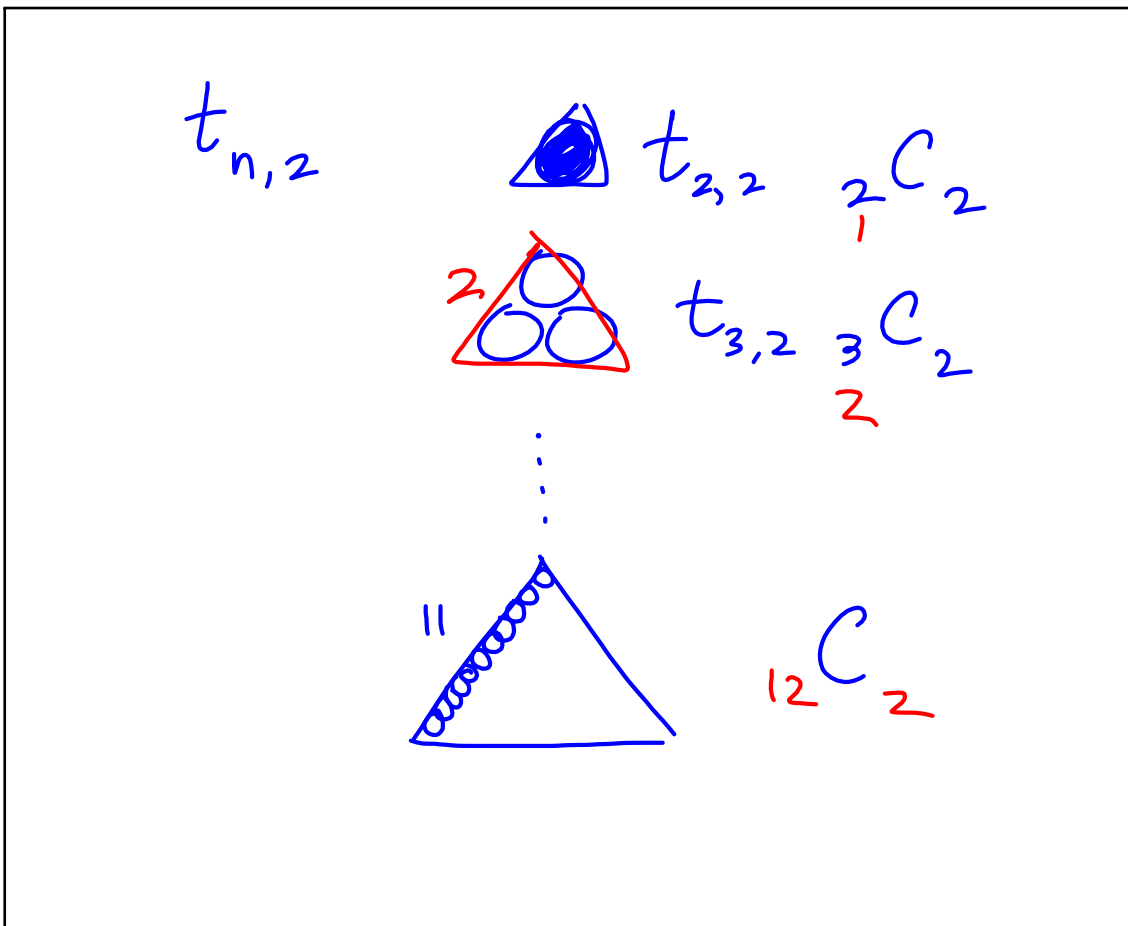


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$$\begin{aligned}
 (a+b)^6 & a^6, a^5b^1, a^4b^2, a^3b^3, a^2b^4, \\
 & = {}_6C_0 a^6 \qquad a^1b^5, a^0b^6 \\
 & + {}_6C_1 a^5b + {}_6C_2 a^4b^2 \\
 & + {}_6C_3 a^3b^3 + {}_6C_4 a^2b^4 \\
 & + {}_6C_5 ab^5 + {}_6C_6 b^6
 \end{aligned}$$

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13. Use Pascal's triangle to expand and simplify.

a) $(x+y)^8$

b) $(x-y)^5$

c) $(2a+b)^4$

d) $(x^2-2)^3$

$a=x^2 \quad b=-2$

$$\begin{aligned}
 \text{(a)} \quad & x^8, x^7y, x^6y^2, \dots, y^8 \\
 & \uparrow \quad \uparrow \quad \uparrow \quad \dots \quad \uparrow \\
 & {}_8C_0 \quad {}_8C_1 \quad {}_8C_2 \quad \dots \quad {}_8C_8 \\
 & x^8y^0 \qquad \qquad \qquad x^0y^8
 \end{aligned}$$

d) $(x^2-2)^3$

$= (a+b)^3$

$= {}_3C_0 a^3 b^0 + {}_3C_1 a^2 b^1 + {}_3C_2 a^1 b^2 + {}_3C_3 a^0 b^3$

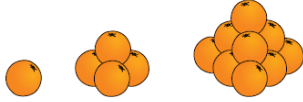
$= (1)a^3 + 3a^2b + 3ab^2 + 1b^3$

$= (x^2)^3 + 3(x^2)^2(-2) + 3(x^2)(-2)^2 + (-2)^3$

$= x^6 - 6x^4 + 12x^2 - 8$

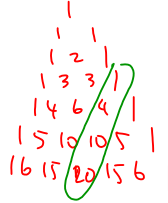
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16. **Thinking** Investigate the number of oranges needed to stack the fruit in a tetrahedron.



- Complete a chart showing the total number of oranges needed relative to the number of layers.
- Identify the results in Pascal's triangle and describe your findings.
- Write a relationship involving ${}_n C_r$.
- How many oranges are needed for a 10-layer stack in a tetrahedral shape?

row	# layers	# oranges
3	1	1
4	2	4
5	3	10
6	4	20



${}_n C_r$

of layers $r = 3$ (tetrahedron)
 $r = n - 2$

10 layers = $n - 2$ $12 C_3$
 $10 = n - 2$
 $n = 12$

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18. **Thinking** Explain how $(h + t)^5$ could be used to show the different combinations of heads and tails when a coin is tossed repeatedly.

$$(h+t)^5 = 1h^5 + \dots + 1t^5$$

↓

$$= 1h^5 + 5ht^4 + 10h^2t^3 + 10h^3t^2 + 5ht^4 + 1t^5$$

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