CHS Y1 Notes
Arranged according to CHS Order of Learning

1.Primes,HCF,LCM (TB Chapter 1)
2.Integers,Rational Numbers and Real Numbers (TB Chapter 2)
3.Approximation and Estimation (TB Chapter 3)
4.Percentage (TB Chapter 8)
5.Ratio and Rate (TB Chapter 9)
6.Basic Algebra and Manipulation (TB Chapter 4)
7.Linear Equations (TB Chapter 5),Simple Inequalities (Sec 2 TB Chapter 2)
8.Linear Functions and Graphs (TB Chapter 6)
9.Number Patterns (TB Chapter 7)
10.Basic Geometry (TB Chapter 10)
11.Polygons and Geometrical Constructions (TB Chapter 11)
12.Pythagoras Theorem (Sec 2 TB Chapter 9)
13.Perimeter and Area of Plane Figures (TB Chapter 12)
14.Volume and Surface Area of Prisms and Cylinders (TB Chapter 13)
15.Volume and Surface Area of Pyramids,cones and Sphere (Sec 2 TB Chapter 11)
16.Statistical Data Handling (TB Chapter 14)
17.Statistical Diagrams (Sec 2 TB Chapter 13)
18.Averages of Statistical Data (Sec 2 TB Chapter 14)

Primes. HCF, LCM

Prime Number

- Number that only has 2 factors and is a whole number greater than 1,such as 2, 3, 7, 13

Understanding Prime Factorisation

- Used to express a composite number as a product of its prime factors,using a factor tree or long division
- When Prime Factorisation is performed some factors are repeated,eg 8=2x2x2, with the factor 2 appearing 3 times
- Use concise notation to represent the product
- Notation with number above the below number is called index notation,read as 8 to the power of 3
- Number located at the top right hand corner called the index,number at the level is called base
- Index shows the number of times the base is multiplied by itself
- Use Ladder Method to find prime factorization of a number,start with smallest prime factor of the number and divide,keep dividing till you get 1 then times all the numbers

Square roots and Cube roots

- 9 can be expressed as product of 2 identical numbers, $9=3x3=3^2$
- Since 3^2=9,9 is the square of 3,we can also say 3 is the positive square root of 9 and it is denoted 9 square root=3
- 8 can be expressed as a product of 3 identical numbers as $8=2x2x2=2^3$,since 2^3=8,8 is called cube of 2
- We can also say 2 is the positive cube root of 8 and denoted cube root 8=2
- For square numbers,power of prime factors must be divisible by 2
- For cube numbers,power of prime factors must be divisible by 3

Highest common factor and Lowest common multiple
Highest common factor

- Largest common factor of a group is called HCF

756 expressed as a product of its prime factors is 2^2x 3^3x7,360 expressed as a product of its prime factors is 2^3x3^2x5,find hcf of 360 and 756
Method 1
$360=2^3x3^2x5$
$756=2^2x3^3x7$
$HCF=2^2x3^2$

- Compare both numbers when expressed as a product of its prime factors then look for common factors (best squared/cubed)

LCM

- Find using prime factorisation

756 expressed as a product of its prime factors is 2^2x 3^3x7,360 expressed as a product of its prime factors is 2^3x3^2x5,find LCM of 360 and 756
$360=2^3x3^2x5$
$756=2^2x3^3x 7$
$LCM=2^2x3^3x5x7$

- Between 2^3 and 2^2 bring down bigger number, then bring down everything else

2. Integers, Rational Numbers and Real Numbers

Negative Numbers
Negative Integers

- Whole numbers are 1,2,3,4,known as positive integers
- Negative integers are -5,-4,-3
- Zero is neither positive nor negative integer

Number line

- All negative numbers to the left of zero,while All positive numbers to the right of zero
- Numbers are arranged in ascending order

How to draw a number line

- Draw horizontal line and mark zero point

- Use 1 cm ruler to mark points 1,2,3 at equal unit length to the right of 0 and -1,-2,-3,on left of 0
- Draw arrow heads on both ends of the lines

Addition and subtraction involving negative numbers (personal methods,idk if in syllabus)

Addition

Method 1

- Use a number line
- Draw number line beginning at 0
- For negative numbers move that many spaces to the left
- For positive numbers move that many spaces to the right
- Examples -5+4
- Beginning at 0,-5 negative so move 5 spaces to the left,after that move 4 spaces to the right

Method 2

Use absolute value (outside the syllabus but still useful)

- Addition of large numbers
- Look at the signs
- If signs of the numbers you are adding are the same they are alike(go in the same direction)
- Therefore add up those two numbers and keep their sign

Example

1+-2=-3(add 1 and 2 then keep negative sign)

- However if the signs of the numbers you are adding are different subtract absolute value of the 2 numbers
- Which number has a higher absolute value?
- The answer will have the same sign that this number had at the beginning

Subtracting Positive and negative numbers

- Subtraction and Addition are opposites of each other,so we can change a subtraction problem by using the additive inverse or opposite

Example

5-4

- Additive inverse of 4 is -4 which we can change to a addition problem,so its 5+-4=1

Example

7-10

- Additive inverse of 10 is -10

7-10=7+(-10)=-3

Example

A bird is flying at 42m above sea level and a fish is swimming 12 metes below sea level. How many meters apart are the fish and bird?

Birds height 42m

Fish height -12m

Subtract, 42-(12)=42+12=54

Multiplying and dividing positive and negative numbers

- Multiply or divide the numbers,then count number of negative numbers
- If there an odd number of negative numbers answer is negative
- If there an even number of negative numbers answer is positive

3. Approximation and Estimation

Approximation

- Process of rounding off a given number to give approximate value

Significant figures

- Round numbers to a required number of Significant Figures

Five rules to identify significant digits

- All non zero digits are significant (eg 192 has 3 SF)
- All zeroes between non zero digits are significant (eg 32047 has 5 SF0
- In a decimal,all zeros after a non zero are significant (eg 0.10 has 2 SF)
- In a decimal all zeroes before a non zero are non significant (eg 0.010 has 2 SF)
- In whole numbers zeroes at the end may or may not be significant, it depends on how numbers are approximated

Example

A piece of paper weighs 0.0004503g,round it to 1dp,2dp,3dp
1dp-0.0
2dp-0.00
3dp-0.000
0.0004503
4 is the 1st SF
And so on
508175.62
5 is 1st SF,,0 is 2nd SF,8 is 3rd SF

Rounding and Truncation errors

- Truncate means cut off the end,eg square root 162=12.72792206
- If we round if the answer to 3dp its 12.728,However if we truncate the answer at 3dp,it is 12.727
- There is no rounding off

Example

2 divide by 3 on calculator has a few options

- If calculator shows 0.66666666666667 answer was rounded
- If calculator shows 0.66666666666666 answer was truncated

Conclusion

- Accurate numerical value cannot be achieved when the number in an expression is rounded off too early

- In practice if a problem requires an answer that is corrected to 3sf we should store the intermediate working values in our calculator or round them off to more SF eg 5 SF
  - This will increase the accuracy of our final answer

Estimation

- Process of guessing value of an unknown quantity

Summary

- 3 situations when approximation is used
  - Actual value known but not used for various reasons eg actual value not necessary, easier to rmb an approximated value, too messy to write a long string of numbers, impossible for calculators to store all digits of non exact number
  - Exact value cannot be obtained
  - Actual value too troublesome/impossible to obtain

4. Percentage

- Natural math extension of fractions, ratio and proportion
- All percentages are expression of relationship based on 100
- Every fraction,ratio and proportion expressed as a percentage
- Percentages also expressed where decimals are required,eg 66.96%
- Calculation of various rates by way of percentages is a backbone of wide range of math applications inc taxes, interest, grades, sports statistics,etc

Percentage Change and Reverse Percentage

- Change in the value of an item expressed as a percentage increase or decrease in the original value
- To calculate the percentage increase,increase in value of a quantity from its original value must be known
- Increase=New Value-Original Value
- Percentage Increase=Increase/Original Value x 100%
- New value can be found using New Value=Original Value x (100%+percentage increase)
- To calculate percentage decrease,
- Decrease=Original Value-New Value
- Percentage Decrease=Decrease/Original Value x 100%
- New Value=Original Value x (100%-Percentage Decrease)

Percentage and Percentage Point in practical situations

Profit and Loss

- Goods produced at a certain cost,when they are sold at a price higher than cost price a profit is made
- When goods are sold at a price lower than the cost price a loss is made
- Profit=Selling price-Cost price

- Loss=Cost price-Selling price
- Profit or loss usually expressed as a percentage of the cost price
- Profit(or loss)/cost price x 100%
- Note in some cases profit or loss can be expressed as a percentage of the selling price

Discount

- Items sold at lower price (sale price)
- Difference between original selling price,or marked price and sale price is called discount
- Discount=Marked Price-Sale Price
- Similarly discount often given as percentage of marked price
- Discount/marked price x100%
- In general sales price also found using Sale price=Marked price x (100%-percentage discount)

GST

- Total amount payable=Marked price-Discount+Service Charge+GST
- Service Charge=Service Charge (in %) x (Marked price-Discount)
- GST payable=GST (in %) x (Marked price-Discount+Service Charge)
- Commision is where an agent is paid on buying something for a party

5. Ratio and Rate

- Used to compare 2 or more quantities of the same kind,measured in the same units
- Ratio of a to b is denoted by a:b represented by fraction a/b where b not = to 0
- In general a ratio is said to be in its simplest form a:b when a and b are integers with no common factors other than 1
- From similar or equivalent ratios can be obtained by multiplying or dividing both parts by the same constant
- x:y=hx:hy=x/k:y/k, where h and k not equal not 0
- x:y,hx:hy and x/k:y/k equivalent ratios
- Using ratios to compare 2 quantities of the same unit is equivalent to using fractions to compare the 2 quantities eg a:b=5:7 equal to a/b=5/7
- Ratios can also be used to represent relationship of more than 2 quantities
- Ratio involving 3 quantities cannot be written as a fraction
- However it can be simplified by multiplying or dividing each term by the same constant

Rate

- Involves 2 quantities and it is a way to measure how one quantity per unit another quantity

- 2 types of rate,constant rate and average rate
- Pulse rate an example of average rate and work wage an example of constant rate

Simple interest

- When money is deposited into a bank the bank will pay interest for the use of money deposited
- Interest in 1 year expressed as a percentage of a deposit called a annual interest rate
- Amount received after a year depends on annual interest rate
- Formula for calculating simple interest is I=PRT/100 where I=interest,P=principal sum,R=rate of interest per annum,T=time or period of loan/deposit
- Note that too obtain total amount=principal+interest

Hire purchase

- Common scenario where a buyer cannot afford to pay the asked price for an item as a lump sum but can afford to pay an initial sum known as deposit,and the rest (loan amount) in monthly repayments known as installments
- Usually buyer has to pay more than the cash price due to interest charged to the balance(cash price-deposit)
- Interest rate is the flat rate as there is no reduction in interest cost after paying off each installment

Currency Exchange

- Exchange rate is the current market price for which one currency can be exchanged for another
- Calcualated both on principal amount as well as the accumulated interest over tim
- Rates change over time depending on supply and demand
- Refer to sell column if you want to BUY the foreign currency with SGD
- Refer to buy column if you want to SELL the foreign currency for SGD

Income Tax

- If a persons a income over a certain amount,he or she have to pay income tax to the gahmen
- Income tax calculated based on tax rate table
- Note rates in the table vary every year
- Chargeable income is total income minus allowable deductions,approved donations and reliefs
- Chargeable income=annual income-tax reliefs

Speed

- Speed of an object defined as distance traveled by the object per unit time
- Special type of rate
- Speed=Distance/Time

- Speed of an object indicates how fast its moving
- Expressed in diff units eg m/s,km/h,cm/s etc

Conversion of Units of speed

- Common ones used are km/h and m/s
- Not easy to compare speeds measured in different units
- Recall 1km=1000m and 1h=60 min=3600s

Average speed

- Object said to be traveled at constant or uniform speed if its speed does not change throughout the journey
- This is unlikely and speed of an object may vary during its course of motion,hence avg speed is calculated
- Average speed is defined as total distance traveled by an object per unit time
- Average Speed=Total Distance Traveled/Total Time

6. Basic Algebra and Algebraic Manipulation

- In algebra letters eg x are used to represent numbers and variables
- A variable represents an unknown value
- Algebraic expression involves number and letters connected with operation symbols like +,-,for example 9x-7,mxn are algebraic expressions -In the term 3x,3 is the coefficient of the term x

Evaluating Algebraic expressions

- Evaluating an algebraic expression is the process of finding the value of the expression when its variables are given certain values
- Use common math sense

Addition and subtraction of linear terms

Like terms and unlike terms

a)Definition:Terms

- In a algebraic expression,parts separated by the plus and minus signs called terms
- In the expression 5y-8x+3,the terms are 5y,-8x and 3

b)Definition:Coefficient

- The number part,including the sign is called the coefficient of its variable part
- Term 5y, coefficient 5
- Term -8x, coefficient -8
- When two terms have identical variable parts called like terms,but when two terms have different variable part they are called unlike terms
- For example 2a and 4a are like terms as they contain the same variable part a
- This is regardless of the coefficient they are multiplied with

- On the other hand 3a and b/5 are unlike terms because they contain different unknowns a and b

Simplifying Algebraic Expressions

- Divide using common factors

Addition and subtraction of linear expressions

- 2 like terms may be combined together when we add or subtract them,for example given two like terms 2a and 4a their sum will give 6a
- However given two unlike terms 2a and 4b their sum will give 2a+4b and they cannot be further simplified

Substituition

- Substitute it with a number to obtain an exact value after simplifying

Expansion and Factorisation of Linear Expressions

- In algebraic multiplication and division,we simply express the product of two terms a and b, as ab and their division to be a/b. In this section,we want to look at the product between a term and a set of algebraic expressions such as a(b+c)

Factorisation

Simplfiying using factorisation

- 3 women were at the market purchasing fruits for a party. They bought a total of 21 apples and 15 pears. They decided to divide the costs equally amongst themselves. Given that each apple costs $x and each year $y,find the amount each woman has to pay
- By reversing the distributive law of algebraic expansion,take out the highest common factor of 21 and 15 and form a new expression involving brackets. This process is known as factorisation.
- Answer 3(7x+5y)

Factorisation by grouping

- To factorise an algebraic expression of the form ac+ad+bc+bd,we should group the four terms into appropriate groups,where the two terms in each group have a common factor. Then we can extract the common factor of each group.
- ac+ad+bc+bd=(ac+ad)+(bc+bd)=a(c+d)+b(c+d)=(a+b)(c+d)
- This method is known as factorisation by grouping because we group the four terms into appropriate groups first

Linear expression with fractional coefficients

- In the linear expression 2/3x +4/5y,⅔ and ⅘ are the fractional coefficient of the variables x and y respectively
- a-½ and 2b-⅗,which can be written ½(a-1) and ⅕(2b-3) respectively,are the other examples of linear expressions with fractional coefficients.
- The procedure for simplifying linear equations with fractional coefficient is similar to that of simplifying ordinary numerical fractions
- Note when simplifying expressions involving fractions,it is important to ensure that the denominator is the same

- Remember to use brackets when combining two fractions

Summary

- Mathematical operations which have multiple steps can be easily and neatly presented in algebraic terms
- Two terms of the same product of letters are considered like terms
- Constants,which are numbers without any letters,are like terms on their own
- In algebra we use symbols eg x,p,and pg to represent numbers
- The linear expression 3x-4+pq+7 consists of four terms,namely 3x,-4p,pq and 7
- In addition and subtraction of algebraic terms only like terms could be further simplified
- The distributive law of algebraic expression states that a(b+c+...+z)=ab+ac+...+az where there can be infinitely many terms in the bracket,in particular a (b+c)=ab+ac
- Factorisation is the process of expressing an algebraic expression as a product of two or more algebraic expressions,its the reverse of expansion
- Algebraic fractions can be added or subtracted together by having a common denominator

7. Linear Equations and Simple Inequalities

- 3x+5=4 is a linear equation (highest power of unknown)
- $x^2+3=9x$ is a quadratic equation(sec 2)
- $x^3=27$ is a cubic equation(sec 3)

Definition of a linear equation

- 2c+3=11 is an equation
- Equal sign means that total value of the left hand side(LHS) of the equation must be the same value as the right hand side(RHS) of the equation (11)
- To solve 2c+3=11 means to find the value of c such that the values on both sides of the equations are equal (LHS=RHS)
- For example if c is substituted with 3,LHS=2(3)+=9 not equal RHS
- If c is substituted for 4,LHS=2(4)+3=11=RHS
- Hence we can say that c=4 satisfies the equation and that c=4 is known as the solution or root of the equation
- A simple equation in one variable (usually x) is known as a linear equation in the form ax+b=c where a,b and c are constants and a not equal to 0
- Non linear equations include $x^2=9$

General strategy for solving Linear Equations in one variable

- If the equations contains a fraction,multiply both sides by the lowest common multiple (LCM) of the denominator(s) to clear the equation of fractions
- Use the distributive property to remove brackets if they occur
- Simplify each side of the equations by combining like terms
- Obtain all variable terms on LHS of the equation,while RHS should contain only numbers
- Solve for the variable
- Check the solution by substituting it into the original equation

Solving Fractional Equations

- A fractional equation is an equation that contains fraction terms
- If the variable is present in the denominator of a term in the equation,it is important to note that solutions cannot include those that will make the denominator zero
- Hence in solving fractional equations, we must check the solutions.

Example

x+x/4=15

- x/1+x/4=15
- 4x+x/4=15
- 4 x 5x/4=15x4
- 5x=60,x=12

Applications of linear equations in real world situations

To solve

- Understand the problem and identify the unknown quantity
- Use a letter to represent the unknown quantity to be found (eg x)
- Express other quantities in terms of x
- Form an equation based on the given information in the problem
- Solve the equation
- Check if the solution obtained satiisfies the conditions of the original problem

Mathematical Formulae

- The area of a rectangle written as a formula is A=lb or A=lxb,where A denotes the area,l denotes the length and b denotes the breadth
- In general a formula expresses a rule in algebraic terms
- It makes use of variables to write instructions for performing a calculation

Simple Inequalities

- Algebraic inequality is expressed when an algebraic expression is separated from a number, variable or another algebraic expression by a greater than sign, less than sign, greater than or equal to sign or less than or equal to sign

- Inequalities can be used to determine upper and lower bounds for a possible range of values, eg the idea that it takes less than 15 min to boil a egg can be expressed as t<15

Addition and subtraction

- The addition property of inequalities states that there is no change in an inequality if the same real number is added to both sides of it
- The subtraction property of inequalities states that there is no change in a inequality if the same real number is subtracted from both sides of it

Multiplication and division

- Multiplication property of inequalities states that there is no change in an inequality if both sides of the inequality are multiplied by the same positive real number
- The multiplication property of inequalities states that there is change in the inequality sign if both sides of the inequality are multiplied by the same negative real number
- The division property of inequalities states that there is no change in an inequality if both sides of the inequality are divided by the same positive real number
- The division property of inequalities states that there is change in inequality sign if both sides are divided by the same real negative number

IN SHORT

- If x>y and d<0(d negative no) then dx<dy and x/d<y/d
- If x>y and c > 0 then cx>cy and x/c>y/c

8. Linear Functions and Graphs

Coordinates

- The ordered pair (a,b) are such that a refers to a point to the horizontal (eastings) axis while b refers to the point on the vertical (northings) axis
- Quadrant is a part of a graph paper
- x axis is the horizontal axis
- y axis is the vertical axis
- Origin is where 2 axis meet
- Coordinates must be enclosed in brackets

Functions and Linear functions

- Function can be considered as a machine
- Takes an input, applies a rule to it and then produces an output
- Function is a relationship between 2 variables x and y such that every input x produces exactly 1 output y
- Function connecting x and y can be represented by an equation of the form y=ax+b where a and b are constants
- The plotted points join to form a straight line

- We say that the function is a linear function eg y=2x+1

How do we draw graphs of linear functions

- Create a table of values,with a minimum of 3 points
- Draw the axes (limits depend on the x and y values in the table of values
- Plot the points (make sure each point is being marked out according to the correct sequence of a point which is x coordinate followed by y coordinate
- Join the points with a straight line, check all points lie on the straight line,if any point does not lie on the lijne check calculations etc
- Label the graph by writing the equation beside the line

Gradient

- Measures steepness of a straight line graph
- Positive and Negative gradient
- Positive gradient–as x increases,y increases,it is sloping upwards from left to right
- By definition gradient of a line is the ratio of the vertical change to the horizontal change of a triangle we draw with 2 points on the line
- Rise/run=vertical change/horizontal change=y2-y1/x2-x1=gradient
- Also y=mx+c

Special cases

- Line parallel to x axis(horizontal) gradient=0
- Line parallel to y axis gradient=undefined

9. Number Patterns

- Number sequence is an ordered list of numbers
- Each no. in a sequence is called a term
- Terms usually identified by T1, t2, t3 etc

General term of a number sequence

- To find any term in a sequence we need to find the general term or the nth term

Example

Position n	1	2	3	4	5
Term tn	2	5	8	11	14

Plus 3

Therefore we can express each term as follows

T2	2+3	2+1x3
T3	2+3+3	2+2x3

By looking at the term above, we can infer

Tn=2+(n+1)x3
=2+3n-3=3n-1

Conclusion

- Nth term of a sequence is called Tn/general term of the sequence
- By substituting suitable values of n,every term in a sequence could be generated
- Tn=an where a is the common difference+b where b is the zeroth term

10.Basic Geometry

- Point (no dimension,no size)
- Line segment (part of line by joining 2 points A and B, infinite number of points)
- Line (infinite number of points,no width,indefinite breadth length thickness)
- Ray(part of a line with only 1 endpoint)
- Plane (has a flat surface,has no thickness)

Types of angles

- Acute angle (measures less than 90 deg)
- Right angle (90 deg)
- Obtuse angle (greater than 90 deg)
- Reflex angle(angle more than 180 deg,less than 360 deg)
- When 2 lines intersect at right angles they are perpendicular to each other

Complementary and supplementary angles

- Adjacent angles (angles sharing a vertex and common side)
- Complementary angles (2 angles summing up to 90 deg)
- Supplementary angles (2 angles summing up to 180 deg)
- Note:Overlapping angles are not adjacent angles

Properties of angles formed by intersecting lines

Properties	Abbreviation
Sum of adjacent angles on a straight line is 180 deg	Adj angles on a st line
Sum of all angles at a point is 360 deg	Angles at a point
When 2 lines intersect,the vertically opp angles are equal	Vert opp angles

Properties of angles formed by parallel lines and transversal

Parallel lines

- 2 lines on the plane
- Do not intersect

Transversal

- Line cuts/intersects other line

More angle properties

- When a transversal intersects a pair of parallel lines,3 types of angles are formed
- Corresponding angles-corr angles (parallel lines C)
- Alternate angles-alt. Angles (Z)
- Interior angles-int. Angles

11. Polygons and Geometrical Constructions

Triangles

- Can be classified according to sides and angles

Sides

Desc	3 sides with diff length	2 sides of equal length	3 sides of equal length
Name	Scalene triangle	Isosceles triangle	Equilateral triangle

Angles

Desc	All angles less than 90deg	1 angle=90 deg	1 angle >90deg,but less than 180deg
Name	Acute triangle	Right angled tri	Obtuse angled tri

Angle properties of triangles

Properties	Abbreviation
Base angles of isosceles triangle are equal	Base angles of isos. Triangle
Each angle is 60deg	Angles of equilateral triangle
Angle sum of a triangle is 180	Angle sum of triangle
Exterior angle of tri=to sum of interior angles	Ext. angle of triangle

Quadrilaterals

- All plane figures with 4 sides and 4 angles are quadrilaterals

Trapezium

- Has at least one pair of parallel sides

Square

- Has 2 pairs of parallel sides

- Far sides equal
- Has 4 right angles
- Opposite angles equa
- Equal diagonals
- Perpendicular to each other
- Bisect each other (cut into 2 equal parts)
- Bisect interior angles

Rhombus

- 2 pairs of parallel side
- 4 sides equal
- Opposite angles are equal
- Perpendicular to each other
- Bisect each other
- Bisect interval angles

Rectangle

- Has 2 pairs of parallel sides
- Opposite sides are equal
- 4 right angles
- Opposite angles are equal
- Equal diagonals
- Diagonals bisect

Parallelogram

- Has 2 pairs of parallel sides
- Opposite sides are equal
- Opposite angles are equal
- Diagonals bisect each other

Kite

- 2 pairs of equal adjacent sides
- Opposite sides may or may not be parallel
- Must cut each other @right angles
- 1 diagonal bisects the interior angles

For Constructing lines (parallel or perpendicular)

- Draw arcs
- No arcs no marks

Perpendicular bisector

- Bisector cuts something into 2 equal parts
- Line which is perpendicular to and divides the line segment into two equal parts

Angle Bisector

- Line drawn from vertex of the angle such that it divides the angle into smaller angles
- Any point aling the angle bisector of an angle jhas equal perpendicular distances from the arms of the angle

Interior and exterior angles of a polygon

- One interior and one exterior angle =180 degrees
- Sum of interior angles of a regular n-sided polygon=(n-2)x180 (angle sum of polygon)
- Size of each interior angle of regular n sided polygon-(n-2)x180/n (angle sum of polygon)
- Sum of exterior angles of a polygon=360 degrees (exterior angle sum of polygon)

12. Pythagoras Theorem

Introduction

- $a^2+b^2=c^2$
- a^2+b^2 squared root=c
- Longest side of a right angle triangle is called the hypothenuse (side vertically opposite the right angle)

Converse of the Pythagoras Theorem

- If the square of the longest side is equal to the sum of the squares of the other two sides then the opppossite the longest side is a right angle
- Given Triangle ABC,computing AC^2=finding AB^2+BC^2,if $AC^2=AB^2+BC^2$,ABC=90 degrees

13. Perimeter and Area of Plane Figures

Formulas

- Area of square=$x^2$where x=length of a side
- Perimeter of square=4x
- Area of rectangle=l x b where l=length and b=breadth
- Perimeter of rectangle=l+b+l+b=2(l+b)
- Area of triangle=½ bh where b=base and h=height
- Perimeter of triangle=a+b+c
- Area of circle=pi x radius x radius
- Circumfrence=2 x pi x radius=pi x diameter where diameter=2 x radius
- Area of Parallelogram=b x h
- Perimeter of parallelogram=sum of 4 sides
- Area of Trapezium=½ x h x (a+b)
- Perimeter of Trapezium=Sum of 4 sides

14. Volume and Surface Area of Prism and Cylinder

Nets

- Show surface area of the solids
- Area determined by looking at the shape of the surface
- Volume refers to the space occupied by the solid
- Given that the side of the cube is x cm,volume of cube=x^3
- $6x^2$
- Volume of cuboid =l x b x h
- Surface area of Cuboid= 2x(lb+lh+bh)

Volume and Surface area of Prism

- Top and bottom of the prism is called base of the cuboid
- Bases are parallel to each other and are identical rectangles
- Any horizontal cross section of the cuboid is parallel to them and is also a rectangle identical to them
- Cuboid has uniform cross section
- Volume of prism= base area x height
- Surface area of prism=perimeter of base x height + (2 x Base area)

Volume and surface area of Cylinder

- Uniformed Cross section
- Volume of cylinder=Base Area x Height = pi x r^2 x height
- Surface area of closed cylinder=2 x pi x radius x height + 2 x pi x radius

15. Volume and Surface Area of other Polygons

- Volume of Pyramid=⅓ x Base area x Height
- SA of Pyramid=Add areas of triangle (x4) and base
- Volume of Cone=⅓ x pi x radius^2 x height
- SA of Cone=pi x radius x slanted height +pi x radius^2
- Volume of Sphere=4/3 x pi x radius^3
- SA of Sphere=4 x pi x radius^2

16. Linear Graphs and Simultaneous Linear Equations

- Linear equations in 2 unknowns x and y is an equation of the form where a,b,c are numbers and a and b are not both zero
- A pair of simultaneous linear equations in 2 variables can be solved by:
  - 1)Elimination
  - 2)Substitution
  - 3)Graphical, where point of intersection is the solution
- A pair of simultaneous linear equations has an infinite number of solutions if the graphs of the two equations are identical
- A pair of simultaneous linear equations has no solution if the graphs of the two equations are parallel