

C12 - 7.2 - Separate/Factoring/Solving Exponents Notes

Solve for x

$$3^{2x+1} - 4(3^{x+1}) + 9 = 0$$

$$3^{2x}3^1 - 4(3^x3) + 9 = 0$$

$$(3^x)^2 3 - 4(3^x)3 + 9 = 0$$

$$3(3^x)^2 - 12(3^x) + 9 = 0$$

$$3m^2 - 12m + 9 = 0$$

$$m^2 - 4m + 3 = 0$$

$$(m-1)(m-3) = 0$$

Divide both sides by 3!

let $m = 3^x$

$$m - 1 = 0$$

$$m = 1$$

$$3^x = 1$$

$$3^x = 3^0$$

$$x = 0$$

$$m - 3 = 0$$

$$m = 3$$

$$3^x = 3$$

$$3^x = 3^1$$

$$x = 1$$

$3^{2x+1} - 4(3^{x+1}) + 9 = 0$	$3^{2x+1} = 3^{2x}3^1$	$4(3^{x+1}) = 4(3^x3^1)$
$3(3^x)^2 - 12(3^x) + 9 = 0$	$= (3^x)^2 3^1$	$= 12(3^x)$
$3m^2 - 12m + 9 = 0$	$= 3(3^x)^2$	

$$3^{2x+1} - 4(3^{x+1}) + 9 = 0$$

$$3^{2(0)+1} - 4(3^{(0)+1}) + 9 = 0$$

$$3^1 - 4(3) + 9 = 0$$

$$3 - 12 + 9 = 0$$

$$0 = 0 \quad \checkmark$$

$$3^{2x+1} - 4(3^{x+1}) + 9 = 0$$

$$3^{2(1)+1} - 4(3^{(1)+1}) + 9 = 0$$

$$3^3 - 4(3^2) + 9 = 0$$

$$27 - 36 + 9 = 0$$

$$0 = 0 \quad \checkmark$$

$$10^x - 4(5^x) - 5(2^x) + 20 = 0$$

$$2^x \times 5^x - 4(5^x) - 5(2^x) + 20 = 0$$

$$mn - 4n - 5m + 20 = 0$$

$$(mn - 4n)(-5m + 20) = 0$$

$$n(m - 4) - 5(m - 4) = 0$$

$$(n - 5)(m - 4) = 0$$

$$\text{let } m = 2^x$$

$$\text{let } n = 5^x$$

$$10^x = (2 \times 5)^x \\ = 2^x \times 5^x$$

$$n - 5 = 0$$

$$n = 5$$

$$5^x = 5$$

$$5^x = 5^1$$

$$x = 1$$

$$m - 4 = 0$$

$$m = 4$$

$$2^x = 4$$

$$2^x = 2^2$$

$$x = 2$$

Group

$$10^x - 4(5^x) - 5(2^x) + 20 = 0$$

$$10^1 - 4(5^1) - 5(2^1) + 20 = 0$$

$$10 - 20 - 10 + 20 = 0$$

$$0 = 0 \quad \checkmark$$

$$10^x - 4(5^x) - 5(2^x) + 20 = 0$$

$$10^2 - 4(5^2) - 5(2^2) + 20 = 0$$

$$100 - 100 - 20 + 20 = 0$$

$$0 = 0 \quad \checkmark$$