1. NUMBERS

Even and Odd Numbers

even+even=even	even-odd=odd
odd+odd=even	odd-even=odd
even+odd=odd	even·even=even
even-even=even	odd·odd=odd
odd-odd=even	even·odd=even

Positive and Negative Numbers

positive+positive=positive	negative·negative=positive
negative+negative=negative	positive·negative=negative
positive−negative=positive	positive÷positive=positive
negative−positive=negative	negative÷negative=positive
positive·positive=positive	negative÷positive=negative

Divisibility Rules

2	the last digit of the number is 0, 2, 4, 6, or 8
3	the sum of the digits is divisible by 3
4	the last two digits are divisible by 4
5	the last digit is 0 or 5
6	the number is divisible by 2 and 3
9	the sum of the digits is divisible by 9
10	the last digit is 0

Squares

$1^2 = 1$	$9^2 = 81$
$2^2 = 4$	$10^2 = 100$
$3^2 = 9$	$11^2 = 121$
$4^2 = 16$	$12^2 = 144$
$5^2 = 25$	$13^2 = 169$
$6^2 = 36$	$14^2 = 196$
$7^2 = 49$	$20^2 = 400$
$8^2 = 64$	$50^2 = 2500$

Exponents

$2^1 = 2$	$3^3 = 27$
$2^2 = 4$	$4^3 = 64$
$2^3 = 8$	$5^3 = 125$
$2^4 = 16$	$3^4 = 81$
$2^5 = 32$	$10^3 = 1000$
$2^6 = 64$	$10^4 = 10000$
$2^7 = 128$	$(-2)^2 = 4$
$2^8 = 256$	$(-3)^3 = -27$

Prime Numbers

- A prime number is divisible by 1 and itself only
- The first 10 prime numbers are:
  2, 3, 5, 7, 11, 13, 17, 19, 23, 29
- 1 is not a prime number
- 2 is the smallest and the only even prime number

v - speed t - time d - distance	$v = \frac{d}{t},\ d = vt,\ t = \frac{d}{v}$

Average Speed	$\frac{\text{total distance}}{\text{total time}}$

%	Decimal	Fraction	%	Decimal	Fraction
1%	0.01	1/100	40%	0.40	2/5
2%	0.02	1/50	50%	0.50	1/2
5%	0.05	1/20	60%	0.60	3/5
10%	0.10	1/10	75%	0.75	3/4
20%	0.20	1/5	80%	0.80	4/5
25%	0.25	1/4	100%	1.00	1

Arithmetic Sequence	$a_{n+1} - a_n = d$ $a_n = a_1 + (n-1)d$

Geometric Sequence	$\frac{b_{n+1}}{b_n} = r$ $b_n = b_1 r^{n-1}$

Percent	$1\% = \frac{\text{number}}{100}$
Percent Proportion	$\frac{\text{part}}{\text{whole}} = \frac{\text{percent}}{100}$
Percent Change	$\frac{\text{change}}{\text{original amount}} \cdot 100\%$

2- SYSTEM OF LINEAR EQUATIONS

One solution	no solution	infinite
(x,y)	$m_1=m_2$	R.H.S = R.H.S

* parallel lines $\left[\begin{matrix}have\ the\ same\ slope\ but\ different\\ y-intercept\end{matrix}\right]$

Ex. $y=mx+b_1$ $\quad y=mx+b_2 \rightarrow b_1 \neq b_2$

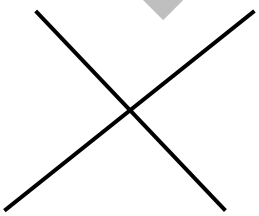
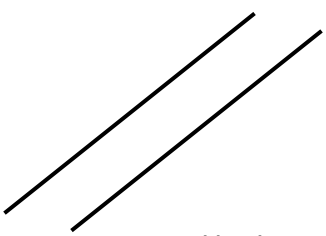
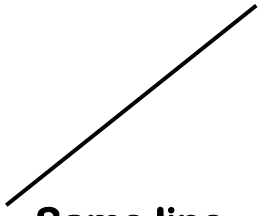
* Two perpendicular lines $\left[\begin{matrix}the\ product\ of\ two\\ slopes\end{matrix}\right]$

Ex. $y=mx+b_1$, $y=\frac{-1}{m}x+b_2$

2- Relation between two lines:

Line 1: $a_1x+b_1y=C_1$

Line 2: $a_2x+b_2y=C_2$

One sol	No sol	Infinite no.
$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$	$\frac{a_1}{a_2}=\frac{b_1}{b_2} \neq \frac{c_1}{c_2}$	$\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$
		
Intersect	Parallel	Same line

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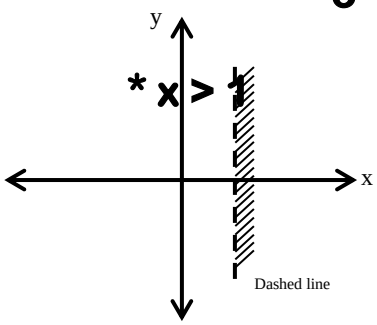
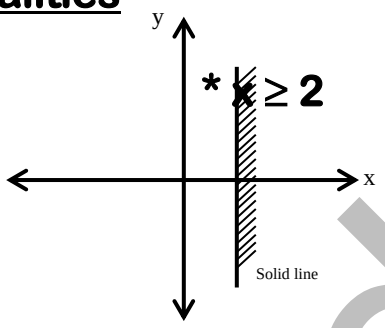
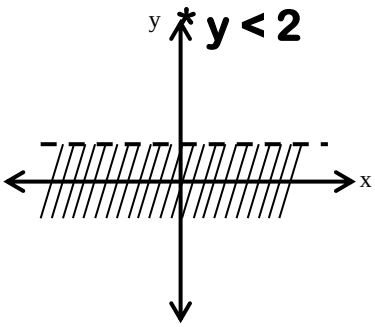
3- Inequalities



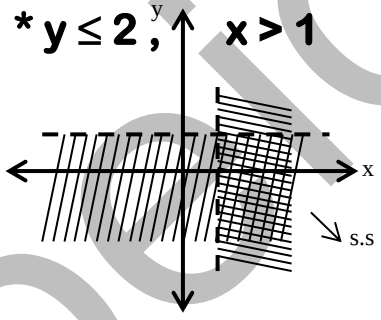
* x > 1



* x ≥ 2



* y < 2



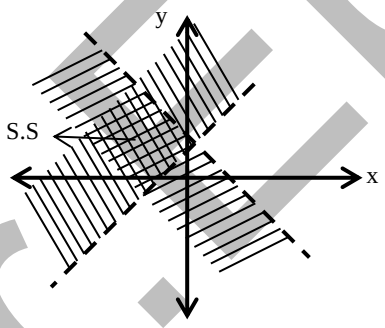
* y ≤ 2 , x > 1

* y ≥ 2x + 3

y ≥ 2x + 3

y – int = 3

slope = 2



y < -x + 1

y< - x + 1

y – int = 1

slope = -1

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4- *Linear function "linear relation"*

Slope from $y = mx + b$

Slope	Start at o
Rate of change	Initial fee, service
Additional amount	Flat cost
(-) decr ➔ (x in c, y dec.)	
(+) inc ➔ (x inc, y inc)	

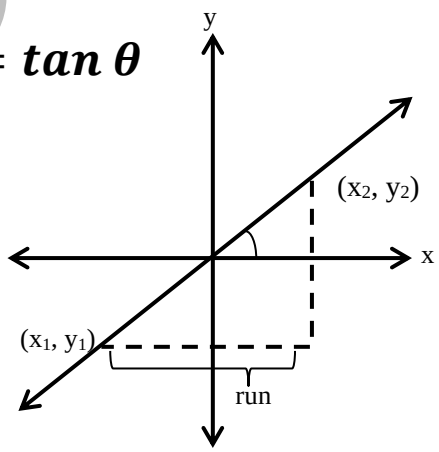
General form $ax + by = c$

Slope = $\frac{-a}{b}$

5- SLOPE = GRADIENT = RATE OF CHANGE

= additional ➔ per unit or each

* Slope = $\frac{y_2 - y_{21}}{x_2 - x_1} = \frac{rise}{rum} = tan\ \theta$



y = mx + b ➔ m slope

y-intercept

* a x + b y = c ➔ slope = $\frac{-a}{b}$

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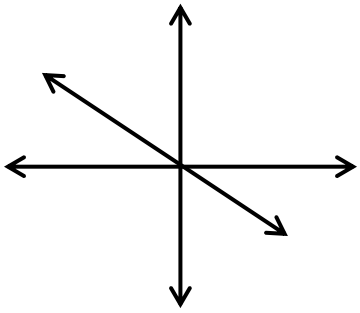
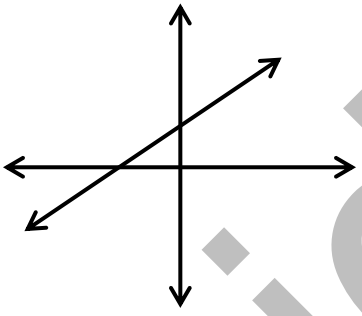
*** Negative slope**

Decreasing



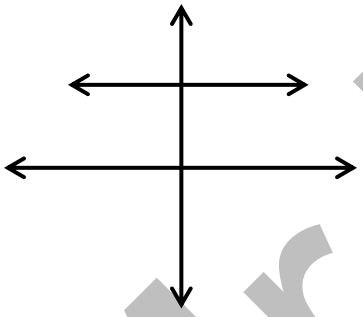
Positive slope

Increasing



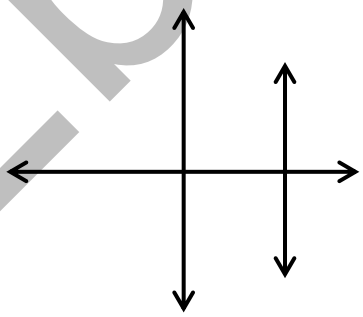
Zero slope

Constant – horizontal



Undefined slope

Vertical



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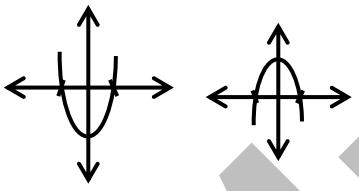
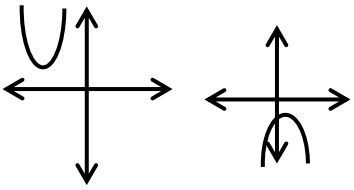
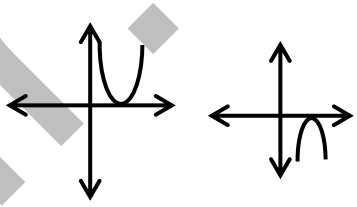
QUADRATIC FORMULA AND DISCRIMINANT

$ax^2 + bx + c = o \quad , \quad a \neq o$

Kind of roots

Δ=Discriminant $= b^2 - 4ac$

$\Delta > \circ$ (±ve)	$\Delta = \circ$	$\Delta < \circ$ (-ve)
➔ two diff. roots(zeros-solutions)	➔ two equal real sol.	➔ no real sol
➔ two x-intercept	➔ double roots	➔ no x-intercept
	➔ one sol	Imaginary roots
	➔ one x-intercept	
	➔ touch x – axis	
		

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Quadratic Equation	
$ax^2 + bx + c = 0$	
Discriminant: $D = b^2 - 4ac$	
$b^2 - 4ac > 0$	two real solutions
$b^2 - 4ac = 0$	one real solution
$b^2 - 4ac < 0$	no real solution

Quadratic Formula
$ax^2 + bx + c = 0$
$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Solutions = Roots = X-intercepts=zeros

How to find the values of x in the quadratic function:

1➔ Factoring ( ) ( )

2➔ G. F = $\frac{-b \pm \sqrt{\Delta}}{2a}$

3➔ Mode 5 3 "Calc. Section"

Relation between two roots

$ax^2 + bx + c = o$ $a \neq o$

Sum = $\frac{-b}{a}$ **Product=** $\frac{c}{a}$

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6- QUADRATIC FUNCTION (PARABOLA)

1- General form $y=ax^2 + bx + c$

a: (+ve) ∪ "Min. value"

a: (-ve) ∩ "Max - value"

b: (+ve) shifted left

b: (-ve) shifted right

c: y- intercept at (o, c)

➔ **vertex** $(\frac{-b}{2a}, f(\frac{-b}{2a}))$

➔ **axis of sym x =** $\frac{-b}{2a}$

2- Vertex form $y = a(x-h)^2+k$

a: $\underset{\cup}{+}\ \underset{\cap}{-}$

➔ **vertex (h, k).**

h: x = h axis of symmetry.

3- Factored form: "intercept form"

$y = a(x-m)(x-n)$

a: $\underset{\cup}{+}\ \underset{\cap}{-}$

➔ **x – intercepts x = m, x = n**

➔ **axis of sym. x =** $\frac{m+n}{2}$ ➔ **vertex =** $\left(\frac{m+n}{2}, f\left(\frac{m+n}{2}\right)\right)$

➔ **y- intercept = amn**

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7- EXPONENTS – POWERS

Rules of Exponents	
$x^n = \underbrace{x \cdot x \cdot \cdots \cdot x \cdot x}_{n \text{ times}}$	$\left(\frac{x}{y}\right)^a = \frac{x^a}{y^a}$
$x^a \cdot x^b = x^{a+b}$	$x^{-b} = \frac{1}{x^b}$
$(x^a)^b = x^{ab}$	$\frac{x^a}{x^b} = x^{a-b}$
$(xy)^a = x^a \cdot y^a$	

Rational Exponent
$x^{\frac{1}{n}} = \sqrt[n]{x}$
$(\sqrt[n]{x})^n = x$
$x^{\frac{m}{n}} = \sqrt[n]{x^m}$
$x^{\frac{1}{2}} = \sqrt{x}$

Radicals
$\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$
$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$
$\sqrt{x^2} = \lvert x \rvert$
$a\sqrt{x} + b\sqrt{x} = (a+b)\sqrt{x}$

Absolute Value	
$\lvert 3 \rvert = \lvert -3 \rvert = 3$	$\lvert xy \rvert = \lvert x \rvert \lvert y \rvert$
$\lvert x \rvert = \lvert -x \rvert$	$\left\lvert \frac{x}{y} \right\rvert = \frac{\lvert x \rvert}{\lvert y \rvert}$
$\lvert x \rvert \geq 0$	

Direct Variation	$\frac{y}{x} = k$ or $y = kx$
Inverse Variation	$xy = k$ or $y = \frac{k}{x}$

8- FACTOR THEOREM

* If $\frac{f(x)}{g(x)} = p(x) + \frac{k}{g(x)}$ k is the remainder

* if k = o ➔ no remainder ➔ g (x) is a factor for f(x)

* if (x-a) is a factor of f(x) ➔ then f(a) = o

* if x is a factor of f(x) ➔ f(o) = o

* if (x-b) is not a factor of f(x) then f(b) $\neq o$

12- Sum and difference of two cubes

$X^3 - y^3 = (x-y)(X^2+xy+y^2)$

$X^3 - y^3 = (x-y)(X^2+xy+y^2)$

13- Difference of two squares

$X^2-y^2= (x-y)(x+y)$

$x^4-y^4= (x^2-y^2)(x^2+y^2)$

$= (x-y)\ (x+y)\ (x^2+y^2)$

$x^2 -a= (x-\sqrt{a}\ )(x +\sqrt{a}\ )$

$x^2- 1/a = (x- \frac{1}{\sqrt{a}})(x +\frac{1}{\sqrt{a}})$

$X^2y^2- m^2 = (xy-m)\ (xy-m)$

$X^2-y^2 \neq (x-y)^2$

$X^2+2xy + y^2$

9- SETUP EQUATION AND INEQUALITY

x is ➔ x =

x is 5 more than y ➔ x = y + 5

x is 2 fewer than y ➔ x = y-2

x is 2 more than twice y ➔ x = 2 + 2y

x less than y ➔ x < y

x is at least m ➔ x ≥ m

x is at most m ➔ x ≤ m

x is no more than m ➔ x ≤ m

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One – half x ➔ $\frac{1}{2}x$

One third x ➔ $\frac{1}{3}x$

square root of x ➔ $\sqrt{x}$

square of x ➔ x^2

square of the sum of x and y ➔ $(x + y)^2$

how many more ➔ subtraction

Product of x and y ➔ x y

Reciprocal of x ➔ $\frac{1}{x}$

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10 - UNDEFINED FUNCTIONS OF VALUES:

* f(x) undefined at	$\frac{1}{x}$	$\frac{1}{x(x-1)}$	$\frac{x-1}{(x+2)(x-3)}$	$\frac{x+3}{x^2-1}$
	X = o	X = 0, 1	X = -2 , 3	X = ±1
So x must be	$\neq 0$	$\neq 0, 1$	$\neq -2, 3$	$\neq \pm 1$

* f(x) = $\sqrt{g(x)}$ ➔ g(x) ≥ o to be defined

11-Rate

➔ x direct variation with y $x \propto y$ ➔ $\frac{x_1}{x_2} = \frac{y_1}{y_2}$

➔ x inversely proportion $x \propto y$ ➔ $\frac{x_1}{x_2} = \frac{y_2}{y_1}$

Or $x_1 y_1 = x_2 y_2$

➔ If Hana do a job in t_1 , hr,

And Dareen do a job in t_2 hr

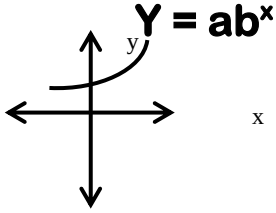
If they work together it takes t_3 hr

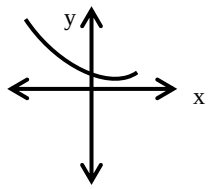
s.t $\frac{1}{t_1} + \frac{1}{t_2} = \frac{1}{t_3}$

12- EXPONENTIAL FUNCTION AND RELATION

$Y = ab^x$

* b > 1 growth





* o < b < 1 decay

➔ to find b from the table ➔ $b = \frac{y_2}{y_1} = \frac{y_3}{y_2} = \frac{y_4}{y_3}$

b: ratio , rate, double , triple

13- Interest – Percent of inc., dec.,Tax , discount

$A = p(1 \pm r\%)^t$

P :Start initial

t: no. of year – week

r: rate per year – week

(-) Dec.

(+) Inc.

$A = P(1 \pm \frac{r\%}{n})^{nt}$

Every n-interval in a year

$A = P(1 \pm r\%)^{\frac{t}{r}}$

Every n years

Tax r%

Value = p (1 + r%)

Disc. r%

Value =P (1-r%)

Tax and disc

n% m%

Value = P (1+n%) (1-m%)

percent of inc. (dec) = $\frac{diff}{old}$ x 100%

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5. PROBABILITY AND STATISTICS

Probability of an Event	Odds
$\frac{number\ of\ favorable\ outcomes}{number\ of\ all\ outcomes}$	$\frac{number\ of\ favorable\ outcomes}{number\ of\ unfavorable\ outcomes}$

Independent Events	$P(A\ and\ B) = P(A) \cdot P(B)$
Dependent Events	$P(A\ and\ B) = P(A) \cdot P(B\ after\ A)$

Geometric Probability	Fundamental Counting Principle
$\frac{measure\ of\ favorable\ region}{measure\ of\ total\ region}$	If one event can occur in M ways and another event can occur in N ways, then the total number of ways both events can occur is MN.

Mean

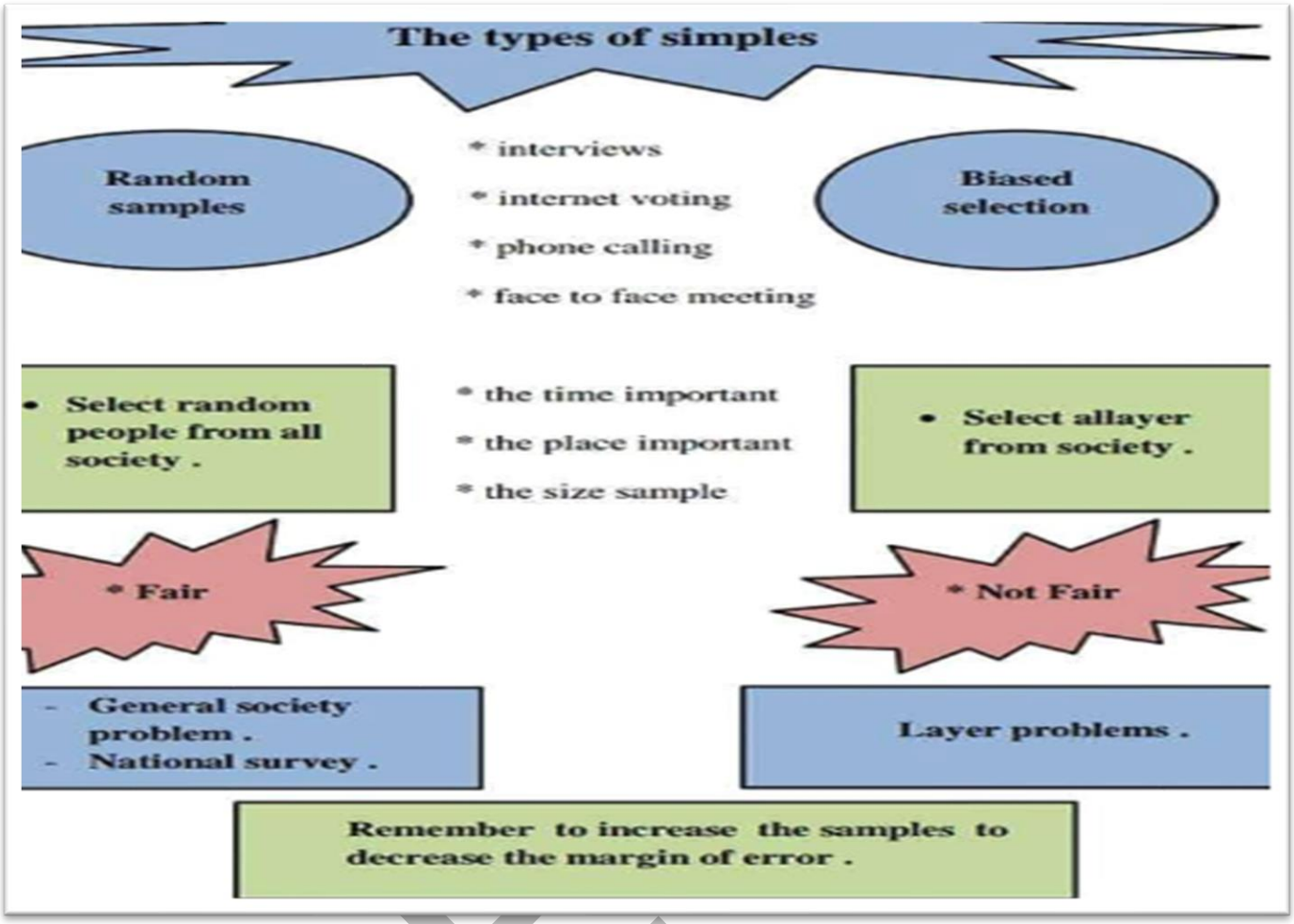
The mean is the sum of the numbers divided by the number of values in the set.

$$\bar{x} = \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n}$$

$$x_1 + x_2 + x_3 + \cdots + x_n = \bar{x} \cdot n$$

Factorial	$n! = 1 \cdot 2 \cdot 3 \cdot 4 \cdot \ldots \cdot (n-1) \cdot n$
Permutations	${}_nP_m = \frac{n!}{(n-m)!}$
Combinations	${}_nC_m = \frac{n!}{(n-m)!\,m!}$

Median	The median is the middle value in an ordered set of numbers.
Mode	The mode is the value that occurs most frequently in a set of numbers.



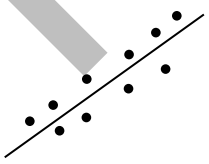
15- STANDARD DEVIATION

*** less standard dev. Is more consistent**

*****

More spread

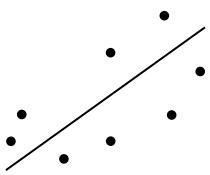
less spread



Less spread

Small standard dev.

Near to mean



More spread

Great standard. dev.

Far from the mean

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14- Margin error and confidence interval

If the true value is x and it has a margin error r%

- so the confidence interval is (x(1-r%), x (1+r%))

Ex.. x has 5% margin error

So the confidence interval is between

X (1-0.05), x (1+0.05)

0.95x , 1.05x

Ex. Number of students came today 200

With more error 6%

200 x (1-0.06) = 188

200 x (1+0.06) = 212

>→ Con. Interval between them

16- Mode most repeated data (value)

17- **Mean** : (Average) = $\frac{total}{\#}$ (individual data)➔ x_1, x_2, x_3

from table mean = $\frac{x_1 f_1 + x_2 f_2 + \cdots}{f_1 + f_2 \ldots}$

18- **Median** Arrange from least to greatest

* odd $\frac{n+1}{2}$ ← order (n. is odd)

* Even Two median s, their order $\frac{n}{2}$ (n: ever)

19 – **Range** Max. value – Min value

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20- Ratio and compound of two ratios:

$\frac{a}{b}$ = a:b

A : b = 2 : 3 ➔ a : b : sum

2 : 3 : 5

a = $\frac{2}{5}$ *of total*

b = $\frac{3}{5}$ *of* total

EX.) a : b = 2 : 5 , b : c = 5 : 2

a : b : c

2 : 5 :

: 5 : 2

10 : 25 : 10

▲ Percent of ratio $\frac{a}{b}$ = $\frac{a}{b}$ x 100%

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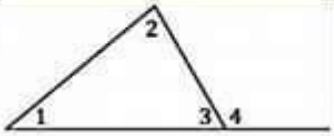
3. GEOMETRY (continued)

Inequalities in Triangles	Any side of a triangle is shorter than the sum of the two other sides
	In a triangle, the longest side is opposite the largest angle

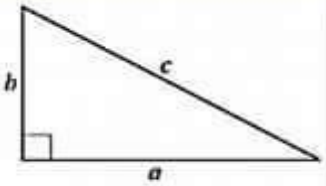
Angles of Triangles



$\angle 1 + \angle 2 + \angle 3 = 180°$

$\angle 4 = \angle 1 + \angle 2$

Pythagorean Theorem



$c^2 = a^2 + b^2$

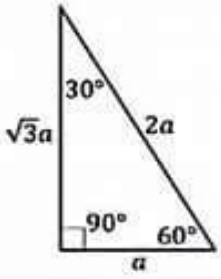
$c = \sqrt{a^2 + b^2}$

$a = \sqrt{c^2 - b^2}$

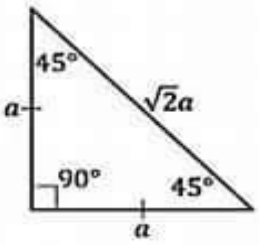
Pythagorean Triples

3, 4, 5
6, 8, 10
5, 12, 13
7, 24, 25
8, 15, 17
9, 12, 15

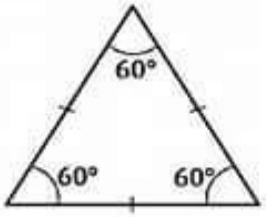
30°-60°-90° Triangles



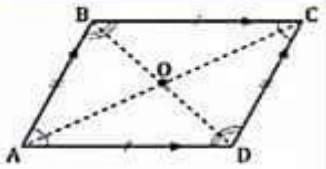
45°-45°-90° Triangles



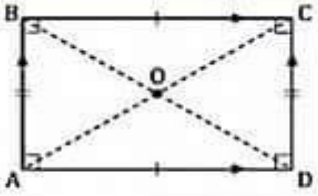
Equilateral Triangles



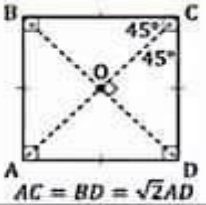
Parallelogram



Rectangle



Square



$AC = BD = \sqrt{2}AD$

Area

Triangle	$\frac{1}{2}bh$
Parallelogram	bh
Rectangle	wl
Square	s^2
Trapezoid	$\frac{1}{2}(b_1 + b_2)h$

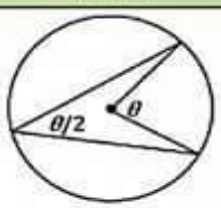
Perimeter

triangle	$a + b + c$
rectangle	$2(w + l)$
square	$4s$

Circle

Radius=r
Diameter=$2r$
Circumference=$2\pi r$
Area=πr^2

Circle



Central Angle=θ

Inscribed Angle $= \frac{\theta}{2}$

Arc length $= 2\pi r\frac{\theta}{360}$

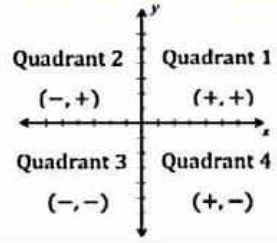
Solids

Solid	*Volume*	*Surface Area*
Rectangular Solid	$V = lwh$	$A = 2(lw + lh + wh)$
Cube	$V = s^3$	$A = 6s^2$
Right Cylinder	$V = \pi r^2 h$	$A = 2\pi r^2 + 2\pi rh$

4. COORDINATE GEOMETRY

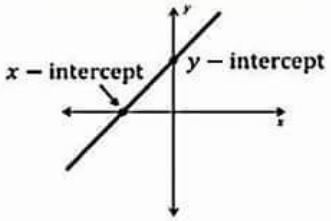
4

The Coordinate Plane



Midpoint Formula	$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$
Distance Formula	$d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$
Slope-Intercept Form	$y = mx + b$
Point-Slope Form	$y - y_1 = m(x - x_1)$

Linear Functions

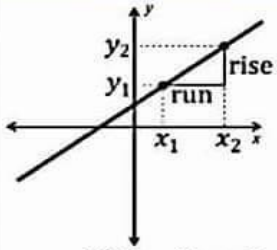


$Ax + By = C$

x-intercept: $y = 0$

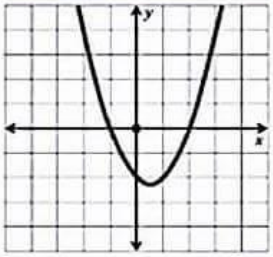
y-intercept: $x = 0$

Slope



$$m = \frac{rise}{run} = \frac{y_2 - y_1}{x_2 - x_1}$$

Quadratic Functions



$y = ax^2 + bx + c$

$a > 0$ - parabola opens upwards

$a < 0$ - parabola opens downwards

Parallel lines

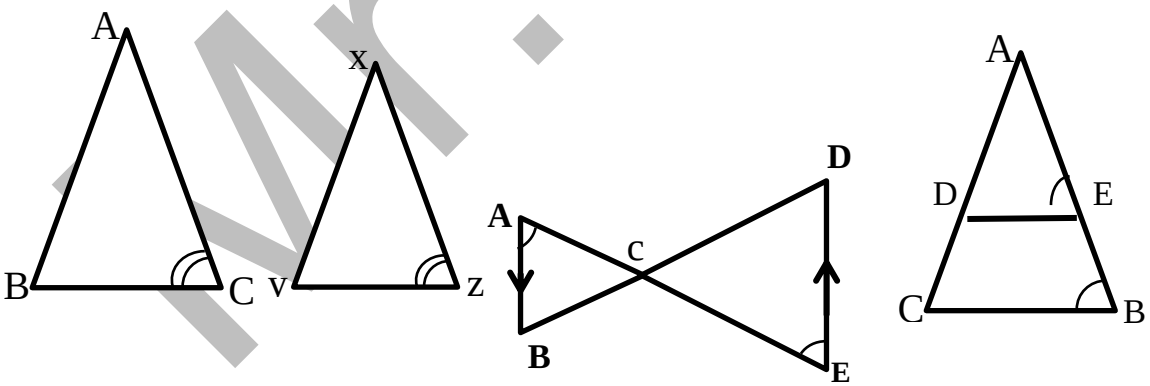
Parallel lines have the same slope

Perpendicular Lines

The product of the slopes of perpendicular lines is -1

Vertical Shift	$y = f(x) + b$, up if $b > 0$, down if $b < 0$
Horizontal Shift	$y = f(x + a)$, left if $a > 0$, right if $a < 0$

23- SIMILAR TRIANGLES



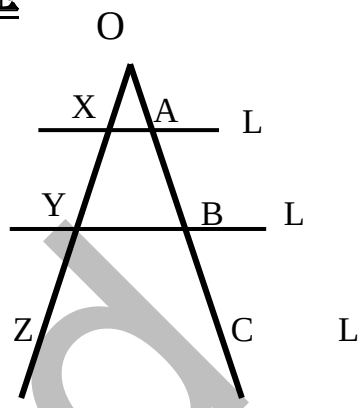
$\Delta ABC \approx \Delta XYZ$ **$\Delta ABC \approx \Delta EDC$** **$\Delta ABC \approx \Delta AED$**

Then

$$\frac{AB}{XY} = \frac{BC}{YZ} = \frac{AC}{XZ} \qquad \frac{AB}{ED} = \frac{BC}{DC} = \frac{AC}{EC} \qquad \frac{AB}{AE} = \frac{BC}{ED} = \frac{AC}{AD}$$

23- PARALLEL LINES IN TRIANGLE

$L_1 \parallel L_2 \parallel L_3$



1- $\frac{OX}{OA} = \frac{XY}{AB} = \frac{YZ}{BC}$

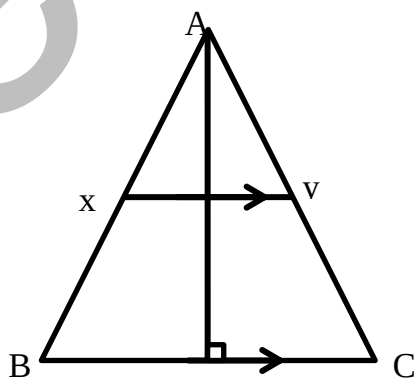
2- $\frac{OA}{OB} = \frac{OX}{OY} = \frac{XA}{YB}$

3- $\frac{OY}{OZ} = \frac{OB}{OC} = \frac{YB}{ZC}$

➔ for the heights of Δ

XY ∥ BC

2- $\frac{AX}{AB} = \frac{AY}{AC} = \frac{XY}{BC} = \frac{AN}{AM}$



24- EQUATION OF THE CIRCLE:

* Standard form $(x-h)^2 + (y-k)^2 = r^2$

Centre: (h,k) r :radius

* General form $x^2 + y^2 + ax + by + c = o$

Centre = $\left(\frac{-a}{2}, \frac{-b}{2}\right)$ r = $\sqrt{\left(\frac{a}{2}\right)^2 + \left(\frac{b}{2}\right)^2 - c}$

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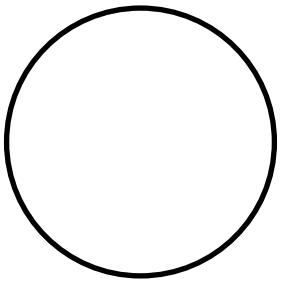
Any Point $(x_1, y_{1)}$

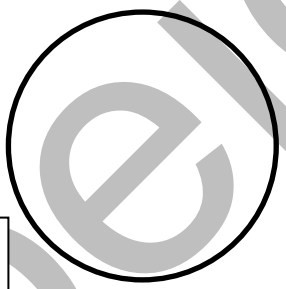
1- Inside

$(x-h)^2 + (y-k)^2 < r^2$



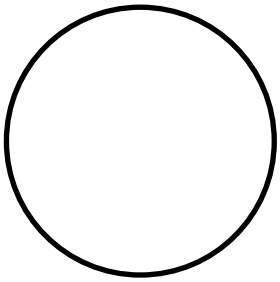
2- Outside

$(x_1- h)^2 + (y_1-k)^3 > r^2$



3- On the circle

$(x-h)^2 + (y-k)^2 = r^2$



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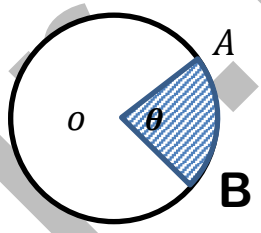
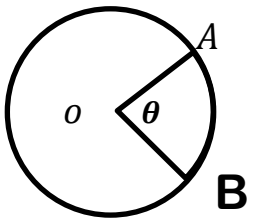
25- AREA OF SECTOR AND AREA LENGTH

$x^\circ = in\ degree$ $\qquad$ $\theta^{rd} = in\ radian$

$$\frac{x^\circ}{\theta^{rd}} = \frac{180^\circ}{\pi}$$

Area of sector	Length of the arc
$\frac{\theta^\circ}{360} \times \pi r^2$ 	$\frac{\theta^\circ}{360} \times 2\,\pi\,r$ 

*** P of sector = Arc length + 2r**

***Area of Sector in $\theta^{rd} = \frac{1}{2}\, r^2 \times \theta^{rd}$**

***Arc Length in $\theta^{rad} = r \times \theta^{rad}$**

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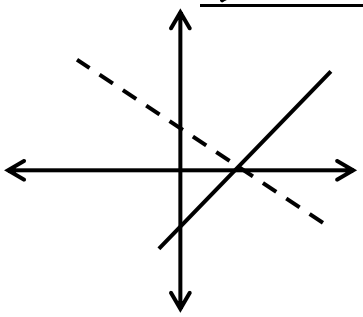
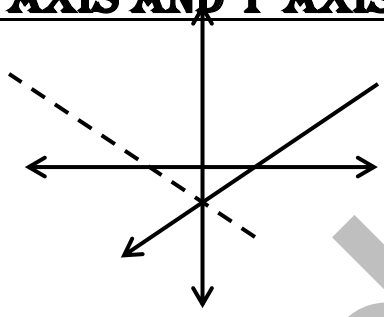
26- REFLECTION IN X-AXIS AND Y-AXIS





Ref. in X-axis	Ref. in Y-axis
1- Opposite slope (-m)	1- Opposite slope (-m)
2- Different Y-int	2- Same X– int
3- Same X – int	3- Different X -int
(x,y) ➔ (x, -y)	(x,y) ➔ (-x, y)

27- Transformation of graphs

Y = f(x)

Upward ➔ f(x)+a

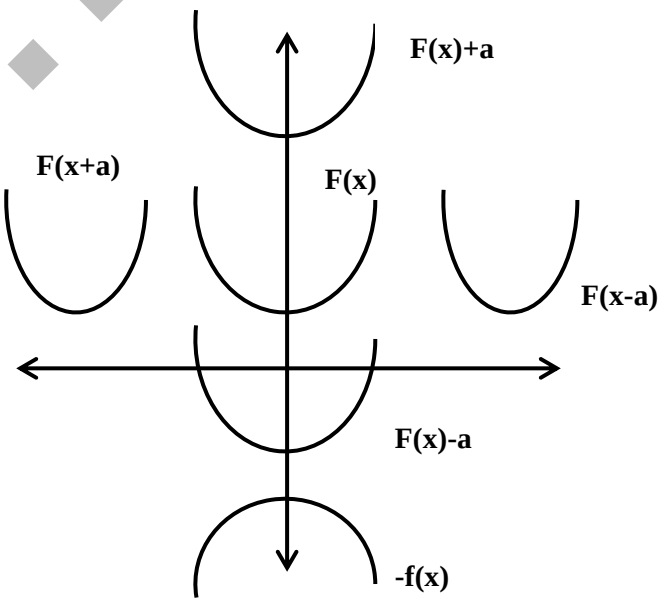
Downward ➔ f(x)-a

Shift left ➔ f (x+a)

Shift right ➔ f (x-a)

Ref in x ➔ - f(x)

Ref in y ➔ f(-x)



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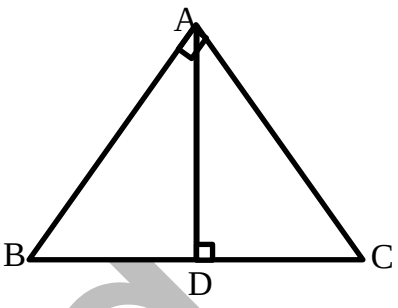
28- Area of triangle

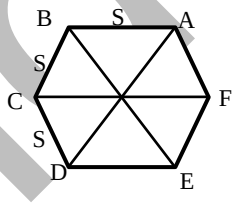
$A = \frac{1}{2} \times BC \times AD = \frac{1}{2} \times AB \times AC$



Equilateral Δ $A = \frac{\sqrt{3}}{4} \times S^2$

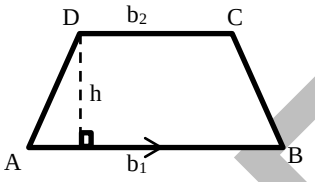
➔ Hexagon

P = 6S diagonal = 2S

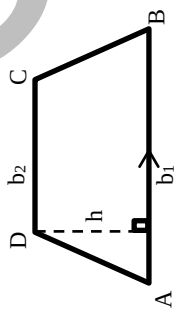


Area $6 \times \frac{\sqrt{3}}{4}$ S^2 $AC = CE = AE = \ldots = S\sqrt{3}$

29- Trapezoid



$A = \left(\frac{b_1 + b_2}{2}\right) \times h$

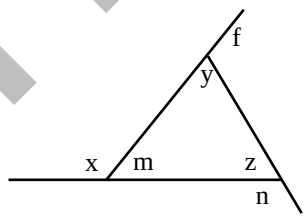


30- Exterior angles

X = y + z

F = m + z

N = m + y



* sum of exterior angles of any polygon = 360^o

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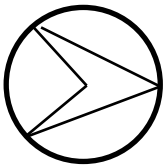
31- POLYGONS

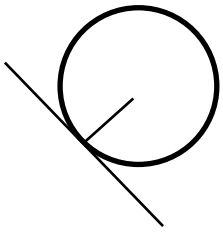
* sum = (n-2) x 180 n number of sides

* Regular ➔ each angle = $\frac{(n-2)\,x\,180}{n}$



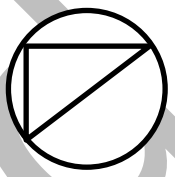
* Exterior angle $= \frac{360}{n}$

32- Inscribed and cent



➔ m (<ACB) = 90°

➔ Tangent of circles is ⊥ r



33- Complex number i = $\sqrt{-1}$

$\sqrt{9}$ = 3 $\sqrt{-9}$ = 3i $\sqrt{a^2}$ = a $\sqrt{-a^2}$ = ai a>o

➔ Complex number = R + Img

Z = 5 + 7i

➔ (a + bi) ± (c+di) = (a±c) + (b±d)i

➔ multiply

➔ Division

Conjugate a + bi ➔ a – bi

i = root -1 $i^2 = -1$ $i^3 = -i$ $i^4 = 1$

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