11-20-13

see 4.8 5, 7, 27, 29

33, 38, 47, 53

63, 77

$(a)^{-n} = \frac{1}{(a)^n}$

want positive exponents

5. 2^{-3} ; $a^{-n} = \frac{1}{a^n}$ *

$= \frac{1}{2^3}$ *

OR

$a^n = \frac{1}{a^{-n}}$

$= \frac{1}{2 \cdot 2 \cdot 2}$

$= \frac{1}{8}$

PROOF *

$a^{-n} = \frac{1}{a^n} \Rightarrow a^n \cdot a^{-n} = a^n \cdot \frac{1}{a^n}$

CLEAR FRACTION

$a^0 = \frac{\cancel{a^n}}{\cancel{a^n}} = 1$

want positive exponents

7. * $(-2)^{-6} = \frac{1}{(-2)^6}$

$(-2)^6 = \overbrace{(-2)(-2)(-2)}^{(-8)}\underbrace{(-2)(-2)(-2)}_{-8}$

= pos

$= +64 \Rightarrow \frac{1}{64}$ = ANSWER

4.8 **WANT** negative exponents:

27. $\frac{1}{y^3} = \boxed{y^{-3}}$ = answer

* $\frac{1}{a^n} = a^{-n}$

29. $\frac{1}{5} = \frac{1}{5^1} = \boxed{5^{-1}}$

answer

$5^1 = 5$

33. SIMPLIFY

$a^m \cdot a^n = a^{m+n}$

$2^{-5} \bullet 2^8 = 2^{-5+8}$

$= \boxed{2^3} = 8$

$-5+8 = +(8-5)$

$= +3$

38. $y^{-5} \cdot y = y^{-5} \cdot y^1$

$a^m \cdot a^n = a^{m+n}$

$\boxed{\text{WANT POS. EXP.}}$

$= y^{-5+1} = y^{-4} = \frac{1}{y^4}$

4.8

47.

$(3x^{-4})^2$; $(ab)^n = a^n \cdot b^n$

$= (3)^2 \cdot (x^{-4})^2$

$(a^m)^n = a^{m \cdot n}$

$3^2 \cdot x^{-8} = 3^2 \cdot \frac{1}{x^8} = \frac{3^2}{x^8} = \frac{9}{x^8}$

$a^{-n} = \frac{1}{a^n}$

pos. exps.

$\frac{a^m}{a^n} = a^{m-n}$

53. $\frac{y^{-7}}{y^{-3}} = y^{-7-(-3)} = y^{-7+3} = y^{-4} = \frac{1}{y^4}$

4.8

63.

$$\frac{8x^{-3}}{y^{-7}\cdot z^{-1}} = 8\cdot x^{-3}\cdot \frac{1}{y^{-7}}\cdot \frac{1}{z^{-1}}$$

de-compose

flip stage

$$= 8\cdot \frac{1}{x^3}\cdot y^7\cdot z^1 = \boxed{\frac{8y^7z}{x^3}}$$

flip neg. exponents

pos. exps.

$$x^{-3} = \frac{1}{x^3};\quad \frac{1}{y^{-7}} = y^7;\quad \frac{1}{z^{-1}} = z^1$$

65

$$\frac{3t^4}{s^{-2}\cdot u^{-4}} = 3\cdot t^4\cdot \frac{1}{s^{-2}}\cdot \frac{1}{u^{-4}}$$

de-composition

flip stage

$$3\cdot t^4\cdot s^2\cdot u^4$$

$$= 3t^4s^2u^4$$

$$= 3s^2t^4u^4$$

flip neg. exps.

4.8

77

FLIP

$$\left(\frac{2a^2}{3b^4}\right)^{-3} = \left(\frac{3b^4}{2a^2}\right)^3$$

TRICK $\boxed{\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n}$

PROOF: $\left(\frac{a}{b}\right)^{-n} = \frac{(a)^{-n}}{(b)^{-n}} = \frac{a^{-n}}{b^{-n}}$

$$\left(\frac{a}{b}\right)^k = \frac{a^k}{b^k}$$

$$= a^{-n} \cdot \frac{1}{b^{-n}}$$

$$= \frac{1}{a^n} \cdot b^n = \frac{b^n}{a^n}$$

$$= \boxed{\left(\frac{b}{a}\right)^n}$$

T. FINISH THE PROBLEM:

$$\left(\frac{3b^4}{2a^2}\right)^3 = \frac{(3b^4)^3}{(2a^2)^3}$$

$$= \frac{(3)^3(b^4)^3}{(2)^3(a^2)^3} = \boxed{\frac{27b^{12}}{8 \cdot a^6}}$$

$(ab)^n = a^n b^n$

5.1

EX	prob
1 $\longrightarrow$	9
2 $\longrightarrow$	17, 21,
3 $\longrightarrow$	17, 21
4 $\longrightarrow$	25, 27
5 $\longrightarrow$	29, 31
6 $\longrightarrow$	33
7 $\longrightarrow$	37, 39
8 $\longrightarrow$	43, 45

9.) $14x^3 = 2 \cdot 7x^3$

$= 14 \cdot x^2 \cdot x = 2 \cdot 7x^2 \cdot x$

$= 2x^2 \cdot 7 \cdot x$

(17) $6x-30$; GCF = 6

G.C.F = Greatest
Common
Factor

$$6x-30 = \underline{6}\cdot x - \underline{6}\cdot 5$$

$$= \underline{6}\cdot(x-5)$$

$$= 6(x-5)$$

(21) $3t^2+t$; $\boxed{GCF = t}$

$$= 3\cdot\underline{t}\cdot t + \underline{t}\cdot 1$$

$$= \underline{t}\cdot(3\cdot t + 1) = t\cdot(3t+1)$$

(25.) $x^3 + 6x^2$; $GCF = x^2$

see
Below Table to find GCF.

List all prime Factors.

$6 = 2 \cdot 3$

$x^3 = x \cdot x \cdot x$

$x^2 = x \cdot x$

2 Factorizations

$6x^2 = 2 \cdot 3 x \cdot x$

$x^3 = x \cdot x \cdot x$

F	L
2	0
3	0
x	2

L ⇒ Least number of times a Factor Appears in any Factorization

$$GCF = 2^0 \cdot 3^0 \cdot x^2$$
$$= 1 \cdot 1 \cdot x^2$$

$$GCF = x^2$$

$$\frac{x^3}{x^2} = x = \frac{x^3}{GCF}$$

$$\frac{6x^2}{x^2} = 6 = \frac{6x^2}{GCF}$$

$$x^3 + 6x^2$$

$$= x \cdot x^2 + 6 \cdot x^2$$

$$= x^2 \cdot (x + 6)$$

FAST METHOD : GCF = x^2

$$x^3 + 6x^2$$

$$= \underline{x^2} \cdot x + 6 \cdot \underline{x^2}$$

$$= \underline{x^2} \cdot (x + 6)$$

27.

$$16a^4 - 24a^2$$

$$GCF = 8a^2 \text{ (guess)}$$

TABLE METHOD:

F	L
2	3
3	0
a	2

$$GCF = 2^3 \cdot 3^0 \cdot a^2$$

$$8 \cdot 1 \cdot a^2$$

$$= 8a^2$$

$$16a^4 = \boxed{2 \cdot 2 \cdot 2 \cdot 2 a^4}$$

$$24a^2 = 2 \cdot 12 \cdot a^2$$

12 → 2 6

6 → 2 3

$$\boxed{2 \cdot 2 \cdot 2 \cdot 3 a^2}$$

27. GCF $= 8a^2$

$$16a^4 - 24a^2$$

$$\frac{16a^4}{8a^2} = 2a^2$$

$$\frac{24a^2}{8a^2} = 3$$

$$16a^4 - 24a^2 = 8a^2 \cdot (2a^2 - 3)$$

29. $-6t^6 + 9t^4 - 4t^2$

use x

$= -6x^6 + 9x^4 - 4x^2$

GUESS: GCF $= 1 \cdot x^2 = x^2$

29.

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

$$\frac{9x^4}{x^2} = 9x^2$$

$$-\frac{4x^2}{x^2} = -4$$

OK

$$x^2 \cdot (-6x^4 + 9x^2 - 4)$$

Factor out -1:

$$(-1) \cdot x^2 \cdot (6x^4 - 9x^2 + 4)$$

$$= -x^2 \cdot (6x^4 - 9x^2 + 4)$$

Change signs inside ( )

31.

$$6x^8+12x^6-24x^4+30x^2$$

GUESS: GCF $= 6x^2$

$$6x^8 = \boxed{2\cdot 3x^8}$$

$$12x^6 = \boxed{2\cdot 2\cdot 3\cdot x^6}$$

$$24x^4 = \boxed{2\cdot 2\cdot 3\cdot 2x^4}$$

$$30x^2 = \boxed{2\cdot 3\cdot 5x^2}$$

TABLE method

F	L
2	1
3	1
5	0
x	2

GCF

$$= 2^1\cdot 3^1\cdot 5^0\cdot x^2$$

$$= 2\cdot 3\cdot 1\cdot x^2$$

$$= \boxed{6x^2}$$

31. $\dfrac{6x^8}{6x^2} = x^6$

$\dfrac{12x^6}{6x^2} = 2x^4$

$\dfrac{-24x^4}{6x^2} = -4x^2$

$\dfrac{30x^2}{6x^2} = 5$

$6x^2 \cdot (x^6 + 2x^4 - 4x^2 + 5)$

$=$ answer

33.

$$x^5y^5 + x^4y^3 + x^3y^3 - x^2y^2$$

F	L
x	2
y	2

GCF $= x^2 \cdot y^2$

$$\frac{x^5y^5}{x^2y^2} = x^3y^3 \;;\quad \frac{x^3y^3}{x^2y^2} = xy$$

$$\frac{x^4y^3}{x^2y^2} = x^2y \;;\quad -\frac{x^2y^2}{x^2y^2} = -1$$

$$x^2y^2 \cdot (x^3y^3 + x^2y + xy - 1)$$

(37.)

$n \cdot (\underline{n-6}) + 3 \cdot (\underline{n-6}) = (\underline{n-6}) \cdot [n+3]$

2 TERMS : $n(n-6)$, $3(n-6)$

EACH TERM HAS a <u>common</u>

<u>Factor</u> = $(\underline{n-6})$ = <u>GCF</u>

(39) $x^2 \cdot (\underline{x+3}) - 7 \cdot (\underline{x+3})$

$(\underline{x+3}) \cdot [x^2 - 7]$

(43.) $(x^3 + 2x^2) + (5x + 10)$

$x^2 \cdot (\underline{x+2}) + 5 \cdot (\underline{x+2})$

$= (\underline{x+2}) \cdot [x^2 + 5]$

$= (x+2)(x^2+5)$

45.

$5a^3 + 15a^2 + 2a + 6$

$\underbrace{(5a^3 + 15a^2)}_{\text{GCF} = 5 \cdot a^2} + \underbrace{(2a+6)}_{\text{GCF} = 2}$

$5a^2 \cdot \underline{(a+3)} + 2 \cdot \underline{(a+3)}$

$\frac{5a^3}{5a^2} = a; \quad \frac{15a^2}{5a^2} = 3$

$= \underline{(a+3)} \cdot [5a^2 + 2]$

$= (a+3)(5a^2+2)$

5.2

Ex	problem
1	7
2	13
3	21, 23
4	29
5	55
6	read
7	61

$$\overset{F}{⑦\ x^2} + \overset{O+I}{8x} + \overset{L}{16}$$

$$= (x + A)(x + \overset{L}{B})$$

$$= (x + 4)(x + 4) = \text{ANSWER}$$

$$\left.\begin{aligned} A \cdot B &= 16 \\ A + B &= 8 \end{aligned}\right) \begin{aligned} A &= 4 \\ B &= 4 \end{aligned}$$

$$(x + A) \cdot (x + B)$$

$$= x^2 + B \cdot x + Ax + AB$$

$$= x^2 + \underbrace{(A+B)}_{8}x + \underbrace{A \cdot B}_{16}$$

⑬ $x^2 - 9x + 14 = (x - A)(x - B)$

$\boxed{A \cdot B = 14}$ and $-A - B = -9 \Leftrightarrow \boxed{A + B = 9}$

$(x-A)(x-B)$

$A=7$

$B=2$

$=(x-7)(x-2)$ = answer

(21.) $x^2 - 2x - 15$ neg.

← mixed signs

$=(x+A)\cdot(x-B)$

$=(x+3)\cdot(x-5)$ = answer

$A=3$

$B=5$

$A-B=-2$

$A\cdot B=15$

$A\cdot(-B)=-15$

$A\cdot(B)=15$

$A\cdot B=15$

5.2

23.

$$x^2+2x-15$$

neg

mix signs

$$=(x+A)\cdot(x-B)$$

$$=(x+5)\cdot(x-3)$$

$A=5$

$B=3$

$A-B=2$

$A\cdot B=15$