Name: _____ Date: _____

Fresh Math

Polynomial Identities - Medium

Use the Binomial Theorem (Pascal's triangle) to expand each power. For a product or a square of numbers, use $(a + b)(a - b) = a^2 - b^2$ or $(a \pm b)^2 = a^2 \pm 2ab + b^2$ to compute without a calculator.

1. 52^2
2. 63^2
3. $(x + 2)^4$
4. $(x - 2)^4$
5. $16 \cdot 24$
6. $48 \cdot 52$
7. $(x - 2)^5$
8. $(x + 2)^5$
9. $88 \cdot 92$
10. 53^2

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11. $(x - 3)^4$

12. $(x + 3)^4$

13. $29 \cdot 31$

14. 73^2

15. $(x + 1)^3$

16. 27^2

17. $28 \cdot 32$

18. $17 \cdot 23$

19. $(x + 3)^5$

20. $15 \cdot 25$

Polynomial Identities - Medium - Answer Key

1. 52^2

   $(50 + 2)^2 = 2500 + 200 + 4 = 2704$

2. 63^2

   $(60 + 3)^2 = 3600 + 360 + 9 = 3969$

3. $(x + 2)^4$

   $x^4 + 8x^3 + 24x^2 + 32x + 16$

4. $(x - 2)^4$

   $x^4 - 8x^3 + 24x^2 - 32x + 16$

5. $16 \cdot 24$

   $20^2 - 4^2 = 400 - 16 = 384$

6. $48 \cdot 52$

   $50^2 - 2^2 = 2500 - 4 = 2496$

7. $(x - 2)^5$

   $x^5 - 10x^4 + 40x^3 - 80x^2 + 80x - 32$

8. $(x + 2)^5$

   $x^5 + 10x^4 + 40x^3 + 80x^2 + 80x + 32$

9. $88 \cdot 92$

   $90^2 - 2^2 = 8100 - 4 = 8096$

10. 53^2

    $(50 + 3)^2 = 2500 + 300 + 9 = 2809$

Polynomial Identities - Medium - Answer Key

11. $(x - 3)^4$

$x^4 - 12x^3 + 54x^2 - 108x + 81$

12. $(x + 3)^4$

$x^4 + 12x^3 + 54x^2 + 108x + 81$

13. $29 \cdot 31$

$30^2 - 1^2 = 900 - 1 = 899$

14. 73^2

$(70 + 3)^2 = 4900 + 420 + 9 = 5329$

15. $(x + 1)^3$

$x^3 + 3x^2 + 3x + 1$

16. 27^2

$(30 - 3)^2 = 900 - 180 + 9 = 729$

17. $28 \cdot 32$

$30^2 - 2^2 = 900 - 4 = 896$

18. $17 \cdot 23$

$20^2 - 3^2 = 400 - 9 = 391$

19. $(x + 3)^5$

$x^5 + 15x^4 + 90x^3 + 270x^2 + 405x + 243$

20. $15 \cdot 25$

$20^2 - 5^2 = 400 - 25 = 375$