BINOMIAL EXPANSION

Investigation

Part 1:

Expand each of the following (use the long method to be safe) and simplify fully:

1. $(\boldsymbol{a+b})^{\boldsymbol{2}}$
2. $(\boldsymbol{a-b})^{\boldsymbol{2}}$
3. $(\boldsymbol{a+b})^{\boldsymbol{3}}$ { hint $(a+b)^3=(a+b)(a+b)^2$}
4. $(\boldsymbol{a-b})^{\boldsymbol{3}}$
5. $(\boldsymbol{a+b})^{\boldsymbol{4}}$ { hint $(a+b)^4=(a+b)(a+b)^3$}
6. $(\boldsymbol{a-b})^{\boldsymbol{4}}$

Part 2:

Organize the results above in a table as shown below:

Power of Binomial, n	**Binomial** $(\boldsymbol{a+b})^{\boldsymbol{n}}$	**Expansion**	**# of terms**	**Coefficients**
0	$(\boldsymbol{a+b})^{\boldsymbol{0}}$	1	1	1
0	$(\boldsymbol{a-b})^{\boldsymbol{0}}$	1	1	1
1	$(\boldsymbol{a+b})^{\boldsymbol{1}}$	$\boldsymbol{a+b}$	2	1,1
	$(\boldsymbol{a-b})^{\boldsymbol{1}}$	$\boldsymbol{a-b}$	2	1,-1
	$(\boldsymbol{a+b})^{\boldsymbol{2}}$	…		1,2,1
	$(\boldsymbol{a-b})^{\boldsymbol{2}}$			1,-2,1
	…			…
	$(\boldsymbol{a-b})^{\boldsymbol{4}}$			…

Part 3:

Observations:

Write observations by completing the statements below:

i. the number of terms in each expansion is …
ii. the powers of a are …
iii. the powers of b are …..
iv. the combined powers of a and b …
v. the coefficients for $(\boldsymbol{a+b})^{\boldsymbol{n}}$and $(\boldsymbol{a-b})^{\boldsymbol{n}}$ are the ….. excepts that the signs coefficients of $(\boldsymbol{a-b})^{\boldsymbol{n}}$ …
vi. the coefficients of the terms in the expansion of $(\boldsymbol{a+b})^{\boldsymbol{n}}$can be written in a triangle as:

1
1 1
1 2 1

This triangle is called PASCAL'S TRIANGLE

Part 4:

Using the pattern you observe to write what you would expect the following to simplify to:

1. $(\boldsymbol{a+b})^{\boldsymbol{5}}$
2. $(\boldsymbol{a-b})^{\boldsymbol{5}}$