

099 §1,2 #< 1-87 odds, 93, 95, 97, 101

#s 1-14 use associative property to rewrite & simplify.

$$\textcircled{1} 5(3y) = (5 \cdot 3)y = 15y$$

$$\textcircled{3} 4\left(\frac{1}{4}a\right) = \left(4 \cdot \frac{1}{4}\right)a = \left(\frac{4}{1} \cdot \frac{1}{4}\right)a = \left(\frac{4 \cdot 1}{1 \cdot 4}\right)a = 1a = a$$

$$\textcircled{5} 10(0.3x) = (10 \cdot 0.3)x = 3x$$

ALT. $\equiv ((10)(0.3))x = 3x$

$$\textcircled{7} \frac{2}{3}\left(\frac{3}{2}x\right) = \left(\frac{2}{3} \cdot \frac{3}{2}\right)x = 1x = x$$

$$\textcircled{9} 15\left(\frac{2}{3}x\right) = \left(15 \cdot \frac{2}{3}\right)x = \left(\frac{15}{1} \cdot \frac{2}{3}\right)x = \left(\frac{3 \cdot 5 \cdot 2}{1 \cdot 3}\right)x$$
$$= \left(\frac{\cancel{3} \cdot 5 \cdot 2}{1 \cdot \cancel{3}}\right)x = \left(\frac{10}{1}\right)x = 10x$$

$$\textcircled{11} -15\left(\frac{x}{5}\right) = \left(-15 \cdot \frac{1}{5}\right)x = -3x$$

$$\textcircled{13} x\left(\frac{5}{x}\right) = \left(x \cdot \frac{1}{x}\right)(5) = 1(5) = 5$$

#s 15-38 Apply the distributive property.

Simplify, if possible.

$$\textcircled{15} 5(3a+2) = (5)(3a) + (5)(2) = 15a + 10$$

OR $5(3a) + 5(2) = \checkmark$

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(2)

$$(17) (5t+1)8 = (5t)(8) + (1)(8) = 40t + 8$$

$$(19) \frac{1}{3}(4x+6) = \left(\frac{1}{3}\right)(4x) + \left(\frac{1}{3}\right)(6) = \frac{4}{3}x + \frac{6}{3} \\ = \frac{4}{3}x + 2 \quad \text{OR} \quad \frac{4x}{3} + 2$$

$$(21) \frac{1}{5}(10+5y) = \frac{1}{5}(5y+10) = \left(\frac{1}{5}\right)(5y) + \left(\frac{1}{5}\right)(10) \\ \text{I like this} \\ \text{order better} \\ \text{(taste)}$$

$$= \left(\frac{1}{5} \cdot \frac{5}{1}\right)y + \frac{1}{5} \cdot \frac{10}{1} = 1y + \frac{1}{5} \cdot \frac{5 \cdot 2}{1} = y + 2$$

$$(23) \frac{3}{4}(8x-4) = \left(\frac{3}{4}\right)(8x) + \left(\frac{3}{4}\right)(-4) \\ = \left(\frac{3 \cdot 8}{4 \cdot 1}\right)x - \frac{3}{4} \cdot \frac{4}{1} = \frac{3 \cdot 4 \cdot 2}{4 \cdot 1}x - \frac{3}{1} = 6x - 3$$

$$(25) \frac{5}{6}(12x-18) = \left(\frac{5}{6}\right)(12x) + \left(\frac{5}{6}\right)(-18) \\ = (5)(2x) - (5)(3) = 10x - 15$$

$$(27) 8\left(\frac{1}{8}x+3\right) = (8)\left(\frac{1}{8}\right)x + (8)(3) = x + 24$$

$$(29) 6\left(\frac{1}{2}x - \frac{1}{3}y\right) = (6)\left(\frac{1}{2}\right)x + 6\left(-\frac{1}{3}\right)y \\ = 3x - 2y$$

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(3)

$$\begin{aligned} (31) \quad 20\left(\frac{2}{5}x + \frac{1}{4}y\right) &= (20)\left(\frac{2}{5}\right)x + (20)\left(\frac{1}{4}\right)y \\ &= \frac{2 \cdot 2 \cdot 5 \cdot 2}{5}x + \frac{2 \cdot 2 \cdot 5 \cdot 1}{4}y = 8x + 5y \end{aligned}$$

The way I'd do #31 for myself is

$$\overset{+}{(20)}\left(\frac{2}{5}x\right) + \overset{5}{(20)}\left(\frac{1}{4}y\right) = 8x + 5y$$

$$(33) \quad 8\left(\frac{x}{8} + \frac{y}{2}\right) = (8)\left(\frac{x}{8}\right) + (8)\left(\frac{y}{2}\right) = x + 4y$$

$$(35) \quad 12\left(\frac{2}{4} + \frac{1}{2}\right) = \overset{3}{12}\left(\frac{2}{4}\right) + \overset{6}{12}\left(\frac{1}{2}\right) = 3a + 6$$

$$(37) \quad 12\left(\frac{y}{2} + \frac{y}{4} + \frac{y}{6}\right) = 6y + 3y + 2y = 11y$$

Speeding up as we become more accomplished

#s 39-60 Apply distributive property. Simplify, if possible.

$$(39) \quad 10(.3x + .7y) = 3x + 7y$$

common to multiply by 10, 100, etc, to get rid of decimals in an eq'n.

$$(41) \quad 100(0.06x + 0.07y) = 6x + 7y$$

$$(43) \quad .05(x + 2,000) = .05x + .05(2,000) = .05x + 100$$

$$(45) \quad .12(x + 500) = .12x + .12(500) = .12x + 60$$

$$\overset{12}{12}\left(\overset{5}{500}\right) = 12(5) = 60$$

2 25pts.

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(4)

$$(47) a\left(1 + \frac{1}{a}\right) = a(1) + a\left(\frac{1}{a}\right) = a + 1$$

$$(49) 3\left(x + \frac{1}{3}\right) = 3x + 3\left(\frac{1}{3}\right) = 3x + 1$$

$$(51) x\left(1 + \frac{2}{x}\right) = x + x\left(\frac{2}{x}\right) = x + 2$$

$$(53) -5(2x - 3) = -5(2x) + (-5)(-3) = -10x + 15$$

$$(55) -4(2x - 1) = -8x + 4$$

Skipping steps, to show how you might do this, after some practice!

$$(57) -1(5 - x) = -1(5) + (-1)(-x) = -5 + x$$

$$(59) -1(7 - x) = -7 + x$$

#s 61-86 Multiply (Find the product)

$$(61) (5x^3)(7x^4) = (5)(7)(x^3 \cdot x^4) \\ = 35x^{3+4} = 35x^7$$

$$(63) (-4x)(7x^3) = (-4)(7)(x^1 \cdot x^3) = -32x^{1+3} = -32x^4$$

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$$(65) (2x^2)^3 (x^4)^5 = (2^3 (x^2)^3) (x^{20}) = (8x^6)(x^{20}) = \boxed{8x^{26}}$$

$$(67) 2x^2(3x^2 - 2x + 1) = 6x^4 - 4x^3 + 2x^2$$

$$(69) 2ab(a^2 - ab + 1) = (2ab)(a^2) + (2ab)(-ab) + (2ab)(1) \\ = \boxed{2a^3b - 2a^2b^2 + 2ab}$$

$$(71) (2x - 3)(x - 4) = (2x)(x) + (2x)(-4) + (-3)(x) + (-3)(-4) \\ = 2x^2 - 8x - 3x + 12 \\ = \boxed{2x^2 - 11x + 12}$$

$$(73) (a + 2)(2a - 1) = 2a^2 - a + 4a - 2 = \boxed{2a^2 + 3a - 2}$$

$$(75) (2x - 5)(3x - 2) = 6x^2 - 4x - 15x + 10 \\ = \boxed{6x^2 - 19x + 10}$$

$$(77) (2x + 3)(a + 4) = \boxed{2xa + 8x + 3a + 12}$$

$$(79) \text{SPECIAL!} \\ (5x - 4)(5x + 4) = (5x)^2 - (4)^2 = \boxed{25x^2 - 16}$$

$$(81) \text{SPECIAL!} \\ (x - 3)^2 = x^2 - 2(x)(3) + 3^2 = \boxed{x^2 - 6x + 9}$$

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SPECIAL

83 $(5x+1)^2 = (5x)^2 + 2(5x)(1) + 1^2$
 $= 25x^2 + 10x + 1$

IN MORE DETAIL:

85 $(2x - \frac{1}{2})(x + \frac{3}{2})$
 $= (2x)(x) + (2x)(\frac{3}{2}) + (-\frac{1}{2})(x) + (-\frac{1}{2})(\frac{3}{2})$
 $= 2x^2 + \frac{(2x)(3)}{2} - \frac{x}{2} - \frac{(1)(3)}{(2)(2)}$

$= 2x^2 + \frac{6x}{2} - \frac{x}{2} - \frac{3}{4} = 2x^2 + \frac{6x-x}{2} - \frac{3}{4}$

$= 2x^2 + \frac{5x}{2} - \frac{3}{4}$ OR $2x^2 + \frac{5}{2}x - \frac{3}{4}$

87 Find each product.

(a) $(x-1)(x^2+x+1) =$
Special / $\begin{array}{r} x^3 + x^2 + x \\ -x^2 - x - 1 \\ \hline x^3 - 1 \end{array}$

(b) $(x-2)(x^2+2x+4) =$
 $\begin{array}{r} x^3 + 2x^2 + 4x \\ -2x^2 - 4x - 8 \\ \hline x^3 - 8 \end{array}$

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(87) (c) $(x-3)(x^2+3x+9)$

$$= \begin{array}{r} x^3 + 3x^2 + 9x \\ -3x^2 - 9x - 27 \\ \hline x^3 + 0 + 0 - 27 \end{array}$$

$$= \boxed{x^3 - 27}$$

(d) $(x-4)(x^2+4x+16)$ Difference of two cubes!
 $= \boxed{x^3 - 64}$!

#s 89-100 Multiply vertically! ?

(93) $(2x^2-3)(3x^2-5) = 6x^4 - 10x^2 - 9x^2 + 15$
 $= \boxed{6x^4 - 19x^2 + 15}$

(95) $(a-b)(a^2+ab+b^2) = a^3 - b^3$ I'm learning these!

(97) $(2x+y)(4x^2-2xy+y^2) = (2x)^3 + y^3 = \boxed{8x^3 + y^3}$

(101) Ink cartridges sold = x & price = p . We have Revenue = xp and $x = 1200 - 100p$ given. To write Revenue purely in terms of price:

$$R = \underline{xp} = \boxed{(1200 - 100p)p}$$