第一章　GRE数学概述

主讲教师：孙瑜

- 130-170
- 1分为最小单位
- section-level adaptive
- The raw score is the number of questions you answered correctly

GRE数学考什么?
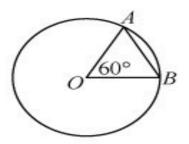- ➢ Arithmetic(算术)
- ➢ Algebra(代数)
- ➢ Geometry(几何)
- ➢ Data analysis(数据分析)

GRE数学考察形式?

➢ Multiple-choice questions
   -select one answer choice
   (单选题)

➢ Multiple-choice questions
   -select one or more answer choices
   (不定项选择题)

➢ Numeric entry questions
   (数字填入题)

➢ Data interpretation
   (数据解释题)

O is the center of the circle, and the perimeter of $\triangle AOB$ is 6.

Quantity A	Quantity B
The circumference of the circle	12

○ Quantity A is greater.

○ Quantity B is greater.

○ The two quantities are equal.

○ The relationship cannot be determined from the information given.

www.koolearn.com

If x and y are the tens digit and the units digit, respectively, of the product $725{,}278 \times 67{,}066$, what is the value of $x + y$?

○ 12

○ 10

○ 8

○ 6

○ 4

Last year Kate spent between $\frac{1}{4}$ and $\frac{1}{3}$ of her gross income on her mortgage payments. If Kate spent $13,470 on her mortgage payments last year, which of the following could have been her gross income last year?

Indicate all such gross incomes.

☐ $40,200

☐ $43,350

☐ $47,256

☐ $51,996

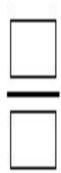☐ $53,808

10, 10, 10, 10, 8, 8, 8, 8, 12, 12, 11, y

The twelve numbers shown represent the ages, in years, of the twelve houses on a certain city block. What is the median age, in years, of the twelve houses on the block?

[　　　　　] years

The sum of the five average ratings was calculated for each of the three airlines. The airline with the least sum was ranked 1st by what fraction of the travel agents?
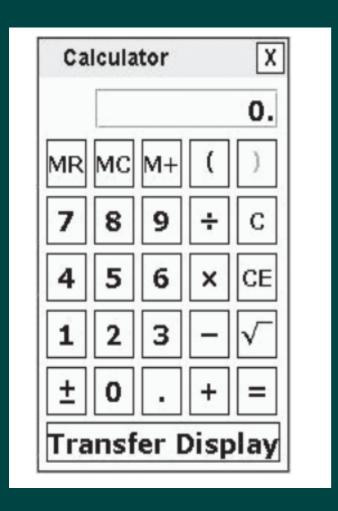
$$\frac{\square}{\square}$$

注意事项

- ➤ For each question, indicate the best answer, using the directions given. If you need more detailed directions, click Help at any time.
- ➤ For numeric entry questions, only numbers, a decimal point and a negative sign can be entered in the answer box.
- ➤ An on-screen calculator is available for each question in this section. To use the calculator, click the calculator icon at the top of the screen. "transfer display"
- ➤ All numbers used are real numbers.

计算器

第二章　算数ARITHMETIC

主讲教师：孙瑜

第二章 Arithmetic（算术）

主要内容

➤ Odd and even numbers(奇数和偶数)

➤ Factors and prime factors(因数和质因数)

➤ Greatest common divisors and least common multiples(最大公约数与最小公倍数)

➤ Consecutive numbers(连续数)

➤ Remainders (余数)

➤ Decimals、fractions、scientific notation(小数 分数和科学计数法)

➤ Ratios and proportions(比率和比例)

主要词汇和数学知识点

➢ Odd

➢ Even

➢ 奇数 + 奇数 = 偶数　　奇数 × 奇数 = 奇数

➢ 偶数 + 偶数 = 偶数　　奇数 × 偶数 = 偶数

➢ 奇数 + 偶数 = 奇数　　偶数 × 偶数 = 偶数

If x and y are integers and xy^2 is a positive odd integer, which of the following must be true?

□ xy is positive

□ xy is odd

□ x^2y^2 is odd

□ x + y is even

□ x + y is negative

If x and y are integers, $2y - x = x^2 - y^2$, which of the following must be an even integer?

☐ x

☐ y

☐ 2x+y

☐ y^2+x

☐ y^2+y

If a and b are positive integers such that a−b and a/b are both even integers, which of the following must be an odd integer?

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

主要词汇和数学知识点

➢ Multiple

➢ Factor/divisor

➢ Divisible

➢ Prime number

➢ Composite number

➢ Prime factor/divisor

➢ Prime factorization

主要词汇和数学知识点

Prime factorization

分解质因数:将一个大合数写成其质因数相乘的形式.

方法:反复用 2 除这个小合数直至不能被 2 整除，再反复用 3 除，以此类推，直至被完全分解，写成完全由质数相乘的形式.

技巧:将大合数写成显而易见的若干小合数相乘的形式.

主要词汇和数学知识点

Prime factorization

4500

$=45×100$

$=5×9×10×10$

$=5×3^2×2^2×5^2$

$=2^2×3^2×5^3$

If x is the product of the positive integers from 1 to 8, inclusive, and if $i, k, m,$ and p are positive integers such that $x = 2^i 3^k 5^m 7^p$, then $i + k + m + p =$

(A) 4

(B) 7

(C) 8

(D) 11

(E) 12

If y is the smallest positive integer such that 3,150 multiplied by y is the square of an integer, then y must be

A. 2

B. 5

C. 6

D. 7

E. 14

Positive integer m is the product of the least five different prime numbers. If 12!/m divisible by 2^n, what is the greatest possible value of n?

A. 7

B. 8

C. 9

D. 10

E. 11

690,△70

If △ represents a single digit in the integer above, which of the following CANNOT be a factor of this integer?

(A)2

(B)3

(C)4

(D)5

(E)7

A positive integer with exactly two different divisors greater than 1 must be

(A) a prime number

(B) an even integer

(C) a multiple of 3

(D) the square of a prime number

(E) the square of an odd integer

n is a positive integer with exactly two different divisors greater than 1 , how many positive factors does n^2 have?

(A)4

(B)5

(C)6

(D)8

(E)9

Positive integer k has exactly 2 prime factors: 3 and 7. If k has 6 positive factors, including 3^2. What is the value of k?

主要词汇和数学知识点

➢ 两个数的最大公约数与最小公倍数的求解方法：

➢ 将两个数分别各自分解质因数；

➢ 每一个质数，取较小的指数，相乘得到最大公约数；

➢ 每一个质数，取较大的指数，相乘得到最小公倍数.

➢ 60 和 45

主要词汇和数学知识点

➢ 60 和 45 分别分解质因数

$60=2^2×3^1×5^1$

$45=2^0×3^2×5^1$

➢ 最大公约数

➢ 底数 2×3×5

➢ 取指数

$2^0×3×5$

$2^0×3^1×5$

$2^0×3^1×5^1$

➢ 最大公约数 $2^0×3^1×5^1$

➢ 最小公倍数 $2^2×3^2×5^1$

koolearn
新东方在线
Greatest common divisors最大公约数
Least common multiples最小公倍数

If M is the least common multiple of 90, 196, and 300, which of the following is NOT a factor of M?

(A) 600

(B) 700

(C) 900

(D) 2,100

(E) 4,900

Consecutive numbers 连续数

主要词汇和数学知识点
➢ 两个连续整数中必然有一个数是2的倍数
➢ 三个连续整数中必然有一个数是3的倍数

In an increasing sequence of 10 consecutive integers, the sum of the first 5 integers is 560. What is the sum of the last 5 integers in the sequence?

(A) 585

(B) 580

(C) 575

(D) 570

(E) 565

If n is an integer greater than 6, which of the following must be divisible by 3?

(A)n(n+5)(n-6)

(B)n(n+2)(n-1)

(C)n(n+3)(n-5)

(D)n(n+4)(n-2)

(E)n(n+1)(n-4)

If n is an integer greater than 6, which of the following must be divisible by 3?

(A) $n(n+5)(n-6)$ ➜ $n(n+2)n$

(B) $n(n+2)(n-1)$ ➜ $n(n-1)(n-1)$

(C) $n(n+3)(n-5)$ ➜ $nn(n-2)$

(D) $n(n+4)(n-2)$ ➜ $n(n-2)(n-2)$

(E) $n(n+1)(n-4)$ ➜ $n(n+1)(n-1)$

If n is a positive integer, then n(n+1)(n+2) is

A. Even only when n is even

B. Even only when n is odd

C. Odd whenever n is odd

D. Divisible by 3 only when n is odd

E. Divisible by 4 whenever n is even

If n is the product of three positive integers: m、 m+4、m+5, which of the following must be true?

☐ n is the multiple of 3.

☐ n is the multiple of 4.

☐ n is the multiple of 6.

主要词汇和数学知识点

- Remainder

When positive integer M is divided by positive integer N, the remainder is 5. N is less than 7, what is the value of N?

A. 4

B. 5

C. 6

D. 7

E. 8

When positive integer x is divided by positive integer y, the remainder is 9. If x/y = 96.12, what is the value of y?

A. 96

B. 75

C. 48

D. 25

E. 12

If t is a positive integer, and the remainder is 0 when t is divided by 2, what is the remainder when (t+1)² is divided by 4?

If n is a positive integer greater than 400, the remainder is 1 when n is divided by 5, 6 or 7,what is the value of n?

When the positive integer n is divided by 25, the remainder is 13. When n is divided by 20, the remainder is 3. Which of the following could be the value of n?

☐ 13

☐ 16

☐ 38

☐ 63

☐ 163

When positive integer x is divided by 5, the remainder is 3; and when x is divided by 7, the remainder is 4. When positive integer y is divided by 5, the remainder is 3; and when y is divided by 7, the remainder is 4. If x > y, which of the following must be a factor of x − y?

A. 12

B. 15

C. 20

D. 28

E. 35

1：

A： the remainder of （333^{777}）/5

B： the remainder of （777^{333}）/5

2：

What is the units digit of $2^{345}+1$?

3：

What is the remainder when 7^{548} is divided by 10?

Decimals、fractions、scientific notation （小数分数和科学计数法)

- 识别各位数字名称"7654.321"，其中：
- "7"：thousands
- "6"：hundreds
- "5"：tens
- "4"：units (or ones)
- "."：decimal point
- "3"：tenths
- "2"：hundredths
- "1"：thousandths

➢ a/b

➢ "a"：numerator

➢ "b"：denominator

➢ $0.0000486 = 4.86 \times 10^{-5}$

➢ $8,245,000 = 8.245 \times 10^{6}$

If the tens digit x and the units digit y of a positive integer n are reversed, the resulting integer is 9 more than n. What is y in terms of x?

(A) $10 - x$

(B) $9 - x$

(C) $x + 9$

(D) $x - 1$

(E) $x + 1$

A two-digit number, reverse the tens digit and the units digit, which one of the following cannot be the sum of the two numbers?

(A)77

(B)121

(C)181

(D)132

(E)154

If a two-digit positive integer has its digits reversed, the resulting integer differs from the original by 27. By how much do the two digits differ?

A. 3
B. 4
C. 5
D. 6
E. 7

A printer numbered consecutively the pages of a book, beginning with 1 on the first page . In numbering the pages, he printed a total of 204 digits. What is the number of pages in the book?

If $10^{50} - 74$ is written as an integer in base decimal notation, what is the sum of the digits in that integer?

(A) 424

(B) 433

(C) 440

(D) 449

(E) 467

考查词汇

➢ Ratio

    ➢ the ratio of A to B

➢ Fraction

    ➢ What fraction A of B?

    ➢ What the fractional part of A is B?

考查词汇

➢ Percent

➢ Proportion

   ➢ direct proportion

   ➢ inverse proportion

Decrease

Increase

There are twice as many girls as boys.

The positive numbers *w, x, y,* and *z* are such that *x* is 20 percent greater than *y, y* is 20 percent greater than *z,* and *w* is 20 percent less than *x.* What percent greater than *z* is *w*?

A. 15.2%

B. 16.0%

C. 20.0%

D. 23.2%

E. 24.8%

In Town X, 64 percent of the population are employed, and 48 percent of the population are employed males. What percent of the employed people in Town X are females?

A. 16%

B. 25%

C. 32%

D. 40%

E. 52%

A merchant purchased a jacket for $60 and then determined a selling price that equaled the purchase price of the jacket plus a markup that was 25 percent of the selling price. During a sale, the merchant discounted the selling price by 20 percent and sold the jacket. What was the merchant's gross profit on this sale?

(A)$0

(B) $3

(C)$4

(D)$12

(E)$15

第三章　代数 Algebra
主讲教师：孙瑜

第三章　代数 Algebra

主要内容

- Operations with exponents(指数运算)
- Equations(方程式)
- Inequalities(不等式)
- Arithmetic sequence(等差数列)
- Geometric sequence(等比数列)
- Functions(函数)

主要词汇和数学知识点

- Exponent

- Index

- Power

- Base

Operations with exponents(指数运算)

主要词汇和数学知识点

- $a^m \times a^n = a^{m+n}$
- $a^m \div a^n = a^{m-n}$
- $(a^m)^n = a^{mn}$
- $a^{-m} = 1/a^m$

- $a^m \times b^m = (a \times b)^m$
- $a^m \div b^m = (a \div b)^m$

If $3^{6x} = 8100$, what is the value of 3^{3x-3}?

If x and y are integers, and $x^{2y} = 16$. What is the value of $2x^{6y} - 4$?

- There are two sets： set A={1， 3， -7}, set B={-1、3、6、7}. If we choose one number from each set, what is the probability that $B^A > 0$?

- If $x^4 + x^{-4} = 7$, what is the value of $x^8 + x^8 = $?

Of the following values of n, the value of $(-1/5)^{-n}$ will be greatest for $n =$

(A) -3

(B) -2

(C) 0

(D) 2

(E) 3

主要词汇和数学知识点

- 一元二次方程(quadratic equation of one variable)

- $ax^2+bx+c=0$ $x_1 = \dfrac{-b+\sqrt{b^2-4ac}}{2a}, x_2 = \dfrac{-b-\sqrt{b^2-4ac}}{2a}.(b^2-4ac \geq 0)$

- 标准根公式

- 十字相乘法

  $ax^2+bx+c=(a_1x+c_1)(a_2x+c_2)$

  其中 $a=a_1 \times a_2$ $c=c_1 \times c_2$ $b=a_1 \times c_2 + c_1 \times a_2$

If the function f(x)= x^2 +px+9 has the roots: x_1 and x_2, x_1+x_2 = -6. What is the value of p^2?

If the equation $x^2-(m-2)x-(n-4)^2=0$ has only one solution, what is the product of m and n?

A. 4

B. 8

C. 10

D. 12

E. 16

比较大小题可以通过方程式判断

1) 一个未知数、一次方形式：

相减之后，相减得到的差值和 0 进行大小关系判定。

2) 一个未知数、两次方形式：

相减之后，利用 $b^2 - 4ac$ 和 0 的大小关系判断

如果 $b^2 - 4ac$>0，说明无法判定；

如果 $b^2 - 4ac$=0，说明无法判定；

如果 $b^2 - 4ac$<0，说明可以判定谁大谁小。

Equations(方程式)

$$y=2x^2+7x-3$$

Quantity A	Quantity B
x	y

主要词汇和数学知识点

- 二元一次方程组(linear and quadratic equation)
- 将一个方程中x和y 的关系代入另一个方程
- $(x+y)^2=x^2+2xy+y^2$
- $(x-y)^2=x^2-2xy+y^2$
- $x^2-y^2=(x+y)(x-y)$

Two positive numbers differ by 12 and their reciprocals differ by 4/5. What is their product?

A. 15

B. 2/15

C. 60

D. 48/5

E. 42

Inequalities(不等式)

主要词汇和数学知识点

- 不等式的基本性质

1）传递性

若 a<b, b<c,则 a<c

2）不等式的加减运算

不等式两边都加(或减去)同一个数,不等式的方向不变。

如果 a < b,那么 a+c < b+c, a-c < b-c;

如果 a > b,那么 a+c > b+c, a-c > b-c.

3) 不等式的乘除运算

如果不等式两边同时乘以或者除以一个正数,不等式的方向不变; 如果不等式两边同时乘以或者除以一个负数,不等式的方向发生变化。

若 a>b, c>0,则 a×c>b×c;

若 a>b, c<0,则 a×c<b×c。

若 a×b>0, a>0,则 b>0。

4) 乘以一个大于 0 小于1的数,数值越变越小;
   除以一个大于 0 小于1的数,数值越变越大。

Inequalities(不等式)

主要词汇和数学知识点

- 对已有的不等式两边取倒数或负数，不等号可能要改变方向，例如：

- $\qquad\qquad$ -7 < -3

- 7 > 3 ➝ $\qquad\qquad\qquad$ ➝(-1/7) > (-1/3)

$\qquad\qquad$ 1/7 < 1/3

- 绝对值(absolute value)

- |x|恒非负，|x-a| 表示数轴上 x 到 a 的距离.

If x < 0 and 0 < y < 1, which of the following has the greatest value?

A. x^2y

B. $(x/y)^2$

C. x^2/y

D. x^2

E. $(xy)^2$

If −4 < x < 7 and −6 < y < 3, which of the following specifies all the possible values of xy?

A. −24 < xy < 21

B. −28 < xy < 18

C. −42 < xy < 24

D. −24 < xy < 24

E. −42 < xy < 21

How many of the integers that satisfy the inequality $(x+2)(x+3)/(x-2) \geq 0$ are less than 5?

A. 1

B. 2

C. 3

D. 4

E. 5

Which of the following inequalities has a
solution set that, when graphed in the
number line, is a single line segment of finite
length?

(A)$x^4 \geq 16$

(B)$x^3 \leq 27$

(C)$x^2 \geq 16$

(D)$2 \leq |x| \leq 5$

(E)$2 \leq 3x+4 \leq 6$

Sequence 数列

主要词汇和数学知识点

- Sequence 数列

- Term 数列中的项

- inclusive 包含数列的首末项

- exclusive 不包含数列的首末项

Arithmetic sequence(等差数列)

主要词汇和数学知识点

- $a_n = a_1 + (n-1)d$
- $s_n = (a_1 + a_n)n/2$
- $n = (a_n - a_1)/d + 1$
- "d": common difference

Geometric sequence(等比数列)

主要词汇和数学知识点

- $a_n = a_1 q^{n-1}$
- $s_n = a_1(1-q^n)/(1-q)$
- 当$|q| < 1$时 $s_\infty = a_1/(1-q)$
- "q" : common ratio

The sequence $a_1, a_2, ..., a_n$ is such that $a_n = 2a_{n-1} - X$ for all positive integers $n \geq 2$ and for certain number X. If $a_5 = 99$ and $a_3 = 27$, what is the value of X?

A. 3

B. 9

C. 18

D. 36

E. 45

In the sequence a_n, $a_n = a_1 + a_2 + \cdots + a_{n-1}$ for all positive integers n ≥ 2. If a_n = p, what is the value of a_{n+2} in terms of p?

A. 2p

B. 3p

C. 4p

D. 5p

E. 6p

For all real numbers *v*, the operation *v** is defined by the equation *v** = v-v/3. If (*v**)* = 8, then *v* =

(A)15

(B)18

(C)21

(D)24

(E)27

If f(x)=1-x, which of the following is -f(-f(-x))?

第四章 几何 Geometry
主讲教师：孙瑜

第四章　几何 Geometry

主要内容

- Lines(直线)

- Polygons (多边形)

- Triangles and Quadrilaterals

  (三角形和四边形)

- Circles (圆)

- Solid geometry(立体几何)

- Plane rectangular coordinate geometry
  (平面直角坐标系)

Lines(直线)

- 平行线： parallel lines
- 垂直线： perpendicular lines
- 相交线： intersect lines

- 锐　角：　acute angle
- 钝　角：　obtuse angle
- 直　角：　right angle

Polygons (多边形)

- 内角和：(n-2)x180°
- 数字前缀
- 1:uni、mono   6:hex、sex
- 2:bi、du、di   7:sept、hept
- 3:tri、ter   8:oct
- 4:tetra、quad   9:novem、enn
- 5:penta、quint   10:dec、deka

Polygons (多边形)

- triangle 三角形

- quadrilateral 四边形

- pentagon 五边形

- hexagon 六边形

- octagon 八边形

- decagon 十边形

- regular polygon 正多边形

- In a polygon that has five vertices, what is the average of the interior angles of the polygon?

1.三角形的通用性质

- 三角形内角和为180°.

- 三角形两边之和大于第三边，两边之差小于第三边.

- 三角形中，较大角的对边也较大.

2.直角三角形的性质

- 勾股定理the Pythagorean theorem：
  (直角边a)^2 + (直角边b)^2 = (斜边c)^2

直角边 leg

斜边 hypotenuse

An obtuse triangle has three sides, and the length of each side is 40, 9, and x. which of the following could be the possible value of x?

A. 30

B. 33

C. 39

D. 40

E. 41

重要：

直角三角形:$a^2 + b^2 = c^2$

锐角三角形:$a^2 + b^2 > c^2$

钝角三角形:$a^2 + b^2 < c^2$

(a和b为钝角三角形的两个短边)

A ladder 25 feet long is leaning against a wall that is perpendicular to level ground. The bottom of the ladder is 7 feet from the base of the wall. If the top of the ladder slips down 4 feet, how many feet will the bottom of the ladder slip?

A. 4

B. 5

C. 8

D. 9

E. 15

3. 三角形(triangles)

   面积 = 1/2×底×高

4. 矩形(rectangles)

   面积 = 长length ×宽width

   周长 = 2×(长+宽)

5.正方形(squares)

   面积 = 边长^2

   周长 = 4×边长

parallelogram平行四边形

rhombus菱形

trapezoid梯形

面 积： area

周 长： circumference

perimeter

1.半径为 r 的圆：

面积 $=\pi r^2$

周长 $=2\pi r$
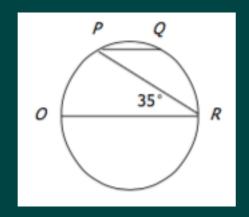
2.角度为 $x°$ 的圆弧： 弧长 $= 2\pi r(x/360)$

3.同一段圆弧所对圆心角是圆周角的两倍

If the number of square units in the area of circle *C* is twice the number of linear units in the circumference of *C*, what is the number of square units in the area?

A. 4

B. 8

C. 4π

D. 8π

E. 16π

In the circle above, *PQ* is parallel to diameter *OR*, and *OR* has length 18. What is the length of minor arc *PQ*?

A. 2π   B. 9π/4   C. 7π/2

D. 9π/2   E. 3π

Solid geometry(立体几何)

1.长方体 (Rectangular Solids)：

体积 = 长 × 宽 × 高.

2.正方体 (Cubes)：

体积 = 边长^3.

3.圆柱 (Cylinders)：

体积 = π× 底面半径^2 × 高.

Solid geometry(立体几何)

Square root 平方根

Cube root 立方根

A grocer is storing small cereal boxes in large cartons that measure 25 inches by 42 inches by 60 inches. If the measurement of each small cereal box is 7 inches by 6 inches by 5 inches, then what is the maximum number of small cereal boxes that can be placed in each large carton?
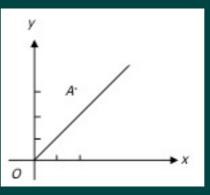
A. 25   B. 210   C. 252

D. 300   E. 420

- 平面直角坐标上两点间距离为：$\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

- 通过两点直线方程为：$\dfrac{(Y - Y_1)}{(X - X_1)} = \dfrac{(Y_2 - Y_1)}{(X_2 - X_1)}$

- 化简为斜截式： y=kx+b

- 其中，k 为斜率 (Slope) ，b为y轴截距 (Intercept).

- 若两直线垂直，其斜率乘积为 −1.

In the rectangular coordinate system above, the line y=x is perpendicular bisector of segment *AB* (not shown), and the *x*-axis is the perpendicular

bisector of segment *BC* (not shown). If the coordinates of point *A* are (2, 3), what are the coordinates of point *C*?

A. (-3,-2)   B. (-3,2)   C.(2,-3)
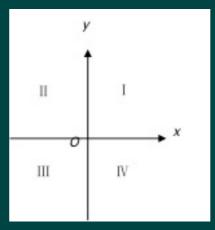
D. (3,-2)   E. (2,3)

In the rectangular coordinate system shown

above, which of the following statements

if true,the line *k* (not shown) must intersect

quadrant I ?

☐The x-intercept of *k* is negative.

☐The y-intercept of k is positive.

☐The y-intercept of k is negative.

☐The slope of *k* is positive.

☐The slope of *k* is negative.

第五章 数据分析 Data analysis
主讲教师：孙瑜

主要内容

- Work problem(工作问题)

- Sets (集合)

- Permutation combination probability

  (排列组合和概率)

- Descriptive statistics(描述统计学)

Six machines, each working at the same constant rate, together can complete a certain job in 12 days. How many additional machines, each working at the same constant rate, will be needed to complete the job in 8 days?

A. 3

B. 4

C. 6

D. 8

E. 9

Running at their respective constant rates, machine X takes 2 days longer to produce w widgets than machine Y. At these rates, if the two machines together produce 5w/4 widgets in 3 days, how many days would it take machine X alone to produce 2w widgets?

A. 4

B. 6

C. 8

D. 10

E. 12

Susan drove at an average speed of 60 miles per hour for 5 hours and then at an average speed of 30 miles per hour for the remaining miles of the trip. If she made no stops during the trip and Susan's average speed is 45 miles per hour. How many hours does Susan take for the remaining miles of the trip?

A. 3

B. 4

C. 5

D. 6

E. 7

A boat traveled upstream a distance of 90 miles at an average speed of (v - 3) miles per hour and then traveled the same distance downstream at an average speed of (v + 3) miles per hour. If the trip upstream took half an hour longer than the trip downstream, how many hours did it take the boat to travel downstream?

A. 2.5

B. 2.4

C. 2.3

D. 2.2

E. 2.1

Three grades of milk are 1 percent, 2 percent, and 3 percent fat by volume. If x gallons of the 1 percent grade, y gallons of the 2 percent grade, and z gallons of the 3 percent grade are mixed to give x + y + z gallons of a 1.5 percent grade, what is x in terms of y and z ?

A.   y + 3z

B.   (y+z)/4

C.   2y + 3z

D.   3y + z

E.   3y+4.5z

An auction house charges a commission of 15 percent on the first $50,000 of the sale price of an item, plus 10 percent on the amount of the sale price in excess of $50,000. What was the sale price of a painting for which the auction house charged a total commission of $24,000?

A. $115,000

B. $160,000

C. $215,000

D. $240,000

E. $365,000

Work problem(工作问题)

- Revenue

- Cost

- Profit

- Discount

- Principal

- Simple interest

- Compound interest

- Semiannually

- Quarterly

Mary invested $14,000 for 3 years in a certificate of deposit paying 9.25% simple annual interest. How many more interest would Mary have received if the interest rate on this certificate had been 9.75% simple annual interest?

A. $21

B. $210

C. $420

D. $2,100

E. $4,200

A 2-year certificate of deposit is purchased for k dollars. If the certificate earns interest at an annual rate of 6 percent compounded quarterly, which of the following represents the value, in dollars, of the certificate at the end of the 2 years?

A. $(1.06)^2k$ B. $(1.06)^8k$ C. $(1.015)^2k$

D. $(1.015)^8k$ E. $(1.03)^4k$

- 1. If an amount *P* is to be invested at an annual interest rate of 3.5 percent, compounded annually, what should be the value of *P* so that the value of the investment is $1,000 at the end of 3 years?

- 2. A college student expects to earn at least $1,000 in interest on an initial investment of $20,000. If the money is invested for one year at interest compounded quarterly, what is the least annual interest rate that would achieve the goal?

John deposited $10000 to open a new savings account that earned 4 percent annual interest, compounded quarterly. If there were no other transactions in the account, what was the amount of money in John's account 6 months after the account was opened?

A. $10100   B. $10101   C. $10200
D. $10201   E. $10400

Sets(集合)

- 全集：universal set
- 子集：subset
- 互斥的: mutually exclusive
  disjoint

According to a survey, 93 percent of teenagers have used a computer to play games, 89 percent have used a computer to write reports, and 5 percent have not used a computer for either of these purposes. What percent of the teenagers in the survey have used a computer both to play games and to write reports?
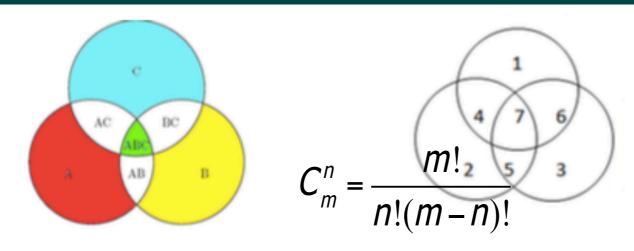
A. 82%

B. 87%

C. 89%

D. 92%

E. 95%

There are two popular newspapers in Town Beautiful Water: A and B. The residents subscribe to at least one of them. 1/5 of the readers that subscribe to A also subscribe to B, while 1/4 of the readers that subscribe to B also subscribe to A. What is the percent of the readers that subscribe to B?

Sets(集合)

三个集合文氏图法

dfasdf

$$C_m^n = \frac{m!}{n!(m-n)!}$$

全集 I = A +B +C - （A∩B）- （A∩C）- （B∩C）+ （A∩B∩C）+ 非 A

非 B 非 C

全集 I = A +B +C - （④+⑦）- （⑤+⑦）- （⑥+⑦）+⑦+ 非 A 非 B 非 C

注意：exactly/only two

In a marketing survey for products some people were asked which of the products, if any, they use. Of the people surveyed, a total of 400 use A, a total of 400 use B, a total of 450 use C, a total of 200 use A and B simultaneously, a total of 175 use B and C simultaneously, a total of 200 use C and A simultaneously, a total of 75 use A, B, and C simultaneously, and a total of 200 use none of the products. How many people were surveyed?

A. 950   B. 975   C. 1,000   D. 1,025   E. 1,050

In a certain class, 10 students can play the piano, 14 students can play the violin, 11 students can play the flute. If 3 students can play exactly three instruments, 20 students can play exactly one instrument, how many students can play exactly two instruments?

A shipment of banners contains banners of two different shapes, triangular and square, and two different colors, red and green. In a particular shipment 26% of the banners are square and 35% of the banners are red. If 60% of the red banners in the shipment are square, what is the ratio of red triangular banners to green triangular banners?

A. 7/50

B. 3/13

C. 7/30

D. 13/37

E. 35/26

One-fifth of the light switches produced by a certain factory are defective. Four-fifths of the defective switches are rejected and 1/20 of the nondefective switches are rejected by mistake. If all the switches not rejected are sold, what percent of the switches sold by the factory are defective?

A. 4%

B. 5%

C. 6.25%

D. 11%

E. 16%

- 组合 (Combination)：

-

-

- 排列 (Permutation)：

-

-

- 加法原理:做一件事,完成它可以有n类办法,在第一类办法中有m1种不同的方法,在第二类办法中有m2 种不同的方法…在第n类办法中有 mn种不同的方法,那么完成这件事共有 N=m1+m2+m3+…+mn种不同方法。

- 乘法原理:做一件事,完成它需要分成n个步骤,做第一步有m1种不同的方法,做第二步有m2 种不同的方法…做第n步有mn种不同的方法,那么完成这件事共有 N=m1×m2×m3×…×mn 种不同的方法。

- 加法原理:独立完成

- 乘法原理:缺一不可

- 概率 (Probability)：

1.等可能事件的概率：

如：7个白球5个红球中，取出1个白球的概率

2. 互斥事件的概率：

如：一个骰子掷出奇数的概率；一个骰子掷出偶数的概率

3.相互独立事件同时发生的概率：

如：一个骰子连续掷出两次奇数的概率.

A certain club has 20 members. What is the ratio of the number of 5-member committees that can be formed from the members of the club to the number of 4-member committees that can be formed from the members of the club?

A. 16 to 1   B. 15 to 1   C. 16 to 5

D. 15 to 6   E. 5 to 4

A company has assigned a distinct 3-digit code number to each of its 330 employees. Each code number was formed from the digits:2, 3, 4, 5, 6, 7, 8, 9 and no digit appears more than once in any one code number. How many unassigned code numbers are there?

A. 6

B. 58

C. 174

D. 182

E. 399

An analyst will recommend a combination of 3 industrial stocks, 2 transportation stocks, and 2 utility stocks. If the analyst can choose from 5 industrial stocks, 4 transportation stocks, and 3 utility stocks, how many different combinations of 7 stocks are possible?

A. 12

B. 19

C. 60

D. 180

E. 720

A certain stock exchange designates each stock with a one-, two-, or three-letter code, where each letter is selected from the 26 letters of the alphabet. If the letters may be repeated and if the same letters used in a different order constitute a different code, how many different stocks is it possible to uniquely designate with these codes?

A. 2,951

B. 8,125

C. 15,600

D. 16,302

E. 18,278

A company plans to assign identification numbers to its employees. Each number consists of four different digits from 0 to 9, inclusive, except that the first digit cannot be 0. How many different identification numbers are possible?

A. 3,024

B. 4,536

C. 5,040

D. 9,000

E. 10,000

Six cards numbered from 1 to 6 are placed in an empty bowl. First one card is drawn and then put back into the bowl; then a second card is drawn. If the cards are drawn at random and if the sum of the numbers on the cards is 8, what is the probability that one of the two cards drawn is numbered 5 ?

A. 1/6

B. 1/5

C. 1/3

D. 2/5

E. 2/3

From a group of 3 boys and 3 girls, 4 children are to be randomly selected. What is the probability that equal numbers of boys and girls will be selected?

A. 1/10

B. 4/9

C. 1/2

D. 3/5

E. 2/3

There are 8 magazines lying on a table; 4 are fashion magazines and the other 4 are sports magazines. If 3 magazines are to be selected at random from the 8 magazines, what is the probability that at least one of the fashion magazines will be selected?

A. 1/2

B. 2/3

C. 32/35

D. 11/12

E. 13/14

A shipment of 8 television sets contains 2 black-and-white sets and 6 color sets. If 2 television sets are to be chosen at random from this shipment, what is the probability that at least 1 of the 2 sets chosen will be a black-and-white set?

A. 1/7

B. 1/4

C. 5/14

D. 11/28

E. 13/28

A certain roller coaster has 3 cars, and a passenger is equally likely to ride in any 1 of the 3 cars each time that passenger rides the roller coaster. If a certain passenger is to ride the roller coaster 3 times, what is the probability that the passenger will ride in each of the 3 cars?

A. 0   B. 1/9   C. 2/9

D. 1/3   E. 1

How many 4-digit positive integers are there in which all 4 digits are even?

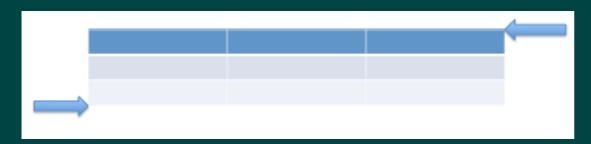A. 625

B. 600

C. 500

D. 400

E. 256

In a meeting of 3 representatives from each of 6 different companies, each person shook hands with every person not from his or her own company. If the representatives did not shake hands with people from their own company, how many handshakes took place?

In a certain class of 20 students with different initials of surname, the roster is arranged by the order of initial of surnames. If three students are selected to join a seminar, how many different ways to select them whose initial of surnames are not near to each other?

A man walks to his home from his current location on the rectangular grid shown. If he may choose to walk north or east at any corner, but may never moves south or west, how many different paths can the man take to get home?

Right triangle PQR is to be constructed in the xy-plane so that the right angle is at P and PR is parallel to the x-axis. The x and y coordinates of P, Q, and R are to be integers that satisfy the inequalities -4≤x≤5, 6≤y≤16. How many different triangles with these properties could be constructed?

Three typists work for four companies, each company has one document, what is the probability that three typists all receive documents?
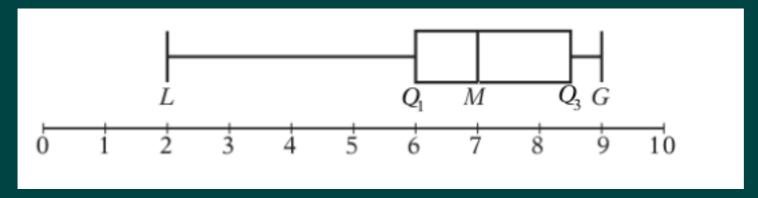
In how many distinguishable ways can the 7 letters in the word MINIMUM be arranged, if all the letters are used each time?
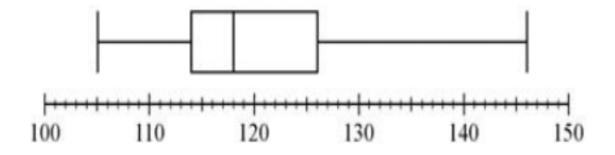
A. 7

B. 42

C. 420

D. 840

E. 5040

- 算术平均数 (Average or Arithmetic Mean or Mean)：
  所有数据之和除以数据个数.

- 中数 (Median)：将所有数据从小到大排列，取中间的数
  或中间两个数的算术平均数.

- 众数 (Mode)：一组数据中出现频率最高的数. 一组数据
  中可能有不止一个众数.

- 极差 (Range)：一组数据中最大数与最小数之差.

Descriptive statistics(描述统计学)

- 方差 (Variance)：一组数据中每个数与算术平均数之差的平方和的算术平均数.

- 标准方差 (Standard Deviation)：方差的平方根.

- Measures of position-----quartiles and percentiles

- Interquartile range= the third quartile minus the first quartile

- Quartiles

- Boxplot

Eight hundred insects were weighed, and the resulting measurements, in milligrams, are summarized in the boxplot below.

(a) What are the range, the three quartiles, and the interquartile range of the measurements?
(b) If the 80th percentile of the measurements is 130 milligrams, about how many measurements are between 126 milligrams and 130 milligrams?

The company at which Mark is employed has 80 employees, each of whom has a different salary. Mark's salary of $43,700 is the second-highest salary in the first quartile of the 80 salaries. If the company were to hire 8 new employees at salaries that are less than the lowest of the 80 salaries, what would Mark's salary be with respect to the quartiles of the 88 salaries at the company, assuming no other changes in the salaries?
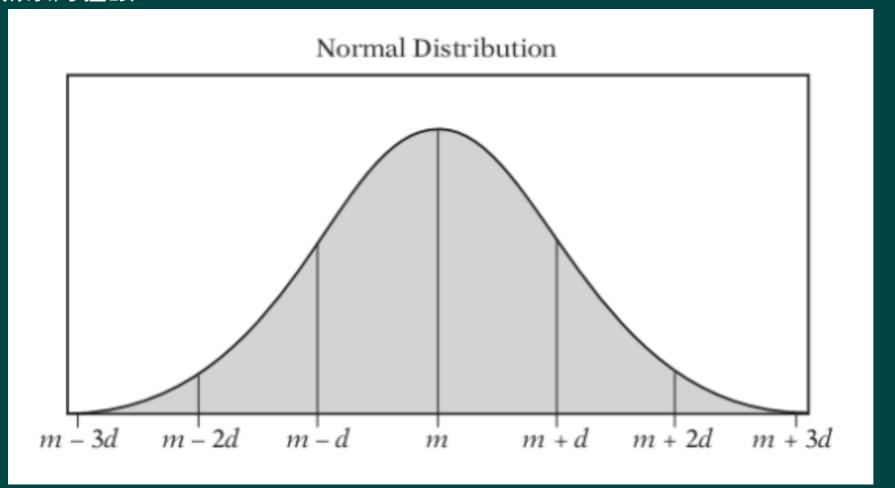
A. The fourth-highest salary in the first quartile

B. The highest salary in the first quartile

C. The second-lowest salary in the second quartile

D. The third-lowest salary in the second quartile

E. The fifth-lowest salary in the second quartile

- The normal distribution
- The standard normal distribution

Normal Distribution

the random variable X is normally distributed. The values 650 and 850 are at the 60th and 90th percentiles of the distribution of X, respectively.

Quantity A	Quantity B
The value at the 75th percentile of the distribution of X	750

For a certain examination, a score of 58 was 2 standard deviations below the mean, and a score of 98 was 3 standard deviations above the mean. What was the mean score for the examination?

A. 74

B. 76

C. 78

D. 80

E. 82

A certain characteristic in a large population has a distribution that is symmetric about the mean m. If 68 percent of the distribution lies within one standard deviation d of the mean, what percent of the distribution is less than $m + d$?

A. 16%

B. 32%

C. 48%

D. 84%

E. 92%

The residents of Town X participated in a survey to determine the number of hours per week each resident spent watching television. The distribution of the results of the survey had a mean of 21 hours and a standard deviation of 6 hours. The number of hours that Pat, a resident of Town X, watched television last week was between 1 and 2 standard deviations below the mean. Which of the following could be the number of hours that Pat watched television last week?

A. 30   B. 20   C. 18   D. 12   E. 6

Three boxes of supplies have an average (arithmetic mean) weight of 7 kilograms and a median weight of 9 kilograms. What is the maximum possible weight, in kilograms, of the lightest box?

A. 1

B. 2

C. 3

D. 4

E. 5

For a certain race, 3 teams were allowed to enter 3 members each. A team earned 6-n points whenever one of its members finished in nth place, where $1 \leqslant n \leqslant 5$. There were no ties, disqualifications, or withdrawals. If no team earned more than 6 points, what is the least possible score a team could have earned?

A. 0   B. 1   C. 2   D. 3   E. 4

The least and greatest numbers in a list of 7 real numbers are 2 and 20, respectively. The median of the list is 6, and the number 3 occurs most often in the list. Which of the following could be the average of the numbers in the list?

☐ 7

☐ 8.5

☐ 10

☐ 10.5

☐ 12.5

Which of the following could be the median of the 4 integers listed below?

150 200 250 n

☐ 155

☐ 175

☐ 215

☐ 235

☐ 255

The standard deviation of four numbers *a, b, c,* and d is *M,* then the standard deviation of which of the following MUST be *M*?

(A) $\sqrt{a^2}, \sqrt{b^2}, \sqrt{c^2}, \sqrt{d^2}$

(B) a^2, b^2, c^2, d^2

(C) $2a, 2b, 2c, 2d$

(D) $a+2, b+2, c+2, d+2$

(E) $a+2, b-2, c+2, d-2$