MA115 - Selected WeBWork Solutions - 1.1 - 1.4

#8 $(a+b)^2 - 36 = ((a+b)-6)((a+b)+6)$ Difference of Two Squares

squared term; squared term; difference

#11 Expand $(y-x)^3$

the long way $= (y-x)(y-x)^2 = (y-x)(y^2-2xy+x^2)$

$= y^3 - 2xy^2 + yx^2 - xy^2 + 2yx^2 - x^3 = y^3 - 3xy^2 + 3x^2y - x^3$

short way

Exponents sum to 3 & step down

Signs Alternate

1
1 1
1 2 1
1 3 3 1

pascal's triangle give coefficients

$$\boxed{y^3 - 3xy^2 + 3x^2y - y^3}$$

#15 $(r+1)^2 + 8t(r+1) + 16t^2$ Factor This.

Do you see the pattern: $A^2 + 2AB + B^2$? (we recognize this as the expansion of $(A+B)^2$)

Here $A = r+1$ & $B = 4t$.

so this factors as $\boxed{((r+1)+4t)^2}$

#18 $$\frac{\underbrace{ab+b}_{(a+1)b}}{\underbrace{8b^2+40b}_{8b(b+5)}} \cdot \frac{\underbrace{5a^2+40a}_{5a(a+8)}}{\underbrace{a+a^2}_{a(1+a)}}$$

Factor First. Then cancel where possible. ONLY MULTIPLY AT END.

$$= \frac{5(a+8)}{8(b+5)}$$

#19 Simplify $$\frac{\frac{7}{s}+\frac{8}{t}}{st} = \frac{\frac{7t+8s}{st}}{st} = \frac{7t+8s}{st} \cdot \frac{1}{st} = \frac{7t+8s}{(st)^2}$$

#21 $$\frac{\frac{3}{k+1} - 1}{\frac{4}{k+1} + 1} = \frac{\frac{3}{k+1} - \frac{k+1}{k+1}}{\frac{4}{k+1} + \frac{k+1}{k+1}} = \frac{\frac{3-(k+1)}{k+1}}{\frac{4+(k+1)}{k+1}} = \frac{3-(k+1)}{\cancel{k+1}} \cdot \frac{\cancel{k+1}}{4+(k+1)} = \frac{3-k-1}{4+k+1} = \frac{2-k}{5+k}$$

#24 $e^{t-3}(t+3) = e^t \cdot e^{-3}(t+3) = e^t(t+3)\cdot e^{-3} = \frac{e^t(t+3)}{e^3}$

#27 $(x^2+y)^9(x+y^2)^9 = \left((x^2+y)(x+y^2)\right)^9$

(remember $A^n B^n = (AB)^n$

#29 Equivalent to $\frac{3^n}{2^n}$

$\left(\frac{3}{2}\right)^n$ since $\left(\frac{3}{2}\right)^n = \frac{3^n}{2^n}$ this is similar to

$\frac{2^{-n}}{3^{-n}} = \frac{1}{3^{-n}\cdot 2^n} = \frac{3^n}{2^n}$

$(1.5)^n = \left(\frac{3}{2}\right)^n$ since $1.5 = \frac{3}{2}$

$\left(\frac{2}{3}\right)^{-n} = \left(\frac{3}{2}\right)^n$ (negative exponent $\Rightarrow$ flip fraction)

$\left(\frac{1}{\left(\frac{2}{3}\right)}\right)^n = \left(1\cdot\frac{3}{2}\right)^n = \left(\frac{3}{2}\right)^n$ dividing by fraction $\Rightarrow$ flip & multiply

#31 $(-59)^0 = 1$

$(-57)^{-55} = \left(\frac{1}{-57}\right)^{55} = \left(\frac{1}{-1}\right)^{55}\cdot\left(\frac{1}{57}\right)^{55} =$ NEGATIVE

positive

$(-1)^{odd} =$ negative

$1^{-1} = \frac{1}{1} = 1 > 0$

$-63^{-8} = -\frac{1}{63^8} < 0$ be careful ... this equals $-(63^{-8})$

$(-15)^{30} > 0$ because $(-1)^{even} = 1$

#34 $8\sqrt{\underbrace{12t^3}_{4\cdot 3\cdot t^3}} + 2t\sqrt{\underbrace{128t}_{64\cdot 2\cdot t}} - 2t\sqrt{48t}$

$16\cdot 3t \longrightarrow \sqrt{16\cdot 3t} = 4\sqrt{3t}$

! $\sqrt{4\cdot 3\cdot t^3} = \sqrt{4}\sqrt{3}\sqrt{t^3} = 2\sqrt{3}\cdot t\sqrt{t}$ $= 2t\sqrt{3t}$

" $t^{3/2} = t^{2/2}\cdot t^{1/2}$

$\sqrt{64\cdot 2\cdot t} = 8\sqrt{2t}$

$= 16t\sqrt{3t} + 16t\sqrt{2t} - 8t\sqrt{3t}$

#35 $\frac{\sqrt[3]{8x^{13}y^4}}{\sqrt[3]{27x^4y}} = \frac{\sqrt[3]{8}\sqrt[3]{x^{13}y^4}}{\sqrt[3]{27}\sqrt[3]{x^4y}} = \frac{2}{3}\left(\frac{x^{13}y^4}{x^4y}\right)^{1/3} = \frac{2}{3}\left(x^9y^3\right)^{1/3} = \frac{2}{3}x^3y$