. Volume flow rate, Q is increased by a factor of 2

The first law of thermodynamics states that:

A. heat energy cannot be completely transformed into work
B. internal energy is due to molecular motion
C. heat can only be transferred from a body of higher temperature to one of lower temperature
D. energy can be neither created nor destroyed

In any non – quasistatic thermodynamics process, the overall entropy of an isolated system will:

A. increase then decrease
B. stay the same
C. decrease and then increase
D. increase only

Comparing the face-centered cubic lattice with the hexagonal close-packed lattice, which of the following features describes the hexagonal close-packed structure only?

A. It has the closes packed lattice structure
B. Its coordination number is 2
C. Its deformation properties are more directional
D. Its stacking order is ABCABC

A plane intercepts the coordinate axis at x = 1, y = 1, and z = 2. What are the Miller indices of the plane?

A. (132)
B. (123)
C. (623)
D. (326)

Entropy is a measure of

A. the change in enthalpy of a system
B. the internal energy of a gas
C. the heat capacity of a substance
D. randomness or disorder

MESL FORMULA ELEMENTS

What is the degree of the polynomial $3x^4y + 2x^3z^3 - 4yz^2$?

A. 6th
B. 5th
C. 4th
D. 3rd

ANSWER: A. 6th

For a complex number a + bi, the real number $\sqrt{a^2 + b^2}$ is _____ of the complex number.

A. absolute value
B. magnitude
C. modulus
D. all of the above

ANSWER: D. all of the above

The symbol $\sqrt[n]{b}$ means the principal nth root. "n" is called the

A. Radicand
B. radical
C. radix
D. index

ANSWER: D. index

In the quadratic equation $Ax^2 + Bx + C = 0$, when the two roots are multiplied, the result is

A. C/A
B. –B/A
C. –C/A
D. A/C

ANSWER: A. C/A

In the quadratic equation $Ax^2 + Bx + C = 0$, when the two roots are multiplied, the result is

A. C/A
B. –B/A
C. –C/A
D. A/C

ANSWER: B. –B/A

What is the discriminant of the quadratic equation $Ax^2 + Bx + C = 0$?

A. $\sqrt{B^2 - 4AC}$
B. $B^2 - 4AC$
C. $B^2 + 4AC$
D. $\sqrt{B^2 + 4AC}$

ANSWER: B. $B^2 - 4AC$

What is the multiplicative inverse of a + bi?

A. 0
B. 1
C. –a –bi
D. $a/(a^2 + b^2) - bi/(a^2 + b^2)$

ANSWER: D. $a/(a^2 + b^2) - bi/(a^2 + b^2)$

Equations used for checking the solution to a plane triangle using law of sine's are as follows: $\frac{a+b}{c} = \frac{\cos\frac{1}{2}(A-B)}{\sin\frac{1}{2}C}$ and $\frac{a-b}{c} = \frac{\sin\frac{1}{2}(A-B)}{\cos\frac{1}{2}C}$. These equations are called

A. Diophantine equations
B. Mollweide's equations
C. Mohr equations
D. Gauss equations

ANSWER: B. Mollweide's equations

The equation $y^2 = (x^2 + 1)^2(2 - x^2)^2$ is an equation of

A. cocked hat
B. fishmouth
C. spiral
D. lemniscate

ANSWER: B. fishmouth

The equation $(x^2 + 2ay - a^2) = y^2(a^2 - x^2)$ is a

A. rosette
B. cocked hat
C. fishmouth
D. spiral

ANSWER: B. cocked hat

The equation $x^2 + y^2 = a^2$ is a

A. cocked hat
B. fishmouth
C. triscectrix
D. lames quartic

ANSWER: D. lames quartic

The equation $ax^2 = y^2(2a - y)$ is the equation of

A. the top
B. cocked hat
C. fishmouth
D. lames quartic

ANSWER: A. the top

The equation $(x^2 + y^2)^2 = ax^2y$ is an equation of

A. bifolium
B. cocked hat
C. spiral
D. limacon

ANSWER: A. bifolium

What is the graph of the equation $Ax^2 + Bx + Cy^2 + Dy + Ex + F = 0$?

A. Circle
B. Ellipse
C. Parabola
D. Hyperbola

ANSWER: B. ellipse

The semi-conjugate axis of the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$

A. 3
B. -3
C. -2
D. 2

ANSWER: D. 2

The length of the latus rectum of the parabola $y = 4px^2$ id

A. 4p
B. 2p
C. $\frac{1}{4p}$
D. -4p

ANSWER: C. $\frac{1}{4p}$

A line parallel to the y-axis at a directed distance x_1 has the equation

A. $y = y_1$
B. $x = x_1$
C. $y = x_1$
D. $x = y_1$

ANSWER: B. $x = x_1$

Let m_1 and m_2 be the respective slopes of two perpendicular lines. Then

A. $m_1 + m_2 = 1$
B. $m_1 + m_2 = 0$
C. $(m_1)(m_2) = 1$
D. $(m_1)(m_2) = -1$

ANSWER: D. $(m_1)(m_2) = -1$

In general equation of a conic section $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$, if A and C have different signs, then the curve is a/an

A. Circle
B. Parabola
C. Ellipse
D. Hyperbola

ANSWER: D. Hyperbola

The derivative of a^u with respect to x is

A. $a^u \, ln \, a \frac{du}{dx}$
B. $a^u \, ln \, u \frac{du}{dx}$
C. $u^a \, ln \, a \frac{du}{dx}$
D. $u^a \, ln \, u \frac{du}{dx}$

ANSWER: A. $a^u \, ln \, a \frac{du}{dx}$

The quantity $2/(e^x - e^{-x})$ is equal to

A. cosh x
B. tanh x
C. csch x
D. sech x

ANSWER: C. csch x

What is $1 - tan\, h^2\, x$ equal to?

A. $sec\, h^2\, x$
B. $cos\, h^2\, x$
C. $cot\, h^2\, x$
D. $csc\, h^2\, x$

ANSWER: A. $sec\, h^2 x$

The integral of $sin^m \theta \, cos^n \theta \, d\theta$ can easily be determined by using Wallis formula provided the limits are form

A. 0 to π
B. 0 to π/2
C. 0 to π/4
D. 0 to 2π

ANSWER: B. 0 to π/2

The value of x in trigonometric substitution with an integrand involving $(a^2 - x^2)$ is

A. a sec θ
B. a tan θ
C. a cos θ
D. a sin θ

ANSWER: D. a sin θ

An infinite series in which successive terms are of the form of constant times successive integral power of the variable. It takes the form of $a_0 + a_1 x + a_2 x^2 + a_3 x^3 + \ldots$.

A. Fourier series
B. Taylor's series
C. McClaurin series
D. Power series

ANSWER: D. Power series

A fund established to produced a desired amount at the end or a given period by means of series of payments throughout the period is called a sinking fund, and is represented by the formula:

A. $A = F\left[\frac{i}{(1+i)^n-1}\right]$
B. $A = P\,(1+i)^{-n}$
C. $A = F\left[\frac{(1+i)^n-1}{i\,(1+i)^n}\right]$
D. $A = F\left[\frac{(1+i)^n}{i}\right]$

ANSWER: A. $A = F\left[\frac{i}{(1+i)^n-1}\right]$

In determining the average annual cost of a project, the formula $\frac{P-S}{n} + (P-S)\left(\frac{i}{2}\right)\left(\frac{n+1}{n}\right) + Si$ represents the economic method of

A. Sinking fund depreciation plus interest on first cost
B. Straight line depreciation plus interest on first cost
C. Straight line depreciation plus average interest
D. Capital recovery with a return

ANSWER: C. Straight line depreciation plus average interest

In finding the distance, d, between two points, which equation is the appropriate one to use?

A. $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$
B. $d = \sqrt{(x_1^2 - x_2^2) + (y_1^2 - y_2^2)}$
C. $d = \sqrt{(x_1 - y_1)^2 + (x_2 - y_2)^2}$
D. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

ANSWER: D. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

How can the differential equation $a\frac{d^2x}{dt^2} + B(t)\frac{dx}{dt} + C = D(t)$ best described?

A. linear, homogeneous, and first order
B. homogeneous and first order
C. linear, second order, and nonhomogeneous
D. linear, homogeneous and second order

ANSWER: C. linear, second order, and nonhomogeneous

The differential equation given is correctly described by which one of the following choices?

$$a\frac{d^2y}{dx^2} + bxy\frac{dy}{dx} = f(x)$$

A. Linear, second order, homogeneous
B. Nonlinear, second order, homogeneous
C. Linear, second order, non homogeneous
D. Nonlinear, second order, nonhomogeneous

ANSWER: D. Nonlinear, second order, nonhomogeneous

Energy changes are represented by all EXCEPT which one of the following?

A. $-\int VdP$
B. $Tds - PdV$
C. $TdS + VdP$
D. $\frac{dQ_{rev}}{T}$

ANSWER: D. $\frac{dQ_{rev}}{T}$

The expression $\frac{6!}{3!0!}$ is equal to

A. ∞
B. 2!
C. 120
D. 0

ANSWER: C. 120

Which of the statements is true concerning the following continuity equation?

$$\frac{\partial p}{\partial t}+\frac{\partial(\rho\mu)}{\partial x}+\frac{\partial(\rho v)}{\partial y}+\frac{\partial(\rho\omega)}{\partial z}=0$$

where: $\rho = density$
$\mu = velocity\ in\ x\ direction$
$v = velocity\ in\ y\ direction$
$\omega = velocity\ in\ z\ direction$

A. It is valid only for incompressible flow
B. It is derived from the principle of conservation of mass
C. It is valid only for steady flow
D. It is derived from the principle of conservation of energy

ANSWER: C. It is valid only for steady flow

Under certain flow conditions, the expression for the first law of thermodynamics for a control volume reduces to Bernoulli's equation:

$$gz_1+\frac{V_1^2}{2}+\frac{P_1}{p}=gz_2+\frac{V_2^2}{2}+\frac{P_2}{p}$$

Which combination of the following conditions is necessary and sufficient to reduce the first law for a control volume to Bernoulli's equation?

I. steady flow
II. incompressible
III. no frictional losses of energy
IV. no heat transfer or change in internal energy

A. I and II
B. I, III, and IV
C. I and IV
D. I, II, III, and IV

ANSWER: D. I, II, III, and IV

A homogeneous round bar of diameter D, length L, and total weight W is hung vertically from one end. If E is the modulus of elasticity, what is the total elongation of the bar?

A. $\frac{WL}{\pi D^2 E}$
B. $\frac{WL}{2\pi D^2 E}$
C. $\frac{2WL}{\pi D^2 E}$
D. $\frac{2WLE}{\pi D^2}$

ANSWER: C. $\frac{2WL}{\pi D^2 E}$

In an ideal gas mixture of constituents i and j, what is the mole fraction x, equal to?

A. $\frac{T_i}{T_i+T_j}$
B. $\frac{Z_i}{Z_i+Z_j}$
C. $\frac{P_i}{P_i+P_j}$
D. $\frac{p_1V_1}{RT}$

ANSWER: C. $\frac{P_i}{P_i+P_j}$

The compressibility factor, z, is used for predicting the behavior of non-ideal gases. How is the compressibility factor defined relative to an ideal gas? (Subscript "c" refers to critical value)

A. $z = \frac{p}{p_c}$
B. $z = \frac{pV}{RT}$
C. $z = \frac{T}{T_c}$
D. $Z = \left(\frac{T}{T_c}\right)\left(\frac{p_c}{p}\right)$

ANSWER: B. $z = \frac{pV}{RT}$

Given that a is a lattice constant that h, k, and I are the Miller indices, which of the following equations describes the interplanar distance d in a cubic crystal?

A. $d = \frac{2a}{\sqrt{\left(\frac{1}{h}\right)^2+\left(\frac{1}{k}\right)^2+\left(\frac{1}{I}\right)^2}}$
B. $d = a\left(\frac{1}{h}+\frac{1}{k}+\frac{1}{I}\right)$
C. $d = \left(\frac{a}{2}\right)\sqrt{h^2+k^2+I^2}$
D. $d = \frac{2a}{\sqrt{h^2+k^2+I^2}}$

ANSWER: D. $d = \frac{2a}{\sqrt{h^2+k^2+I^2}}$