WHAT DID THE CALCULUS TEACHER SAY TO HER NERVOUS STUDENTS BEFORE THE QUIZ ON THE CHAIN RULE?

Derivatives of Composite Functions

If $y = f(g(x))$

then $y' = f'(g(x))g'(x)$

$y = (1 - 2x^4)^7$

$y' = 7(1 - 2x^4)^6 \cdot (-8x^3)$

$y' = -56x^3(1 - 2x^4)^6$

Find the derivative y' of each function.

1) $y = 4x^4 + 12x^2 + 9$ E	2) $y = x^3 + 6x^2 + 12x + 8$ S	3) $y = 1 - 10x^3 + 25x^6$ O
4) $y = (2x^2 + 3)^2$ E	5) $y = (x + 2)^3$ S	6) $y = (1 - 5x^3)^2$ O
7) $y = 3(x^2 + 2x)^2$ R	8) $y = \left(1+\sqrt{x}\right)^2$ V	9) $y = \left(1-\frac{1}{x}\right)^2$ Y
10) $y = 2(2x^2 + 3)^5$ C	11) $y = \sqrt{x^2 - 4}$ P	12) $y = -5\sqrt{2-x}$ S
13) $y = \frac{-1}{x^2-4}$ M	14) $y = \frac{-1}{\sqrt{x^2-4}}$ L	15) $y = -5\sqrt[3]{2-x}$ U

Derivatives.

E. $y' = 8x(2x^2+3)$	O. $y' = -30x^2(1-5x^3)$	R. $y' = 12x(x+1)(x+2)$	S. $y' = 3(x+2)^2$
C. $y' = 40x(2x^2+3)^4$	L. $y' = \frac{x}{(x^2-4)^{3/2}}$	M. $y' = \frac{2x}{(x^2-4)^2}$	P. $y' = \frac{x}{\sqrt{x^2-4}}$
S. $y' = \frac{5}{2\sqrt{2-x}}$	U. $y' = \frac{5}{3(2-x)^{2/3}}$	V. $y' = \frac{1+\sqrt{x}}{\sqrt{x}}$	Y. $y' = \frac{2}{x^2} - \frac{2}{x^3}$

C	O	M	P	O	S	E
10	3	13	11	6	12	4

Y	O	U	R	S	E	L	V	E	S
9	6	15	7	2	1	14	8	4	5

22

Chain Rule Puzzle

E (1) $y' = 16x^3 + 24x = 8x(2x^2+3)$

S (2) $y' = 3x^2 + 12x + 12 = 3(x^2+4x+4) = 3(x+2)^2$

O (3) $y' = -30x^2 + 150x^5 = -30x^2(1-5x^3)$

E (4) $y' = 2(2x^2+3)^1(4x) = 8x(2x^2+3)$

S (5) $y' = 3(x+2)^2(1) = 3(x+2)^2$

O (6) $y' = 2(1-5x^3)^1(-15x^2) = -30x^2(1-5x^3)$

R (7) $y' = 3 \cdot 2(x^2+2x)^1(2x+2) = 6(x)(x+2) \cdot 2(x+1) = 12x(x+2)(x+1)$

V (8) $y = (1+\sqrt{x})^2 = (1+x^{1/2})^2$

$y' = 2(1+\sqrt{x})^1(\frac{1}{2}x^{-1/2}) = \dfrac{1+\sqrt{x}}{\sqrt{x}}$

Y (9) $y = (1-\frac{1}{x})^2 = (1-x^{-1})^2$

$y' = 2(1-\frac{1}{x})^1(1x^{-2}) = \dfrac{2(1-\frac{1}{x})}{x^2} = \dfrac{2}{x^2} - \dfrac{2}{x^3}$

C (10) $y' = 2(5)(2x^2+3)^4(4x) = 40x(2x^2+3)^4$

P (11) $y = \sqrt{x^2-4} = (x^2-4)^{1/2}$

$y' = \frac{1}{2}(x^2-4)^{-1/2}(2x) = \dfrac{x}{\sqrt{x^2-4}}$

S (12) $y = -5(2-x)^{1/2}$

$y' = -5 \cdot \frac{1}{2}(2-x)^{-1/2}(-1) = \dfrac{5}{2\sqrt{2-x}}$

M (13) $y = \dfrac{-1}{x^2-4} = -1(x^2-4)^{-1}$

$y' = -1 \cdot (-1)(x^2-4)^{-2}(2x) = \dfrac{2x}{(x^2-4)^2}$

L (14) $y = -1(x^2-4)^{-1/2}$

$y' = -1\left(-\frac{1}{2}\right)(x^2-4)^{-3/2}(2x) = \dfrac{x}{(x^2-4)^{3/2}}$

u (15) $y = -5(2-x)^{1/3}$

$y' = -5\left(\frac{1}{3}\right)(2-x)^{-2/3}(-1) = \dfrac{5}{3(2-x)^{2/3}}$