

Factoring Sum of Cubes

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

Use the sum of cubes formula to factor the following. Don't forget to factor out the GCF if necessary.

<p>1. <math>x^3 + 27</math>  <math>= x^3 + 3^3</math>  <math>= (x + 3)(x^2 - x \cdot 3 + 3^2)</math>  <math>= (x + 3)(x^2 - 3x + 9)</math></p>	<p>2. <math>y^3 + 216</math>  <math>= y^3 + 6^3</math>  <math>= (y + 6)(y^2 - y \cdot 6 + 6^2)</math>  <math>= (y + 6)(y^2 - 6y + 36)</math></p>	<p>3. <math>8 + s^3</math>  <math>= 2^3 + s^3</math>  <math>= (2 + s)(2^2 - 2 \cdot s + s^2)</math>  <math>= (2 + s)(4 - 2s + s^2)</math></p>
<p>4. <math>64t^3 + 1</math>  <math>= (4t)^3 + 1^3</math>  <math>= (4t + 1)[(4t)^2 - 4t \cdot 1 + 1^2]</math>  <math>= (4t + 1)(16t^2 - 4t + 1)</math></p>	<p>5. <math>8 + 27a^3</math>  <math>= 2^3 + (3a)^3</math>  <math>= (2 + 3a)[2^2 - 2 \cdot 3a + (3a)^2]</math>  <math>= (2 + 3a)(4 - 6a + 9a^2)</math></p>	<p>6. <math>81x^3 + 3</math>  <math>= 3(27x^3 + 1)</math> factor out GCF  <math>= 3[(3x)^3 + 1^3]</math>  <math>= 3(3x + 1)[(3x)^2 - 3x \cdot 1 + 1^2]</math>  <math>= 3(3x + 1)(9x^2 - 3x + 1)</math></p>
<p>7. <math>3t^4 + 24t</math>  <math>= 3t(t^3 + 8)</math> factor out GCF  <math>= 3t(t^3 + 2^3)</math>  <math>= 3t(t + 2)(t^2 - t \cdot 2 + 2^2)</math>  <math>= 3t(t + 2)(t^2 - 2t + 4)</math></p>	<p>8. <math>-8x^3 - 125y^3</math>  <math>= -(8x^3 + 125y^3)</math> factor out GCF  <math>= -[(2x)^3 + (5y)^3]</math>  <math>= -(2x + 5y)[(2x)^2 - 2x \cdot 5y + (5y)^2]</math>  <math>= -(2x + 5y)(4x^2 - 10xy + 25y^2)</math></p>	<p>9. <math>x^6 + 64</math>  <math>= (x^2)^3 + 4^3</math>  <math>= (x^2 + 4)[(x^2)^2 - x^2 \cdot 4 + 4^2]</math>  <math>= (x^2 + 4)(x^4 - 4x^2 + 16)</math></p>
<p>10. <math>54ab^3 + 128a</math>  <math>= 2a(27b^3 + 64)</math> factor out GCF  <math>= 2a[(3b)^3 + 4^3]</math>  <math>= 2a(3b + 4)[(3b)^2 - 3b \cdot 4 + 4^2]</math>  <math>= 2a(3b + 4)(9b^2 - 12b + 16)</math></p>		