

099 §1.4 #5 1-12 ALL, 13-17, 19-37, 41-49, 51-57,  
65, 69, 73, 80

#51-8 Factor in the product of (powers of) prime s

①  $288 = 2^5 \cdot 3^2$

$$\begin{array}{r} 2 \overline{) 210} \\ 3 \overline{) 105} \\ 5 \overline{) 35} \\ 7 \end{array}$$

$$2 \overline{) 200}$$

$$2 \overline{) 144}$$

$$2 \overline{) 72}$$

$$2 \overline{) 36}$$

$$2 \overline{) 18}$$

$$3 \overline{) 9}$$

$$3$$

$$3 \overline{) 63}$$

$$3 \overline{) 21}$$

$$7$$

②  $63 = 3^2 \cdot 7$

③  $210 = 2 \cdot 3 \cdot 5 \cdot 7$

④  $900 = 2^2 \cdot 3^2 \cdot 5^2$

⑤  $1925 = 5^2 \cdot 7 \cdot 11$

$$5 \overline{) 1925}$$

$$5 \overline{) 385}$$

$$7 \overline{) 77}$$

$$11$$

$$2 \overline{) 598}$$

$$13 \overline{) 299}$$

$$23$$

$$2 \overline{) 546}$$

$$3 \overline{) 273}$$

$$7 \overline{) 91}$$

$$13$$

$$2 \overline{) 900}$$

$$2 \overline{) 450}$$

$$3 \overline{) 225}$$

$$3 \overline{) 75}$$

$$5 \overline{) 25}$$

$$5$$

⑥  $546 = 2 \cdot 3 \cdot 7 \cdot 13$

⑦  $598 = 2 \cdot 13 \cdot 23$

⑧  $2310 = 2 \cdot 3 \cdot 5 \cdot 7 \cdot 11$  !?

$$2 \overline{) 2310}$$

$$3 \overline{) 1155}$$

$$5 \overline{) 385}$$

$$73$$

#s 9-12 Reduce each fraction to lowest terms-

⑨  $\frac{165}{385} = \frac{3 \cdot 5 \cdot 11}{5 \cdot 7 \cdot 11} = \boxed{\frac{33}{73}}$

$$2 \overline{) 550}$$

$$5 \overline{) 275}$$

$$5 \overline{) 55}$$

$$11$$

$$2 \overline{) 266}$$

$$7 \overline{) 133}$$

$$19$$

$$3 \overline{) 165}$$

$$5 \overline{) 55}$$

$$11$$

$$3 \overline{) 735}$$

$$5 \overline{) 245}$$

$$7 \overline{) 49}$$

$$7$$

⑩  $\frac{550}{735} = \frac{2 \cdot 5 \cdot 11}{3 \cdot 5 \cdot 7 \cdot 2} = \boxed{\frac{110}{147}}$

⑫  $\frac{266}{285} = \frac{2 \cdot 7 \cdot 19}{3 \cdot 5 \cdot 19} = \boxed{\frac{14}{15}}$

$$3 \overline{) 285}$$

$$5 \overline{) 95}$$

$$19$$

099 §1.4

#s 13-18 Factor the binomials

(13)  $x^2 - 2x - 24$

$= x^2 - 6x + 4x - 24$

$= x(x-6) + 4(x-6)$

$= (x-6)(x+4)$

(1)  $(-24) = -24$

$(-6)(4) = -24$  product

$-6 + 4 = -2$  sum = -2?

~~(14)  $x^2 + 2x - 24$~~

use +6 & -4

~~$x^2 + 6x - 4x - 24$~~

~~$= x(x+6) - 4(x+6)$~~

~~$= (x+6)(x-4)$~~

(15)  $x^2 - 10x + 25$

$= x^2 - 5x - 5x + 25$

$= x(x-5) - 5(x-5)$

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

$(5)(5) = 25$   
 $5+5 = 10$   
WRONG SIGN

$(-5)(-5) = 25$   
 $-5-5 = -10$  ✓

~~(17)  $21x^2 - 23x + 6$~~

$(21)(6) = (3)(7)(2)(3)$

want sum of -23

~~$= 21x^2 - 14x - 9x + 6$~~

~~$14+9 = 23$~~

~~$= 7x(3x-2) - 3(3x-2)$~~

~~$-14-9 = -23$  ✓~~

~~$= (3x-2)(7x-3)$~~

099  $\int 1.4$  #s 19-37,  $\frac{41-49}{B}$ ,  $\frac{51-57}{B}$ ,  $\frac{65, 69, 78, 86}{B}$

(17) Done w/ "Cheat"

$$21x^2 - 23x + 6$$

$$a=21, b=-23, c=6$$

$$b^2 - 4ac = (-23)^2 - 4(21)(6)$$

$$= 25 \Rightarrow$$

$$\sqrt{b^2 - 4ac} = 5 \Rightarrow$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{23 \pm 5}{2(21)} \begin{cases} \frac{23+5}{42} = \frac{28}{42} = \frac{2}{3} \\ \frac{23-5}{42} = \frac{18}{42} = \frac{3}{7} \end{cases}$$

$$0 \cdot 0 \quad 21x^2 - 23x + 6$$

$$= 21(x - \frac{2}{3})(x - \frac{3}{7})$$

$$= 3(x - \frac{2}{3})(7)(x - \frac{3}{7})$$

$$= \boxed{(3x-2)(7x-3)}$$

#s 19-38 Factor

(19)  $x^2 - 16 = x^2 - 4^2 = \boxed{(x-4)(x+4)}$

(21)  $a^2 - 1 = a^2 - 1^2 = \boxed{(a-1)(a+1)}$

(23)  $a^2 - 16b^2 = a^2 - (4b)^2 = \boxed{(a-4b)(a+4b)}$

(25)  $9x^2 - 49 = (3x)^2 - 7^2 = \boxed{(3x-7)(3x+7)}$

(27)  $16x^4 - 49 = (4x^2)^2 - 7^2 = \boxed{(4x^2-7)(4x^2+7)}$

099 § 1.4 #5 29-37,  $\frac{41-49}{\sqrt{8}}$ , 51-57,  $\frac{65, 69, 78, 80}{\sqrt{8}}$

(29)  $t^4 - 81 = (t^2)^2 - 9^2 = (t^2 - 9)(t^2 + 9) = \boxed{(t-3)(t+3)(t^2+9)}$   
 $t^2 - 9 = t^2 - 3^2 = (t-3)(t+3)$

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

(33)  $8x^3 - 27y^3 = (2x)^3 - (3y)^3 = (2x-3y)((2x)^2 - (2x)(3y) + (3y)^2)$   
 $= \boxed{(2x-3y)(4x^2 - 6xy + 9y^2)}$

(35)  $t^3 + \frac{1}{27} = t^3 + \frac{1}{3^3} = t^3 + \left(\frac{1}{3}\right)^3$   
 $= \left(t + \frac{1}{3}\right) \left(t^2 - \left(t\right)\left(\frac{1}{3}\right) + \left(\frac{1}{3}\right)^2\right) = \boxed{\left(t + \frac{1}{3}\right) \left(t^2 - \frac{1}{3}t + \frac{1}{9}\right)}$

(37)  $64a^3 + 125b^3$   
 $= 2^6 a^3 + 5^3 b^3$   
 $= (2^2)^3 a^3 + 5^3 b^3$   
 $= 4^3 a^3 + 5^3 b^3$

2   64	5   125
2   32	5   25
2   16	5   5
2   8	
2   4	
2	

$= (4a)^3 + (5b)^3 = (4a+5b)((4a)^2 - (4a)(5b) + (5b)^2)$

$= \boxed{(4a+5b)(16a^2 - 20ab + 25b^2)}$

099  $51.4 \approx \frac{41-49}{13}, 51-57, \frac{65, 69, 73, 80}{13}$

$\approx 39-50$  Factor

$$(41) x^3 - 2x^2 - 24x$$

$$= x(x^2 - 2x - 24)$$

$$= \boxed{x(x-6)(x+4)} \quad \text{see } \#13$$

$$(43) 100x^2 - 300x$$

$$= \boxed{100x(x-3)}$$

$$\begin{array}{r} 2 \overline{) 20} \\ \underline{2} \phantom{0} \\ 0 \phantom{0} \\ 2 \overline{) 10} \\ \underline{2} \phantom{0} \\ 0 \phantom{0} \\ 5 \end{array} \quad \begin{array}{r} 5 \overline{) 45} \\ \underline{3} \phantom{0} \\ 15 \\ \underline{3} \phantom{0} \\ 0 \phantom{0} \\ 3 \end{array}$$

GCF = 5

$$(45) 20a^2 - 45$$

$$= 5(4a^2 - 9)$$

$$= \boxed{5(2a-3)(2a+3)}$$

$$(47) 9a^3 - 16a$$

$$= a(9a^2 - 16)$$

$$= \boxed{a(3a-4)(3a+4)}$$

$$\begin{array}{l} -6 = (3)(-2) \checkmark \\ 3 - 2 = 1 \checkmark \end{array}$$

$$(49) 12y - 2xy - 2x^2y$$

$$= 2y(6 - x - x^2)$$

$$= 2y(-x^2 - x + 6)$$

$$= -2y(x^2 + x - 6)$$

$$\begin{aligned} &= -2y(x^2 + 3x - 2x - 6) \\ &= -2y(x(x+3) - 2(x+3)) \\ &= \boxed{-2y(x+3)(x-2)} \end{aligned}$$

099 \$ 1.4 #5 51-57, 65, 69, 78, 80

#5 51-58 Factor by grouping  $\rightarrow B$

$$\begin{aligned} \textcircled{51} \quad & 2x+2x+3a+6 \\ & = x(2+2) + 3(a+2) \\ & = \boxed{(2+2)(x+3)} \end{aligned}$$

$$\begin{aligned} \textcircled{53} \quad & x^2-3ax-2x+6a \\ & = x(x-3a) - 2(x-3a) \\ & = \boxed{(x-3a)(x-2)} \end{aligned}$$

$$\begin{aligned} \textcircled{55} \quad & 4x^3+12x^2-9x-27 \\ & = 4x^2(x+3) - 9(x+3) \\ & = (x+3)(4x^2-9) \\ & = \boxed{(x+3)(2x-3)(2x+3)} \end{aligned}$$

$$\begin{aligned} \textcircled{57} \quad & 2x^3+x^2-18x-9 \\ & = x^2(2x+1) - 9(2x+1) \\ & = (2x+1)(x^2-9) \\ & = \boxed{(2x+1)(x-1)(x+1)} \end{aligned}$$

#5 59-78 Factor completely, if possible.

$$\begin{aligned} \textcircled{59} \quad & 4x^2-31x-8 \\ & = 4x^2-32x+1x-8 \\ & = 4x(x-8) + 1(x-8) \\ & = \boxed{(x-8)(4x+1)} \end{aligned}$$

$$(4)(-8) = -32 = (2)(2)(2)(2)(2)(-1)$$

sum of -31:

$$(-32)(1) = -32$$

$$-32+1 = -31 \quad \checkmark$$

099  $\$1.45$  69, 78, 80  
 $\$13$

(69)  $12a^2(x-7) - 75(x-7)$

$= (x-7)(12a^2 - 75)$

$= 3(x-7)(4a^2 - 25)$

$= 3(x-7)(2a-5)(2a+5)$

$$\begin{array}{r} 2 \overline{) 76} \\ 2 \overline{) 48} \\ 2 \overline{) 24} \\ 2 \overline{) 12} \\ 2 \overline{) 6} \\ 3 \end{array}$$

$5 \overline{) 35}$   
7

(78)  $96a^2 + 44a - 35$

Find a sum of 44 & product of (96)(-35) looks hard!

$a = 96, b = 44, c = -35$

$b^2 - 4ac = (-44)^2 - 4(96)(-35)$

$= 1936 + 13440$

$= 15376 \rightarrow$

$\sqrt{b^2 - 4ac} = 124 \rightarrow$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-44 \pm 124}{2(96)}$

$$\begin{array}{l} \frac{-44 + 124}{192} \\ \frac{-44 - 124}{192} \end{array}$$

$$= \begin{array}{l} \frac{80}{192} = \frac{5}{12} \\ -\frac{168}{192} = -\frac{7}{8} \end{array}$$

$96a^2 + 44a - 35$

$= 96(x - \frac{5}{12})(x - \frac{7}{8})$

$= 12(x - \frac{5}{12})(8)(x - \frac{7}{8}) = (12x - 5)(8x - 7)$

899 § 1.4 #80

(80) Arrow is shot up @  $16 \frac{\text{ft}}{\text{sec}}$  from a hill 32 ft high. The height,  $h$ , <sup>in feet</sup> of the arrow, as a function of time,  $t$ , in seconds,

is  $h(t) = -16t^2 + 16t + 32$

Factor  $h(t)$  and find  $h$  when  $t = 1, 2$

ALSO, For BONUS I want to know when the arrow hits the ground!

$$h(t) = -16(t^2 - t - 2) = -16(t-2)(t+1)$$

$$\Rightarrow h(1) = -16(1-2)(1+1) = -16(-1)(2) = \boxed{32 \text{ ft}}$$

$$\text{¢ } h(2) = -16(2-2)(2+1) = \boxed{0 \text{ ft}}$$

Ah,  $t=2$  is when it hits. How convenient!

Alternate factoring method:

$$-16t^2 + 16t + 32 = -16(t^2 - t - 2) \xrightarrow{\text{SET } 0}$$

$$t^2 - t - 2 = 0 \Rightarrow$$

$$a=1, b=-1, c=-2$$

$$b^2 - 4ac = (-1)^2 - 4(1)(-2)$$

$$= 1 + 8 = 9 \Rightarrow$$

$$\sqrt{b^2 - 4ac} = \sqrt{9} = 3$$

$$t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-1) \pm 3}{2(1)} = \frac{1 \pm 3}{2}$$

$$\frac{1+3}{2} = \frac{4}{2} = 2$$

$$\frac{1-3}{2} = \frac{-2}{2} = -1$$

$$\xrightarrow{\text{}} -16t^2 + 16t + 32 = \underline{-16(t-2)(t+1)}$$