

ALGEBRA PITFALLS

The following represent many of the algebra pitfalls that cause students to stumble and commit errors in their work. Test yourself by indicating whether each statement is True (this means for all numbers) or False. Assume that x, y, a, b, c, d are any real numbers except in situations where they shouldn't be 0 in the denominator of a fraction. The answers are at the end. Don't peek.

_____ 1) $x^a x^b = x^{ab}$

_____ 2) $\frac{x^a}{x^b} = x^{-a-b}$

_____ 3) $(x^a)^b = x^{ab}$

_____ 4) $\sqrt[b]{x^a} = x^{b/a}$

_____ 5) $x^a x^a = x^{a^2}$

_____ 6) $(x^a y^a) = (xy)^a$

_____ 7) $-3^2 = 9$

_____ 8) $3a^{-1} = \frac{1}{3a}$

_____ 9) $\frac{1}{ax^b} = ax^{-b}$

_____ 10) $2x^{-2} + 3y^{-3} = \frac{5}{x^2+y^3}$

_____ 11) $\sqrt{2+b} = \sqrt{2} + \sqrt{b}$

_____ 12) $\sqrt{2b} = \sqrt{2}\sqrt{b}$

_____ 13) $\frac{1}{\sqrt{b}} = \frac{b\sqrt{b}}{b}$

_____ 14) $\frac{x+5}{x-1} = -5$

_____ 15) $x^2 - (a^2 + a - 2) = x^2 - a^2 + a - 2$

_____ 16) $\frac{2 \pm \sqrt{3}}{6} = \frac{1 \pm \sqrt{3}}{3}$

_____ 17) $\frac{x+y}{a+b} = \frac{x}{a} + \frac{y}{b}$

_____ 18) $\sqrt{x^2 - y^2} = x - y$

_____ 19) $(a+b)^2 = a^2 + b^2$

_____ 20) $3(x-1)^{12} = (3x-3)^{12}$

- 1) False. Add the exponents. $x^2x^3 = x^5$
- 2) False Subtract the exponents. $\frac{x^7}{x^4} = x^3$
- 3) True
- 4) False The root goes in the denominator. $\sqrt[4]{x^3} = x^{3/4}$
- 5) False Add the exponents. $x^4x^4 = x^8$
- 6) True
- 7) False Order of operations says do powers, then subtract. $(-3)^2 = 9$ but $-3^2 = -9$
- 8) False The 3 has an exponent of +1. $3a^{-1} = \frac{3}{a}$
- 9) False The a also has a negative exponent. $\frac{1}{xy^3} = x^{-1}y^{-3}$
- 10) False Find a common denominator. $2x^{-2} + 3y^{-3} = \frac{2}{x^2} + \frac{3}{y^3} = \frac{2y^3+3x^2}{x^2y^3}$
- 11) False The root of a sum does not equal the sum of the roots. $\sqrt{25+16} = \sqrt{41} \neq 5+4$
- 12) True
- 13) False $\frac{1}{\sqrt{b}} = \frac{1}{\sqrt{b}} \cdot \frac{\sqrt{b}}{\sqrt{b}} = \frac{\sqrt{b}}{b}$
- 14) False Fractions are only reduced by dividing out factors (multipliers)
- 15) False The negative distributes over *all* the terms. $x^2 - (a^2 + a - 2) = x^2 - a^2 - a + 2$
- 16) False Each term has to have a factor of 2 in order to reduce it.
- 17) False Each term in the numerator is divided by the entire denominator. $\frac{6+9}{1+2} = \frac{6}{1+2} + \frac{9}{1+2}$
- 18) False Same situation as #11.
- 19) False There's a middle term when squaring binomials. $(a+b)^2 = a^2 + 2ab + b^2$
- 20) False You can't distribute the 3 inside the parenthesis. It has an exponent of 1, and the binomial has an exponent of 12.