Mathematical Operations: Addition

**Adding & Subtracting Numbers**

Rule #1: If you are combining two numbers of the same sign (+ with + or – with –), then the result will be a “bigger” number that keeps the same sign.

Rule #2: If you are combining two numbers of different signs (+ with – or – with +), then the result will be a “smaller” number that keeps the sign of the bigger starting number.

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| **Example 1** | **Example 2** | **Example 3** | **Example 4** |
| Simplify. 3 + 2*(same as +3 +2)*+3 + 2 = +5+++ & ++ = +++++or/// & // = /////*(where / = +1)* | Simplify. –5 – 1–5 – 1 = –6– – – – – & – = – – – – – –or\\\\\ & \ = \\\\\\*(where* \ *=* –*1)* | Simplify. 4 – 3*(same as +4 –3)*+4 – 3 = + 1++++ & – – – = +*(+ cancels out –)*//// & \\\ = XXX/ = /*(/ cancels out* \*)* | Simplify. –5 + 2–5 + 2 = –3– – – – – & + + = – – –*(– cancels out +)*\\\\\ & // = XX\\\ = \\\*(*\ *cancels out /)* |
| 1. Simplify. 6 + 10 | 2. Simplify. –1 – 9 | 3. Simplify. 5 – 7 | 4. Simplify. –6 + 5 |
| 5. Simplify. –7 – 9 | 6. Simplify. 3 + 4 | 7. Simplify. –7 + 7 | 8. Simplify. 8 – 1 |
| 9. Simplify. –3 + 4 | 10. Simplify. –7 – 10 | 11. Simplify. 6 + 1 | 12. Simplify. 8 – 8 |

Rule #3: If two of the same sign are next to each other [++, ––, +(+, or –(–], then change them to a “+” sign instead.

Rule #4: If two different signs are next to each other [+–, –+, +(–, or –(+], then change them to a “–” sign instead.

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| **Example 5** | **Example 6** | **Example 7** | **Example 8** |
| Simplify. 3 + +2*(same sign: ++ = +)*3 ++ 2 = 3 + 2+3 + 2 = +5 | Simplify. –5 –(–2)*(same sign: –– = +)*–5 –(–2) = –5 + 2–5 + 2 = –3 | Simplify. –5 + (–1)*(different sign: +– =* –*)*–5 + –1 = –5 – 1 –5 – 1 = –6 | Simplify. 4 – +3*(different sign: –+ =* –*)*4 – +3 = 4 – 3+4 – 3 = + 1 |
| 13. Simplify. –1 + +9 | 14. Simplify. 6 – (–10) | 15. Simplify. –6 + –5 | 16. Simplify. 5 – (+7) |
| 17. Simplify. 3 – (+4) | 18. Simplify. 8 + –1 | 19. Simplify. –3 – –10 | 20. Simplify. –7 + (+9) |
| 21. Simplify. 6 + –1 | 22. Simplify. 8 – (–8) | 23. Simplify. –3 + (+4) | 24. Simplify. –7 – +10 |

**Adding & Subtracting with Variable Terms**

Rule #5: If you are combining terms that have variables, then you can only combine terms that are “like,” which means the variable exponent is the same.

Rule #6: If you are combining like terms, then you combine the numbers in front of the variables (called the “coefficients”) but you must leave the variable exponents the same as they were.

Rule #7: If the variable term doesn’t have a visible exponent or a visible number in front (called the “coefficient”), then the invisible number is 1.

Rule #8: If a term doesn’t have a visible variable, then the variable exponent is 0.

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| **Example 9** | **Example 10** | **Example 11** | **Example 12** |
| $$3x^{2}+5x^{2}$$*(same exponents 2&2 = combine terms)*$$3x^{2}+5x^{2}=8x^{2}$$*(combine numbers in front, but keep exponents same)* | $$-7x^{5}+x^{5}$$*(same exponents 5&5 = combine terms)*$$-7x^{5}+1x^{5}=-6x^{5}$$ | $$9x^{4}+9x$$ *means:* $9x^{4}+9x^{1}$*(different exponents 1&4 = can’t combine terms, so do nothing)*$$9x^{4}+9x^{1}=9x^{4}+9x$$ | $$4x^{7}+3$$ *means:* $4x^{7}+3x^{0}$*(different exponents 7&0 = can’t combine terms)*$$4x^{7}+3x^{0}=4x^{7}+3$$ |
| 25. Simplify. $5x^{7}-4x^{7}$ | 26. Simplify. $-3x^{5}-7x^{5}$  | 27. Simplify. $6x^{3}+5x^{2}$ | 28. Simplify. $7x^{3}-1$ |
| 29. Simplify. $8x+4$ | 30. Simplify. $-2x^{8}-3x^{8}$ | 31. Simplify. $4x^{2}-9x$ | 32. Simplify. $6x^{7}+5x^{7}$ |
| 33. Simplify. $6x^{3}-1$ | 34. Simplify. $8x^{2}+2x^{2}$ | 35. Simplify. $3x-8x$ | 36. Simplify. $-5x^{4}+3x^{4}$ |

Rule #9: If you have variable terms with different exponents, the bigger exponents go first (it doesn’t matter how big the numbers out front are).

Rule #10: If you are combining more than two terms, you can move the added/subtracted terms, as long as you keep the signs the same.

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| **Example 13** | **Example 14** | **Example 15** | **Example 16** |
| $$9x^{5}-8x^{7}+2x^{7}$$$$=+9x^{5}-8x^{7}+2x^{7}$$*(bigger exponents(7) move to front, smaller(5) to back)*$$=-8x^{7}+2x^{7}+9x^{5}$$*(same exponents 7 = combine terms)*$$=-6x^{7}+9x^{5}$$*(different exponents 7&5 = can’t combine)* | $$4x^{3}+5x^{2}-x^{3}$$$$=+4x^{3}+5x^{2}-1x^{3}$$*(bigger exponents(3) move to front, smaller(2) to back)*$$=+4x^{3}-1x^{3}+5x^{2}$$*(same exponents 3 = combine terms)*$$=3x^{3}+5x^{2}$$*(different exponents 3&2 = can’t combine)* | $$-3x^{2}+2x+5x-x^{2}$$$$=-3x^{2}+2x+5x-1x^{2}$$ *(bigger exponents(2) move to front, smaller(1) to back)*$$=-3x^{2}-x^{2}+2x+5x$$*(same exponents 1&1 and 2&2 = combine terms)*$=-4x^{2}+7x$ | $$x^{2}+5-4x+2x^{2}$$$$=+1x^{2}+5-4x+2x^{2}$$ *(bigger exponents(2) move to front, smaller(1&0) back)*$$=+1x^{2}+2x^{2}-4x+5$$*(same exponents 2&2 = combine terms)*$$=3x^{2}-4x+5$$ |
| 37. $10x+4x^{6}-8x$ | 38. $6x^{2}-7x-4x^{2}$ | 39. $-2x^{7}-x^{9}+4x^{9}+x^{7}$ | 40. $9x+2x^{2}+6-3x$ |
| 41. $8x^{5}-7x^{3}-4x^{5}-2$ | 42. $-7x^{2}-5x^{2}+4x$ | 43. $2+7x^{8}-6$ | 44. $–x^{9}+2x+10x^{9}$ |
| 45. $7x+10x^{3}-2x^{3}$ | 46. $-3-10x+10$ | 47. $9x^{8}+9x^{5}-5x+x^{5}$ | 48. $3x^{4}+9x^{8}-x^{4}+4$ |