**Essentials of Quantitative Reasoning**

based upon a KAPLAN Math Workbook

**Arithmetic**

□ Reals 실수 = rationals 유리수 + irrationals 무리수 (π, etc.)

rationals 유리수 = integers정수 + decimal fractions소수 + common fractions분수

□ **Reducing** or **canceling** to the lowest terms:

□ LCM: least common multiple 최소공배수 (multiple 배수)

□ Mixed numbers: , etc.

□ 1 2 3 **.** 4 5 6

□ Remainder: 17 = 5 X 3 + **2**

□ Factors = divisors 약수 (36: 1,2,3,4,6,9,12,36) / common factors 공약수

□ The greatest common factor (divisor) 최대공약수

□ Prime numbers 소수: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29 …

▷ “1” is not considered a prime number.

□ Prime factors 소인수: 2, 3, 5, … 즉 “prime number”로 구성된 약수들

▷ “1” is not considered a prime factor.

□ Prime factorization: 소수의 곱으로 나타내는 것 (480 = 25 x 3 x 5)

□ Consecutive numbers

▷ consecutive positive numbers: 1,2,3,4,5, …

▷ consecutive even numbers: …, -4, -2, 0, 2, 4, …

▷ consecutive prime numbers: 2, 3, 5, 7, 11, 13, …

□ Multiple 배수: 6 =3X2

□ Product: 곱하기한 값

□ 1 penny = $0.01 / 1 nickel = $0.05

1 dime = $0.1 / 1 quarter = $0.25

□ Signed Numbers

▷ Like signs: + + / - - (-1)+(-1)=(-2)

▷ Unlike signs: + - / - - (-1)+(+2)=(+1)

□ 문제유형

약수찾기

What is the greatest integer that will divide evenly **into** both 48 and 60?

□ Average Rate = Average *A* per *B* =

▷ John travels 30miles in 2hrs and then 60miles in 3 hours. What so his

average speed in miles per hour?

□ Round **to** the nearest hundredth: 소수 3째 자리에서 반올림 (3.526 => 3.53)

□ Ratio of *X* to *Y* = = *X* : *Y*

□ *Percent* is just another word for ***hundredth***: 19% means ***19 hundredth***.

□ A2: A **squared** / A3: A ***cubed***

□ Radical = 근호 = root

□ = : Read “the *n*th root of A.”

□ c = *A*bc  / *A*b X *A*c = *A*(b+c) / *A*-b = = ()b / =

□ Write 0.001 ***in scientific notation***: 1.0 X 10-3

□ 1 less than A% of B = B X A% - 1

**Algebra**

□: ***the base*** is *X* and **the exponent** is *a*.

□ In a **quadratic equation**(2차방정식), the ***Quadric Formula***:

□ 문제유형

▷ The quotient of *h* divided by -11:

▷ The difference between a number and 4.5 is -1: *n* – 4.5 = -1, *n*=3.5

▷ If $9,500 is invested at 4.5% annual interest, compounded quarterly,

what is the balance after 2 yrs?

◌ Compounded Interest: A =

where, c = 4 (quarterly), 2 (semiannually) or 1 (annually)

◌ Simple Interest: A = P(1+r\*t)

▷ If $2,300 is invested at % annual interest, compounded semiannually,

what is the balance after 5 yrs?

□ *f* (*x*) = *X* 2 -1, *X* = 1: the input = 1, the output is 0

the **Domain**: the set of input numbers => 1,-1

the **Range**: the set of output values => 0

□ If there are multi points on a graph in which ***two different Y-values*** exist for ***the same***

***X-value***, it represents ***no function***.

□ Slope = =

□ The slope of any horizontal line is ‘0’ and the slope of any vertical line is ‘undefined.’

□ ***Parallel*** lines have the same slope.

***Perpendicular*** lines have slopes that are negative reciprocals of each other.

=> The perpendicular line of ‘y=- +2’ is ‘y=+ +2.’

\* perpendicular to~ : ~에 수직인, 수직선(면)

□ SYMMETRY: A point whose coordinates are (a, b) can be reflected across the line

y=x in the coordinate plane. The coordinates of the reflected point will be (b, a).

To say it another way, the points (a, b) and (b, a) ***are symmetric about*** the line y=x.

□ Parabola: 포물선

□ Circles

X2 + Y2 = Z2 🡺 Center (0, 0) / Z = radius

(X-a)2 + (Y-b)2 = Z2 🡺 Center (a, b) / Z = radius

□ A ***Piecewise Function*** is defined by more than one equation, where each equation

applies to a different part of the domain of the function. The ***absolute function*** is

an example of a piecewise function: |*X*|.

□ A coordinate plane has a ***quadrant*** (4분면).

|  |  |
| --- | --- |
| y  x  The graph of ***C*** x f(x) the graph of f(x) ***stretched from the X-axis*** by  a factor of ***C***. | y  x  The graph of x f(x) the graph of f(x) ***compressed toward the X-axis***  a factor of ***1/C***. |

□ 🡺

**Geometry**

□ Two lines are parallel: l1 || l 2

□ Acute angles: x<90°, Right angles: x=90°, Obtuse angles: 90°<x<180°

꼭지점: vertex ( vertices)

□ Two lines are ***perpendicular*** if they intersect at a 90° angle.

□ Two lines are ***supplementary*** if the sum of their measures is **180°**.

□ Two lines are ***complementary*** if together they make up **a right angle**.

□ The ***height***, or ***altitude***, of a triangle is a perpendicular distance from a vertex to

the side opposite the vertex.

□ The length of any side of a triangle is less than the sum of the lengths of the

other two sides: b + c > a > b – c.

□ In a ***Right triangle*** (직각삼각형), the height and base are the two ***legs***.

Height

(Leg1) Hypotenuse

Base (Leg2)

□ In a ***Isosceles triangle*** (이등변삼각형), two sides of equal length are ***legs***.

Leg1 Leg2

Height

Base

□ a ***Equilateral triangle***: 정삼각형

□ When two triangles are similar with each other,

=

□ When two triangles, ∆ABC and ∆DEF, are ***congruent to*** with each other,

AB = DE, BC = EF and AC = DF. Moreover, ∠A=∠D, ∠B=∠E and ∠C=∠F.

□ A ***Transversal***: 횡단선, ***quadruple***: 4배의/4배가 되게 하다

□ sin30 =, sin60 =, sin45 = cos45 =

cos30 =, sin60 =

tan30 =, tan60 =, tan45 = 1

□ A ***Regular polygon*** (정다각형) has sides of equal length & interior angles of

equal measure. The ***Perimeter*** of a polygon is the sum of the lengths of the sides.

□ The sum of interior angles of polygons

Triangles: 180° / ***Quadrilateral***s (4각형): 180° X 2 = 360° / Pentagons: 180° X 3 = 540°

Hexagon: 180° X 4 = 720° / ***Heptagon***: 180° X 5 = 900° / Octagon: 180° X 6 = 1,080°

□ Quadrilaterals: Rectangles (직사각형), Squares (정사각형),

***Parallelogram*** (평행사변형), ***Trapezoids*** (부등변사각형(사다리꼴))

□ A ***diagonal*** (대각선) of a polygon is a line segment connecting two nonadjacent vertices.

□ Diameter (직경), Radius (반경), ***Chord*** (현), ***Central angle***

Central Angle

Chord

***Minor arc***

***Major arc***

□ The ***Circumference*** of a circle:

□ The ***area*** of a circle:

□ The **arc** (원호) of a circle: ***Minor arc*** & ***Major arc***

□ A ***Revolution*** of wheel is the circumference of the wheel.

□ Square *ABCD* is ***inscribed in*** circle O; Circle O is ***circumscribed about*** square *ABCD*.

**원에 내접하는 삼각형의 한 변이**

**원의 직경인 경우, 이 삼각형은**

**항상 직각삼각형 !**

***Tip !***

***O***

***O***

***A***

***B***

***C***

***D***

□ A ***Solid*** is a three-dimensional figure: ***Rectangular solid***s, ***Cube***s, ***Cylinder***s and ***Sphere***s.

***Edges***

***Faces***

□ The ***Edge***s of a solid are line segments that connect the vertices.

□ A cube has ***twelve*** ***edges*** and ***six faces***.

**Data Interpretation**

□ The ***Union*** (합집합) of *A* and *B*: ; the ***Intersection*** (교집합) of *A* and *B*:

The ***Inclusion-exclusion principle***:

□ The ***Multiplication principle***: When the first event does not influence the second one,

the number of possible outcomes is ***m*** X ***n***; where ***m*** is the number of possible outco-

mes for the first event and ***m*** is the number of possible outcomes for the second one.

The probability of two independent events occurring is .

□ ***Permutations*** (순열): ***n***, ***n*** factorial

□ Permutations of ***n*** objects taken ***k*** at a time

: = ***n****P****k*** =

<Suppose you have a set of ***n*** objects, but ***you want order some of them***.

Let the number of objects you are choosing for the subset be ***k***.>

문제유형 There are ten finalists for the school spelling bee. A 1st, 2nd and 3rd place

trophy will be awarded with no ties or duplications. (순서가 문제됨)

□ ***Combinations*** (조합) of ***n*** objects taken ***k*** at a time

: ***n****C****k*** =

<Suppose you have a set of ***n*** objects and you still want to select some number,

***k***, of them, but ***their order does not matter***.>

문제유형 From a box of 12 candles, you are to remove 5. How many different sets

of 5 candles could you remove?

문제유형 If 8 schools are all in the same conference, how many soccer games are

played during the season if the teams all play each other exactly once?

□ When there is an even number of terms in a set, the ***median*** is the average of the two

middle terms.

□ ***Mode***: the number that appears most frequently.

□ The ***Interquartile range***

The ***1st quartile (Q1)*** : the median of all of the numbers below the mean

The **2nd *quartile (Q2)***: the median of the entire data set

The **3rd *quartile (Q3)***: the median of the numbers above **Q2**

🡺 a ***box-and-whisker plot*** or a ***box plot***

□ The ***Standard deviation***

: Find the **arithmetic mean** of the set

🡺 Find the ***differences*** between the mean and each value in the set

🡺 ***Square*** each of the differences

🡺 Find the ***average*** of the squared differences

🡺 Take the positive ***square root*** of the average