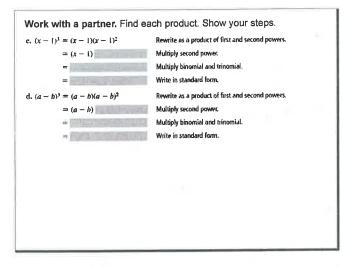
$(x+1)^3 = (x+1)^3$	$(x+1)(x+1)^2$	Rewrite as a product of first and second powers.
x) =	+ 1) 麗	Multiply second power.
= 1-2	T. MARK	Multiply binomial and trinomial.
= [738 E MATE	Write in standard form, $ax^3 + bx^2 + cx + d$.
$(a+b)^3=(a$	$a+b)(a+b)^2$	Rewrite as a product of first and second powers.
= (a	ı + b)	Multiply second power.
= 88		Multiply binomial and trinomial.
= 10	THE RESERVE	Write in standard form.

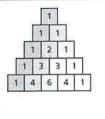
Exploration 1a-b



Exploration 1c-d

Work with a partner.

- a. Use the results of Exploration 1 to describe a pattern for the coefficients of the terms when you expand the cube of a binomial. How is your pattern related to Pascal's Triangle, shown at the right?
- b. Use the results of Exploration 1 to describe a pattern for the exponents of the terms in the expansion of a cube of a binomial.
- c. Explain how you can use the patterns you described in parts (a) and (b) to find the product $(2x 3)^3$. Then find this product.



Warm Up

Find the value of c that makes the expression a perfect square trinomial. Then write the expression as the square of a binomial. 2. $z^2 + 6z + c = 9$ 4. $x^2 - 25x + c =$ 5. x2 - 8x + c - 14 6. $s^2 + 27x + c$

Cumulative Warm Up

review of distributive

Essential Question, How can you cube a binomial?	1 -
$(x-a)^3$	
(x-a)(x-a)(x-a	

Essential Question

neview of foil
Multiple methods
· double alistributive

a. Add
$$3x^3 + 2x^2 - x - 7$$
 and $x^3 - 10x^2 + 8$ in a vertical format.

$$3x^3 + 3x^2 - x - 7$$

$$+ x^3 - 10x^3 + 0x + 8$$

$$+ x^3 - 8x^2 - x + 1$$

b. Add $9y^3 + 3y^2 - 2y + 1$ and $-5y^2 + y - 4$ in a horizontal format.

Example 1

han up and down
format. Use place holders
It all exponent (variables)
are not represented

horizontal: write as an
expression and combine.
The terms.

a. Subtract $2x^3 + 6x^2 - x + 1$ from $8x^3 - 3x^2 - 2x + 9$ in a vertical format.

b. Subtract $3z^2 + z - 4$ from $2z^2 + 3z$ in a horizontal format.

Example 2

with subtraction: remember you must subtract every term in the second

property: you can change subtraction to addition if you change the sign of each term that follows.

Find the sum or difference. 1. $(2x^2 - 6x + 5) + (7x^2 - x - 9)$

2.
$$(3t^3 + 8t^2 - t - 4) - (5t^3 - t^2 + 17)$$

use either method to

*Student practice

a. Multiply $-x^2 + 2x + 4$ and x - 3 in a vertical format.

b. Multiply y + 5 and $3y^2 - 2y + 2$ in a horizontal format.

Example 3

Multiply x - 1, x + 4, and x + 5 in a horizontal format.

(X-1)(X+4)(X+5) (x2+4x-x-4)(x+5) (x2+3x-4)(x+5) X3+8X3+11X-90

Example 4

X3 +5x2 +3x2+15x-4x-10

Special Product Patterns Sum and Difference	F
Sum und Difference $(a+b)(a-b) = a^2 - b^2$	Example
$(a+b)(a-b)=a^{2}-b^{2}$	$(x+3)(x-3) = x^2 - 9$
Square of a Binomial	Example
$(a+b)^2 = a^2 + 2ab + b^2$	$(y+4)^2 = y^2 + 8y + 16$
$(a-b)^2 = a^2 - 2ab + b^2$	$(2t - 5)^2 = 4t^2 - 20t + 25$
Cube of a Binomial	Example
$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$	$(z+3)^3 = z^3 + 9z^2 + 27z +$
$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$	$(m-2)^3 = m^3 - 6m^2 + 12m$

Core Concept

	plying		
2 bunomia		gethe	r
	multip	ly une	12
and then	multip	ly by	3
the third		2	1
·always	Com bine	e lik	0
40000			

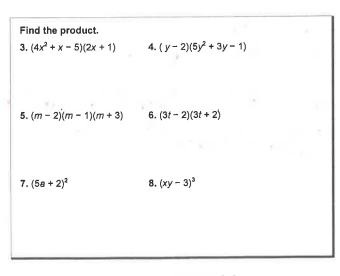
* Student practice

a. Prove the polynomial identity for the cube of a binomial representing a sum:
(a + b)³ = a³ + 3a²b + 3ab² + b³.
b. Use the cube of a binomial in part (a) to calculate 11³.

Ex	am	lar	е	5

Find each product. a. $(4n + 5)(4n - 5)$	b. (9y - 2) ²	c. (ab + 4) ³
$\frac{ 4n ^{15}}{4n ^{16n^2}} = \frac{ 4n ^{15}}{20n}$ $-5 -30n -35$ $16n ^2 - 35$. 81	-2)(9y-2). 12-18y-18y t 2-3loy.ta

Example 6

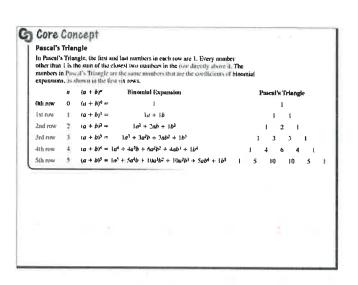


tmultiply out using any method to
(ab+4)3 (ab+4)(ab+4)(ab+4)

100		
	9	

 9. (a) Prove the polynomial identity for the cube of a binomial representing a difference: (a - b)³ = a³ - 3a²b + 3ab² - b³. (b) Use the cube of a binomial in part (a) to calculate 9³. 	· Show linear and
(a-b)(a-b) (a-b) [a(a-b)+(-b)(a-b)](a-b)	area model
$(a^2 - ab - ab + b^2)(a - b)$ $(a^2 - aab + b^2)(a - b)$	
a(a2-2ab +b2) + (-b)(a2-2ab +b2) a3-2ab + ab2-a2b+2ab2-b3	

Monitoring Progress 9



Core Concept

```
In general: nthrougives (atb)<sup>n</sup>

1) expansion has ntl terms

a) paver of a begins whe,

decreases by 1 in each term,

ends in a

linereases by 1, ends whe paver

of n.

H) the sum of the pavers

of each term is n.
```

Use Pascal's Triangle to expand (a) $(x-2)^5$ and (b) $(3y+1)^3$.	
(X-2)5 Mouss: 1,5,10,10,5,1	
1 x5+5x4(-2)+10x3(-2)2+10x3(-2)3 +5x(-3)4+1(-2)5	13 T
x5-10x7 +10x3 (4) + 10x2 (-8) +5x(16)	-32

Examp	le 7
-------	------

(3y+1)3 now 3: 1,3,3,1	
1/3413 + 3(34)2(1) + 3(34)(1)2+ 1(2343) + 3(942) + 94 +1	1(1)3

10. Use Pascal's Triangle to expand (a) $(z + 3)^4$ and (b) $(2t - 1)^5$.	
(2+3) 4 pow 4: 1,4,6,4,1	
124+4(3)3(+3)+6(3)2(3)2. +42(3)3+1(34)	
24+1953 + 2452 + 1085 + 81 24+1953 + 2452 + 1085 + 81	8

Monitoring Progress 10

Writing Prompt: Explain why $(x + 2)^3 \neq x^3 + 8$.

Closure

(2t-1)5 now 5: 1,5,10,10,5
1(at) + 5(at) 4(-1) + 10(at) 3(-1)2
$\frac{+ 0(2t)^{4}-1 ^{5} + 5(2t)^{4}(-1)^{4}}{+ 1(-1)^{5}}$ $32t^{5} + 5(16t^{4}) + 10(8t^{3}) + 10(4t^{2})(-1)$
+ 10+ -1
3265-8064 + 8063 - 4062 + 106-1

Xit	ticket	!	