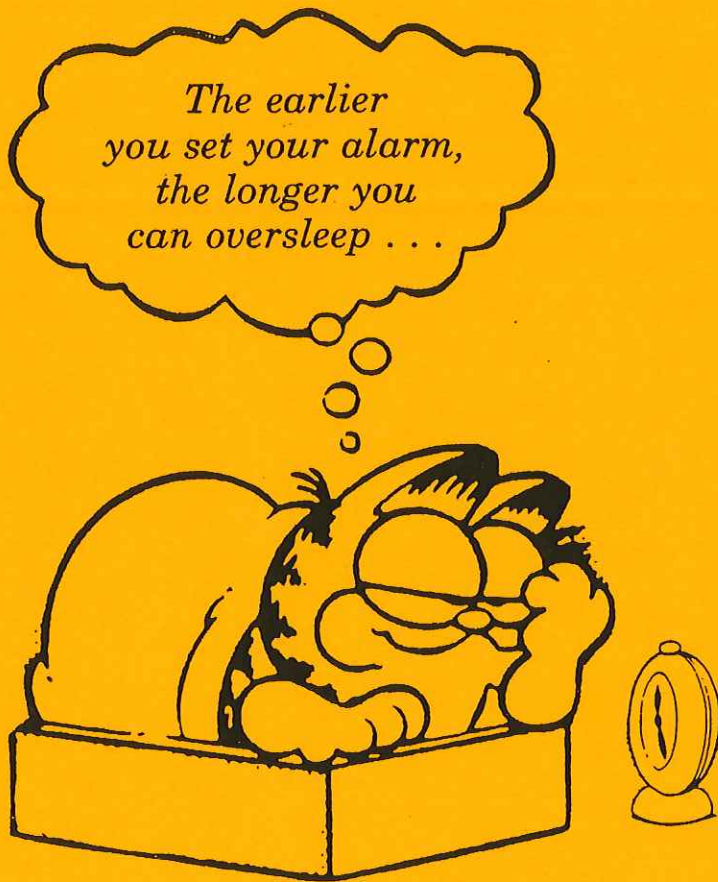


Friendship Jr. High School
Accelerated Math Program

Algebra



2

UNIT #4

Monomials

UNIT #5

Polynomials

UNIT #6

Factoring

4.1

Answer Key

- ① $(3a^2b)(2ab^5)$
 $6a^3b^6$
- ② $(4x^2y^3)(2xy^6)$
 $8x^3y^9$
- ③ $(3x^4)(-2x^4y^3)$
 $-6x^8y^3$
- ④ $(-8x^3y)(2x^4)$
 $-16x^7y$
- ⑤ $(3x^4y)(4x^2y^2)$
 $12x^6y^3$
- ⑥ $(-2x^2y)(-6x^4y^7)$
 $12x^6y^8$
- ⑦ $(-3x^5y)(2x^4)$
 $-6x^9y$
- ⑧ $(-2n^4y^3)(3ny^4)$
 $-6n^5y^7$
- ⑨ $(3x^2y^2z)(2x^2y^2z^2)$
 $6x^4y^4z^3$
- ⑩ $(r^3xy)(-2r^3x)$
 $-2r^5x^2y$
- ⑪ $(5a^2b^2c)(-7a^3)$
 $-35a^5b^2c$
- ⑫ $(2am^3n)(-3am^4)$
 $-6a^2m^7n$
- ⑬ $(5^3)^3 = 5^9$ or
1,453,125
- ⑭ $(10^2)^2 = 10^4$ or
10,000
- ⑮ $[(-5)^2]^3 = (-5)^6$
 5^6 or 15,625
- ⑯ $[(-4)^2]^2 = (-4)^4$
 4^4 or 256

- ⑰ $(x^4)^3 = x^{12}$
- ⑱ $(m^2)^5 = m^{10}$
- ⑲ $(-y^3)^6 = y^{18}$
- ⑳ $(-m^5)^2 = m^{10}$
- ㉑ $(4xy)^2(-3x)$
 $(16x^2y^2)(-3x)$
 $-48x^3y^2$
- ㉒ $(2a)^2(3y)$
 $(4a^2)(3y)$
 $12a^2y$
- ㉓ $(2a)^3(-3b)$
 $(8a^3)(-3b)$
 $-24a^3b$
- ㉔ $(-3ab)^3(2b^2)$
 $(-27a^3b^3)(2b^2)$
 $-54a^3b^5$
- ㉕ $(4x^2y^3)^3$
 $64x^6y^9$
- ㉖ $(3ab^4)^3$
 $27a^3b^{12}$
- ㉗ $(-2a^2b^3)^4$
 $16a^8b^{12}$
- ㉘ $(-6a^3x^5)^2$
 $36a^6x^{10}$
- ㉙ $(4ab)^2(a^3b)^4$
 $(16a^2b^2)(a^{12}b^4)$
 $16a^{14}b^6$
- ㉚ $(-3x^2y)^2(2x)^3$
 $(9x^4y^2)(8x^3)$
 $72x^7y^2$
- ㉛ $(\frac{2}{3}x^2y)^2(\frac{1}{2}y^3)^2$
 $(\frac{4}{9}x^4y^2)(\frac{1}{4}y^6)$
 $\frac{1}{9}x^4y^8$
- ㉜ $(\frac{1}{2}a^2b^3)^3(-2ab)^2$
 $(\frac{1}{8}a^6b^9)(4a^2b^2)$
 $\frac{1}{2}a^8b^{11}$

4.2

Answer Key

- ① $(r^2s)(r^4s^3)$
 r^6s^4
- ② $(a^2b)(ab^4)$
 a^3b^5
- ③ $(ab)(ac)(bc)$
 $a^2b^2c^2$
- ④ $(m^2n)(am)(an^2)$
 $a^2m^3n^3$
- ⑤ $(-27ay^3)(-\frac{1}{3}ay^3)$
 $9a^2y^6$
- ⑥ $(\frac{1}{2}a^2)(6ab^2)$
 $3a^3b^2$
- ⑦ $(-\frac{5}{6}c)(12a^3)$
 $-10a^3c$
- ⑧ $(\frac{1}{8}a)(\frac{1}{6}b)(48c)$
 abc
- ⑨ $(2a^4)(2a^3b^2)(-3ab^3)$
 $-12a^8b^5$
- ⑩ $(4m^3n^2)(-m^4n^5)(2mn)$
 $-8m^8n^8$
- ⑪ $[(-2)^3]^2 = (-8)^2$
64
- ⑫ $[(-1)^5]^3 = (-1)^3$
-1
- ⑬ $(x^4y^5) = x^8y^{10}$
- ⑭ $(a^2b^4)^3 = a^6b^{12}$
- ⑮ $(-xy)^5 = -x^5y^5$
- ⑯ $(-xy)^4 = x^4y^4$

$$\textcircled{17} \frac{6(ab^2)^3(5a)^2}{6(a^3b^6)(25a^2)} = \boxed{150a^5b^6}$$

$$\textcircled{18} \frac{3(m^3n^2)^4(-n^2)^5}{3(m^{12}n^8)(-n^{10})} = \boxed{-3m^{12}n^{18}}$$

$$\textcircled{19} \frac{(-2x^2)^3(\frac{1}{2}y^2)^2}{(-8x^6)(\frac{1}{4}y^4)} = \boxed{-2x^6y^4}$$

$$\textcircled{20} \frac{(\frac{3}{10}y^2)^2(10y^2)^3}{(\frac{9}{100}y^4)(1000y^6)} = \boxed{90y^{10}}$$

$$\textcircled{21} \frac{(-3x^2y)^3(x^3) - 3(x^2y)^2(x^5y)}{(-27x^6y^3)(x^3) - 3(x^4y^2)(x^5y)} = \boxed{-30x^9y^3}$$

$$\textcircled{22} \frac{(-2a^2b)^2(ab)^3 - 2(a^2b)^3(-ab^2)}{(4a^4b^2)(a^3b^3) - 2(a^6b^3)(-ab^2)} = \boxed{6a^7b^5}$$

$$\textcircled{23} \frac{(3ab)^2(2a^2b) + 5a^3(ab^3)}{(9a^2b^2)(2a^2b) + 5a^3(ab^3)} = \boxed{23a^4b^3}$$

$$\textcircled{24} \frac{(-2x^2)^3(x^2y)^2 - (-2x^5y)^2}{(-8x^6)(x^4y^2) - (4x^{10}y^2)} = \boxed{-12x^{10}y^2}$$

$$\textcircled{25} \left[\left(\frac{1}{2}x^2y \right)^2 \right]^3 = \left(\frac{1}{4}x^4y^2 \right)^3 = \boxed{\frac{1}{64}x^{12}y^6}$$

$$\textcircled{26} \left[\left(-\frac{1}{2}a^3b \right)^3 \right]^3 = \left(-\frac{1}{8}a^9b^3 \right)^3 = \boxed{-\frac{1}{512}a^{27}b^9}$$

4.3

Answer Key



$$\textcircled{1} \frac{1}{m^8}$$

$$\textcircled{17} an$$

$$\textcircled{31} \frac{x^{2a}}{x^{a+1}}$$

$$\textcircled{2} \frac{1}{x^3}$$

$$\textcircled{18} xy^3$$

$$\frac{(2a)-(a+1)}{x}$$

$$\textcircled{3} 5^4$$

$$\textcircled{19} -b$$

$$x^{2a-a-1}$$

$$\boxed{x^{a-1}}$$

$$\textcircled{4} \frac{1}{n^5}$$

$$\textcircled{20} \frac{-1}{y^3}$$

$$\textcircled{5} \frac{x^3}{2y^6}$$

$$\textcircled{21} \frac{1}{a^2b^3}$$

$$\textcircled{32} \frac{3n^{x+y}}{3n^{x-y}}$$

$$\textcircled{6} \frac{2}{3a^7b^4}$$

$$\textcircled{22} \frac{m^4}{n^4}$$

$$n^{(x+y)-(x-y)}$$

$$n^{x+y-x+y}$$

$$\boxed{n^{2y}}$$

$$\textcircled{7} \frac{1}{d^2e}$$

$$\textcircled{23} \frac{-5y^5}{x^9}$$

$$\textcircled{8} \frac{x^5}{z^5}$$

$$\textcircled{24} -12ab^4$$

$$\textcircled{33} \frac{2ab^{3n+2}}{a^1b^{n-1}}$$

$$2a^2b^{(3n+2)-(n-1)}$$

$$2a^2b^{3n+2-n+1}$$

$$\boxed{2a^2b^{2n+3}}$$

$$\textcircled{9} x^4$$

$$\textcircled{25} \frac{-4b^3}{c^2}$$

$$\textcircled{10} 3r^3$$

$$\textcircled{26} -8ab$$

$$\textcircled{11} \frac{b^3}{a^4}$$

$$\textcircled{27} \frac{-3z^3}{xy^4}$$

$$\textcircled{12} \frac{k}{r^5}$$

$$\textcircled{28} \frac{2a^3}{3b^2c^4}$$

$$\textcircled{34} \frac{5x^2y^{2n+3}}{x^2y^{n-2}}$$

$$5x^4y^{(2n+3)-(n-2)}$$

$$5x^4y^{2n+3-n+2}$$

$$\textcircled{13} n^3$$

$$\textcircled{29} \frac{-9a^7b^2c^8}{5}$$

$$\textcircled{14} w^7$$

$$\textcircled{30} \frac{-ad^4}{4b^2c}$$

$$\boxed{5x^4y^{n+5}}$$

$$\textcircled{15} \frac{1}{n^6}$$

$$\textcircled{16} \frac{1}{x^9}$$

$$\textcircled{35} \frac{3a^3b^{2+n}}{a^2b^{n+1}} = 3ab^{(2+n)-(n+1)}$$

$$3ab^{2+n-n-1} = \boxed{3ab}$$

$$\textcircled{36} (3a^2b)(-4a^3bc)$$

$$\boxed{-12a^5b^2c}$$

$$\textcircled{37} (2x^2y)^2(-2xy^3)^3$$

$$(4x^4y^2)(-8x^3y^9)$$

$$\boxed{-32x^7y^{11}}$$

$$\textcircled{38} a\left(\frac{1}{4}a\right)(-2a)^2(-2a^2)^3$$

$$a\left(\frac{1}{4}a\right)(4a^2)(-8a^6)$$

$$\boxed{-8a^{10}}$$

$$\textcircled{39} (3x^2y)^2(-2xy^2) + (3xy)^3(x^2y)$$

$$(9x^4y^2)(-2xy^2) + (27x^3y^3)(x^2y)$$

$$(-18x^5y^4) + (27x^5y^4)$$

$$\boxed{9x^5y^4}$$

$$\textcircled{40} (-2a^3b)^3 - (-3a^3b)^2 + (-2a^2)^3(-3b^2)$$

$$(-8a^6b^3) - (9a^6b^2) + (-8a^6)(-3b^2)$$

$$(-8a^6b^3) - (9a^6b^2) + (24a^6b^2)$$

$$\boxed{-8a^6b^3 + 15a^6b^2}$$

$$\textcircled{41} (-3y^2)^3(y^{-3})$$

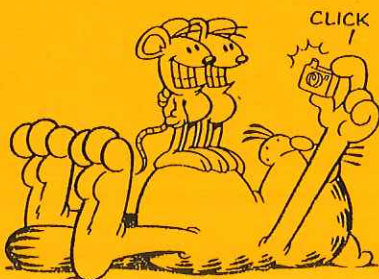
$$(-27y^6)(y^{-3})$$

$$\frac{-27y^6}{y^3} = \boxed{-27y^3}$$

$$\textcircled{42} (-2x^2)^4(x^{-5})$$

$$(16x^8)(x^{-5})$$

$$\frac{16x^8}{x^5} = \boxed{16x^3}$$



4.4

Answer Key

$$\textcircled{1} 4293$$

$$4.293 \times 10^3$$

$$\textcircled{9} 32 \times 10^5$$

$$3.2 \times 10^6$$

$$\textcircled{2} 240,000$$

$$2.4 \times 10^5$$

$$\textcircled{10} .284 \times 10^3$$

$$2.84 \times 10^2$$

$$\textcircled{3} 389,500$$

$$3.895 \times 10^5$$

$$\textcircled{11} 450 \times 10^{-4}$$

$$4.5 \times 10^{-2}$$

$$\textcircled{4} 5280$$

$$5.28 \times 10^3$$

$$\textcircled{12} .3 \times 10^{-2}$$

$$3 \times 10^{-3}$$

$$\textcircled{5} .000319$$

$$3.19 \times 10^{-4}$$

$$\textcircled{13} 1.085 \times 10^4$$

$$10,850$$

$$\textcircled{6} .004296$$

$$4.296 \times 10^{-3}$$

$$\textcircled{14} 2.77 \times 10^3$$

$$2770$$

$$\textcircled{7} .0092$$

$$9.2 \times 10^{-3}$$

$$\textcircled{15} 1.4 \times 10^{-5}$$

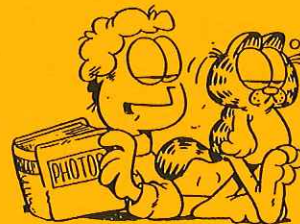
$$.000014$$

$$\textcircled{8} .00031$$

$$3.1 \times 10^{-4}$$

$$\textcircled{16} 3.45 \times 10^{-2}$$

$$.0345$$



$$\textcircled{17} (2 \times 10^5)(30 \times 10^{-8})$$

$$60 \times 10^{-3}$$

$$\boxed{6 \times 10^{-2}}$$

$$\textcircled{18} (4 \times 10^2)(15 \times 10^6)$$

$$60 \times 10^8$$

$$\boxed{6 \times 10^9}$$

$$\textcircled{19} (3.1 \times 10^{-2})(.21 \times 10^5)$$

$$.651 \times 10^3$$

$$\boxed{6.51 \times 10^2}$$

$$\textcircled{20} \frac{(1.2 \times 10^{-3})(.34 \times 10^{-2})}{.068 \times 10^{-5}} = \boxed{6.8 \times 10^{-7}}$$

$$\textcircled{21} \frac{4.8 \times 10^3}{1.6 \times 10^1} = \boxed{3 \times 10^2}$$

$$\textcircled{22} \frac{5.2 \times 10^5}{1.3 \times 10^2} = \boxed{4 \times 10^3}$$

$$\textcircled{23} \frac{1.32 \times 10^{-6}}{2.4 \times 10^2} = .55 \times 10^{-8}$$

$$\boxed{5.5 \times 10^{-9}}$$

$$\textcircled{24} \frac{2.31 \times 10^{-2}}{3.3 \times 10^{-9}} = .7 \times 10^7$$

$$\boxed{7 \times 10^6}$$

$$\textcircled{25} \frac{4.25 \times 10^4}{.05 \times 10^7} = 85 \times 10^{-3}$$

$$\boxed{8.5 \times 10^{-2}}$$

$$\textcircled{26} \frac{28 \times 10^{-3}}{.14 \times 10^5} = 200 \times 10^{-8}$$

$$\boxed{2 \times 10^{-6}}$$

$$\textcircled{27} (-2x^3y)(-3xy^2z)$$

$$\boxed{6x^4y^2z}$$

$$\textcircled{28} \left(\frac{1}{2}a^2y^3\right)^2(2ay^4)^3$$

$$\left(\frac{1}{4}a^4y^6\right)(8a^3y^{12})$$

$$\boxed{2a^7y^{18}}$$

$$\textcircled{29} (a^2b)^3(bc) + (-2ab^2)(ac)(-a)^3$$

$$(a^6b^3)(bc) + (-2ab^2)(ac)(-a^3)$$

$$(a^6b^4c) + (2a^5b^2c)$$

$$\boxed{a^6b^4c + 2a^5b^2c}$$

$$\textcircled{30} \frac{12a^2b^{-4}c}{-3a^{-4}b^{-6}c^2} = \boxed{\frac{-4a^6b^2}{c}}$$

$$\textcircled{31} \frac{-6a^{-4}bc^5}{8b^{-2}c^3} = \boxed{\frac{-3b^3c^2}{4a^4}}$$

$$\textcircled{32} -3a^2b^{-3}c^{-2} = \boxed{\frac{-3a^2}{b^3c^2}}$$

$$\textcircled{33} \frac{n^{3a+2}}{n^{a-3}} = n^{(3a+2)-(a-3)}$$

$$n^{3a+2-a+3} = \boxed{n^{2a+5}}$$

$$\textcircled{34} \frac{a^{2k+3}}{a^{2k-2}} = a^{(2k+3)-(2k-2)}$$

$$a^{2k+3-2k+2} = \boxed{a^5}$$

$$\textcircled{35} \frac{3mn^{x-y}}{m^{-2}n^{x+y}} = 3m^3n^{(x-y)-(x+y)}$$

$$3m^3n^{x-y-x-y} = 3m^3n^{-2y}$$

$$\boxed{\frac{3m^3}{n^{2y}}}$$

$$\textcircled{36} (-2x^{-2})^3(x^{-3}) = (-8x^{-6})(x^{-3})$$

$$-8x^{-9} = \boxed{\frac{-8}{x^9}}$$

4.5

Answer Key



	<u>now</u>	
①	Abe	$n+3$
	Mindy	n

$$\boxed{\begin{array}{l} \text{Abe is 21} \\ \text{Mindy is 18} \end{array}}$$

$$\begin{aligned} n+(n+3) &= 39 \\ 2n+3 &= 39 \\ 2n &= 36 \\ n &= 18 \end{aligned}$$

	<u>now</u>	
②	Charlie	$n-14$
	Jack	n

$$\boxed{\begin{array}{l} \text{Jack is 44} \\ \text{Charlie is 30} \end{array}}$$

$$\begin{aligned} n+(n-14) &= 74 \\ 2n-14 &= 74 \\ 2n &= 88 \\ n &= 44 \end{aligned}$$

- ③
- | | | | |
|-------|--------|-----|------|
| | 12 ago | now | in 8 |
| Thea | 7 | 19 | 27 |
| Nancy | | n | n+8 |
| Cindy | | | |
- Cindy's age is not necessary

$$\begin{aligned} \text{Thea in 8} &= \text{Nancy in 8} \\ 27 &= 3(n+8) \\ 27 &= 3n+24 \\ 3 &= 3n \\ 1 &= n \end{aligned}$$

Nancy is 1 yr old

- ④
- | | | |
|-------|-----|------------|
| | now | |
| David | n+4 | n+(n+4)=40 |
| Ben | n | 2n+4=40 |
| Ann | | 2n=36 |
| | | n=18 |
- Ann's age is not necessary

David is 22

- ⑤
- | | | |
|--------|-----|-----------|
| | now | x yrs ago |
| Barney | 54 | 54-x |
| Hugh | 38 | 38-x |
- $$\begin{aligned} 54-x &= 3(38-x) \\ 54-x &= 114-3x \\ 2x &= 60 \\ x &= 30 \end{aligned}$$

30 yrs ago

- ⑥
- | | | |
|--------|-----|----------|
| | now | in x yrs |
| Hector | 28 | 28+x |
| Henry | 8 | 8+x |
- $$\begin{aligned} 28+x &= 2(8+x) \\ 28+x &= 16+2x \\ 12 &= x \end{aligned}$$

in 12 yrs

- ⑦
- | | | |
|------|-------|-----|
| | 8 ago | now |
| Pete | n-8 | n |
| Matt | n-4 | n+4 |
- $$\begin{aligned} (n-8)+(n-4) &= 26 \\ 2n-12 &= 26 \\ 2n &= 38 \\ n &= 19 \end{aligned}$$

Pete is 19 yrs old

- ⑧
- | | | |
|---------|-----|------|
| | now | in 7 |
| Dana | n | n+7 |
| Natalie | n+3 | n+10 |
- $$\begin{aligned} (n+7)+(n+10) &= 63 \\ 2n+17 &= 63 \\ 2n &= 46 \\ n &= 23 \end{aligned}$$

**Dana is 23
Natalie is 26**

- ⑨
- | | | |
|---------|------|------|
| | in 6 | now |
| Shannon | 4n | 4n-6 |
| Susie | 5n | 5n-6 |
- $$\begin{aligned} \text{Shannon} &= \text{Susie} - 8 \\ (4n-6) &= (5n-6) - 8 \\ 8 &= n \\ \text{Susie} &: 5n-6 = 34 \end{aligned}$$

Susie is 34 yrs old

- ⑩
- | | | |
|----------|-------|------|
| | 6 ago | now |
| Jennifer | n | n+6 |
| Jim | 3n | 3n+6 |
- $$\begin{aligned} \text{Jen} &= \text{Jim} - 12 \\ n &= 3n - 12 \\ 12 &= 2n \\ n &= 6 \\ \text{Jim now} &: 3n+6 = 24 \end{aligned}$$

**Jim will be 26
in two years**

- ⑪
- $$\begin{aligned} &(-4x^3y)^3 \left(\frac{1}{2}xy^2z^3\right)^4 \\ &(-64x^9y^3) \left(\frac{1}{16}x^4y^8z^{12}\right) \\ &= -4x^{13}y^{11}z^{12} \end{aligned}$$



- ⑫
- $$\frac{-6a^2b^{-3}c^{-1}}{-2ab^2c^{-2}} = \frac{3ac}{b^5}$$

- ⑬
- $$\frac{-2x^{-3}y^2z^{-2}}{4xy^{-3}z^{-5}} = \frac{-y^5z^3}{2x^4}$$

- ⑭
- $$\begin{aligned} 3x^n \cdot x^{-2}n^{a+2} &= 3x^3n^{(2a-1)-(a+2)} \\ 3x^3n^{2a-1-a-2} &= 3x^3n^{a-3} \end{aligned}$$

$$\textcircled{15} \frac{(20 \times 10^3)(3.5 \times 10^{-5})}{70 \times 10^{-2}}$$

$$\boxed{7 \times 10^{-1}}$$

$$\textcircled{16} \frac{3.4 \times 10^{-3}}{.017 \times 10^{-2}} = 200 \times 10^{-1}$$

$$\boxed{2 \times 10^1}$$

4.6

Answer Key

④ $n = \text{kg}$ of pure copper to be added

$$\begin{aligned} \left(\begin{array}{c} \text{Starting} \\ \text{solution} \end{array} \right) \left(\begin{array}{c} \% \\ \text{copper} \end{array} \right) + \left(\begin{array}{c} \text{Copper} \\ \text{added} \end{array} \right) \left(\begin{array}{c} \% \\ \text{copper} \end{array} \right) &= \left(\begin{array}{c} \text{Final} \\ \text{sol.} \end{array} \right) \left(\begin{array}{c} \% \\ \text{cop.} \end{array} \right) \\ (50)(.12) + (n)(1) &= (50+n)(.2) \\ 6+n &= 10+.2n \\ .8n &= 4 \rightarrow n = \boxed{5 \text{ kg}} \end{aligned}$$

⑤ $n = \text{ml}$ of 90% lemon juice to be added

$$\begin{aligned} \left(\begin{array}{c} \text{Starting} \\ \text{sol.} \end{array} \right) \left(\begin{array}{c} \% \\ \text{lemon} \end{array} \right) + \left(\begin{array}{c} \text{sol} \\ \text{added} \end{array} \right) \left(\begin{array}{c} \% \\ \text{lemon} \end{array} \right) &= \left(\begin{array}{c} \text{Final} \\ \text{sol} \end{array} \right) \left(\begin{array}{c} \% \\ \text{lem.} \end{array} \right) \\ (300)(.1) + (n)(.9) &= (300+n)(.4) \\ 30+.9n &= 120+.4n \\ .5n &= 90 \rightarrow n = \boxed{180 \text{ ml}} \end{aligned}$$

① $n = \text{ml}$ of 30% silver nitrate to be added

$$\begin{aligned} \left(\begin{array}{c} \text{Starting} \\ \text{solution} \end{array} \right) \left(\begin{array}{c} \% \text{ silver} \\ \text{nitrate} \end{array} \right) + \left(\begin{array}{c} \text{solution} \\ \text{added} \end{array} \right) \left(\begin{array}{c} \% \text{ silver} \\ \text{nitrate} \end{array} \right) &= \left(\begin{array}{c} \text{Final} \\ \text{solution} \end{array} \right) \left(\begin{array}{c} \% \text{ silver} \\ \text{nitrate} \end{array} \right) \\ (500)(.6) + (n)(.3) &= (500+n)(.5) \\ 300+.3n &= 250+.5n \\ 50 &= .2n \\ n &= 250 \quad \boxed{250 \text{ ml}} \end{aligned}$$

② $n = \text{l}$ of 80% salt solution to be added

$$\begin{aligned} \left(\begin{array}{c} \text{Starting} \\ \text{solution} \end{array} \right) \left(\begin{array}{c} \% \\ \text{salt} \end{array} \right) + \left(\begin{array}{c} \text{solution} \\ \text{added} \end{array} \right) \left(\begin{array}{c} \% \\ \text{salt} \end{array} \right) &= \left(\begin{array}{c} \text{Final} \\ \text{solution} \end{array} \right) \left(\begin{array}{c} \% \\ \text{salt} \end{array} \right) \\ (90)(.4) + (n)(.8) &= (90+n)(.5) \\ 36+.8n &= 45+.5n \\ .3n &= 9 \\ n &= 30 \quad \boxed{30 \text{ l}} \end{aligned}$$

③ $n = \text{l}$ of water to be added

$$\begin{aligned} \left(\begin{array}{c} \text{Starting} \\ \text{solution} \end{array} \right) \left(\begin{array}{c} \% \\ \text{acid} \end{array} \right) + \left(\begin{array}{c} \text{water} \\ \text{added} \end{array} \right) \left(\begin{array}{c} \% \\ \text{acid} \end{array} \right) &= \left(\begin{array}{c} \text{Final} \\ \text{solution} \end{array} \right) \left(\begin{array}{c} \% \\ \text{acid} \end{array} \right) \\ (2.5)(.7) + (n)(0) &= (2.5+n)(.5) \\ 1.75+0 &= 1.25+.5n \\ .5 &= .5n \quad \boxed{1 \text{ l}} \\ n &= 1 \end{aligned}$$

⑥ $n = \text{kg of } 25\% \text{ alloy to be added}$

$$\left(\begin{array}{c} \text{starting} \\ \text{sol.} \end{array}\right) \left(\begin{array}{c} \% \\ \text{silver} \end{array}\right) + \left(\begin{array}{c} \text{alloy} \\ \text{added} \end{array}\right) \left(\begin{array}{c} \% \\ \text{silver} \end{array}\right) = \left(\begin{array}{c} \text{final} \\ \text{sol} \end{array}\right) \left(\begin{array}{c} \% \\ \text{silver} \end{array}\right)$$

$$(40)(.6) + (n)(.25) = (40+n)(.4)$$

$$54 + .25n = 36 + .4n$$

$$18 = .15n$$

$$n = 120 \quad \boxed{120 \text{ kg}}$$

⑦ $n = \text{water to be evaporated}$

$$\left(\begin{array}{c} \text{starting} \\ \text{sol.} \end{array}\right) \left(\begin{array}{c} \% \\ \text{salt} \end{array}\right) - \left(\begin{array}{c} \text{water} \\ \text{evap.} \end{array}\right) \left(\begin{array}{c} \% \\ \text{salt} \end{array}\right) = \left(\begin{array}{c} \text{final} \\ \text{sol.} \end{array}\right) \left(\begin{array}{c} \% \\ \text{salt} \end{array}\right)$$

$$(75)(.4) - (n)(0) = (75-n)(.5)$$

$$30 - 0 = 37.5 - .5n$$

$$.5n = 7.5$$

$$n = 15 \quad \boxed{15 \text{ L}}$$

⑧ $n = \text{water to be added}$

$$\left(\begin{array}{c} \text{starting} \\ \text{sol.} \end{array}\right) \left(\begin{array}{c} \% \\ \text{acid} \end{array}\right) + \left(\begin{array}{c} \text{water} \\ \text{added} \end{array}\right) \left(\begin{array}{c} \% \\ \text{acid} \end{array}\right) = \left(\begin{array}{c} \text{final} \\ \text{sol.} \end{array}\right) \left(\begin{array}{c} \% \\ \text{acid} \end{array}\right)$$

$$(48)(.25) + (n)(0) = (48+n)(.15)$$

$$12 + 0 = 7.2 + .15n$$

$$4.8 = .15n$$

$$n = 32 \quad \boxed{32 \text{ ml}}$$

$$\textcircled{9} \left(\frac{-2}{3}a^2b^3\right)^2 \left(\frac{-3}{2}ab^3\right)^3$$

$$\left(\frac{4}{9}a^4b^6\right) \left(\frac{-27}{8}a^3b^9\right) = \boxed{\frac{-3}{2}a^7b^{15}}$$

$$\textcircled{10} (-ab)^3 - (2a^2b)(ab^2)$$

$$(-a^3b^3) - (2a^3b^3) = \boxed{-3a^3b^3}$$

$$\textcircled{11} \frac{-2x^{-2}yz^{-3}}{x^3y^{-2}z^{-5}} = \boxed{\frac{-2y^3z^2}{x^5}}$$

$$\textcircled{12} \frac{-6a^{x+3}}{2a^{x+5}}$$

$$-3a^{(x+3)-(x+5)}$$

$$-3a^{x+3-x-5}$$

$$-3a^{-2} = \boxed{\frac{-3}{a^2}}$$

$$\textcircled{13} 43 \times 10^3$$

$$.05 \times 10^{-5}$$

$$860 \times 10^8$$

$$\boxed{8.6 \times 10^{10}}$$

$$\textcircled{14} (35 \times 10^7)(25 \times 10^{-4})$$

$$875 \times 10^3$$

$$\boxed{8.75 \times 10^5}$$



⑮

	<u>now</u>	<u>4 ago</u>	<u>in 6</u>
Syd	$5n$	$5n-4$	
Mandy	$6n$		$6n+6$

$$3(5n-4) = 6n+6$$

$$15n-12 = 6n+6$$

$$9n = 18 \quad \text{Syd now: } 5n=10$$

$$n = 2 \quad \text{next yr: } \boxed{11 \text{ yrs old}}$$

⑯

	<u>now</u>	<u>8 ago</u>	<u>in 4</u>
Jan	$2n$	$2n-8$	
Karyn	$3n$		$3n+4$

$$5(2n-8) = 2(3n+4)$$

$$10n-40 = 6n+8$$

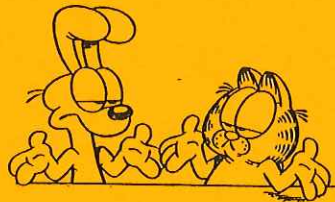
$$4n = 48 \quad \text{Jan } 2n=24$$

$$n = 12 \quad \text{Kar } 3n=36$$

Jan is $\boxed{12 \text{ yrs younger}}$

4.7

Answer Key



① $n =$ pounds of \$3 coffee

$$(3.50)(5) + (3)(n) = (3.25)(5+n)$$

$$17.5 + 3n = 16.25 + 3.25n$$

$$1.25 = .25n$$

$$n = 5 \quad \boxed{5 \text{ pounds of } \$3 \text{ coffee}}$$

② $n =$ number of adult tickets

$$(3.50)(n) + (2.50)(8-n) = 23$$

$$3.5n + 20 - 2.5n = 23$$

$$n = 3$$

$\boxed{3 \text{ adult tickets}}$

③ nickels = n
dimes = $n+5$

$$(5)(n) + (10)(n+5) = 230$$

$$5n + 10n + 50 = 230$$

$$15n = 180$$

$$n = 12 \quad \boxed{12 \text{ nickels}}$$

④ nickels = n
dimes = $27-n$

$$(5)(n) + (10)(27-n) = 190$$

$$5n + 270 - 10n = 190$$

$$-5n = -80$$

$$n = 16$$

$$27-n = 11$$

$\boxed{16 \text{ nickels}} \\ \boxed{11 \text{ dimes}}$

⑤ nickels = n
dimes = $n+3$
quarters = $2n$

$$(5)(n) + (10)(n+3) + (25)(2n) = 420$$

$$5n + 10n + 30 + 50n = 420$$

$$65n = 390$$

$$n = 6$$

$$n+3 = 9$$

$$2n = 12$$

$\boxed{6 \text{ nickels}} \\ \boxed{9 \text{ dimes}} \\ \boxed{12 \text{ quarters}}$

⑥ nickels = $n+8$
dimes = n
quarters = $42 - (n+n+8)$
 $34-2n$

$$5(n+8) + (10)(n) + (25)(34-2n) = 715$$

$$5n + 40 + 10n + 850 - 50n = 715$$

$$-35n + 890 = 715$$

$$-35n = -175$$

$$n = 5$$

$$n+8 = 13$$

$$34-2n = 24$$

$\boxed{13 \text{ nickels}} \\ \boxed{5 \text{ dimes}} \\ \boxed{24 \text{ quarters}}$



4.8

Answer Key

⑦ $n = \text{Kg of } 70\% \text{ nickel alloy}$

$$\left(\begin{array}{c} \text{starting} \\ \text{sol.} \end{array}\right) \left(\begin{array}{c} \% \\ \text{nickel} \end{array}\right) + \left(\begin{array}{c} \text{alloy} \\ \text{added} \end{array}\right) \left(\begin{array}{c} \% \\ \text{nickel} \end{array}\right) = \left(\begin{array}{c} \text{Final} \\ \text{alloy} \end{array}\right) \left(\begin{array}{c} \% \\ \text{nickel} \end{array}\right)$$

$$(60)(.2) + (n)(.7) = (60+n)(.5)$$

$$12 + .7n = 30 + .5n$$

$$.2n = 18$$

$$n = 90$$

90 Kg of 70% nickel alloy

⑧ $n = \text{l of pure alcohol}$

$$\left(\begin{array}{c} \text{starting} \\ \text{sol.} \end{array}\right) \left(\begin{array}{c} \% \\ \text{alcohol} \end{array}\right) + \left(\begin{array}{c} \text{alcohol} \\ \text{added} \end{array}\right) \left(\begin{array}{c} \% \\ \text{alcohol} \end{array}\right) = \left(\begin{array}{c} \text{Final} \\ \text{sol.} \end{array}\right) \left(\begin{array}{c} \% \\ \text{alcohol} \end{array}\right)$$

$$(30)(.2) + (n)(1) = (30+n)(.6)$$

$$6 + n = 18 + .6n$$

$$.4n = 12$$

$$n = 30$$

30 l of alcohol

⑨ $(-2a^3bc)^2(abc)$
 $(4a^6b^2c^2)(abc)$
 $4a^5b^3c^3$

$$\frac{4b^3c^3}{a^5}$$

⑩ $\frac{-4ab^2c^{-3}}{-ab^{-2}c^{-1}} = \frac{4b^4}{c^2}$

⑪ $\frac{9n^{6-2x}}{-n^{8-2x}}$
 $(6-2x) - (8-2x)$
 $-9n$
 $-9n^{6-2x-8+2x}$
 $-9n^{-2} = \frac{-9}{n^2}$

⑫ $.00000532$
 5.32×10^{-5}

⑬ $43,600,000$
 4.36×10^7

⑭ $(32 \times 10^4)(12 \times 10^{-8})$
 384×10^{-4}
 3.84×10^{-2}

⑮ $\frac{6.4 \times 10^{-3}}{.08 \times 10^{-7}}$
 80×10^4
 8×10^5

⑯ $\begin{array}{ccc} \text{now} & 4 \text{ ago} & \text{in } 8 \\ J & 2n & 2n-4 \\ T & 5n & 5n+8 \end{array}$
 $7(2n-4) = 5n+8$
 $14n-28 = 5n+8$
 $9n = 36$
 $n = 4$

Tammy now $5n = 20$
 2 yrs ago $20-2 = 18$
18 yrs old

① $\frac{\text{increase}}{\text{org amt}} \frac{2}{10} = \frac{n}{100}$

$$10n = 200$$

$$n = 20$$

20% increase

② $\frac{\text{decrease}}{\text{org amt}} \frac{5}{20} = \frac{n}{100}$

$$20n = 500$$

$$n = 25$$

25% decrease

③ $\frac{\text{decrease}}{\text{org amt}} \frac{10}{50} = \frac{n}{100}$

$$50n = 1000$$

$$n = 20$$

20% decrease

④ $\frac{\text{increase}}{\text{org amt}} \frac{8}{8} = \frac{n}{100}$

$$8n = 800$$

$$n = 100$$

100% increase

⑤ $(12)(1.06)$
\$12.72

⑥ $(3.35)(1.07)$
 3.5845
\$3.58



⑦ $\frac{\text{after tax}}{\text{org price}} = \frac{92.04}{n} = \frac{104}{100}$
 $104n = 9204$
 $n = 88.5$ \$88.50

⑧ $\frac{\text{after tax}}{\text{org price}} = \frac{45.10}{n} = \frac{107.5}{100}$
 $107.5n = 4510$
 $n \approx 41.95$ \$41.95

⑨ $\frac{\text{selling pr}}{\text{org pr}} = \frac{13.96}{n} = \frac{80}{100}$
 $80n = 1396$
 $n = 17.45$ \$3.49
 $17.45 - 13.96 = 3.49$

⑩ $\frac{\text{selling pr}}{\text{org pr}} = \frac{18.36}{n} = \frac{85}{100}$
 $85n = 1836$ \$3.24
 $n = 21.6$
 $21.60 - 18.36 = 3.24$

⑪

	<u>now</u>	<u>n yrs ago</u>
mike	18	18-n
Elaine	14	14-n

 $2(18-n) = 3(14-n)$
 $36 - 2n = 42 - 3n$
 $n = 6$ 6 yrs ago

⑫ $n = \ell$ of 60% salt solution added in
 $\left(\frac{\text{starting sol.}}{\text{sol.}}\right)\left(\frac{\%}{\text{salt}}\right) + \left(\frac{\text{sol}}{\text{add}}\right)\left(\frac{\%}{\text{salt}}\right) = \left(\frac{\text{final sol.}}{\text{sol.}}\right)\left(\frac{\%}{\text{salt}}\right)$
 $(16)(.25) + (n)(.6) = (16+n)(.4)$
 $4 + .6n = 6.4 + .4n$
 $.2n = 2.4$
 $n = 12$ 12ℓ of 60% salt solution

⑬ $n = \text{pounds of cashews}$
 $(4)(1.80) + (n)(1.60) = (4+n)(1.68)$
 $7.2 + 1.6n = 6.72 + 1.68n$
 $.48 = .08n$
 $n = 6$ 6 pounds of cashews

⑭ nickels = $n+3$
dimes = n
quarters = $35 - (2n+3) = 32 - 2n$
 $(5)(n+3) + (10)(n) + (25)(32-2n) = 290$
 $5n + 15 + 10n + 800 - 50n = 290$
 $-35n = -525$
 $n = 15$
 $32 - 2n = 2$ 2 quarters

⑮ $\left[(-a^2b^{-2}c)^2\right]^3 = (a^4b^{-4}c^2)^3$
 $a^{12}b^{-12}c^6 = \frac{a^{12}c^6}{b^{12}}$

⑯ $(-3x^2y)^{-2}(3x^2y)^3$
 $\left(\frac{1}{9}x^{-4}y^{-2}\right)(27x^6y^3) = \frac{3x^2y}{1}$

⑰ $(2a^2b^3)^2(ab) - (-2ab)^3(ab^2)^2$
 $(4a^4b^6)(ab) - (-8a^3b^3)(a^2b^4)$
 $(4a^5b^7) - (-8a^5b^7)$
12a⁵b⁷

⑱ $\frac{-6a^{-3}bc^{-2}}{-4ab^{-2}c^{-6}}$

$\frac{3b^3c^4}{2a^4}$



Unit 4

REVIEW

Answer Key

$$\textcircled{1} (a^3)(a^2b) = \boxed{a^5b}$$

$$\textcircled{2} (3ab)(-4a^2b^3) \\ \boxed{-12a^3b^4}$$

$$\textcircled{3} (-4a^2x)(-5a^3x^4) \\ \boxed{20a^5x^5}$$

$$\textcircled{4} (4a^2b)^3 = \boxed{64a^6b^3}$$

$$\textcircled{5} \left(\frac{1}{3}b^2\right)^4 = \boxed{\frac{1}{81}b^8}$$

$$\textcircled{6} (-3x^{-2}y^2)^3(xy^{-2}) \\ (-27x^{-6}y^6)(xy^{-2}) \\ -27x^{-5}y^4 \\ \boxed{\frac{-27y^4}{x^5}}$$



$$\textcircled{7} (-2a^2b)^3(a^{-2}b) - 3(-a^2b^2)^2 \\ (-8a^6b^3)(a^{-2}b) - 3(a^4b^4) \\ (-8a^4b^4) - (3a^4b^4) \\ \boxed{-11a^4b^4}$$

$$\textcircled{8} (-3xy^2)^3(2xy) + \left(\frac{1}{2}x^2y\right)^2(12y^5) \\ (-27x^3y^6)(2xy) + \left(\frac{1}{4}x^4y^2\right)(12y^5) \\ (-54x^4y^7) + (3x^4y^7) \\ \boxed{-51x^4y^7}$$

$$\textcircled{9} \frac{3a^3bc^2}{18a^2b^3c^4} = \boxed{\frac{a}{6b^2c^2}}$$

$$\textcircled{10} \frac{(3y)^0}{2a^{-2}} = \frac{1}{2a^{-2}} = \boxed{\frac{a^2}{2}}$$

$$\textcircled{11} \frac{35b^{-2}}{14b^{-3}} = \boxed{\frac{5b}{2}}$$

$$\textcircled{12} \frac{-4ab^{-2}c^3}{2a^3b^{-5}c} = \boxed{\frac{-2b^3c^2}{a^2}}$$

$$\textcircled{13} \left(\frac{1}{2}a^2b\right)^3(4ab^3)^2 \\ \left(\frac{1}{8}a^6b^3\right)(16a^2b^6) \\ -2a^{-4}b^9 = \boxed{\frac{-2b^9}{a^4}}$$

$$\textcircled{14} (2x^3y^{-1})^4\left(\frac{1}{2}x^{-3}y\right)^5 \\ (16x^{12}y^{-4})\left(\frac{1}{32}x^{-15}y^5\right) \\ -\frac{1}{2}x^{-3}y = \boxed{\frac{-y}{2x^3}}$$

$$\textcircled{15} \frac{3x^{4n-1}}{x^{n+3}} = 3x^{(4n-1)-(n+3)} \\ 3x^{4n-1-n-3} = \boxed{3x^{3n-4}}$$

$$\textcircled{16} \frac{-10n^{a+3}}{5n^{4+2a}} = -2n^{(a+3)-(4+2a)} \\ -2n^{a+3-4+2a} = \boxed{-2n^{3a-1}}$$

$$\textcircled{17} 240,000 = \boxed{2.4 \times 10^5}$$

$$\textcircled{18} .000314 = \boxed{3.14 \times 10^{-4}}$$

$$\textcircled{19} (22 \times 10^3)(3.4 \times 10^{-5}) \\ 74.8 \times 10^{-2} = \boxed{7.48 \times 10^{-1}}$$

$$\textcircled{20} (4.1 \times 10^2)(35 \times 10^{-6}) \\ 143.5 \times 10^{-4} = \boxed{1.435 \times 10^{-2}}$$

$$\textcircled{21} \frac{5.4 \times 10^{-2}}{.09 \times 10^{-6}}$$

$$60 \times 10^4 = \boxed{6 \times 10^5}$$

$$\textcircled{22} \frac{.35 \times 10^3}{700 \times 10^7}$$

$$.0005 \times 10^{-4} = \boxed{5 \times 10^{-8}}$$

$$\textcircled{23} \begin{array}{ccc} & \text{now} & \text{4 ago} \\ \text{Janice} & n & n-4 \\ \text{Jimmy} & n-4 & n-8 \end{array}$$

$$3(n-4) = 4(n-8)$$

$$3n-12 = 4n-32$$

$$n=20 \quad n+2=22$$

$$n=20 \quad n+2=22$$

$$\boxed{22 \text{ yrs old}}$$

$$\textcircled{24} \begin{array}{ccc} & \text{now} & \text{next yr} & \text{3 ago} \\ \text{Jack} & 2n & & 2n-3 \\ \text{Jill} & n & n+1 & \end{array}$$

$$3(n+1) = 2(2n-3)$$

$$3n+3 = 4n-6$$

$$n=9 \quad 2n=18$$

$$\boxed{\text{Jack is 9 yrs older}}$$

$$\textcircled{25} \begin{array}{ccc} \text{after tax} & 46.41 & \\ \text{org pr} & n & = \frac{105}{100} \end{array}$$

$$105n = 4641$$

$$n = 44.2 \quad \boxed{\$44.20}$$

$$\textcircled{26} \begin{array}{ccc} \text{after tax} & 34.24 & \\ \text{org pr} & n & = \frac{107}{100} \end{array}$$

$$107n = 3424$$

$$n = 32$$

$$34.24 - 32 = 2.24$$

$$\boxed{\$2.24}$$

$$\textcircled{27} \left(\begin{array}{c} \text{starting} \\ \text{sol} \end{array} \right) \left(\begin{array}{c} \% \\ \text{acid} \end{array} \right) + \left(\begin{array}{c} \text{sol.} \\ \text{added} \end{array} \right) \left(\begin{array}{c} \% \\ \text{acid} \end{array} \right) = \left(\begin{array}{c} \text{final} \\ \text{sol.} \end{array} \right) \left(\begin{array}{c} \% \\ \text{acid} \end{array} \right)$$

$$(36)(.4) + (n)(.8) = (36+n)(.5)$$

$$14.4 + .8n = 18 + .5n$$

$$.3n = 3.6$$

$$n = 12 \quad \boxed{12 \text{ ml}}$$

$$\textcircled{28} \left(\begin{array}{c} \text{starting} \\ \text{alloy} \end{array} \right) \left(\begin{array}{c} \% \\ \text{silver} \end{array} \right) + \left(\begin{array}{c} \text{amt} \\ \text{added} \end{array} \right) \left(\begin{array}{c} \% \\ \text{silver} \end{array} \right) = \left(\begin{array}{c} \text{final} \\ \text{alloy} \end{array} \right) \left(\begin{array}{c} \% \\ \text{silver} \end{array} \right)$$

$$(80)(.5) + (n)(0) = (80+n)(.2)$$

$$40 + 0 = 16 + .2n$$

$$24 = .2n$$

$$n = 120 \quad \boxed{120 \text{ Kg}}$$

$$\textcircled{29} n = \text{student tickets}$$

$$16 - n = \text{adult tickets}$$

$$(2.10)(n) + (3.75)(16-n) = 38.55$$

$$2.1n + 60 - 3.75n = 38.55$$

$$-1.65n = -21.45$$

$$n = 13$$

$$\boxed{13 \text{ student tickets}}$$

$$\textcircled{30} (5)(1.40) + (n)(.80) = (5+n)(1.05)$$

$$7 + .8n = 5.25 + 1.05n$$

$$.25n = 1.75$$

$$n = 7$$

$$\boxed{7 \text{ pounds}}$$

$$\textcircled{31} \text{ nickels} = n$$

$$\text{ dimes} = n+2$$

$$\text{ quarters} = 18 - (2n+2) = 16 - 2n$$

$$(5)(n) + (10)(n+2) + (25)(16-2n) = 280$$

$$5n + 10n + 20 + 400 - 50n = 280$$

$$-35n = -140$$

$$n = 4$$

$$16 - 2n = 8$$

$$\boxed{8 \text{ quarters}}$$



$$\begin{aligned} \textcircled{32} \text{ nickels} &= n \\ \text{dimes} &= n+2 \\ \text{quarters} &= 2n+2 \end{aligned}$$

$$\begin{aligned} 5(n) + 10(n+2) + 25(2n+2) &= 395 \\ 5n + 10n + 20 + 50n + 50 &= 395 \\ 65n &= 325 \\ n &= 5 \quad n+2 = 7 \quad \boxed{7 \text{ dimes}} \end{aligned}$$



Unit 4

SKILL CHECK - ANSWER KEY

$$\begin{aligned} \textcircled{1} (-3a^2b)^2(-2ab^2)^3 \\ (9a^4b^2)(-8a^3b^6) &= \boxed{-72a^7b^8} \end{aligned}$$

$$\begin{aligned} \textcircled{2} (-2a^3b)^2 - (-4a^2b^2)(a^4) \\ (4a^6b^2) - (-4a^6b^2) \\ \boxed{8a^6b^2} \end{aligned}$$

$$\textcircled{3} \frac{-2x^{-2}yz^4}{6x^{-5}y^2z^{-2}} = \boxed{\frac{-x^3z^6}{3y}}$$

$$\begin{aligned} \textcircled{4} 48,296.3 \\ \boxed{4.82963 \times 10^4} \end{aligned}$$

$$\textcircled{5} .00046 = \boxed{4.6 \times 10^{-4}}$$

$$\begin{aligned} \textcircled{6} (4 \times 10^{-3})(21 \times 10^8) \\ 84 \times 10^5 = \boxed{8.4 \times 10^6} \end{aligned}$$

$$\begin{aligned} \textcircled{7} \frac{19.55 \times 10^{-7}}{.23 \times 10^{-4}} \\ 85 \times 10^{-3} = \boxed{8.5 \times 10^{-2}} \end{aligned}$$

$$\begin{array}{ccc} \textcircled{8} & \text{now} & \text{2 ago} & \text{in 6} \\ \text{Jason} & n & & n+6 \\ \text{Don} & n-4 & n-6 & \end{array}$$

$$\begin{aligned} (n+6) &= 3(n-6) \\ n+6 &= 3n-18 \\ 24 &= 2n \\ n &= 12 \quad \boxed{12 \text{ yrs old}} \end{aligned}$$

$$\begin{aligned} \textcircled{9} \frac{\text{purch pr}}{\text{org pr}} \cdot \frac{13.44}{n} &= \frac{106}{100} \\ 106n &= 1344 \quad n = \boxed{\$12.68} \end{aligned}$$

$$\begin{aligned} \textcircled{10} \left(\begin{array}{c} \text{start} \\ \text{alloy} \end{array} \right) \left(\begin{array}{c} \% \\ \text{cop.} \end{array} \right) + \left(\begin{array}{c} \text{cop.} \\ \text{add} \end{array} \right) \left(\begin{array}{c} \% \\ \text{cop.} \end{array} \right) &= \left(\begin{array}{c} \text{final} \\ \text{alloy} \end{array} \right) \left(\begin{array}{c} \% \\ \text{cop.} \end{array} \right) \\ (12)(.2) + (n)(1) &= (12+n)(.5) \\ 2.4 + n &= 6 + .5n \\ .5n &= 3.6 \quad n = 7.2 \quad \boxed{7.2 \text{ kg}} \end{aligned}$$

$$\begin{aligned} \textcircled{11} \text{notebooks} &= n \\ \text{pens} &= 18-n \\ 79n + 63(18-n) &= 1198 \\ 79n + 1134 - 63n &= 1198 \\ 16n &= 64 \\ n &= 4 \quad 18-n = 14 \quad \boxed{14 \text{ pens}} \end{aligned}$$

$$\begin{aligned} \textcircled{12} \text{nickels} &= n \\ \text{dimes} &= n+1 \\ \text{quarters} &= 19-2n \\ 5n + 10(n-1) + 25(19-2n) &= 240 \\ 5n + 10n - 10 + 475 - 50n &= 240 \\ -35n &= -245 \\ n &= 7 \quad 19-2n = 5 \quad \boxed{5 \text{ quarters}} \end{aligned}$$

$$\textcircled{13} \left(\frac{1}{3}x^3y^{-2}\right)^2(-6x^{-2}y)^2$$

$$\left(\frac{1}{9}x^6y^{-4}\right)(36x^{-4}y^2)$$

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

$$\textcircled{14} \frac{6x^{2n-3}}{-3x^{n+1}} = -2x^{(2n-3)-(n+1)}$$

$$-2x^{2n-3-n-1} = \boxed{-2x^{n-4}}$$

Unit 4

REMEDICATION - ANSWER KEY

$$\textcircled{1} (-2a^3b^2)^3(-ab^2)^2$$

$$(-8a^9b^6)(a^2b^4)$$

$$\boxed{-8a^{11}b^{10}}$$

$$\textcircled{2} (-3xy^2)^2 - (6y)^2\left(\frac{1}{2}xy\right)^2$$

$$(9x^2y^4) - (36y^2)\left(\frac{1}{4}x^2y^2\right)$$

$$(9x^2y^4) - (9x^2y^4) = \boxed{0}$$

$$\textcircled{3} \frac{-4a^{-3}b^{-2}c}{-12a^{-7}b^3c^{-4}} = \boxed{\frac{a^4c^5}{3b^5}}$$

$$\textcircled{4} 580,000 = \boxed{5.8 \times 10^5}$$

$$\textcircled{5} .00103 = \boxed{1.03 \times 10^{-3}}$$

$$\textcircled{6} (2.5 \times 10^6)(.32 \times 10^{-9})$$

$$.8 \times 10^{-3} = \boxed{8 \times 10^{-4}}$$

$$\textcircled{7} \frac{54.4 \times 10^{-2}}{1.6 \times 10^{-6}}$$

$$34 \times 10^4 = \boxed{3.4 \times 10^5}$$

$$\textcircled{8} \begin{array}{l} \text{now} \quad 3 \text{ ago} \quad \text{in } 3 \\ \text{Judy} \quad 2n \quad \quad \quad 2n+3 \\ \text{Alice} \quad n \quad \quad \quad n-3 \end{array}$$

$$2n+3 = 3(n-3)$$

$$n=12 \quad \boxed{12 \text{ yrs old}}$$

$$\textcircled{9} \begin{array}{l} \text{purch pr} \quad 36.12 \quad 105 \\ \text{org pr} \quad \quad \quad n \quad \quad 100 \end{array}$$

$$105n = 3612$$

$$n = 34.40 \quad \boxed{\$34.40}$$

$$\textcircled{10} \begin{array}{l} (\text{start}) \left(\frac{\%}{\text{sol.}} \right) + (\text{sol.}) \left(\frac{\%}{\text{salt}} \right) = (\text{Final}) \left(\frac{\%}{\text{sol.}} \right) \left(\frac{\%}{\text{salt}} \right) \\ (24)(.6) + (n)(0) = (24+n)(.2) \end{array}$$

$$14.4 = 4.8 + .2n$$

$$9.6 = .2n \quad n = 48$$

$$\boxed{48 \text{ ml}}$$

$$\textcircled{11} \begin{array}{l} 1.50 \text{ books } n \\ 2.25 \text{ books } 16-n \end{array} \quad \begin{array}{l} \boxed{12 @ \$1.50} \\ \boxed{4 @ \$2.25} \end{array}$$

$$(n)(1.50) + (16-n)(2.25) = 27.00$$

$$150n + 3600 - 225n = 2700$$

$$-75n = -900 \quad n = 12 \quad 16-n = 4$$

$$\textcircled{12} \begin{array}{l} \text{nickels} = 32-2n \\ \text{dimes} = n+4 \\ \text{quarters} = n \end{array}$$

$$(5)(32-2n) + (10)(n+4) + (25)(n) = 400$$

$$160 - 10n + 10n + 40 + 25n = 400$$

$$25n = 200$$

$$n = 8 \quad 32 - 2n = \boxed{16 \text{ nickels}}$$

$$\textcircled{13} \left(\frac{2}{5}a^3b^{-3}\right)^2(-5ab)^3$$

$$\left(\frac{4}{25}a^6b^{-6}\right)(-125a^3b^3)$$

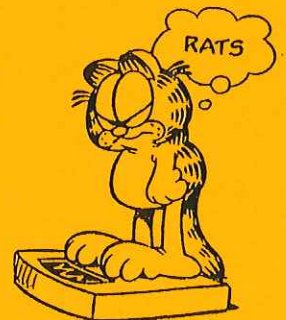
$$-20a^9b^{-3} = \boxed{\frac{-20a^9}{b^3}}$$

$$\textcircled{14} -8n^{3a+3}$$

$$-4n^{a-2}$$

$$2n^{(3a+3)-(a-2)} = 2n^{3a+3-a+2}$$

$$\boxed{2n^{2a+5}}$$



Unit 4

EXTRA PRACTICE - ANSWER KEY

① $(3n^2)(5n^4) = \boxed{15n^6}$

② $(xy^2z^3)(x^4yz^2)$
 $\boxed{x^5y^3z^5}$

③ $(3a)(-2a^2bc^2)(-ab^3)$
 $\boxed{6a^4b^4c^2}$

④ $(6x^2yz^3)(-2xy^3z)$
 $\boxed{-12x^3y^4z^4}$

⑤ $(-6ab)(-ab^2c^3)(-\frac{1}{2}ac^2)$
 $\boxed{-3a^3b^3c^5}$

⑥ $(x^3y^2)^3 = \boxed{x^9y^6}$

⑦ $(-3ab^2c)^2 - (-4ab)(-2ab^3c^2)$
 $(9a^2b^4c^2) - (8a^2b^4c^2)$
 $\boxed{a^2b^4c^2}$

⑧ $\frac{-10x^{-2}y^{-1}}{-15xy^{-3}} = \boxed{\frac{2y^2}{3x^3}}$

⑨ $\frac{8n^{x-3y}}{-4n^{3x+2y}}$
 $-2n^{(x-3y)-(3x+2y)}$
 $-2n^{x-3y-3x-2y}$
 $\boxed{-2n^{-2x-5y}}$

⑩ original 32
decrease 4 $\frac{4}{32} = .125$
 $\boxed{12.5\%}$

⑪ $93,200,000 = \boxed{9.32 \times 10^7}$

⑫ $(2 \times 10^{-6})(14 \times 10^{-3})$
 $28 \times 10^{-9} = \boxed{2.8 \times 10^{-8}}$

⑬ $\frac{34.1 \times 10^{-6}}{3.1 \times 10^{-2}}$
 $11 \times 10^{-4} = \boxed{1.1 \times 10^{-3}}$

⑭ nickels $x+4$
dimes x
quarters $22-(x+4) = 18-2x$
 $5(x+4) + 10(x) + 25(18-2x) = 330$
 $5x+20+10x+450-50x = 330$
 $-35x = -140$
 $x = 4$ $18-2x = \boxed{10 \text{ quarters}}$

⑮

	now	In 3	last yr
Jay	$n+12$	$n+15$	$n+11$
Devin	n	$n+3$	$n-1$

 $2(n+3) = n+11$
 $2n+6 = n+11$
 $n = 5$ $n+1 = \boxed{6 \text{ years old}}$

⑯ after tax $\frac{15.37}{n} = \frac{106}{100}$
before tax
 $106n = 1537$
 $n = 14.5$ $\boxed{\$14.50}$

⑰ $.6(10) + .25(n) = .3(10+n)$
 $6 + .25n = 3 + .3n$
 $-.05n = -3$
 $n = 60$ $\boxed{60 \text{ kg}}$

⑱ hard cover 9.25 n
paperback 3.75 $20-n$
 $9.25n + 3.75(20-n) = 108$
 $9.25n + 75 - 3.75n = 108$
 $5.5n = 33$ $n = 6$
 $20-6 = 14$ $\boxed{14 \text{ paperbacks}}$

⑲

	now	6 ago
Andre	$n+3$	$n+3$
Tim	n	$n-6$

 $4(n-6) = 3(n-3)$
 $4n-24 = 3n-9$
 $n = 15$
 $n+2 = \boxed{17 \text{ yrs old}}$

⑳ $(-\frac{1}{4}x^2y^3)^2(-8xy^3)$
 $(\frac{1}{16}x^4y^6)(-8xy^3)$
 $\boxed{-\frac{1}{2}x^5y^9}$

5.1

Answer Key

- ① n^2+3m
expression
- ② $\frac{3}{a}+b-c$
expression
- ③ $5x^2y$
term
- ④ $\frac{1}{3}m^2n$
term
- ⑤ $a^2+3b+\frac{c}{5}$
expression
- ⑥ $\frac{2}{3}xy^2z$
term
- ⑦ $12ab^2$
term
- ⑧ $2a^2+\frac{1}{3}b-\frac{a}{5}$
expression
- ⑨ Only #1 is
a polynomial
- ⑩ $5x^2y+3x+7$
trinomial
- ⑪ $4t^2+3t$
binomial
- ⑫ 8
monomial
- ⑬ $4x^2+3y^2z$
binomial
- ⑭ $x^2-\frac{x}{2}+\frac{1}{3}$
trinomial
- ⑮ $5a^2b^3$
monomial
- ⑯ -12
monomial

⑰ $3a^2x-5a$
binomial

⑱ $11x^2$
degree: 2

⑲ $x+2y^2+3z^3$
degree: 3

⑳ $29n^2+17n^2t^2$
degree: 4

㉑ $4^3xy+9xz^2+17rs$
degree: 3

㉒ $2xy^2z+5xyz^5+x^4$
degree: 7

㉓ $n^2+r^3+s^{14}+c^2$
degree: 14

㉔ 3^3xy+5x
degree: 2

㉕ $-7+4x+x^2$

㉖ $-20-6x+4x^3+x^5$

㉗ $a^3+5ax+2x^3$

㉘ $p^4+21p^2x+3px^3$

㉙ $b^3x^3+\frac{2}{3}bx+5b$

㉚ $4x^3y-x^2y^3+3xy^4+y^4$

㉛ $-8a^2x^3+\frac{2}{3}x^2+7a^3x+27$

㉜ $\frac{3}{4}x^3y-x^2+\frac{2}{3}x+4$

㉝ $(5ax^2+3ax-5x)+(2ax^2-5ax+7x) = 7ax^2-2ax+2x$

㉞ $(\frac{5}{7}a^2-\frac{3}{4}a+\frac{1}{2})-(\frac{3}{7}a^2+\frac{1}{2}a-\frac{1}{2}) = \frac{2}{7}a^2-\frac{5}{4}a+1$

㉟ $(\frac{3}{8}m^2-4m+\frac{2}{3})+(\frac{5}{8}m^2-2m+\frac{1}{3}) = m^2-6m+1$

㊱ $(n^2+3n-7)+(3n^2-4n+8) = 4n^2-n+1$

㊲ $(3mn^2+3mn-n^3)-(5mn^2+m+2n^3) = -2mn^2+2mn-3n^3$

㊳ $(x^3-3x^2y+4xy^2+y^3)$
 $-(7x^3+x^2y-9xy^2+y^3)$
 $-6x^3-4x^2y+13xy^2$

5.2

Answer Key

① $9a-3b-4c+16d$

② $8x^2+x+15$

③ $2x^2-8x-8$

④ $-5a^2-6a+4$

⑤ $(x+y)+(x+y) = 2x+2y$
 $(3x+3y)-(2x+2y)$

$\boxed{x+y}$

⑥ $(2x+y)+(3x-5y) = 5x-4y$
 $(7x+2y)-(5x-4y)$

$\boxed{2x+6y}$

⑦ $(5x^2-13x+24)+(x^2+7x+9)$
 $6x^2-6x+33$

$(11x^2-29x+10)-(6x^2-6x+33)$

$\boxed{5x^2-23x-23}$

⑧ complement of 70
 $90-70 = \boxed{20}$



⑨ complement of $3x$
 $90 - 3x$

⑩ complement of $x-2$
 $90 - (x-2)$
 $92 - x$

⑪ complement of $2x+40$
 $90 - (2x+40)$
 $50 - 2x$

⑫ supplement of 45
 $180 - 45 = 135$

⑬ supplement of $2x$
 $180 - 2x$

⑭ supplement of $8x-10$
 $180 - (8x-10)$
 $190 - 8x$

⑮ supplement of $5x+130$
 $180 - (5x+130)$
 $50 - 5x$

⑯ $5x^2y(3x^2-7xy+y^2)$
 $15x^4y - 35x^3y^2 + 5x^2y^3$

⑰ $4m^2(9m^2n+mn-5n^2)$
 $36m^4n + 4m^3n - 20m^2n^2$

⑱ $7a^2b^2(a^4-5a^2b+6b^2)$
 $7a^6b^2 - 35a^4b^3 + 42a^2b^4$

⑲ $2x^2(9x^2y-7xy+y^2)$
 $18x^4y - 14x^3y + 2x^2y^2$

⑳ $-8xy(4xy+7x-14y^2)$
 $-32x^2y^2 - 56x^2y + 112xy^3$

㉑ $-7ab(ab+11a^2b-11b^2)$
 $-7a^2b^2 - 77a^3b^2 + 77ab^3$

㉒ $-\frac{1}{3}x(9x^2+x-5) = -3x^3 - \frac{1}{3}x^2 + \frac{5}{3}x$

㉓ $\frac{2}{5}a(10a^2-15a+8) = 4a^3 - 6a^2 + \frac{16}{5}a$

㉔ $\frac{3}{4}ab^2(\frac{1}{3}b^2 - \frac{1}{4}b + 1)$
 $-\frac{1}{4}ab^4 + \frac{1}{3}ab^3 - \frac{3}{4}ab^2$

㉕ $-\frac{1}{3}xy(12x^2+8xy-\frac{2}{3}y^2)$
 $-4x^3y - \frac{8}{3}x^2y^2 + \frac{2}{9}xy^3$

㉖ $3n^2mp$
 term

㉗ $4x^2-2xy+3y^2$
 trinomial

㉘ $5a^2+2ab+6b^2$
 expression

㉙ $n-2p^2$
 degree: 2

㉚ $4x - \frac{3}{4}x^2$
 binomial

㉛ $12^2x^4y^5+xy^6$
 degree: 9
 $(4+5)=9$

㉜ $2a^2bc^3$
 monomial

㉝ $2a^2 + \frac{3a}{c} - 1$
 not a
 polynomial

㉞ descending order
 of x : $7ax^3 + 11x^2 - 3x + 2$

5.3

Answer Key



① $(2x+3y)(5x+2y)$
 $10x^2+4xy+15xy+6y^2 = 10x^2+19xy+6y^2$

② $(7y-1)(2y-3)$
 $14y^2-21y-2y+3 = 14y^2-23y+3$

③ $(5m+2n)(8m-3n)$
 $40m^2-15mn+16mn-6n^2$
 $40m^2+mn-6n^2$

④ $(5r-7s)(4r+3s)$
 $20r^2+15rs-28rs-21s^2$
 $20r^2-13rs-21s^2$

⑤ $(2x-\frac{1}{2})(6x+\frac{1}{2})$
 $12x^2+x-3x-\frac{1}{4}$
 $12x^2-2x-\frac{1}{4}$

⑥ $(3x+\frac{1}{4})(6x-\frac{1}{2})$
 $18x^2-\frac{3}{2}x+\frac{3}{2}x-\frac{1}{8}$
 $18x^2-\frac{1}{8}$

⑦ $(5a+3)(3a+1)$
 $15a^2+5a+9a+3$
 $15a^2+14a+3$

⑧ $(8a+3)(5a+4)$
 $40a^2+32a+15a+12$
 $40a^2+47a+12$

⑨ $(3x+5)(2x^2-5x+11)$
 $6x^3-15x^2+33x$
 $+10x^2-25x+55$
 $6x^3-5x^2+8x+55$

⑩ $(4n+5)(3n^2+8n-9)$
 $12n^3+32n^2-36n$
 $+15n^2+40n-45$
 $12n^3+47n^2+4n-45$

⑪ $(4x-3y)(3x^2+5xy+y^2)$
 $12x^3+20x^2y+4xy^2$
 $-9x^2y-15xy^2-3y^3$
 $12x^3+11x^2y-11xy^2-3y^3$

⑫ $(5x-2y)(6x^2-5xy+9y^2)$
 $30x^3-25x^2y+45xy^2$
 $-12x^2y+10xy^2-18y^3$
 $30x^3-37x^2y+55xy^2-18y^3$

⑬ $2x^2-3xy$
 Expression

⑭ $9mn^2$
 term

⑮ $4x^2-2xy+3y^2$
 trinomial

⑯ $2x-3y$
 binomial

⑰ $\frac{tab}{c}$ is not
 a polynomial

⑱ $3xyz$
 degree: 3

⑲ -8
 degree: 0

⑳ $3a^2b^3-2c^4$
 degree: 5

㉑ 8^2xy^3-1
 degree: 4

㉒ 0
 degree: undefined

㉓ $4xy^2z+6^3x^2y^2z^3$
 degree: 6

㉔ ascending n:
 $15-3mn+n^2-2mn^3$

㉕ $3x-15$ complement
 $90-(3x-15)=105-3x$

㉖ $(2n-4)+(3n-4)=5n-8$
 $(6n-11)-(5n-8)$
 $n-3$

5.4

Answer Key



① $(4x+y)^2 = 16x^2+8xy+y^2$

② $(6m+2n)^2 = 36m^2+24mn+4n^2$

③ $(2a-b)^2 = 4a^2-4ab+b^2$

④ $(4x-9y)^2 = 16x^2-72xy+81y^2$

⑤ $(3x+5)(3x-5) = 9x^2-25$

⑥ $(8a+2b)(8a-2b) = 64a^2-4b^2$

⑦ $(2n-m)(2n+m) = 4n^2-m^2$

⑧ $(5a+3b)(5a-3b) = 25a^2-9b^2$

⑨ $(3x+2)(3x-2) = 9x^2-4$

⑩ $(4n-1)^2 = 16n^2-8n+1$

⑪ $(x^{3a}+y^{3a})^2 = x^{6a}+2x^{3a}y^{3a}+y^{6a}$

$$\textcircled{12} (x^{3n}-y^{2n})^2$$

$$\boxed{x^{6n}-2x^{3n}y^{2n}+y^{4n}}$$

$$\textcircled{13} (2n^{3x}-m^x)^2$$

$$\boxed{4n^{6x}-4n^{3x}m^x+m^{2x}}$$

$$\textcircled{14} (a^n+5x^{2n})^2$$

$$\boxed{a^{2n}+10a^n x^{2n}+25x^{4n}}$$

$$\textcircled{15} (a^{2n}-b^{5n})(a^{2n}+b^{5n})$$

$$\boxed{a^{4n}-b^{10n}}$$

$$\textcircled{16} (x^{2n}+y^n)(x^{2n}-y^n)$$

$$\boxed{x^{4n}-y^{2n}}$$

$$\textcircled{17} (x^{3n}+2y^{5n})(x^{3n}-2y^{5n})$$

$$\boxed{x^{6n}-4y^{10n}}$$

$$\textcircled{18} (a^{3x}-3b^{4x})(a^{3x}+3b^{4x})$$

$$\boxed{a^{6x}-9b^{8x}}$$

$$\textcircled{19} (3n-4)(2n+5)$$

$$\boxed{6n^2+7n-20}$$

$$\textcircled{20} (2x+3y)(3x+y)$$

$$\boxed{6x^2+11xy+3y^2}$$

$$\textcircled{21} (x+2y)(2x^2+3xy+5y^2)$$

$$2x^3+3x^2y+5xy^2$$

$$+4x^2y+6xy^2+10y^3$$

$$\boxed{2x^3+7x^2y+11xy^2+10y^3}$$

$$\textcircled{22} (2a^2-3ab+5b^2) -$$

$$(4a^2-2ab+7b^2)$$

$$2a^2-3ab+5b^2$$

$$-4a^2+2ab-7b^2$$

$$\boxed{-2a^2-ab-2b^2}$$

$$\textcircled{23} \text{ supplement of } x+B$$

$$180-(x+B) = \boxed{167-x}$$

$$\textcircled{24} -2a^2b(3a^2-2ab+\frac{1}{2}b^2)$$

$$\boxed{-6a^4b+4a^3b^2-a^2b^3}$$

5.5

Answer Key



$$\textcircled{1} 2x-3 \overline{) \begin{array}{r} x^2-2x+5 \\ 2x^3-7x^2+16x-15 \\ \underline{2x^3-3x^2} \\ -4x^2+16x \\ \underline{-4x^2+6x} \\ 10x-15 \\ \underline{10x-15} \\ 0 \end{array}}$$

$$\textcircled{2} 4a+1 \overline{) \begin{array}{r} a^2-3a-7 \\ 4a^3-11a^2-31a-7 \\ \underline{4a^3+a^2} \\ -12a^2-31a \\ \underline{-12a^2-3a} \\ -28a-7 \\ \underline{-28a-7} \\ 0 \end{array}}$$

$$\textcircled{3} x+2 \overline{) \begin{array}{r} 3x^2+2x-3-\frac{1}{x}+2 \\ 3x^3+8x^2+x-7 \\ \underline{3x^3+6x^2} \\ 2x^2+x \\ \underline{2x^2+4x} \\ -3x-7 \\ \underline{-3x-6} \\ -1 \end{array}}$$



$$\begin{array}{r} 3n^2 - 2n + 3 + \frac{3}{2n+3} \\ \textcircled{4} \quad 2n+3 \overline{) 6n^3 + 5n^2 \quad \quad + 12} \\ \underline{6n^3 + 9n^2} \\ -4n^2 - 6n \\ \underline{6n + 12} \\ 6n + 9 \\ \underline{3} \end{array}$$

$$\begin{array}{r} x^2 + 3x - 2 - \frac{2}{x^2 - 2x + 4} \\ \textcircled{9} \quad x^2 - 2x + 4 \overline{) x^4 + x^3 - 4x^2 + 16x - 10} \\ \underline{x^4 - 2x^3 + 4x^2} \\ 3x^3 - 8x^2 + 16x \\ \underline{3x^3 - 6x^2 + 12x} \\ -2x^2 + 4x - 10 \\ \underline{-2x^2 + 4x - 8} \\ -2 \end{array}$$

$$\begin{array}{r} x^2 - 4x + 16 \\ \textcircled{5} \quad x+4 \overline{) x^3 \quad \quad \quad + 64} \\ \underline{x^3 + 4x^2} \\ -4x^2 - 16x \\ \underline{16x + 64} \\ 16x + 64 \end{array}$$

$$\begin{array}{r} 2a^2 - a - 3 + \frac{7}{3a^2 - 4a + 2} \\ \textcircled{10} \quad 3a^2 - 4a + 2 \overline{) 6a^4 - 11a^3 - a^2 + 10a + 1} \\ \underline{6a^4 - 8a^3 + 4a^2} \\ -3a^3 - 5a^2 + 10a \\ \underline{-3a^3 + 4a^2 - 2a} \\ -9a^2 + 12a + 1 \\ \underline{-9a^2 + 12a - 6} \\ 7 \end{array}$$

$$\begin{array}{r} 9a^2 + 6ab + 4b^2 \\ \textcircled{6} \quad 3a - 2b \overline{) 27a^3 \quad \quad \quad - 8b^3} \\ \underline{27a^3 - 18a^2b} \\ 18a^2b \\ \underline{18a^2b - 12ab^2} \\ 12ab^2 - 8b^3 \\ \underline{12ab^2 - 8b^3} \end{array}$$

⑪ $6a^3b^2 - 2ac^5$
degree: 6

⑫ $-3^3a + 1$
degree: 1

⑬ $(4n^2 - 3mn + 2m^2) - (4n^2 - 2mn - m^2)$
 $4n^2 - 3mn + 2m^2 - 4n^2 + 2mn + m^2$
 $3m^2 - mn$

⑭ Complement of $6a^2 - 2a + 1$
 $90 - (6a^2 - 2a + 1) = 89 - 6a^2 + 2a$

⑮ $\frac{1}{3}ab^2(9ab^2 - 3a^2b - 12)$
 $-3a^2b^4 + a^3b^3 + 4ab^2$

⑯ $(3n+5)^2 = 9n^2 + 30n + 25$

⑰ $(2a-7b)(2a+7b)$
 $4a^2 - 49b^2$

⑱ $(4n+5)(3n-8)$
 $12n^2 - 32n + 15n - 40$
 $12n^2 - 17n - 40$



$$\begin{array}{r} x - 3y \\ \textcircled{7} \quad x^2 + 3xy + 9y^2 \overline{) x^3 \quad \quad \quad - 27y^3} \\ \underline{x^3 + 3x^2y + 9xy^2} \\ -3x^2y - 9xy^2 - 27y^3 \\ \underline{-3x^2y - 9xy^2 - 27y^3} \end{array}$$

$$\begin{array}{r} x^3 + x^2y + xy^2 + y^3 \\ \textcircled{8} \quad x-y \overline{) x^4 \quad \quad \quad \quad \quad - y^4} \\ \underline{x^4 - x^3y} \\ x^3y \\ \underline{x^3y - x^2y^2} \\ x^2y^2 \\ \underline{x^2y^2 - xy^3} \\ xy^3 - y^4 \\ \underline{xy^3 - y^4} \end{array}$$

19) $(x^{3n} - 2y^{n+3})^2$

$x^{6n} - 4x^{3n}y^{n+3} + 4y^{2n+6}$

20) $(4a^x + 3a^{2x-1})(4a^x - 3a^{2x-1})$

$16a^{2x} - 9a^{4x-2}$

21) $(3n^{3x+2} + m^{x-1})^2$

$9n^{6x+4} + 6n^{3x+2}m^{x-1} + m^{2x-2}$

22) $(5x^{3a-2} + 2y^{a+4})(5x^{3a-2} - 2y^{a+4})$

$25x^{6a-4} - 4y^{2a+8}$

5.6

Answer Key

1) $R \cdot T = D$

Train 1 $40 \cdot t = 40t$

Train 2 $30 \cdot t = 30t$



$30t + 40t = 245$

$70t = 245$

$t = 3.5$ 3.5 hours

2) $R \cdot T = D$

Cyclist 1 $20 \cdot t = 20t$

Cyclist 2 $14 \cdot t = 14t$



$20t - 14t = 15$

$6t = 15$

$t = 2.5$

2.5 hours



3) $R \cdot T = D$

Jason $8 \cdot t = 8t$

Sharon $10 \cdot (t - \frac{1}{2}) = 10t - 5$

J $\xrightarrow{8t}$ $10t - 5 = 8t$

S $\xrightarrow{10t - 5}$ $2t = 5$

11:30 AM $t = 2.5$
2.5 hours

4) $R \cdot T = D$

Express $80 \cdot t = 80t$

Passenger $48 \cdot (t + 2) = 48t + 96$

E $\xrightarrow{80t}$ $80t = 48t + 96$

P $\xrightarrow{48t + 96}$ $32t = 96$

240 km $t = 3$
 $80t = 240$

5) $R \cdot T = D$

Plane 1 $r \cdot 3 = 3r$

Plane 2 $(r + 80) \cdot 3 = 3r + 240$



$3r + (3r + 240) = 2940$

$6r + 240 = 2940$

$6r = 2700$

$r = 450$

$r + 80 = 530$

Plane 1 450 mph
Plane 2 530 mph

6) $R \cdot T = D$

Jake $r \cdot 4.5 = 4.5r$

Abbey $42 \cdot 1.5 = 63$

4.5) IF Abbey rides 1.5 hours and Jake started three hours earlier, he rides for 4.5 hours.

J $\xrightarrow{4.5r}$

A $\xrightarrow{63}$

$4.5r = 63$

$r = 14$

14 mph

⑦ $\frac{R}{r} \cdot T = \frac{D}{5}$
 Ike $r \cdot 5 = 5r$
 melissa $(r+2) \cdot 5 = 5r+10$

10:30 to 3:30 = 5 hours
 $5r + (5r+10) = 110$
 $10r + 10 = 110$
 $10r = 100$
 $r = 10$
 $r+2 = 12$ 12 Kph

⑧ $\frac{R}{r} \cdot T = \frac{D}{6}$
 Kris $r \cdot 6 = 6r$
 Amy $(r+5) \cdot 6 = 6r+30$

$6r + (6r+30) = 510$
 $12r + 30 = 510$
 $12r = 480$
 $r = 40$ 40 mph

⑨ $(3n+8)(3n-8) = \boxed{9n^2-64}$

⑩ $(2x-5y)^2 = \boxed{4x^2-20xy+25y^2}$

⑪ $(3n-4m)(n-3m)$
 $\boxed{3n^2-13mn+12m^2}$

⑫ $(4x^{n+1}-2y^{3n})^2$
 $\boxed{16x^{2n+2}-16x^{n+1}y^{3n}+4y^{6n}}$

⑬ $(3a^{4x+2}-b^{x-3})(3a^{4x+2}+b^{x-3})$
 $\boxed{9a^{8x+4}-b^{2x-6}}$

⑭ $(4x-2)+(2x-2)+(3x+6)=9x+2$
 $(11x+4)-(9x+2)$
 $11x+4-9x-2$
 $\boxed{2x+2}$

⑮ $x-2y \overline{) 3x^2+6xy+12y^2+\overset{23y^3}{x-2y}}$
 $\underline{3x^3 -y^3}$
 $ \underline{6x^2y}$
 $ \underline{6x^2y-12xy^2}$
 $ \underline{12xy^2-y^3}$
 $ \underline{12xy^2-24y^3}$
 $ \underline{23y^3}$

5.7

Answer Key



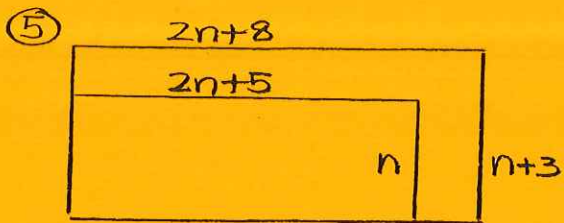
① $2n+4$
 n
 $2(n)+2(2n+4)=116$
 $2n+4n+8=116$
 $6n=108$
 $n=18$
 $2n+4=40$
18 by 40 ft

② $2(n)+2(4n-3)=54$
 $2n+8n-6=54$
 $10n=60$
 $n=6$
 $4n-3=21$
 $6 \times 21 = \boxed{126 \text{ cm}^2}$

③ $(n)+(2n)+(2n-3)=37$
 $5n-3=37$
 $5n=40$
 $n=8$
 $2n=16$ $2n-3=13$

8, 16, 13 cm

④ $(n)+(n)+(n-17)=91$
 $3n-17=91$
 $3n=108$
 $n=36$
 $n-17=19$
19 cm



$$(n+3)(2n+8) - (n)(2n+5) = 213$$

$$(2n^2 + 14n + 24) - (2n^2 + 5n) = 213$$

$$2n^2 + 14n + 24 - 2n^2 - 5n = 213$$

$$9n = 189$$

$$n = 21$$

$$2n+5 = 47$$

21 by 47 ft

⑥

$$(n+6)(n+4) - (n)(n+2) = 80$$

$$(n^2 + 10n + 24) - (n^2 + 2n) = 80$$

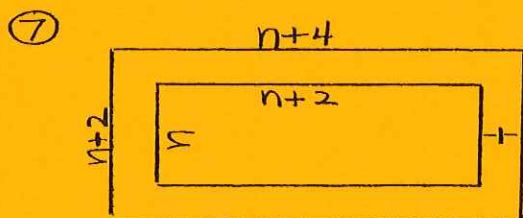
$$n^2 + 10n + 24 - n^2 - 2n = 80$$

$$8n = 56$$

$$n = 7$$

$$n+2 = 9$$

7 by 9 ft



$$(n+2)(n+4) - n(n+2) = 32$$

$$(n^2 + 6n + 8) - (n^2 + 2n) = 32$$

$$n^2 + 6n + 8 - n^2 - 2n = 32$$

$$4n = 24$$

$$n = 6$$

$$n+2 = 8$$

8 by 6 cm

⑧

$$(n+5)^2 - (n)^2 = 145$$

$$(n^2 + 10n + 25) - n^2 = 145$$

$$10n + 25 = 145$$

$$10n = 120$$

$$n = 12$$

$$12 \times 12$$

144 sq ft

⑨

$$n(n+20) = (n+4)(n+15)$$

$$n^2 + 20n = n^2 + 19n + 60$$

$$n = 60$$

original length
 $n+20 = \boxed{80 \text{ yards}}$

⑩

$$n(2n-7) = (n-6)(2n+4) + 40$$

$$2n^2 - 7n = 2n^2 - 8n - 24 + 40$$

$$n = 16$$

$$2n-7 = 25$$

original dimensions
 $A = 16 \times 25 = \boxed{400 \text{ cm}^2}$

⑪

$$\frac{R}{\text{Michele}} \cdot \frac{T}{3} = \frac{D}{3r}$$

$$\text{Chris } (n+2) \cdot 2\frac{1}{4} = \frac{9}{4}r + 27$$

$$m \xrightarrow{3r}$$

$$c \xrightarrow{\frac{9}{4}r + 27}$$

$$\boxed{3r = \frac{9}{4}r + 27} \quad (4)$$

$$2r = 9r + 108$$

$$3r = 108$$

$$r = 36$$

108 miles



⑫

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

⑬

$$(5n-m)(2n+3m)$$

$$\boxed{10n^2 + 13mn - 3m^2}$$

⑭

$$(3a^{2x-4} - 4b^{x+3})^2$$

$$\boxed{9a^{4x-8} - 24a^{2x-4}b^{x+3} + 16b^{2x+6}}$$

⑮

$$2n+1 \overline{) 8n^3 - 4n^2 + 2n - 1 - \frac{9}{2}n + 1}$$

$$\underline{16n^4 + 8n^3}$$

$$-8n^3 - 4n^2$$

$$\underline{-8n^3 - 4n^2}$$

$$4n^2 + 2n$$

$$\underline{-2n - 1}$$

$$-2n - 1$$

$$\underline{-9}$$

5.8

Answer Key



① $n = \$$ invested at 8%

$$(.08)(n) + (.12)(10,000 - n) = 944$$

$$.08n + 1200 - .12n = 944$$

$$-.04n = -256$$

$$n = 6400$$

$$\boxed{\$6400 @ 8\%, \$3600 @ 12\%}$$

② $n = \$$ invested at 10%

$$(.10)(n) + (.14)(7200 - n) = 960$$

$$.10n + 1008 - .14n = 960$$

$$-.04n = -48$$

$$n = 1200$$

$$\boxed{\$1200 @ 10\%, \$6000 @ 14\%}$$

③ $n = \$$ invested at 9%

$$(.09)(n) = (.12)(5000 - n) + 198$$

$$.09n = 600 - .12n + 198$$

$$.21n = 798$$

$$n = 3800$$

$$\boxed{\$3800 @ 9\%}$$

④ $n = \$$ invested at 12%

$$(.12)(n) = (.14)(8500 - n)$$

$$.12n = 1190 - .14n$$

$$.26n = 1190$$

$$n \approx 4576.92$$

$$\boxed{\$4576.92 @ 12\%}$$

$$\boxed{\$3923.08 @ 14\%}$$

⑤ $n = \$$ invested at 12%

$n + 1500 = \$$ invested at 8%

$$(.12)(n) = (.08)(n + 1500)$$

$$.12n = .08n + 120$$

$$.04n = 120$$

$$n = 3000$$

$$\boxed{\$3000 @ 12\%}$$

⑥ $n = \$$ invested at 16%

$$2(.16)(n) = (.11)(7525 - n)$$

$$.32n = 827.75 - .11n$$

$$.43n = 827.75$$

$$n = 1925$$

$$\boxed{\$1925 @ 16\%}$$

⑦

$$\begin{array}{l} \text{Art} \\ \text{Jennifer} \end{array} \quad \begin{array}{l} R \cdot T = D \\ 50 \cdot t = 50t \\ 45 \cdot (t - \frac{3}{2}) = 45t - \frac{135}{2} \end{array}$$

$$\begin{array}{l} A \\ J \end{array} \quad \begin{array}{l} \xrightarrow{50t} \\ \xrightarrow{45t - \frac{135}{2}} \end{array} \quad \begin{array}{l} \\ \end{array} \rightarrow 100 \text{ miles}$$

$$50t = 45t - \frac{135}{2} + 100$$

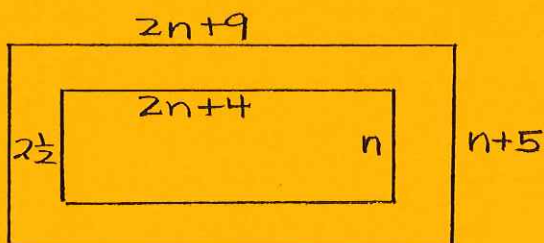
$$100t = 90t - 135 + 200$$

$$10t = 65$$

$$t = 6.5$$

$$10:00 \text{ AM} + 6.5 \text{ hrs} = \boxed{4:30 \text{ PM}}$$

⑧



$$(2n+9)(n+5) - n(2n+4) = 195$$

$$(2n^2 + 19n + 45) - (2n^2 + 4n) = 195$$

$$2n^2 + 19n + 45 - 2n^2 - 4n = 195$$

$$15n = 150$$

$$n = 10$$

$$2n + 4 = 24$$

$$\boxed{10 \text{ by } 24 \text{ ft}}$$

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

⑩ $(5n^{x+2} + m^{3x})^2$

$$\boxed{25n^{2x+4} + 10n^{x+2}m^{3x} + m^{6x}}$$

⑪ $(3a - 2)(3a + 2) = \boxed{9a^2 - 4}$



$$\begin{array}{r} \textcircled{12} \quad \frac{3x+1 - \cancel{24}x^2-x+4}{x^2-x+4} \quad \frac{3x^3-2x^2+11x-20}{3x^3-3x^2+12x} \\ \phantom{\textcircled{12} \quad} \quad \quad \quad \frac{x^2-x-20}{x^2-x+4} \\ \phantom{\textcircled{12} \quad} \quad \quad \quad \underline{-24} \end{array}$$

Unit 5
REVIEW
Answer Key



$$\textcircled{1} \quad \begin{array}{l} \text{a) } -3 + a^2x + ax^2 - 5x^3 \\ \text{b) } -5x^3 + ax^2 + a^2x - 3 \end{array}$$

$$\textcircled{2} \quad \begin{array}{l} \text{a) } -5 - x + x^2 + 3x^4 \\ \text{b) } 3x^4 + x^2 - x - 5 \end{array}$$

$$\textcircled{3} \quad 4a^4bc - 5ab^2 + 2^4c^3$$

degree: $\boxed{6}$

$$\textcircled{4} \quad 2^3x^2y^3z - 18 + xy^3$$

degree: $\boxed{6}$

$$\textcircled{5} \quad (x^2 - 6xy + 7y^2) - (3x^2 + xy - y^2)$$

$$x^2 - 6xy + 7y^2 - 3x^2 - xy + y^2$$

$$\boxed{-2x^2 - 7xy + 8y^2}$$

$$\textcircled{6} \quad (2x^2 - 5x + 7) - (3x^3 + x^2 + 2)$$

$$2x^2 - 5x + 7 - 3x^3 - x^2 - 2$$

$$\boxed{-3x^3 + x^2 - 5x + 5}$$

$$\textcircled{7} \quad 7xy(x^2 + 4xy - 8y^2)$$

$$\boxed{7x^3y + 28x^2y^2 - 56xy^3}$$

$$\textcircled{8} \quad \frac{1}{2}a^2b(8b^2 - 6ab + 10a^2)$$

$$\boxed{4a^2b^3 - 3a^3b^2 + 5a^4b}$$

$$\textcircled{9} \quad (4x-3)(x+4)$$

$$\boxed{4x^2 + 13x - 12}$$

$$\textcircled{10} \quad (2a-5)(4a+3b)$$

$$\boxed{8a^2 - 14ab - 15b^2}$$

$$\textcircled{11} \quad (x-4)(x^2+5x-7)$$

$$x^3 + 5x^2 - 7x$$

$$-4x^2 - 20x + 28$$

$$\boxed{x^3 + x^2 - 27x + 28}$$

$$\textcircled{12} \quad (a+b)(a^2-2ab+3b^2)$$

$$a^3 - 2a^2b + 3ab^2$$

$$+ a^2b - 2ab^2 + 3b^3$$

$$\boxed{a^3 - a^2b + ab^2 + 3b^3}$$

$$\textcircled{13} \quad \begin{array}{l} \text{a) } 90 - (2x-4) = \boxed{94-2x} \\ \text{b) } 180 - (2x-4) = \boxed{184-2x} \end{array}$$

$$\textcircled{14} \quad \begin{array}{l} \text{a) } 90 - (3n+7) = \boxed{83-3n} \\ \text{b) } 180 - (3n+7) = \boxed{173-3n} \end{array}$$

$$\textcircled{15} \quad \begin{array}{l} (3n-5) + (n+14) = 4n+9 \\ (5n-4) - (4n+9) = \boxed{n-13} \end{array}$$

$$\textcircled{16} \quad \begin{array}{l} 2(4) + 2(?) = 6x+2 \\ 2(?) = 6x-6 \\ ? = \boxed{3x-3} \end{array}$$

$$\textcircled{17} \quad (3n+2)^2 = \boxed{9n^2 + 12n + 4}$$

$$\textcircled{18} \quad (7a-4b)^2 = \boxed{49a^2 - 56ab + 16b^2}$$

$$\textcircled{19} \quad (3x-4y)(3x+4y)$$

$$\boxed{9x^2 - 16y^2}$$

$$\textcircled{20} \quad (5n+9)(5n-9) = \boxed{25n^2 - 81}$$

$$\textcircled{21} \quad (x^{2n} - y^{3n-2})^2$$

$$\boxed{x^{4n} - 2x^{2n}y^{3n-2} + y^{6n-4}}$$

$$\textcircled{22} \quad (3a^{n+3} + 4b^{3n-1})^2$$

$$\boxed{9a^{2n+6} + 24a^{n+3}b^{3n-1} + 16b^{6n-2}}$$

$$\textcircled{23} (2n^{3x} - 3m^{x+1})(2n^{3x} + 3m^{x+1})$$

$$\boxed{4n^{6x} - 9m^{2x+2}}$$

$$\textcircled{24} (5a^{2n-1} + 4b^{4n})(5a^{2n-1} - 4b^{4n})$$

$$\boxed{25a^{4n-2} - 16b^{8n}}$$

$$\textcircled{25} \begin{array}{r} 2x^2 - 5x + 3 - \frac{5}{x-5} \\ x-5 \overline{) 2x^3 - 15x^2 + 28x - 20} \\ \underline{2x^3 - 10x^2} \\ -5x^2 + 28x \\ \underline{-5x^2 + 25x} \\ 3x - 20 \\ \underline{3x - 15} \\ -5 \end{array}$$

$$\textcircled{26} \begin{array}{r} 3n^2 - 2n + 4 - \frac{2}{2n-3} \\ 2n-3 \overline{) 6n^3 - 13n^2 + 14n - 14} \\ \underline{6n^3 - 9n^2} \\ -4n^2 + 14n \\ \underline{-4n^2 + 6n} \\ 8n - 14 \\ \underline{8n - 12} \\ -2 \end{array}$$

$$\textcircled{27} \begin{array}{r} a^2 + 2ab + 4b^2 + \frac{b^3}{a-2b} \\ a-2b \overline{) a^3 - 2a^2b - 7b^3} \\ \underline{a^3 - 2a^2b} \\ 2a^2b - 4ab^2 \\ \underline{2a^2b - 4ab^2} \\ 4ab^2 - 7b^3 \\ \underline{4ab^2 - 8b^3} \\ b^3 \end{array}$$

$$\textcircled{28} \begin{array}{r} x^2 - xy + y^2 + \frac{y^3}{x+y} \\ x+y \overline{) x^3 - x^2y + 2y^3} \\ \underline{x^3 + x^2y} \\ -x^2y \\ \underline{-x^2y - xy^2} \\ xy^2 + 2y^3 \\ \underline{xy^2 + y^3} \\ y^3 \end{array}$$

$$\textcircled{29} \begin{array}{l} R \cdot T = D \\ \text{Karen } 32 \cdot t = 32t \\ \text{Gail } 40 \cdot (t - \frac{1}{2}) = 40t - 20 \end{array}$$

$$\begin{array}{l} K \xrightarrow{32t} 12 \text{ miles} \\ G \xrightarrow{40t - 20} \end{array}$$

$$32t + 12 = 40t - 20$$

$$-8t = -32$$

$$t = 4$$

$$1:00 + 4 \text{ hrs} = \boxed{5:00 \text{ PM}}$$

$$\textcircled{30} \begin{array}{l} R \cdot T = D \\ \text{Sue } 30 \cdot t = 30t \\ \text{Sharon } 45 \cdot (t - \frac{1}{2}) = 45t - \frac{45}{2} \end{array}$$

$$\begin{array}{l} \leftarrow 30t \quad \bullet \quad 45t - \frac{45}{2} \rightarrow \\ 165 \text{ miles} \end{array}$$

$$30t + 45t - \frac{45}{2} = 165$$

$$\left[75t - \frac{45}{2} = 165 \right] (2)$$

$$150t - 45 = 330$$

$$150t = 375$$

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

$$4:30 + 2\frac{1}{2} \text{ hrs} = \boxed{7:00 \text{ PM}}$$



$$\textcircled{31} n = \$ \text{ invested at } 8\%$$

$$(.08)(n) = (.12)(9000 - n) + 200$$

$$.08n = 1080 - .12n + 200$$

$$.2n = 1280$$

$$n = 6400 \quad \boxed{\$6400 @ 8\%}$$

$$\textcircled{32} n = \$ \text{ invested at } 6\%$$

$$(.06)(n) + 90 = (.10)(10,500 - n)$$

$$.06n + 90 = 1050 - .1n$$

$$.16n = 960$$

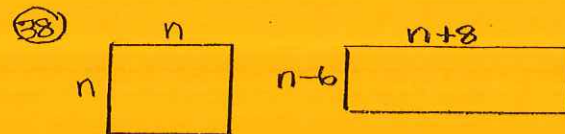
$$n = 6000 \quad \boxed{\$6000 @ 6\%}$$

$$\textcircled{33} \begin{array}{l} 2n - 12 \\ n \boxed{} \end{array} \begin{array}{l} 2(n) + 2(2n - 12) = 42 \\ 2n + 4n - 24 = 42 \\ 6n = 66 \end{array}$$

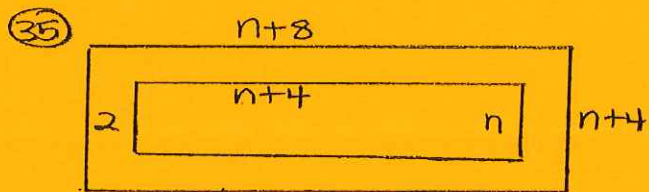
$$\boxed{10 \text{ by } 11 \text{ ft}} \quad \begin{array}{l} n = 11 \\ 2n - 12 = 10 \end{array}$$



$$\begin{aligned} 2(n) + 2(3n+4) &= 72 \\ 2n + 6n + 8 &= 72 \\ 8n &= 64 \\ n &= 8 \quad 3n+4 = 28 \end{aligned}$$



$$\begin{aligned} n^2 - (n-6)(n+8) &= 8 \\ n^2 - (n^2 + 2n - 48) &= 8 \\ n^2 - n^2 - 2n + 48 &= 8 \\ -2n &= -40 \\ n &= 20 \quad 20 \times 20 = \boxed{400 \text{ in}^2} \end{aligned}$$

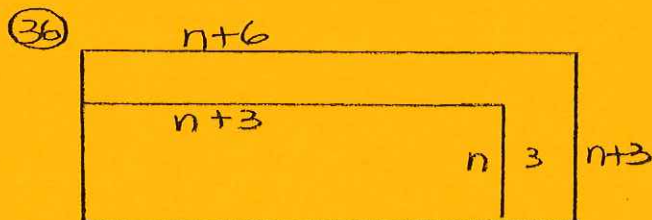


$$\begin{aligned} (n+8)(n+4) - n(n+4) &= 192 \\ (n^2 + 12n + 32) - (n^2 + 4n) &= 192 \\ n^2 + 12n + 32 - n^2 - 4n &= 192 \\ 8n &= 160 \quad n = 20 \end{aligned}$$

- a) $n+4 = 24$ 20 by 24 in
 b) $n+8 = 28$ 24 by 28 in

39) Alisha $\frac{R}{42} \cdot \frac{T}{6} = \frac{D}{252}$
 Greg $r \cdot 5\frac{1}{4} = 252$
 $\frac{252}{42} = 6$ $6 - \frac{3}{4} = 5\frac{1}{4}$

$$\begin{aligned} 5\frac{1}{4}r &= 252 \\ r &= 48 \quad \boxed{48 \text{ mph}} \end{aligned}$$

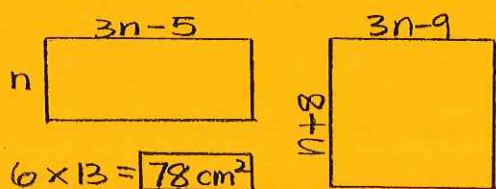


$$\begin{aligned} (n+6)(n+3) - n(n+3) &= 72 \\ (n^2 + 9n + 18) - (n^2 + 3n) &= 72 \\ n^2 + 9n + 18 - n^2 - 3n &= 72 \\ 6n &= 54 \\ n &= 9 \\ n+3 &= 12 \quad \boxed{9 \text{ by } 12 \text{ ft}} \end{aligned}$$

40) Bob $\frac{R}{40} \cdot \frac{T}{5\frac{3}{4}} = \frac{D}{230}$
 Jack $r \cdot 5 = 230$
 At 40mph, Bob goes 30 miles in $\frac{3}{4}$ hrs
 $(40)(5\frac{3}{4})$

$$\begin{aligned} 5r &= 230 \\ r &= 46 \quad \boxed{46 \text{ mph}} \end{aligned}$$

37) $(3n-9)(n+8) - n(3n-5) = 48$
 $(3n^2 + 15n - 72) - (3n^2 - 5n) = 48$
 $3n^2 + 15n - 72 - 3n^2 + 5n = 48$
 $20n = 120 \quad n = 6$



Unit 5

SKILL CHECK - ANSWER KEY

① $16n^4m^2 - 3 + 2n^3 + 4nm - 22m^3$

$16n^4m^2 + 2n^3 - 22m^3 + 4nm - 3$

② $4a^2b^2c - 3a^4b^3 + 2ab^3c$
degree: 7

③ $(4a^2 - 3ab + 6b^2) - (2a^2 - 5ab - 5b^2)$
 $4a^2 - 3ab + 6b^2 - 2a^2 + 5ab + 5b^2$
 $2a^2 + 2ab + 11b^2$

④ $(3n-2)(n^2-6n+4)$
 $3n^3 - 18n^2 + 12n - 2n^2 + 12n - 8$
 $3n^3 - 20n^2 + 24n - 8$

⑤ complement of $3n+6$
 $90 - (3n+6) = 84 - 3n$
Supplement of $3n+6$
 $180 - (3n+6) = 174 - 3n$

⑥ $2(3) + 2(?) = 14n + 8$
 $6 + 2(?) = 14n + 8$
 $2(?) = 14n + 2$
 $(?) = 7n + 1$

⑦ $(3n^x - m^{3x+1})^2$
 $9n^{2x} - 6n^x m^{3x+1} + m^{6x+2}$

⑧ $(4a-3b)(4a+3b) = 16a^2 - 9b^2$

⑨ $2x+y \overline{) 8x^3 - 2xy + y^2 - 5y^3}$
 $\underline{8x^3 + 4x^2y}$
 $-4x^2y$
 $\underline{-4x^2y - 2xy^2}$
 $2xy^2 - 4y^3$
 $\underline{2xy^2 + y^3}$
 $-5y^3$



⑩ $\frac{R}{\text{Andy}} \cdot \frac{T}{t} = \frac{D}{40t}$
 $\frac{R}{\text{Pam}} \cdot \frac{T}{(t-\frac{1}{2})} = \frac{D}{60t-30}$
 $40t + 60t - 30 = 570$
 $100t = 600$
 $t = 6 \text{ hrs}$ $3:00 + 6 \text{ hrs} = 9:00 \text{ AM}$

⑪ $(n+6)(2n+2) - n(2n-4) = 174$
 $(2n^2 + 14n + 12) - (2n^2 - 4n) = 174$
 $2n^2 + 14n + 12 - 2n^2 + 4n = 174$
 $18n = 162$ $n = 9$ $2n-4 = 14$
 $9 \text{ by } 14 \text{ Feet}$ $n+6 = 15$

⑫ $(n)(.10) = 2(6500-n)(.08)$
 $.1n = 1040 - .16n$
 $.26n = 1040$
 $n = 4000$ $6500 - n = 2500$
 $\$4000 @ 10\%$ $\$2500 @ 8\%$

⑬ $n \square \quad \square n+4 \quad \square n-5$
 $n^2 - (n+4)(n-5) = 30$
 $n^2 - (n^2 - n - 20) = 30$
 $n^2 - n^2 + n + 20 = 30$
 $n = 10$ $10 \times 10 = 100 \text{ m}^2$

⑭ $\frac{R}{\text{Plane 1}} \cdot \frac{T}{5} = \frac{D}{420}$
 $\frac{R}{\text{Plane 2}} \cdot \frac{T}{3\frac{1}{2}} = \frac{D}{210}$
 $\frac{2100}{420} = 5$ $5 - \frac{1}{2} = 3\frac{1}{2}$

$3\frac{1}{2}r = 2100$
 $3.5r = 2100$
 $r = 600$
Plane 2 $\rightarrow 600 \text{ mph}$

Unit 5

REMEDICATION - ANSWER KEY

① $14xy - 2y^3 + 3x^2y - 2x^3$
 $-2x^3 + 3x^2y + 14xy - 2y^3$

② $3xyz - x^2y^2z + 4x^3y$
 degree: 5

③ $(6x^2 - 2xy - 3y^2) - (4x^2 + xy - 2y^2)$
 $6x^2 - 2xy - 3y^2 - 4x^2 - xy + 2y^2$
 $2x^2 - 3xy - y^2$

④ $(4a+5)(2a^2-3a-2)$
 $8a^3 - 12a^2 - 8a$
 $+ 10a^2 - 15a - 10$
 $8a^3 - 2a^2 - 23a - 10$

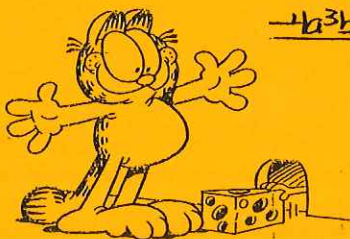
⑤ complement of $3x-2$
 $90 - (3x-2) = 92 - 3x$
 Supplement of $3x-2$
 $180 - (3x-2) = 182 - 3x$

⑥ $2(3n+1) + 2(?) = 8n+6$
 $6n+2 + 2(?) = 8n+6$
 $2(?) = 2n+4$
 $(?) = n+2$

⑦ $(5x^{2n} - y^{n-3})^2$
 $25x^{4n} - 10x^{2n}y^{n-3} + y^{2n-6}$

⑧ $(3a-b)(3a+b) = 9a^2 - b^2$

⑨ $a+b \overline{) 4a^4 - b^4}$
 $\underline{4a^4 + 4a^3b}$
 $-4a^3b$
 $\underline{-4a^3b - 4a^2b^2}$
 $4a^2b^2$
 $\underline{4a^2b^2 + 4ab^3}$
 $-4ab^3 - b^4$
 $\underline{-4ab^3 - 4b^4}$
 $3b^4$



⑩ $\frac{R}{\text{Jennifer } 30} \cdot \frac{T}{(t+\frac{1}{2})} = \frac{D}{30t+45}$
 $\frac{R}{\text{Sam } 40} \cdot T = 40t$
 $30t+45 + 40t = 150$
 $70t = 105 \quad t = 1\frac{1}{2} \text{ hrs}$
 $\frac{45 \text{ miles}}{30 \text{ mph}} = 1\frac{1}{2}$
 $5:00 \text{ PM}$

⑪ $(n+3)(n+7) - n(n+4) = 69$
 $(n^2+10n+21) - (n^2+4n) = 69$
 $n^2+10n+21 - n^2 - 4n = 69$
 $6n+21 = 69$
 $6n = 48$
 $n = 8 \quad n+4 = 12$
 $n+3 = 11 \quad n+7 = 15$

8 by 12 in
 11 by 15 in

⑫ $(n)(.12) = 3(10,000-n)(.08) + 48$
 $.12n = 2400 - .24n + 48$
 $.36n = 2448$
 $n = 6800$
 $10,000 - n = 3200$

\$6800 @ 12%
 \$3200 @ 8%

⑬ $(2n+2)(n+5) - n(2n+4) = 58$
 $(2n^2+12n+10) - (2n^2+4n) = 58$
 $2n^2+12n+10 - 2n^2 - 4n = 58$
 $8n = 48$
 $n = 6$
 $2n+4 = 16$
 $6 \times 16 = 96 \text{ ft}^2$

⑭ $\frac{R}{\text{To town } 36} \cdot \frac{T}{t} = \frac{D}{36t}$
 $\frac{R}{\text{From town } 48} \cdot T = 168 - 48t$

to town $\xrightarrow{36t}$
 from town $\xleftarrow{168-48t}$

$36t = 168 - 48t$
 $84t = 168$
 $t = 2$
 To Town $36t = 72 \text{ miles}$

Unit 5

EXTRA PRACTICE - ANSWER KEY

① $2xy^2 - x^2y + 4y^2 + 2x^3$
 $2x^3 - x^2y + 2xy^2 + 4y^2$

② $3abc^2 - 2a^2b^3 - ab^2$
 4 5 3

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

④ $(n-2)(n-5) = n^2 - 7n + 10$

⑤ $2x^2(3x - x^2 + 4)$
 $6x^3 - 2x^4 + 8x^2$

⑥ $(2x-3)(x^2-3x+4)$
 $2x^3 - 6x^2 + 8x$
 $-3x^2 + 9x - 12$
 $2x^3 - 9x^2 + 17x - 12$

⑦ $90 - (4n-5) = a) 95 - 4n^0$
 $180 - (4n-5) = b) 185 - 4n^0$

⑧ $(3x+2) + (4x-3) = 7x-1$
 $(8x+2) - (7x-1) = x+3$

⑨ $(3a-5)^2 = 9a^2 - 30a + 25$

⑩ $(4x+3)(4x-3) = 16x^2 - 9$

⑪ $x-y \overline{) 3x^2 - xy - 2y^2}$
 $\underline{3x^2 - 3xy}$
 $2xy - 2y^2$
 $\underline{2xy - 2y^2}$

⑫ $a-b \overline{) 5a^2 + 5ab + 5b^2 + \frac{3b^3}{a-b}}$
 $\underline{5a^3}$
 $5a^3 - 5a^2b$
 $\underline{5a^2b}$
 $5a^2b - 5ab^2$
 $\underline{5ab^2 - 2b^3}$
 $5ab^2 - 5b^3$
 $\underline{3b^3}$

⑬ $\frac{R \cdot T = D}{\text{Harry } 14 \cdot t = 14t}$
 $\text{Jack } 8 \cdot t = 8t$
 $14t - 8t = 21$
 $6t = 21$
 $t = 7/2 = 3\frac{1}{2}$
 $3:30$
 $1:15 + 3:30 = 4:45 \text{ pm}$

⑭ $\frac{R \cdot T = D}{\text{Sarah } r+8 \quad 3 = 3r+24}$
 $\text{Amber } r \quad 3 = 3r$
 $(3r+24) + 3r = 204$
 $6r = 180$
 $r = 30 \text{ mph}$

⑮ $2(n) + 2(2n-3) = 30$
 $2n + 4n - 6 = 30$
 $6n = 36$
 $n = 6$
 $2n - 3 = 9$
 $n \quad 2n-3$
 $6 \times 9 \text{ ft}$

⑯ $(n+10)(n+8) - n(n+2) = 240$
 $n^2 + 18n + 80 - n^2 - 2n = 240$
 $16n + 80 = 240$
 $16n = 160$
 $n = 10$
 $10 \times 12 \text{ in.}$
 $n+8$
 n
 $n+2$
 4

⑰ $n(n+6) - (n+4)(n-3) = 42$
 $n^2 + 6n - (n^2 + n - 12) = 42$
 $n^2 + 6n - n^2 - n + 12 = 42$
 $5n + 12 = 42$
 $n = 6$
 $6 \times 12 = 72 \text{ cm}^2$
 $n+6$
 n
 $n+4$
 $n-3$

⑱ $.06n + .08(12,000 - n) = 880$
 $.06n + 960 - .08n = 880$
 $-.02n = -80$
 $n = 4000$
 $12,000 - n = \$8000 @ 8\%$

⑲ $(a^{3x} - b^{2x-1})^2$
 $a^{6x} - 2a^{3x}b^{2x-1} + b^{4x-2}$

⑳ $\frac{R \cdot T = D}{\text{Plane 1 } 260 \text{ } \textcircled{1} 4 \text{ } 1040}$
 $\text{Plane 2 } \textcircled{3} 320 \text{ } \textcircled{2} 3\frac{1}{4} \text{ } 1040$
 $\textcircled{1} 1040 \div 260 = 4 \text{ hours}$
 $\textcircled{2} 4 - 15 \text{ min} - 30 \text{ min} = 3\frac{1}{4} \text{ hours}$
 $\textcircled{3} 1040 \div 3.25 = 320 \text{ mph}$

6.1

Answer Key



① $6a^2, 18b^2, 9b^3$

$$\begin{aligned} 6 &= 2 \cdot 3 & \text{GCF} &= 3 \\ 18 &= 2 \cdot 3^2 & \text{LCM} &= 2 \cdot 3^2 \\ 9 &= 3^2 \end{aligned}$$

$$\boxed{\text{GCF} = 3 \quad \text{LCM} = 18a^2b^3}$$

② $3ax, 10bx, 12cx$

$$\begin{aligned} 3 &= 3 & \text{GCF} &= 1 \\ 10 &= 2 \cdot 5 & \text{LCM} &= 2^2 \cdot 3 \cdot 5 \\ 12 &= 2^2 \cdot 3 \end{aligned}$$

$$\boxed{\text{GCF} = x \quad \text{LCM} = 60abcx}$$

③ $8b^4, 5c, 3a^2b$

$$\begin{aligned} 8 &= 2^3 & \text{GCF} &= 1 \\ 5 &= 5 & \text{LCM} &= 2^3 \cdot 3 \cdot 5 \\ 3 &= 3 \end{aligned}$$

$$\boxed{\text{GCF} = 1 \quad \text{LCM} = 120a^2b^4c}$$

④ $15abc, 35a^2c, 105a$

$$\begin{aligned} 15 &= 3 \cdot 5 & \text{GCF} &= 5 \\ 35 &= 5 \cdot 7 & \text{LCM} &= 3 \cdot 5 \cdot 7 \\ 105 &= 3 \cdot 5 \cdot 7 \end{aligned}$$

$$\boxed{\text{GCF} = 5a \quad \text{LCM} = 105a^2bc}$$

⑤ $8a^2b^2, 12a^3c^2, 14abc^2$

$$\begin{aligned} 8 &= 2^3 & \text{GCF} &= 2 \\ 12 &= 2^2 \cdot 3 & \text{LCM} &= 2^3 \cdot 3 \cdot 7 \\ 14 &= 2 \cdot 7 \end{aligned}$$

$$\boxed{\text{GCF} = 2a \quad \text{LCM} = 168a^3b^2c^2}$$

⑥ $20x^2yz, 12xy^3, 27xy^2z$

$$\begin{aligned} 20 &= 2^2 \cdot 5 & \text{GCF} &= 1 \\ 12 &= 2^2 \cdot 3 & \text{LCM} &= 2^2 \cdot 3^3 \cdot 5 \\ 27 &= 3^3 \end{aligned}$$

$$\boxed{\text{GCF} = xy \quad \text{LCM} = 540x^2y^3z^2}$$

⑦ $28a^4bc, 36ab^3, 21b^2c$

$$\begin{aligned} 28 &= 2^2 \cdot 7 & \text{GCF} &= 1 \\ 36 &= 2^2 \cdot 3^2 & \text{LCM} &= 2^2 \cdot 3^2 \cdot 7 \\ 21 &= 3 \cdot 7 \end{aligned}$$

$$\boxed{\text{GCF} = b \quad \text{LCM} = 252a^4b^3c}$$

⑧ $8n^3m^2, 36n^4mp^2, 24nm^3p$

$$\begin{aligned} 8 &= 2^3 & \text{GCF} &= 2^2 \\ 36 &= 2^2 \cdot 3^2 & \text{LCM} &= 2^3 \cdot 3^2 \\ 24 &= 2^3 \cdot 3 \end{aligned}$$

$$\boxed{\text{GCF} = 4nm \quad \text{LCM} = 72n^4m^3p^2}$$

⑨ $18a^2b^2, 6b, 42a^2b^3$

$$\begin{aligned} 18 &= 2 \cdot 3^2 & \text{GCF} &= 2 \cdot 3 \\ 6 &= 2 \cdot 3 & \text{LCM} &= 2 \cdot 3^2 \cdot 7 \\ 42 &= 2 \cdot 3 \cdot 7 \end{aligned}$$

$$\boxed{\text{GCF} = 6b \quad \text{LCM} = 126a^2b^3}$$

⑩ $24a^2b, 28axy, 36ay$

$$\begin{aligned} 24 &= 2^3 \cdot 3 & \text{GCF} &= 2^2 \\ 28 &= 2^2 \cdot 7 & \text{LCM} &= 2^3 \cdot 3 \cdot 7 \\ 36 &= 2^2 \cdot 3^2 \end{aligned}$$

$$\boxed{\text{GCF} = 4a \quad \text{LCM} = 504a^2bxy}$$

⑪ $60x^2y^2, 35xz^3, 28xy^4z$

$$\begin{aligned} 60 &= 2^2 \cdot 3 \cdot 5 & \text{GCF} &= 1 \\ 35 &= 5 \cdot 7 & \text{LCM} &= 2^2 \cdot 3 \cdot 5 \cdot 7 \\ 28 &= 2^2 \cdot 7 \end{aligned}$$

$$\boxed{\text{GCF} = x \quad \text{LCM} = 420x^2y^4z^3}$$

⑫ $56x^3y, 49ax^2, 8xyz$

$56 = 2^3 \cdot 7$ $49 = 7^2$ $8 = 2^3$
 $GCF = 1$ $LCM = 2^3 \cdot 7^2$

$GCF = x$ $LCM = 392ax^3yz$

⑬ $40n^3m^4, 36n^2m^2, 60n^5m^3$

$40 = 2^3 \cdot 5$ $36 = 2^2 \cdot 3^2$ $60 = 2^2 \cdot 3 \cdot 5$
 $GCF = 2^2$ $LCM = 2^3 \cdot 3^2 \cdot 5$

$GCF = 4n^2m^2$ $LCM = 360n^5m^4$

⑭ $18xyz, 30abc, 54n$

$18 = 2 \cdot 3^2$ $30 = 2 \cdot 3 \cdot 5$ $54 = 2 \cdot 3^3$
 $GCF = 2 \cdot 3$ $LCM = 2 \cdot 3^3 \cdot 5$

$GCF = 6$ $LCM = 270abcxyzn$

⑮ $24m^2n^3, 20mn^3, 28m^3n^4$

$24 = 2^3 \cdot 3$ $20 = 2^2 \cdot 5$ $28 = 2^2 \cdot 7$
 $GCF = 2^2$ $LCM = 2^3 \cdot 3 \cdot 5 \cdot 7$

$GCF = 4mn^3$ $LCM = 840m^3n^4$

⑯ $36a^2, 28b^2, 45c^2$

$36 = 2^2 \cdot 3^2$ $28 = 2^2 \cdot 7$ $45 = 3^2 \cdot 5$
 $GCF = 1$ $LCM = 2^2 \cdot 3^2 \cdot 5 \cdot 7$

$GCF = 1$ $LCM = 1260a^2b^2c^2$

6.2

Answer Key



① $3x^2y + 9y^2 + 6 = 3(x^2y + 3y^2 + 2)$

② $5a^2 + 10ab - 15b^2 = 5(a^2 + 2ab - 3b^2)$

③ $2a^3b^2 - 16a^2b^3 + 8ab = 2ab(a^2b - 8ab^2 + 4)$

④ $3x^3y + 9xy^2 + 36xy = 3xy(x^2 + 3y + 12)$

⑤ $24x^2y^2 + 12xy + x = x(24xy^2 + 12y + 1)$

⑥ $28a^2b^2c^2 + 21a^2bc^2 - 14abc = 7abc(4abc + 3ac - 2)$

⑦ $12ax + 20bx + 32cx = 4x(3a + 5b + 8c)$

⑧ $a + a^2b + a^3b^3 = a(1 + ab + a^2b^3)$

⑨ $ax^3 + 5bx^3 + 9cx^3 = x^3(a + 5b + 9c)$

⑩ $14a^3x + 19a^3y + 11a^3z = a^3(14x + 19y + 11z)$

⑪ $6x^2 - 9xy + 24x^2y^2 = 3x(2x - 3y + 8xy^2)$

⑫ $\frac{1}{2}x^2 - \frac{1}{4}ax = \frac{1}{2}x(x - \frac{1}{2}a)$ or $\frac{1}{4}x(2x - a)$

⑬ $\frac{2}{3}x + \frac{1}{3}y = \frac{1}{3}(2x + y)$ or $\frac{2}{3}(x + \frac{1}{2}y)$

⑭ $\frac{4}{5}x^2y + \frac{3}{5}y^2 = \frac{1}{5}y(4x^2 + 3y)$

⑮ $\frac{2}{5}a - \frac{2}{5}b + \frac{4}{5}c = \frac{2}{5}(a - b + 2c)$ or $2(\frac{1}{5}a - \frac{1}{5}b + \frac{2}{5}c)$

⑯ $32a^3b, 40a^2bc, 48a^2b^2c$

$32 = 2^5$ $40 = 2^3 \cdot 5$ $48 = 2^4 \cdot 3$
 $GCF = 2^3$ $LCM = 2^5 \cdot 3 \cdot 5$

$GCF = 8a^2b$ $LCM = 480a^3b^2c$

⑰ $25xy, 45x^2, 55y^2z^2$

$25 = 5^2$ GCF = 5
 $45 = 3^2 \cdot 5$ LCM = $3^2 \cdot 5^2 \cdot 11$
 $55 = 5 \cdot 11$

GCF = 5 LCM = $2475x^2y^2z^2$

⑱ $44n^3m^7, 24n^2m^6, 20n^3m^8$

$44 = 2^2 \cdot 11$ GCF = 2^2
 $24 = 2^3 \cdot 3$ LCM = $2^3 \cdot 3 \cdot 5 \cdot 11$
 $20 = 2^2 \cdot 5$

GCF = $4n^2m^6$ LCM = $1320n^3m^8$

6.3

Answer Key



- | | |
|---|--|
| ① $x^2 - y^2$ <input type="checkbox"/> yes | ⑥ $b^2 - 25$ <input type="checkbox"/> yes |
| ② $a^2 + b^2$ <input type="checkbox"/> no | ⑦ $8c^2 - 7$ <input type="checkbox"/> no |
| ③ $9x^2 - 5$ <input type="checkbox"/> no | ⑧ $a^2 - 1$ <input type="checkbox"/> yes |
| ④ $36a^2 - 49$ <input type="checkbox"/> yes | ⑨ $\frac{16}{25}x^2 + 1$ <input type="checkbox"/> no |
| ⑤ $\frac{4}{9}a^2 - \frac{1}{4}$ <input type="checkbox"/> yes | |



- ⑩ $x^2 - y^2 = (x+y)(x-y)$
- ⑪ $a^4 - b^2 = (a^2+b)(a^2-b)$
- ⑫ $x^2 - 1 = (x+1)(x-1)$
- ⑬ $a^2 - 4b^2 = (a+2b)(a-2b)$
- ⑭ $x^2 + y^2 =$ not factorable
- ⑮ $2a^2 - b^2 =$ not factorable
- ⑯ $\frac{4}{25}n^2 - \frac{1}{9}m^2 = (\frac{2}{5}n + \frac{1}{3}m)(\frac{2}{5}n - \frac{1}{3}m)$

⑰ $\frac{1}{4}c^4 - \frac{49}{100}d^2 = (\frac{1}{2}c^2 + \frac{7}{10}d)(\frac{1}{2}c^2 - \frac{7}{10}d)$

⑱ $6m^2 - 24n^2 = 6(m+2n)(m-2n)$

⑲ $5x^2 - 5y^2 = 5(x+y)(x-y)$

⑳ $3a^3 - 12ab^2 = 3a(a+2b)(a-2b)$

㉑ $x^4 - 1 = (x^2+1)(x+1)(x-1)$

㉒ $a^4 - b^4 = (a^2+b^2)(a+b)(a-b)$

㉓ $2x^8 - 2 = 2(x^4+1)(x^4-1)$
 $2(x^4+1)(x^2+1)(x+1)(x-1)$

㉔ $16ax^4 - a^5 = a(16x^4 - a^4)$
 $a(4x^2+a^2)(4x^2-a^2)$
 $a(4x^2+a^2)(2x+a)(2x-a)$

㉕ $15n^3 - 60m^2n = 15n(n^2 - 4m^2)$
 $15n(n+2m)(n-2m)$

㉖ $6a^2b - 24b^3 = 6b(a^2 - 4b^2)$
 $6b(a+2b)(a-2b)$

㉗ $2xy^4 - 162x = 2x(y^4 - 81)$
 $2x(y^2+9)(y^2-9)$
 $2x(y^2+9)(y+3)(y-3)$

㉘ $\frac{2}{3}x^2 - \frac{8}{3} = \frac{2}{3}(x^2 - 4)$
 $\frac{2}{3}(x+2)(x-2)$

㉙ $\frac{9}{2}x^2 - \frac{49}{2}y^2 = \frac{1}{2}(9x^2 - 49y^2)$
 $\frac{1}{2}(3x+7y)(3x-7y)$



$$\begin{aligned} 30) (a+b)^2 - m^2 &= [a+b+m][a+b-m] \\ &= (a+b+m)(a+b-m) \end{aligned}$$

$$\begin{aligned} 31) (x-y)^2 - y^2 &= [(x-y)+y][(x-y)-y] \\ &= x(x-2y) \end{aligned}$$

$$\begin{aligned} 32) p^2 - (m+n)^2 &= [p+(m+n)][p-(m+n)] \\ &= (p+m+n)(p-m-n) \end{aligned}$$

$$\begin{aligned} 33) a^2 - (b-c)^2 &= [a+(b-c)][a-(b-c)] \\ &= (a+b-c)(a-b+c) \end{aligned}$$

$$\begin{aligned} 34) (a+b)^2 - (a-c)^2 &= [(a+b)+(a-c)][(a+b)-(a-c)] \\ &= (2a+b-c)(b+c) \end{aligned}$$

$$\begin{aligned} 35) (x-y)^2 - (x+z)^2 &= [(x-y)+(x+z)][(x-y)-(x+z)] \\ &= (2x-y+z)(-y-z) \end{aligned}$$

$$7) a^2 + 12a + 36 = (a+6)^2$$

$$8) b^2 + 10b + 25 = (b+5)^2$$

$$9) 121y^2 + 22y + 1 = (11y+1)^2$$

$$10) 81n^2 + 36n + 4 = (9n+2)^2$$

$$11) 25b^2 - 30b + 9 = (5b-3)^2$$

$$12) 64x^2 - 72x + 81 = \text{not factorable}$$

$$13) m^2 - 16mn + 64n^2 = (m-8n)^2$$

$$14) 9x^2 - 24xy + 16y^2 = (3x-4y)^2$$

$$15) 25a^2 + 40a + 9 = \text{not factorable}$$

$$16) 144n^2 + 168n + 49 = (12n+7)^2$$

$$\begin{aligned} 17) 3x^2 + 18x + 27 &= 3(x^2 + 6x + 9) \\ &= 3(x+3)^2 \end{aligned}$$

$$\begin{aligned} 18) 2n^2 - 20n + 50 &= 2(n^2 - 10n + 25) \\ &= 2(n-5)^2 \end{aligned}$$

$$\begin{aligned} 19) 6a^2 + 24ab + 24b^2 &= 6(a^2 + 4ab + 4b^2) \\ &= 6(a+2b)^2 \end{aligned}$$

$$\begin{aligned} 20) 12a^2 + 12ab + 3b^2 &= 3(4a^2 + 4ab + b^2) \\ &= 3(2a+b)^2 \end{aligned}$$

$$\begin{aligned} 21) 3b^2 - 18bc + 27c^2 &= 3(b^2 - 6bc + 9c^2) \\ &= 3(b-3c)^2 \end{aligned}$$

$$\begin{aligned} 22) 2m^2 - 16mn + 32n^2 &= 2(m^2 - 8mn + 16n^2) \\ &= 2(m-4n)^2 \end{aligned}$$

$$\begin{aligned} 23) x^4 - 16 &= (x^2+4)(x^2-4) \\ &= (x^2+4)(x+2)(x-2) \end{aligned}$$



$$\begin{aligned} 24) 162a^5 - 32ab^4 &= 2a(81a^4 - 16b^4) \\ &= 2a(9a^2 + 4b^2)(3a+2b)(3a-2b) \end{aligned}$$

$$\begin{aligned} 25) 98x^6 - 128y^8 &= 2(49x^6 - 64y^8) \\ &= 2(7x^3 + 8y^4)(7x^3 - 8y^4) \end{aligned}$$

6.4

Answer Key

$$① a^2 + 4a + 4 \quad \boxed{\text{yes}}$$

$$② x^2 + 10x + 100 \quad \boxed{\text{no}}$$

$$③ n^2 - 18n + 36 \quad \boxed{\text{no}}$$

$$④ 4x^2 + 24x + 36 \quad \boxed{\text{yes}}$$

$$⑤ 9a^2 - 12ab + 4b^2 \quad \boxed{\text{yes}}$$

$$⑥ 25x^2 + 15xy + 9y^2 \quad \boxed{\text{no}}$$

$$\begin{aligned} 26) (2x-y)^2 - (x+4y)^2 &= [(2x-y)+(x+4y)][(2x-y)-(x+4y)] \\ &= (3x+3y)(x-5y) \\ &= 3(x+y)(x-5y) \end{aligned}$$

$$\begin{aligned} 27) (a+b)^2 - (3a-2b)^2 &= [(a+b)+(3a-2b)][(a+b)-(3a-2b)] \\ &= (4a-b)(-2a+3b) \end{aligned}$$

$$\begin{aligned} 28) 24a^2b + 8ab - 12ab^2 &= 4ab(6a+2-3b) \end{aligned}$$

$$\begin{aligned} 29) 9xy - 15x^2y^2 + 3xy^3 &= 3xy(3-5xy+y^2) \end{aligned}$$

$$\begin{aligned} 30) 6ab^2c, 15a^3c^3, 48ab^4c^2 \\ 6 = 2 \cdot 3 \quad \text{GCF} = 3 \\ 15 = 3 \cdot 5 \quad \text{LCM} = 2^3 \cdot 3 \cdot 5 \\ 48 = 2^4 \cdot 3 \end{aligned}$$

$$\text{GCF} = 3ac \quad \text{LCM} = 240a^3b^4c^3$$

6.5

Answer Key



$$1) y^2 + 12y + 27 = (y+3)(y+9)$$

$$2) x^2 + 9x + 20 = (x+4)(x+5)$$

$$3) m^2 - 12m + 27 = (m-3)(m-9)$$

$$4) b^2 - 11b + 28 = (b-7)(b-4)$$

$$5) c^2 + 3c + 6 = \text{not factorable}$$

$$6) r^2 - 12r + 20 = (r-10)(r-2)$$

$$7) a^2 + 22a + 21 = (a+21)(a+1)$$

$$8) c^2 + 10c + 20 = \text{not factorable}$$

$$9) a^2 + 5a - 50 = (a+10)(a-5)$$

$$10) b^2 + 2b - 48 = (b+8)(b-6)$$

$$11) x^2 - 10x + 39 = \text{not factorable}$$

$$12) c^2 - 2cd - 8d^2 = (c-4d)(c+2d)$$

$$13) a^2 + 2ab - 3b^2 = (a+3b)(a-b)$$

$$14) a^2 - 6ab - 32b^2 = \text{not factorable}$$

$$15) m^2 - mn - 6n^2 = (m-3n)(m+2n)$$

$$16) x^2 - 4xy - 5y^2 = (x-5y)(x+y)$$

$$\begin{aligned} 17) (a+b)^2 - 5(a+b) + 6 \\ [(a+b)-3][(a+b)-2] = (a+b-3)(a+b-2) \end{aligned}$$

$$\begin{aligned} 18) (x+y)^2 - 8(x+y) - 9 \\ [(x+y)-9][(x+y)+1] = (x+y-9)(x+y+1) \end{aligned}$$

$$\begin{aligned} 19) 3x^2 + 15x - 108 \\ 3(x^2 + 5x - 36) = 3(x+9)(x-4) \end{aligned}$$

$$\begin{aligned} 20) 5n^2 - 15n - 90 \\ 5(n^2 - 3n - 18) = 5(n-6)(n+3) \end{aligned}$$

$$\begin{aligned} 21) 4a^2 + 8ab - 12b^2 \\ 4(a^2 + 2ab - 3b^2) = 4(a+3b)(a-b) \end{aligned}$$

$$\begin{aligned} 22) 3x^2 - 3y^2 \\ 3(x^2 - y^2) = 3(x+y)(x-y) \end{aligned}$$

$$\begin{aligned} 23) 12ab^2 - 3a^3 \\ 3a(4b^2 - a^2) = 3a(2b+a)(2b-a) \end{aligned}$$

$$24) c^2 + 10c + 25 = (c+5)^2$$

$$\begin{aligned} 25) 4ab^2 - 8abc + 4ac^2 \\ 4a(b^2 - 2bc + c^2) = 4a(b-c)^2 \end{aligned}$$

$$\begin{aligned} 26) 5x^2 - 20xy + 20y^2 \\ 5(x^2 - 4xy + 4y^2) = 5(x-2y)^2 \end{aligned}$$

$$\begin{aligned} 27) (2a-3b)^2 - (a+5b)^2 \\ [(2a-3b)+(a+5b)][(2a-3b)-(a+5b)] \\ (3a+2b)(a-8b) \end{aligned}$$

$$\textcircled{28} \frac{(4x+3y)^2 - (x+y)^2}{[(4x+3y)+(x+y)][(4x+3y)-(x+y)]}$$

$$\boxed{(5x+4y)(3x+2y)}$$

$$\textcircled{29} \frac{1}{2}ab^2 + \frac{1}{4}a^2b - \frac{3}{4}ab$$

$$\boxed{\frac{1}{4}ab(2b+a-3)}$$

$$\textcircled{30} 16a^2b^3, 18abc, 15bc^3$$

$$16 = 2^4 \quad \text{GCF} = 1$$

$$18 = 2 \cdot 3^2 \quad \text{LCM} = 2^4 \cdot 3^2 \cdot 5$$

$$15 = 3 \cdot 5$$

$$\boxed{\text{GCF} = b \quad \text{LCM} = 720a^2b^3c^3}$$

6.6

Answer Key



$$\textcircled{1} a^2 - ab + 2ab - 2b^2$$

$$a(a-b) + 2b(a-b)$$

$$\boxed{(a-b)(a+2b)}$$

$$\textcircled{2} 3x^2 + 9xy - 2xy - 6y^2$$

$$3x(x+3y) - 2y(x+3y)$$

$$\boxed{(x+3y)(3x-2y)}$$

$$\textcircled{3} 4ax + 3ay + 4bx + 3by$$

$$a(4x+3y) + b(4x+3y)$$

$$\boxed{(4x+3y)(a+b)}$$

$$\textcircled{4} x^2 + 5xy + ax + 5ay$$

$$x(x+5y) + a(x+5y)$$

$$\boxed{(x+5y)(x+a)}$$

$$\textcircled{5} 4n^2 + 12nm - 2nm - 6m^2$$

$$2(2n^2 + 6nm - nm - 3m^2)$$

$$2[2n(n+3m) - m(n+3m)]$$

$$\boxed{2(n+3m)(2n-m)}$$

$$\textcircled{6} 4y^3 + 4y^2 - 4y - 4$$

$$4(y^3 + y^2 - y - 1)$$

$$4[y^2(y+1) - 1(y+1)]$$

$$4(y+1)(y^2-1) = \boxed{4(y+1)^2(y-1)}$$

$$\textcircled{7} 5x^3 + 10x^2 - 5x - 10$$

$$5(x^3 + 2x^2 - x - 2)$$

$$5[x^2(x+2) - 1(x+2)]$$

$$5(x+2)(x^2-1) = \boxed{5(x+2)(x+1)(x-1)}$$

$$\textcircled{8} 2a^3 - 2a^2b - 2ab^2 + 2b^3$$

$$2(a^3 - ab - ab^2 + b^3)$$

$$2[a^2(a-b) - b^2(a-b)]$$

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

$$\textcircled{9} ay - ab + cb - cy$$

$$a(y-b) + c(b-y)$$

$$a(y-b) - c(y-b) = \boxed{(y-b)(a-c)}$$

$$\textcircled{10} 3ax - 6bx + 8b - 4a$$

$$3x(a-2b) + 4(2b-a)$$

$$3x(a-2b) - 4(a-2b) = \boxed{(a-2b)(3x-4)}$$

$$\textcircled{11} 10a^2 - 8ab + 24b^3 - 30ab^2$$

$$2(5a^2 - 4ab + 12b^3 - 15ab^2)$$

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

$$2[a(5a-4b) - 3b^2(5a-4b)]$$

$$\boxed{2(5a-4b)(a-3b^2)}$$

$$\textcircled{12} 3x^3 - 3xy^2 + 3y^3 - 3x^2y$$

$$3(x^3 - xy^2 + y^3 - x^2y)$$

$$3[x(x^2 - y^2) + y(y^2 - x^2)]$$

$$3[x(x^2 - y^2) - y(x^2 - y^2)]$$

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

$$\textcircled{13} y^2 - 9y - 36 = \boxed{(y-12)(y+3)}$$

$$\textcircled{14} (a+b)^2 - 5(a+b) - 6$$

$$[(a+b)-6][(a+b)+1]$$

$$\boxed{(a+b-6)(a+b+1)}$$

$$\begin{aligned} 15) (x+y)^2 - 10(x+y) - 24 \\ [(x+y) - 12] [(x+y) + 2] \\ \boxed{(x+y-12)(x+y+2)} \end{aligned}$$

$$\begin{aligned} 16) 8a^2 - 32b^2 \\ 8(a^2 - 4b^2) = \boxed{8(a+2b)(a-2b)} \end{aligned}$$

$$\begin{aligned} 17) 48a^4 - 3 \\ 3(16a^4 - 1) = 3(4a^2 + 1)(4a^2 - 1) \\ \boxed{3(4a^2 + 1)(2a + 1)(2a - 1)} \end{aligned}$$

$$18) 64b^2 + 16b + 1 = \boxed{(8b+1)^2}$$

$$\begin{aligned} 19) 18a^2 - 48a + 32 \\ 2(9a^2 - 24a + 16) = \boxed{2(3a-4)^2} \end{aligned}$$

$$\begin{aligned} 20) (2n+3x)^2 - (n+x)^2 \\ [(2n+3x) + (n+x)] [(2n+3x) - (n+x)] \\ \boxed{(3n+4x)(n+2x)} \end{aligned}$$

$$\begin{aligned} 21) 20xy^2z, 24x^3y^3, 30x^2y^2z^2 \\ 20 = 2^2 \cdot 5 \quad \text{GCF} = 2 \\ 24 = 2^3 \cdot 3 \quad \text{LCM} = 2^3 \cdot 3 \cdot 5 \\ 30 = 2 \cdot 3 \cdot 5 \\ \boxed{\text{GCF} = 2xy^2 \quad \text{LCM} = 20x^3y^3z^2} \end{aligned}$$

$$\begin{aligned} 22) x^4 - x^2y^2 + 9y^2 - 9x^2 \\ x^2(x^2 - y^2) + 9(y^2 - x^2) \\ x^2(x^2 - y^2) - 9(x^2 - y^2) \\ (x^2 - y^2)(x^2 - 9) \\ \boxed{(x+y)(x-y)(x+3)(x-3)} \end{aligned}$$

$$\begin{aligned} 23) 8a^6 - 8a^2 + 2 - 2a^4 \\ 2(4a^6 - 4a^2 + 1 - a^4) \\ 2[4a^2(a^4 - 1) + 1(1 - a^4)] \\ 2[4a^2(a^2 - 1)(a^2 + 1) - 1(a^4 - 1)] \\ 2(a^4 - 1)(4a^2 - 1) \\ 2(a^2 + 1)(a^2 - 1)(2a + 1)(2a - 1) \\ \boxed{2(a^2 + 1)(a + 1)(a - 1)(2a + 1)(2a - 1)} \end{aligned}$$

6.7

Answer Key



$$\begin{aligned} 1) 4b^2 + 5b - 6 \\ 4b^2 + 8b - 3b - 6 \\ 4b(b+2) - 3(b+2) \\ \boxed{(b+2)(4b-3)} \end{aligned}$$

$$\begin{aligned} 2) 4y^2 - 17y - 15 \\ 4y^2 - 20y + 3y - 15 \\ 4y(y-5) + 3(y-5) \\ \boxed{(y-5)(4y+3)} \end{aligned}$$

$$\begin{aligned} 3) 16a^2 - 38ab - 5b^2 \\ 16a^2 - 40ab + 2ab - 5b^2 \\ 8a(2a - 5b) + b(2a - 5b) \\ \boxed{(2a - 5b)(8a + b)} \end{aligned}$$

$$\begin{aligned} 4) 20x^2 + 11xy - 4y^2 \\ 20x^2 + 16xy - 5xy - 4y^2 \\ 4x(5x + 4y) - y(5x + 4y) \\ \boxed{(5x + 4y)(4x - y)} \end{aligned}$$

$$\begin{aligned} 5) 5b^2 - 13b - 10 \\ \boxed{\text{not factorable}} \end{aligned}$$

$$\begin{aligned} 6) 15x^2 - 13xy + 2y^2 \\ 15x^2 - 10xy - 3xy + 2y^2 \\ 5x(3x - 2y) - y(3x - 2y) \\ \boxed{(3x - 2y)(5x - y)} \end{aligned}$$

$$\begin{aligned} 7) 4y^2 - 10y + 6 \\ 2(2y^2 - 5y + 3) \\ 2(2y^2 - 3y - 2y + 3) \\ 2[y(2y - 3) - 1(2y - 3)] \\ \boxed{2(2y - 3)(y - 1)} \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad & 9a^2 + 24ab + 12b^2 \\ & 3(3a^2 + 8ab + 4b^2) \\ & 3(3a^2 + 6ab + 2ab + 4b^2) \\ & 3[3a(a+2b) + 2b(a+2b)] \\ & \boxed{3(a+2b)(3a+2b)} \end{aligned}$$

$$\textcircled{9} \quad \begin{aligned} & 4xy^2 - 6x^2y + 2xy \\ & \boxed{2xy(2y - 3x + 1)} \end{aligned}$$

$$\textcircled{10} \quad \begin{aligned} & 36a^2b^2 - 12ab \\ & \boxed{12ab(3ab - 1)} \end{aligned}$$

$$\textcircled{11} \quad \begin{aligned} & 9x^4 - 16y^2 \\ & \boxed{(3x^2 + 4y)(3x^2 - 4y)} \end{aligned}$$

$$\textcircled{12} \quad \begin{aligned} & 3x^4 - 3 \\ & 3(x^4 - 1) \\ & 3(x^2 + 1)(x^2 - 1) \\ & \boxed{3(x^2 + 1)(x + 1)(x - 1)} \end{aligned}$$

$$\textcircled{13} \quad \begin{aligned} & 2a^2 - 2(a-b)^2 \\ & 2[a^2 - (a-b)^2] \\ & 2[a + (a-b)][a - (a-b)] \\ & 2(2a-b)(b) \\ & \boxed{2b(2a-b)} \end{aligned}$$

$$\textcircled{14} \quad \begin{aligned} & y^2 + 14y + 49 \\ & \boxed{(y+7)^2} \end{aligned}$$

$$\textcircled{15} \quad \begin{aligned} & 2x^2 - 20xy + 50y^2 \\ & 2(x^2 - 10xy + 25y^2) \\ & \boxed{2(x-5y)^2} \end{aligned}$$

$$\textcircled{16} \quad \begin{aligned} & 16a^2 - 12a + 9 \\ & \boxed{\text{not factorable}} \end{aligned}$$

$$\textcircled{17} \quad \begin{aligned} & t^2 + 17t + 72 \\ & \boxed{(t+8)(t+9)} \end{aligned}$$

$$\textcircled{18} \quad \begin{aligned} & 2a^3b - 24a^2b + 70ab \\ & 2ab(a^2 - 12a + 35) \\ & \boxed{2ab(a-5)(a-7)} \end{aligned}$$

$$\textcircled{19} \quad \begin{aligned} & (a+b)^2 - 2(a+b) - 8 \\ & [(a+b)-4][(a+b)+2] \\ & \boxed{(a+b-4)(a+b+2)} \end{aligned}$$

$$\textcircled{20} \quad \begin{aligned} & 3my - 3by - ab + am \\ & 3y(m-b) - a(b-m) \\ & 3y(m-b) + a(m-b) \\ & \boxed{(m-b)(3y+a)} \end{aligned}$$

$$\textcircled{21} \quad \begin{aligned} & 4ax - 4bx - 3by + 3ay \\ & 4x(a-b) - 3y(b-a) \\ & 4x(a-b) + 3y(a-b) \\ & \boxed{(a-b)(4x+3y)} \end{aligned}$$

$$\textcircled{22} \quad \begin{aligned} & 7a^2m - 7b^2m + 5b^2y - 5a^2y \\ & 7m(a^2 - b^2) + 5y(b^2 - a^2) \\ & 7m(a^2 - b^2) - 5y(a^2 - b^2) \\ & (a^2 - b^2)(7m - 5y) \\ & \boxed{(a+b)(a-b)(7m-5y)} \end{aligned}$$

$$\textcircled{23} \quad \begin{aligned} & 6ab^2 - 15ab + 9a \\ & 3a(2b^2 - 5b + 3) \\ & 3a(2b^2 - 3b - 2b + 3) \\ & 3a[b(2b-3) - 1(2b-3)] \\ & \boxed{3a(2b-3)(b-1)} \end{aligned}$$

$$\textcircled{24} \quad \begin{aligned} & 2x^2 - 7xy + 3y^2 \\ & 2x^2 - 6xy - xy + 3y^2 \\ & 2x(x-3y) - y(x-3y) \\ & \boxed{(x-3y)(2x-y)} \end{aligned}$$

$$\begin{aligned}
 & 25) 8a^2x^4 - 8a^2y^4 + 2b^2y^4 - 2b^2x^4 \\
 & 2(4a^2x^4 - 4a^2y^4 + b^2y^4 - b^2x^4) \\
 & 2[4a^2(x^4 - y^4) + b^2(y^4 - x^4)] \\
 & 2[4a^2(x^4 - y^4) - b^2(x^4 - y^4)] \\
 & 2(x^4 - y^4)(4a^2 - b^2) \\
 & 2(x^2 + y^2)(x^2 - y^2)(2a + b)(2a - b) \\
 & \boxed{2(x^2 + y^2)(x + y)(x - y)(2a + b)(2a - b)}
 \end{aligned}$$

$$\begin{aligned}
 & 26) 18a^3bc^2, 25a^2b^2c, 42a^4bc \\
 & 18 = 2 \cdot 3^2 \quad \text{GCF} = 1 \\
 & 25 = 5^2 \quad \text{LCM} = 2 \cdot 3^2 \cdot 5^2 \cdot 7 \\
 & 42 = 2 \cdot 3 \cdot 7 \\
 & \boxed{\text{GCF} = a^2bc \quad \text{LCM} = 3150a^4b^2c^2}
 \end{aligned}$$

Unit 6

REVIEW

PART I

Answer Key



$$\begin{aligned}
 & 1) 6a^3bc, 20ab^4c^2, 45b^3c \\
 & 6 = 2 \cdot 3 \quad \text{GCF} = 1 \\
 & 20 = 2^2 \cdot 5 \quad \text{LCM} = 2^2 \cdot 3^2 \cdot 5 \\
 & 45 = 3^2 \cdot 5 \\
 & \boxed{\text{GCF} = bc \quad \text{LCM} = 180a^3b^4c^2}
 \end{aligned}$$

$$\begin{aligned}
 & 2) 3x^5y - 3x + 6xy \\
 & \boxed{3x(x^4y - 1 + 2y)}
 \end{aligned}$$

$$\begin{aligned}
 & 3) 81a^4 - 16b^4 \\
 & (9a^2 + 4b^2)(9a^2 - 4b^2) \\
 & \boxed{(9a^2 + 4b^2)(3a + 2b)(3a - 2b)}
 \end{aligned}$$

$$\begin{aligned}
 & 4) 12a^2 + 12ab + 3b^2 \\
 & 3(4a^2 + 4ab + b^2) \\
 & \boxed{3(2a + b)^2}
 \end{aligned}$$

$$\begin{aligned}
 & 5) c^2 - 23c + 60 \\
 & \boxed{(c - 20)(c - 3)}
 \end{aligned}$$

$$\begin{aligned}
 & 6) (x - y)^2 - 5(x - y) - 24 \\
 & [(x - y) - 8][(x - y) + 3] \\
 & \boxed{(x - y - 8)(x - y + 3)}
 \end{aligned}$$

$$\begin{aligned}
 & 7) 2ax + 6xc + ya + 3yc \\
 & 2x(a + 3c) + y(a + 3c) \\
 & \boxed{(a + 3c)(2x + y)}
 \end{aligned}$$

$$\begin{aligned}
 & 8) ab^2 + mb^2 - 16a - 16m \\
 & b^2(a + m) - 16(a + m) \\
 & (a + m)(b^2 - 16) \\
 & \boxed{(a + m)(b + 4)(b - 4)}
 \end{aligned}$$

$$\begin{aligned}
 & 9) 3a^2 - 10ab - 8b^2 \\
 & 3a^2 - 12ab + 2ab - 8b^2 \\
 & 3a(a - 4b) + 2b(a - 4b) \\
 & \boxed{(a - 4b)(3a + 2b)}
 \end{aligned}$$

$$\begin{aligned}
 & 10) 6y^2 - 19y + 15 \\
 & 6y^2 - 9y - 10y + 15 \\
 & 3y(2y - 3) - 5(2y - 3) \\
 & \boxed{(2y - 3)(3y - 5)}
 \end{aligned}$$

$$\begin{aligned}
 & 11) 5n^2 - 30mn + 45m^2 \\
 & 5(n^2 - 6mn + 9m^2) \\
 & \boxed{5(n - 3m)^2}
 \end{aligned}$$

$$\begin{aligned}
 & 12) 5a^2 - 2a + 3 \\
 & \boxed{\text{not factorable}}
 \end{aligned}$$

$$\begin{aligned}
 & 13) 3x^2 - 3(x + y)^2 \\
 & 3[x^2 - (x + y)^2] = 3[x + (x + y)][x - (x + y)] \\
 & 3(2x + y)(-y) = \boxed{-3y(2x + y)}
 \end{aligned}$$

$$\begin{aligned} (14) \quad & 2mn^2 - 22mn + 48m \\ & 2m(n^2 - 11n + 24) \\ & \boxed{2m(n-8)(n-3)} \end{aligned}$$

$$\begin{aligned} (15) \quad & 6a^2 - 6ab + 3cb - 3ca \\ & 3(2a^2 - 2ab + cb - ca) \\ & 3[2a(a-b) + c(b-a)] \\ & 3[2a(a-b) - c(a-b)] \\ & \boxed{3(a-b)(2a-c)} \end{aligned}$$

$$\begin{aligned} (16) \quad & 3x^2 + 4x - 15 \\ & 3x^2 + 9x - 5x - 15 \\ & 3x(x+3) - 5(x+3) \\ & \boxed{(x+3)(3x-5)} \end{aligned}$$

$$\begin{aligned} (17) \quad & (a-b)^2 + 15(a-b) - 54 \\ & [(a-b)+18][a-b-3] \\ & \boxed{(a-b+18)(a-b-3)} \end{aligned}$$

$$\begin{aligned} (18) \quad & 32a^4b - 8a^2b \\ & 8a^2b(4a^2 - 1) \\ & \boxed{8a^2b(2a+1)(2a-1)} \end{aligned}$$

$$\begin{aligned} (19) \quad & 3xk^2 - 3xm^2 - 4am^2 + 4ak^2 \\ & 3x(k^2 - m^2) - 4a(m^2 - k^2) \\ & 3x(k^2 - m^2) + 4a(k^2 - m^2) \\ & (k^2 - m^2)(3x + 4a) \\ & \boxed{(k+m)(k-m)(3x+4a)} \end{aligned}$$

$$\begin{aligned} (20) \quad & 10x^2 - 14xy + 5xy - 7y^2 \\ & 2x(5x - 7y) + y(5x - 7y) \\ & \boxed{(5x-7y)(2x+y)} \end{aligned}$$

$$\begin{aligned} (21) \quad & x^2y^2 - y^2 + z^2 - x^2z^2 \\ & y^2(x^2-1) + z^2(1-x^2) \\ & y^2(x^2-1) - z^2(x^2-1) \\ & (x^2-1)(y^2-z^2) \\ & \boxed{(x+1)(x-1)(y+z)(y-z)} \end{aligned}$$

$$\begin{aligned} (22) \quad & 3y^4 - 48 \\ & 3(y^4 - 16) \\ & 3(y^2+4)(y^2-4) \\ & \boxed{3(y^2+4)(y+2)(y-2)} \end{aligned}$$

Unit 6 REVIEW PART II Answer Key



$$\begin{aligned} (23) \quad & 5x^3y^3, 15xyz, 12xy^4z^2 \\ & \begin{array}{l} 5 = 5 \\ 15 = 3 \cdot 5 \\ 12 = 2^2 \cdot 3 \end{array} \quad \begin{array}{l} \text{GCF} = 1 \\ \text{LCM} = 2^2 \cdot 3 \cdot 5 \end{array} \\ & \boxed{\text{GCF} = xy \quad \text{LCM} = 60x^3y^4z^2} \end{aligned}$$

$$\begin{aligned} (24) \quad & 18a^2b^2c^2, 25abc, 12c^3 \\ & \begin{array}{l} 18 = 2 \cdot 3^2 \\ 25 = 5^2 \\ 12 = 2^2 \cdot 3 \end{array} \quad \begin{array}{l} \text{GCF} = 1 \\ \text{LCM} = 2^2 \cdot 3^2 \cdot 5^2 \end{array} \\ & \boxed{\text{GCF} = c \quad \text{LCM} = 900a^2b^2c^3} \end{aligned}$$

$$\begin{aligned} (25) \quad & 24a^2b - 8a^4b^3c + 32a^3c \\ & \boxed{8a^2(3b - a^2b^3c + 4ac)} \end{aligned}$$

$$(26) \quad n^2 - 8n + 16 = \boxed{(n-4)^2}$$

$$(27) \quad x^2 - 6x - 27 = \boxed{(x-9)(x+3)}$$

$$\textcircled{28} \quad n^4 - m^4 = (n^2 + m^2)(n^2 - m^2)$$

$$\boxed{(n^2 + m^2)(n + m)(n - m)}$$

$$\textcircled{29} \quad 8a^2b - 10ab - 12ab + 15b$$

$$b(8a^2 - 10a - 12a + 15)$$

$$b[2a(4a - 5) - 3(4a - 5)]$$

$$\boxed{b(4a - 5)(2a - 3)}$$

$$\textcircled{30} \quad 5a^2 - 3ab + 3b^2$$

$$\boxed{\text{not factorable}}$$

$$\textcircled{31} \quad x^4 - 16y^4 = (x^2 + 4y^2)(x^2 - 4y^2)$$

$$\boxed{(x^2 + 4y^2)(x + 2y)(x - 2y)}$$

$$\textcircled{32} \quad 15a^2 - 15ab + 5b^2 - 5ab$$

$$5(3a^2 - 3ab + b^2 - ab)$$

$$5[3a(a - b) + b(b - a)]$$

$$5[3a(a - b) - b(a - b)]$$

$$\boxed{5(a - b)(3a - b)}$$

$$\textcircled{33} \quad 12x^3 + 27x^2y - 27xy^2$$

$$3x(4x^2 + 9xy - 9y^2)$$

$$3x(4x^2 + 12xy - 3xy - 9y^2)$$

$$3x[4x(x + 3y) - 3y(x + 3y)]$$

$$\boxed{3x(x + 3y)(4x - 3y)}$$

$$\textcircled{34} \quad 32a^3b^2 - 8ab^4$$

$$8ab^2(4a^2 - b^2)$$

$$\boxed{8ab^2(2a + b)(2a - b)}$$

$$\textcircled{35} \quad 36x^2 - 48xy + 16y^2$$

$$4(9x^2 - 12xy + 4y^2)$$

$$\boxed{4(3x - 2y)^2}$$

$$\textcircled{36} \quad 8a^3 - 8a^2b - 6ab + 6a^2$$

$$2a(4a^2 - 4ab - 3b + 3a)$$

$$2a[4a(a - b) - 3(b - a)]$$

$$2a[4a(a - b) + 3(a - b)]$$

$$\boxed{2a(a - b)(4a + 3)}$$

$$\textcircled{37} \quad 7n^8 - 7 = 7(n^8 - 1)$$

$$7(n^4 + 1)(n^4 - 1)$$

$$7(n^4 + 1)(n^2 + 1)(n^2 - 1)$$

$$\boxed{7(n^4 + 1)(n^2 + 1)(n + 1)(n - 1)}$$

$$\textcircled{38} \quad (x - y)^2 - 6(x - y) + 9$$

$$\boxed{(x - y - 3)^2}$$



$$\textcircled{39} \quad 7a^2 - 22ab + 3b^2$$

$$7a^2 - 21ab - ab + 3b^2$$

$$7a(a - 3b) - b(a - 3b)$$

$$\boxed{(a - 3b)(7a - b)}$$

$$\textcircled{40} \quad x^6y - x^2y^5 = x^2y(x^4 - y^4)$$

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

$$\boxed{x^2y(x^2 + y^2)(x + y)(x - y)}$$

$$\textcircled{41} \quad (2x + 3y)^2 - (x - y)^2$$

$$[(2x + 3y) + (x - y)][(2x + 3y) - (x - y)]$$

$$\boxed{(3x + 2y)(x + 4y)}$$

$$\textcircled{42} \quad 3x^2b^2 - 12x^2 + 12a^2 - 3a^2b^2$$

$$3(x^2b^2 - 4x^2 + 4a^2 - a^2b^2)$$

$$3[x^2(b^2 - 4) + a^2(4 - b^2)]$$

$$3[x^2(b^2 - 4) - a^2(b^2 - 4)]$$

$$3(b^2 - 4)(x^2 - a^2)$$

$$\boxed{3(b + 2)(b - 2)(x + a)(x - a)}$$

Unit 6

SKILL CHECK - ANSWER KEY

① $12n^3m, 30n^2m^2x, 54nm^3x^3$

$12 = 2^2 \cdot 3$
 $30 = 2 \cdot 3 \cdot 5$ GCF = $2 \cdot 3$
 $54 = 2 \cdot 3^3$ LCM = $2^2 \cdot 3^3 \cdot 5$

$GCF = 6nm$ $LCM = 540n^3m^2x^3$

② $n^2 - 12n + 35 = (n-7)(n-5)$

③ $4x^2 - 5xy - y^2 = \text{not factorable}$

④ $6xy - 3y^2 - 9xy + 18x^2$
 $3(2xy - y^2 - 3xy + 6x^2)$
 $3[y(2x-y) - 3x(y-2x)]$
 $3[y(2x-y) + 3x(2x-y)]$
 $3(2x-y)(y+3x)$

⑤ $10a^3 - 45a^2b + 20ab^2$
 $5a(2a^2 - 9ab + 4b^2)$
 $5a(2a^2 - 8ab - ab + 4b^2)$
 $5a[2a(a-4b) - b(a-4b)]$
 $5a(a-4b)(2a-b)$

⑥ $2ax - 6bx - 24b + 8a$
 $2(ax - 3bx - 12b + 4a)$
 $2[x(a-3b) - 4(3b-a)]$
 $2[x(a-3b) + 4(a-3b)]$
 $2(a-3b)(x+4)$

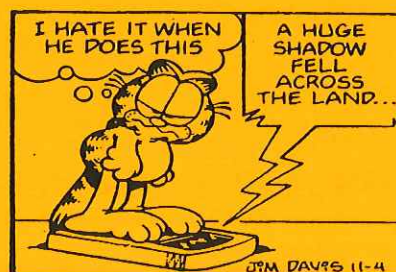
⑦ $3n^8 - 3 = 3(n^8 - 1)$
 $3(n^4 + 1)(n^4 - 1)$
 $3(n^4 + 1)(n^2 + 1)(n^2 - 1)$
 $3(n^4 + 1)(n^2 + 1)(n+1)(n-1)$

⑧ $(2x-y)^2 - 10(2x-y) + 25$
 $(2x-y-5)^2$

⑨ $(3x+2)^2 - (x-3)^2$
 $[(3x+2)+(x-3)][(3x+2)-(x-3)]$
 $(4x-1)(2x+5)$

⑩ $12a^2c^2 - 12a^2d^2 + 3x^2d^2 - 3x^2c^2$
 $3(4a^2c^2 - 4a^2d^2 + x^2d^2 - x^2c^2)$
 $3[4a^2(c^2 - d^2) + x^2(d^2 - c^2)]$
 $3[4a^2(c^2 - d^2) - x^2(c^2 - d^2)]$
 $3(c^2 - d^2)(4a^2 - x^2)$
 $3(c+d)(c-d)(2a+x)(2a-x)$

⑪ $4a^2b^2 + 12abc - 20ac^2$
 $4a(ab^2 + 3bc - 5c^2)$



Unit 6

REMEDICATION - ANSWER KEY

① $75a^6bc^3, 36ab^2c^2, 8b^3c^3$
 $75 = 3 \cdot 5^2$
 $36 = 2^2 \cdot 3^2$
 $8 = 2^3$
 $GCF = 1$
 $LCM = 2^3 \cdot 3^2 \cdot 5^2$
 $GCF = bc^2$ $LCM = 1800a^6b^3c^3$

② $n^2 + 8n - 33 = (n+11)(n-3)$

③ $7a^2 - 8ab - b^2 = \text{not factorable}$

④ $4a^2x - 12a^2 - 24a + 8ax$
 $4a(ax - 3a - 6 + 2x)$
 $4a[a(x-3) - 2(3-x)]$
 $4a[a(x-3) + 2(x-3)]$
 $4a(x-3)(a+2)$

⑤ $6n^3 - 33mn^2 + 15m^2n$
 $3n(2n^2 - 11mn + 5m^2)$
 $3n(2n^2 - 10mn - mn + 5m^2)$
 $3n[2n(n-5m) - m(n-5m)]$
 $3n(n-5m)(2n-m)$

⑥ $5ax^2 - 10bx^2 + 10by^2 - 5ay^2$
 $5(ax^2 - 2bx^2 + 2by^2 - ay^2)$
 $5[x^2(a-2b) + y^2(2b-a)]$
 $5[x^2(a-2b) - y^2(a-2b)]$
 $5(a-2b)(x^2 - y^2)$
 $5(a-2b)(x+y)(x-y)$

⑦ $5x^9 - 5x = 5x(x^8 - 1)$
 $5x(x^4 + 1)(x^4 - 1)$
 $5x(x^4 + 1)(x^2 + 1)(x^2 - 1)$
 $5x(x^4 + 1)(x^2 + 1)(x+1)(x-1)$

⑧ $(3n+2m)^2 - 14(3n+2m) + 49$
 $(3n+2m-7)^2$

⑨ $(2a-3b)^2 - (a+5b)^2$
 $[(2a-3b)+(a+5b)][(2a-3b)-(a+5b)]$
 $(3a+2b)(a-8b)$

⑩ $3a^2n^2 - 12a^2 + 48b^2 - 12b^2n^2$
 $3(a^2n^2 - 4a^2 + 16b^2 - 4b^2n^2)$
 $3[a^2(n^2-4) + 4b^2(4-n^2)]$
 $3[a^2(n^2-4) - 4b^2(n^2-4)]$
 $3(n^2-4)(a^2-4b^2)$
 $3(n+2)(n-2)(a+2b)(a-2b)$

⑪ $15xy - 9x^2yz + 21xy^3$
 $3xy(5 - 3xz + 7y^2)$



Unit 6

EXTRA PRACTICE - ANSWER KEY

$$\textcircled{1} 16x^2yz$$

$$18x^2y^3z$$

$$20x^3yz^2$$

$$16 = 2^4 \quad \text{GCF } 2$$

$$18 = 2 \cdot 3^2 \quad \text{LCM } 2^4 \cdot 3^2 \cdot 5$$

$$20 = 2^2 \cdot 5$$

$$\boxed{\text{GCF} = 2x^2y}$$

$$\boxed{\text{LCM} = 720x^3y^3z^2}$$

$$\textcircled{2} 12a^3b^2c^2$$

$$36ab^3c^2$$

$$30a^2bc$$

$$12 = 2^2 \cdot 3 \quad \text{GCF } 2 \cdot 3$$

$$36 = 2^2 \cdot 3^2 \quad \text{LCM } 2^2 \cdot 3^2 \cdot 5$$

$$30 = 2 \cdot 3 \cdot 5$$

$$\boxed{\text{GCF} = 6abc}$$

$$\boxed{\text{LCM} = 180a^3b^3c^2}$$

$$\textcircled{3} 8x^2 + 12xy^2 - 24x^3y$$

$$\boxed{4x(2x + 3y^2 - 6x^2y)}$$

$$\textcircled{4} n^2 - 10n + 25$$

$$\boxed{(n-5)^2}$$

$$\textcircled{5} x^2 - 5x - 24$$

$$\boxed{(x-8)(x+3)}$$

$$\textcircled{6} a^2 + 5ab + 6b^2$$

$$\boxed{(a+2b)(a+3b)}$$

$$\textcircled{7} a^2 - 2b^2$$

$$\boxed{\text{not factorable.}}$$

$$\textcircled{8} 12n^2 - 3n + 20n - 5$$

$$3n(4n-1) + 5(4n-1)$$

$$\boxed{(4n-1)(3n+5)}$$

$$\textcircled{9} a^4 - 16b^4$$

$$(a^2 + 4b^2)(a^2 - 4b^2)$$

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

$$\textcircled{10} 4x^2 - 12xy - 3y^2 + xy$$

$$4x(x-3y) - y(3y-x)$$

$$4x(x-3y) + y(x-3y)$$

$$\boxed{(x-3y)(4x+y)}$$

$$\textcircled{11} 8x^2 - 10xy - 3y^2$$

$$8x^2 - 12xy + 2xy - 3y^2$$

$$4x(2x-3y) + y(2x-3y)$$

$$\boxed{(2x-3y)(4x+y)}$$

$$\textcircled{12} 2a^2 - 8b^2$$

$$2(a^2 - 4b^2)$$

$$\boxed{2(a+2b)(a-2b)}$$

$$\textcircled{13} 3x^2 - 18xy + 27y^2$$

$$3(x^2 - 6xy + 9y^2)$$

$$\boxed{3(x-3y)^2}$$

$$\textcircled{14} 6a^2 - 16ab + 8b^2$$

$$2(3a^2 - 8ab + 4b^2)$$

$$2[3a^2 - 6ab - 2ab + 4b^2]$$

$$2[3a(a-2b) - 2b(a-2b)]$$

$$\boxed{2(a-2b)(3a-2b)}$$

$$\textcircled{15} 6n^5 - 6n$$

$$6n(n^4 - 1)$$

$$6n(n^2 + 1)(n^2 - 1)$$

$$\boxed{6n(n^2 + 1)(n+1)(n-1)}$$

$$\textcircled{19} (3x+y)^2 - (2x-5y)^2$$

$$[(3x+y) + (2x-5y)][(3x+y) - (2x-5y)]$$

$$(3x+y+2x-5y)(3x+y-2x+5y) = \boxed{(5x-4y)(x+6y)}$$

$$\textcircled{20} 3x^2a^2 - 3a^2y^2 + 12y^2b^2 - 12b^2x^2$$

$$3(x^2a^2 - a^2y^2 + 4y^2b^2 - 4b^2x^2)$$

$$3[a^2(x^2 - y^2) + 4b^2(y^2 - x^2)]$$

$$3[a^2(x^2 - y^2) - 4b^2(x^2 - y^2)]$$

$$3(x^2 - y^2)(a^2 - 4b^2) = \boxed{3(x+y)(x-y)(a+2b)(a-2b)}$$



Cumulative Review

"A"

Cumulative Review Answer Key

① Associative Property of Addition

② Transitive Property of Equality

$$\textcircled{3} \frac{2x - 3xy^2}{y^3 + 3xy} = \frac{2(-3) - 3(-3)(-2)^2}{(-2)^3 + 3(-3)(-2)}$$

$$\frac{(-6) - (-36)}{(-8) + (18)} = \frac{30}{10} = \boxed{3}$$

$$\textcircled{4} 4n - 3(2n - 1) = 1 - 3n$$

$$4n - 6n + 3 = 1 - 3n$$

$$-2n + 3 = 1 - 3n$$

$$\boxed{n = -2}$$

$$\textcircled{5} 4xy - 3ab = 3(x+y)$$

$$4xy - 3ab = 3x + 3y$$

$$4xy - 3x = 3y + 3ab$$

$$\boxed{x = \frac{3y + 3ab}{4y - 3} \text{ for } 4y - 3 \neq 0}$$

$$\textcircled{6} 3n - \frac{2n}{5} < 5(n-4) - 4$$

$$5\left[3n - \frac{2n}{5} < 5n - 20 - 4\right]$$

$$15n - 2n < 25n - 120$$

$$-12n < -120 \quad \boxed{n > 10}$$

$$\textcircled{7} 2n - 3 < 7 \text{ or } 3n + 4 > 10$$

$$2n < -4 \text{ or } 3n > 6$$

$$\boxed{n < -2 \text{ or } n > 2}$$



$$\textcircled{8} |2a - 8| + 4 \leq 12$$

$$|2a - 8| \leq 8$$

$$2a - 8 \leq 8 \text{ and } 2a - 8 \geq -8$$

$$2a \leq 16 \text{ and } 2a \geq 0$$

$$a \leq 8 \text{ and } a \geq 0$$



$$\textcircled{9} 2xy(x - 3y) - 3y(x^2 + xy)$$

$$2x^2y - 6xy^2 - 3x^2y - 3xy^2$$

$$\boxed{-x^2y - 9xy^2}$$

$$\textcircled{10} (-3a^2b^2)^3 - 2a^{11}b^{-1}(ab)^{-5}$$

$$-27a^6b^{-6} - 2a^{11}b^{-1}(a^{-5}b^{-5})$$

$$-27a^6b^{-6} - 2a^6b^{-6}$$

$$-29a^6b^{-6}$$

$$\boxed{\frac{-29a^6}{b^6}}$$



$$\textcircled{11} \frac{-6x^3y^{-2}z^{-4}}{8x^5y^{-1}z^3} = \boxed{\frac{-3}{4x^2yz^7}}$$

$$\textcircled{12} \frac{2n^{3x}}{n^{x+2}} = 2n^{3x - (x+2)} = \boxed{2n^{2x-2}}$$

$$\textcircled{13} (2x+3)(5x-4)$$

$$10x^2 - 8x + 15x - 12 = \boxed{10x^2 + 7x - 12}$$

$$\textcircled{14} a + b \left[\begin{array}{r} 3a^2 - 3ab + 3b^2 - 5b^3 / a + b \\ 3a^3 \quad \quad \quad \quad \quad \quad - 2b^3 \\ \hline 3a^3 + 3a^2b \\ - 3a^2b \\ \hline - 3a^2b - 3ab^2 \\ \hline 3ab^2 - 2b^3 \\ 3ab^2 + 3b^3 \\ \hline - 5b^3 \end{array} \right]$$



$$\textcircled{15} \frac{.064 \times 10^{-7}}{.8 \times 10^{-2}} = .08 \times 10^{-5} = \boxed{8 \times 10^{-7}}$$

⑩ $14a^2b, 60abc^2, 100abc^2$

$14 = 2 \cdot 7$
 $60 = 2^2 \cdot 3 \cdot 5$
 $100 = 2^2 \cdot 5^2$
 $GCF = 2$
 $LCM = 2^2 \cdot 3 \cdot 5^2 \cdot 7$

$GCF = 2ab$ $LCM = 2100a^2b^3c^2$

⑪ $16xy^4 - x^5$

$x(16y^4 - x^4)$

$x(4y^2 + x^2)(4y^2 - x^2)$

$x(4y^2 + x^2)(2y + x)(2y - x)$

⑫ $12a^2 + 10ab - 8b^2$

$2(6a^2 + 5ab - 4b^2)$

$2(6a^2 + 8ab - 3ab - 4b^2)$

$2[2a(3a + 4b) - b(3a + 4b)]$

$2(3a + 4b)(2a - b)$

⑬ $(3a + 2b)^2 - (a - 5b)^2$

$[(3a + 2b) + (a - 5b)][(3a + 2b) - (a - 5b)]$

$(4a - 3b)(2a + 7b)$

⑭ $a^2x^2 - 4a^2y^2 + 36y^2 - 9x^2$

$a^2(x^2 - 4y^2) + 9(4y^2 - x^2)$

$a^2(x^2 - 4y^2) - 9(x^2 - 4y^2)$

$(x^2 - 4y^2)(a^2 - 9)$

$(x + 2y)(x - 2y)(a + 3)(a - 3)$

⑮ $(4n + 4) - (n - 2) = 39$

$3n + 6 = 39$

$3n = 33$ $n = 11$

⑯ $.055n + 3(275) = 1056$

$.055n + 825 = 1056$

$.055n = 231$

$n = 4200$

$\$4200$

⑰ n

1	3	5
3	5	7

$-6 < (n) + (n + 2) < 14$

$-6 < 2n + 2 < 14$ ← subtract 2

$-8 < 2n < 12$ ← divide by 2

$-4 < n < 6$

positive, odd → 1, 3, 5

⑱ nickels = x

dimes = $x + 2$

quarters = $24 - (x + 2) = 22 - 2x$

$5x + 10(x + 2) + 25(22 - 2x) = 220$

$5x + 10x + 20 + 550 - 50x = 220$

$570 - 35x = 220$

$-35x = -350$

$x = 10$

$x + 2 = 12$ dimes

⑲ $\frac{\text{after tax}}{\text{org price}} = \frac{25.97}{n} = \frac{106}{100}$

$106n = 2597$

$n = 24.5$

$\$24.50$

⑳ $(.2)(10) + (.6)(n) = (.5)(10 + n)$

$2 + .6n = 5 + .5n$

$.1n = 3$

$n = 30$

30¢

㉑

	now	2 ago	in 4
Liz	$3n$	$3n - 2$	
Jen	$4n$		$4n + 4$

$2(3n - 2) = 4n + 4$

$6n - 4 = 4n + 4$

$2n = 8$

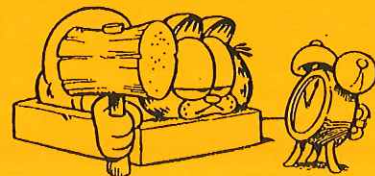
$n = 4$

Liz $(3n) = 12$

Jen $(4n) = 16$

$16 - 12 = 4$

4 yrs older



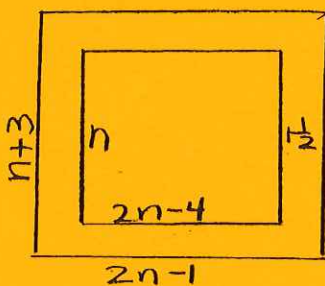
②⑧ $\frac{R}{\text{Kevin } 36} \cdot \frac{T}{t} = \frac{D}{36t}$
 $\frac{R}{\text{Joe } 48} \cdot \frac{T}{(t-\frac{3}{4})} = \frac{D}{48t-36}$

K $\frac{36t}{48t-36} \rightarrow 36t = 48t - 36$
 J $\frac{36t}{48t-36} \rightarrow -12t = -36$
 $t = 3$

Kevin arrives: $1:00 + 3 \text{ hrs} = 4:00$
 Joe (15 min earlier): $\boxed{3:45 \text{ PM}}$

②⑨ $(2n-1)(n+3) - n(2n-4) = 51$
 $(2n^2 + 5n - 3) - (2n^2 - 4n) = 51$
 $9n - 3 = 51$
 $9n = 54$
 $n = 6$
 $n+3 = 9$
 $2n-1 = 11$

$\boxed{9 \text{ by } 11 \text{ inches}}$



③⑩ $2(.08)(n) = (.10)(10,400 - n)$
 $.16n = 1040 - .1n$
 $.26n = 1040$
 $n = 4000$ $\boxed{\$4000 @ 8\%}$

"B"

Cumulative Review Answer Key

① Symmetric Property of Equality

② Multiplicative Inverse

③ $4ab - 2a^3bc$
 $4(-1)(-2) - 2(-1)^3(-2)(2)$
 $(8) - (8) = \boxed{0}$

④ $3x - \frac{x}{4} = 2(x-1) - 7$
 $\left[3x - \frac{x}{4} = 2x - 2 - 7\right] \cdot 4$
 $12x - x = 8x - 36$
 $3x = -36$
 $\boxed{x = -12}$



⑤ $4ab + 3n = m(n-2)$
 $4ab + 3n = mn - 2m$
 $3n - mn = -2m - 4ab$
 $n(3-m) = -2m - 4ab$

$\boxed{n = \frac{-2m - 4ab}{3-m} \text{ for } m \neq 3}$

⑥ $\frac{3x+4}{7} \geq \frac{2(x+3)}{3}$

$\frac{3x+4}{7} \geq \frac{2x+6}{3}$

$3(3x+4) \geq 7(2x+6)$

$9x+12 \geq 14x+42$

$-5x \geq 30$

$\boxed{x \leq -6}$

⑦ $n+4 < 2n+6 \leq 9-n$

subtract 6

$n-2 < 2n \leq 3-n$

$n-2 < 2n$ and $2n \leq 3-n$

$-2 < n$ and $3n \leq 3$

$-2 < n$ and $n \leq 1$

$\boxed{-2 < n \leq 1}$ 

⑧ $|4x-2| > 10$

$4x-2 > 10$ or $4x-2 < -10$

$4x > 12$ or $4x < -8$

$\boxed{x > 3 \text{ or } x < -2}$



$$\textcircled{9} \begin{aligned} &2a(a-b) - a^2(b+1) - ab \\ &2a^2 - 2ab - a^2b - a^2 - ab \\ &\boxed{a^2 - a^2b - 3ab} \end{aligned}$$

$$\textcircled{10} \begin{aligned} &(-4a^2b)^3 \left(\frac{1}{2}a^{-3}b^2\right)^3 \\ &(-64a^6b^3) \left(\frac{1}{8}a^{-9}b^6\right) \\ &-8a^{-3}b^9 \\ &\boxed{\frac{-8b^9}{a^3}} \end{aligned}$$

$$\textcircled{11} \frac{-12a^2b^{-3}c^{-1}d^{-4}}{9ab^{-5}cd^{-2}} = \boxed{\frac{4ab^2}{3c^2d^2}}$$

$$\textcircled{12} \frac{4ab^{3n-1}}{2b^{n+4}} = \boxed{2ab^{2n-5}}$$

$$\textcircled{13} \begin{aligned} &(4x+y)(2x-3y) \\ &8x^2 - 12xy + 2xy - 3y^2 \\ &\boxed{8x^2 - 10xy - 3y^2} \end{aligned}$$

$$\textcircled{14} \begin{array}{r} x^3 - 2x^2y + 4xy^2 - 8y^3 + \frac{15y^4}{x+2y} \\ \hline x+2y \overline{) \begin{array}{r} x^4 \\ -x^4 + 2x^3y \\ \hline -2x^2y - 4xy^2 \\ \hline 4x^2y^2 \\ \hline 4x^2y^2 + 8xy^3 \\ \hline -8xy^3 - 16y^4 \\ \hline -8xy^3 - 16y^4 \\ \hline 15y^4 \end{array} } \end{array}$$



$$\textcircled{15} (2.5 \times 10^3)(8.2 \times 10^{-8}) = \boxed{2.05 \times 10^{-4}}$$

$$\textcircled{16} \begin{aligned} &15x^2y, 50xyz, 21yz^2 \\ &15 = 3 \cdot 5 \quad \text{GCF} = 1 \\ &50 = 2 \cdot 5^2 \quad \text{LCM} = 2 \cdot 3 \cdot 5^2 \cdot 7 \\ &21 = 3 \cdot 7 \\ &\boxed{\text{GCF} = y \quad \text{LCM} = 1050x^2yz^2} \end{aligned}$$

$$\textcircled{17} \begin{aligned} &3a^8 - 3 = 3(a^8 - 1) \\ &3(a^4 + 1)(a^4 - 1) \\ &3(a^4 + 1)(a^2 + 1)(a^2 - 1) \\ &\boxed{3(a^4 + 1)(a^2 + 1)(a + 1)(a - 1)} \end{aligned}$$

$$\textcircled{18} \begin{aligned} &3a^3 - 13a^2b + 12ab^2 \\ &a(3a^2 - 13ab + 12b^2) \\ &a(3a^2 - 9ab - 4ab + 12b^2) \\ &a[3a(a - 3b) - 4b(a - 3b)] \\ &\boxed{a(a - 3b)(3a - 4b)} \end{aligned}$$

$$\textcircled{19} (a+b)^2 - 6(a+b) + 9 = \boxed{(a+b-3)^2}$$

$$\textcircled{20} \begin{aligned} &18ny^2 - 9my^2 + 4mx^2 - 8nx^2 \\ &9y^2(2n-m) + 4x^2(m-2n) \\ &9y^2(2n-m) - 4x^2(2n-m) \\ &(2n-m)(9y^2 - 4x^2) \\ &\boxed{(2n-m)(3y+2x)(3y-2x)} \end{aligned}$$

$$\textcircled{21} \begin{array}{r} n \\ n+2 \quad \boxed{9} \leftarrow \\ n+4 \quad 11 \end{array} \leftarrow$$

$$\begin{aligned} &(n+4) - (2n-6) = 3 \\ &n+4 - 2n+6 = 3 \\ &-n = -7 \\ &n = 7 \end{aligned}$$

$$\textcircled{22} \begin{aligned} &.0825n + 2(190) = 617.6 \\ &.0825n + 380 = 617.6 \\ &.0825n = 237.6 \\ &n = 2880 \quad \boxed{\$2880} \end{aligned}$$

$$\textcircled{23} \begin{aligned} &n = \text{even integer} \\ &12 < 2n - 3 < 20 \\ &15 < 2n < 23 \\ &\frac{15}{2} < n < \frac{23}{2} \\ &n \text{ is between } 7\frac{1}{2} \text{ and } 11\frac{1}{2} \\ &n = \boxed{8, 10} \end{aligned}$$

(24) nickels = x
 dimes = $22-3x$
 quarters = $2x$
 $5x + 10(22-3x) + 25(2x) = 370$
 $5x + 220 - 30x + 50x = 370$
 $25x = 150$
 $x = 6$
 dimes $(22-3x) = \boxed{4 \text{ dimes}}$

(25) after tax $\frac{20.58}{n} = \frac{105}{100}$
 org price
 $105n = 2058$
 $n = 19.6$ $\boxed{\$19.60}$

(26) $(.3)(40) - (0)(n) = (.75)(40-n)$
 $12 = 30 - .75n$
 $-18 = -.75n$
 $n = 24$ $\boxed{24 \text{ ml}}$

(27)

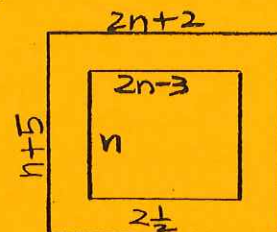
	now	in 3	in 4
Mark	$2n$		$2n+4$
Brad	$3n$	$3n+3$	

 $5(2n+4) = 4(3n+3)$
 $10n+20 = 12n+12$
 $-2n = -8$
 $n = 4$
 Brad $(3n) = \boxed{12 \text{ yrs old}}$

(28) Sue $\frac{R}{30} \cdot \frac{T}{2\frac{1}{2}} = \frac{D}{75}$
 Ellen $r \cdot 1\frac{3}{4} = \frac{7}{4}r$
 $\frac{7r}{4} + 75 = 145$
 $\frac{7r}{4} = 70$ $7r = 280$ $r = \boxed{40 \text{ mph}}$

(29) $(2n+2)(n+5) - n(2n-3) = 85$
 $(2n^2+12n+10) - (2n^2-3n) = 85$
 $2n^2+12n+10-2n^2+3n = 85$
 $15n+10 = 85$
 $15n = 75$
 $n = 5$
 $2n-3 = 7$

$\boxed{5 \text{ by } 7 \text{ inches}}$



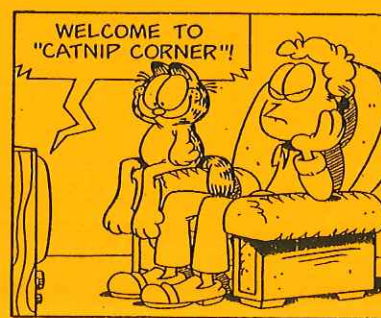
(30) $(.15)(n) = (.10)(10,800-n) + 120$
 $.15n = 1080 - .1n + 120$
 $.25n = 1200$
 $n = 4800$
 $10,800 - n = 6000$

$\boxed{\$4800 @ 15\% \quad \$6000 @ 10\%}$

"C"

Cumulative Review Answer Key

- ① Substitution Property of Equality
- ② Additive Inverse
- ③ $4mn^2(3n-m)^2$
 $4(-2)(1)^2 [3(-1) - (-2)]^2$
 $(-8) [(-3) + (2)]^2$
 $(-8)(-1)^2 = (-8)(1) = \boxed{-8}$



$$\textcircled{4} 2(2x+4)-3 = 3x - \frac{x}{4}$$

$$4x+8-3 = 3x - \frac{x}{4}$$

$$4\left[4x+5 = 3x - \frac{x}{4}\right]$$

$$16x+20 = 12x-x$$

$$16x+20 = 11x$$

$$5x = -20 \quad \boxed{x = -4}$$

$$\textcircled{5} 4y(x+3) = xy^2 - 1$$

$$4xy + 12y = xy^2 - 1$$

$$4xy - xy^2 = -12y - 1$$

$$x(4y - y^2) = -12y - 1$$

$$\boxed{x = \frac{-12y-1}{4y-y^2} \text{ for } 4y-y^2 \neq 0}$$

$$\textcircled{6} \frac{4n-5}{3} > 5(n-4)$$

$$\frac{4n-5}{3} > 5n-20$$

$$4n-5 > 15n-60$$

$$-11n > -55$$

$$\boxed{n < 5}$$

$$\textcircled{7} 2n-3 > 11 \text{ or } 4-3n < 10$$

$$2n > 14 \text{ or } -3n < 6$$

$$n > 7 \text{ or } n > -2$$

Since $n > -2$ includes all solutions of $n > 7$, only $n > -2$ should be indicated as the answer

$$\boxed{n > -2} \leftarrow \begin{array}{c} \circ \\ -2 \end{array} \longrightarrow$$

$$\textcircled{8} |x-4| - 3 \leq 13$$

$$|x-4| \leq 16$$

$$x-4 \leq 16 \text{ and } x-4 \geq -16$$

$$x \leq 20 \text{ and } x \geq -12$$

$$\boxed{-12 \leq x \leq 20}$$

$$\leftarrow \begin{array}{c} \bullet \\ -12 \end{array} \text{---} \begin{array}{c} \bullet \\ 20 \end{array} \longrightarrow$$

$$\textcircled{9} 4ab - 2a(b-3a) - 4a^2 + ab$$

$$4ab - 2ab + 6a^2 - 4a^2 + ab$$

$$\boxed{3ab + 2a^2}$$

$$\textcircled{10} \left(-\frac{1}{3}x^2y^{-1}\right)^3 (9x^{-2}y^4)^2$$

$$\left(-\frac{1}{27}x^6y^{-3}\right) (81x^{-4}y^8) = \boxed{-3x^2y^5}$$

$$\textcircled{11} \frac{-6a^3b^2c^{-4}d^{-3}}{-8a^2b^{-5}c^3d^{-6}} = \boxed{\frac{3ab^7d^3}{4c^7}}$$

$$\textcircled{12} \frac{2x^2y^{4n+3}}{xy^{n-2}}$$

$$2xy^{(4n+3)-(n-2)} = \boxed{2xy^{3n+5}}$$

$$\textcircled{13} (3n-2m)(n-8m)$$

$$3n^2 - 24mn - 2mn + 16m^2$$

$$\boxed{3n^2 - 26mn + 16m^2}$$

$\textcircled{14}$

$$2a+b \overline{) \begin{array}{r} 4a^2 - 2ab + b^2 - \frac{2b^3}{2a+b} \\ 8a^3 \\ \hline 8a^3 + 4a^2b \end{array}}$$

$$-4a^2b$$

$$-4a^2b - 2ab^2$$

$$2ab^2 - b^3$$

$$2ab^2 + b^3$$

$$-2b^3$$



$$\textcircled{15} \frac{3.5 \times 10^5}{.007 \times 10^{-2}} = 500 \times 10^7 = \boxed{5 \times 10^9}$$

$$\textcircled{16} 16a^3b, 24a^2b^2, 100a^4b$$

$$16 = 2^4$$

$$24 = 2^3 \cdot 3$$

$$100 = 2^2 \cdot 5^2$$

$$\text{GCF} = 2^2$$

$$\text{LCM} = 2^4 \cdot 3 \cdot 5^2$$

$$\boxed{\text{GCF} = 4a^2b \quad \text{LCM} = 1200a^4b^2}$$

$$\textcircled{17} 16n^5 - m^4n = n(16n^4 - m^4)$$

$$n(4n^2 + m^2)(4n^2 - m^2)$$

$$\boxed{n(4n^2 + m^2)(2n + m)(2n - m)}$$

$$\begin{aligned} (18) & -6x^2 - 22xy + 8y^2 \\ & -2(3x^2 + 11xy - 4y^2) \\ & -2(3x^2 + 12xy - xy - 4y^2) \\ & -2[3x(x+4y) - y(x+4y)] \\ & \boxed{-2(x+4y)(3x-y)} \end{aligned}$$

$$\begin{aligned} (19) & (3n-2m)^2 - (n+5m)^2 \\ & [(3n-2m) + (n+5m)][(3n-2m) - (n+5m)] \\ & \boxed{(4n+3m)(2n-7m)} \end{aligned}$$

$$\begin{aligned} (20) & 16a^4 - 16b^4 + x^4b^4 - x^4a^4 \\ & 16(a^4 - b^4) + x^4(b^4 - a^4) \\ & 16(a^4 - b^4) - x^4(a^4 - b^4) \\ & (a^4 - b^4)(16 - x^4) \\ & (a^2 + b^2)(a^2 - b^2)(4 + x^2)(4 - x^2) \\ & \boxed{(a^2 + b^2)(a + b)(a - b)(4 + x^2)(2 + x)(2 - x)} \end{aligned}$$

$$\begin{aligned} (21) & n \quad -6 \quad \leftarrow \\ & n+2 \quad \boxed{-4} \quad \leftarrow \\ & [3(n+2) + 2] - (n-1) = -3 \\ & (3n+8) - (n-1) = -3 \\ & 2n+9 = -3 \\ & 2n = -12 \quad n = -6 \end{aligned}$$

$$\begin{aligned} (22) & .065n + 4(230) = 1560.90 \\ & .065n + 920 = 1560.90 \\ & .065n = 640.9 \\ & n = 9860 \\ & \boxed{\$9860} \end{aligned}$$

$$\begin{aligned} (23) & -18 < 3n + 4 < 10 \\ & \text{subtract 4:} \\ & -22 < 3n < 6 \\ & \text{divide by 3:} \\ & \frac{-22}{3} < n < 2 \\ & \text{negative, odd} \end{aligned} \quad \begin{array}{|c|} \hline -7 \\ -5 \\ -3 \\ -1 \\ \hline \end{array}$$

$$\begin{aligned} (24) & \text{nickels} = 30 - (2n+4) = 26-2n \\ & \text{dimes} = n \\ & \text{quarters} = n+4 \\ & 5(26-2n) + 10n + 25(n+4) = 455 \\ & 130 - 10n + 10n + 25n + 100 = 455 \\ & 25n = 225 \\ & n = 9 \\ & 26 - 2n = \boxed{8 \text{ nickels}} \end{aligned}$$

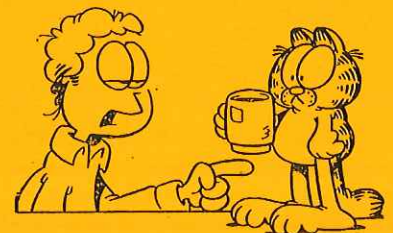
$$\begin{aligned} (25) & \frac{\text{after tax}}{\text{org price}} = \frac{45.05}{n} = \frac{106}{100} \\ & 106n = 4505 \\ & n = 42.5 \quad \boxed{\$42.50} \end{aligned}$$

$$\begin{aligned} (26) & (.60)(12) + (.20)(n) = (.25)(12+n) \\ & 7.2 + .2n = 3 + .25n \\ & -.05n = -4.2 \\ & n = 84 \\ & \boxed{84 \text{ kg}} \end{aligned}$$

	now	4 ago	in 4
Beth	3n	3n-4	
Marla	5n		5n+4

$$\begin{aligned} & 3(3n-4) = 5n+4 \\ & 9n-12 = 5n+4 \\ & 4n = 16 \\ & n = 4 \\ & \text{Beth } 3n = 12 \\ & \text{Marla } 5n = 20 \end{aligned} \quad \boxed{\text{Marla is 8 years older}}$$

$$\begin{aligned} (28) & \frac{R}{48} \cdot \frac{T}{t} = \frac{D}{48t} \\ & \text{Charlie } 48 \cdot t = 48t \\ & \text{Emilio } 40 \cdot (t+1) = 40t+40 \\ & 48t = 40t+40 \\ & 8t = 40 \\ & t = 5 \\ & 48t = 240 \\ & \text{distance is} \\ & \boxed{240 \text{ miles}} \end{aligned}$$



$$\textcircled{29} (2n+6)(n+4) - (n)(2n+2) = 84$$

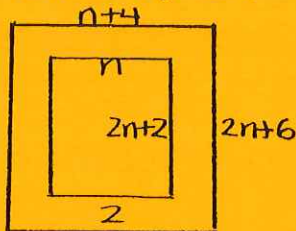
$$(2n^2 + 14n + 24) - (2n^2 + 2n) = 84$$

$$12n = 60$$

$$n = 5$$

$$2n+2=12$$

5 by 12
feet



$$\textcircled{30} (.08)(n) = (.12)(8000 - n)$$

$$.08 = 960 - .12n$$

$$.2n = 960$$

$$n = 4800$$

$$8000 - 4800 = 3200$$

\$4800 @ 8%

\$3200 @ 12%

Quarterly Exam #2

REMEDICATION & EXTRA PRACTICE - Key

① Closure
Multiplicative Inverse

$$\textcircled{2} 4xy^2 - 2x^3$$

$$4(-1)(-3)^2 - 2(-1)^3$$

$$4(-1)(9) - 2(-1)$$

$$(-36) - (-2)$$

$$(-36) + (2) = -34$$

$$3xy - x^2y^2$$

$$3(-1)(-3) - (-1)^2(-3)^2$$

$$3(-1)(-3) - (1)(9)$$

$$(9) - (9) = 0$$



$$\textcircled{3} 4x - 3y = 5xy + y^2$$

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

$$x(4 - 5y) = 3y + y^2$$

$$x = \frac{3y + y^2}{4 - 5y} \text{ for } y \neq -\frac{4}{5}$$

$$2y + x = 3xy + 7$$

$$x - 3xy = 7 - 2y$$

$$x(1 - 3y) = 7 - 2y$$

$$x = \frac{7 - 2y}{1 - 3y} \text{ for } y \neq \frac{1}{3}$$

$$4(3n - \frac{2n}{4}) \leq 5n + 10$$

$$12n - 2n \leq 20n + 40$$

$$10n \leq 20n + 40$$

$$-10n \leq 40$$

$$n \geq -4$$

$$\frac{4n}{6} > 4 - 2(2n - 5)$$

$$\frac{4n}{6} > 4 - 4n + 10$$

$$\frac{4n}{6} > 14 - 4n$$

$$6(\frac{4n}{6} > 14 - 4n)$$

$$4n > 84 - 24n$$

$$28n > 84$$

$$n > 3$$

$$\textcircled{5} |2n - 7| - 3 > 2$$

$$|2n - 7| > 5$$

$$2n - 7 > 5 \text{ or } 2n - 7 < -5$$

$$2n > 12 \text{ or } 2n < 2$$

$$n > 6 \text{ or } n < 1$$



$$5 + |2n - 1| \leq 6$$

$$|2n - 1| \leq 1$$

$$2n - 1 \leq 1 \text{ and } 2n - 1 \geq -1$$

$$\textcircled{4} 3n - \frac{2n}{4} \leq 5(n+2)$$

$$3n - \frac{2n}{4} \leq 5n + 10$$

$$2n \leq 2 \quad \text{and} \quad 2n \geq 0$$

$$n \leq 1 \quad \quad \quad n \geq 0$$

$$0 \leq n \leq 1$$



⑥ $2a(b+3a) - a(a-4b)$
 $2ab + 6a^2 - a^2 + 4ab$
 $6ab + 5a^2$

$$3x(x-2y) - 4(x^2-3xy)$$

$$3x^2 - 6xy - 4x^2 + 12xy$$

$$-x^2 + 6xy$$

⑦ $(-\frac{1}{3}a^2b^{-3})^2 (-3a^{-3}b)^3$
 $(\frac{1}{9}a^4b^{-6})(-27a^{-9}b^3)$
 $-3a^{-5}b^{-3} = \frac{-3}{a^5b^3}$

$$(x^{-2}y^3z^{-1})^{-2} (x^2yz^{-3})^2$$

$$(x^4y^{-6}z^2)(x^4y^2z^{-6})$$

$$x^8y^{-4}z^{-4} = \frac{x^8}{y^4z^4}$$

⑧ $\frac{-12a^3b^{-2}c}{-18a^{-5}bc^{-2}} = \frac{2a^8c^3}{3b^3}$

$$\frac{4x^2y^{-3}z^{-1}}{-2x^{-3}y^{-5}z} = \frac{-2x^5y^2}{z^2}$$

⑨ $(n+5)(2n-4) = 2n^2 + 6n - 20$
 $(3x-y)(2x-5y) = 6x^2 - 17xy + 5y^2$

⑩ $a-b \overline{) 5a^2 + 5ab + 5b^2} \begin{array}{r} \frac{9b^3}{a-b} \\ 5a^2 \\ \underline{5a^2 - 5a^2b} \\ 5a^2b - 5ab^2 \\ \underline{5ab^2 + 4b^3} \\ 5ab^2 - 5b^3 \\ \underline{9b^3} \end{array}$

$$2x+y \overline{) \begin{array}{r} 3x^2 + 5xy + 3y^2 - 11y^3 \\ 6x^3 + 13x^2y + 11xy^2 - 8y^3 \\ \underline{6x^3 + 3x^2y} \\ 10x^2y + 11xy^2 \\ \underline{10x^2y + 5xy^2} \\ 6xy^2 - 8y^3 \\ \underline{6xy^2 + 3y^3} \\ -11y^3 \end{array}}$$



⑪ $\frac{560 \times 10^{-2}}{.08 \times 10^5}$
 $7000 \times 10^{-7} = 7 \times 10^{-4}$

$$\frac{.32 \times 10^{-6}}{25 \times 10^3}$$

$$.0128 \times 10^{-9} = 1.28 \times 10^{-11}$$

⑫ $12a^2b^3c^4 \quad 2^2 \cdot 3$
 $28a^2b^2c^5 \quad 2^2 \quad \cdot 7$
 $30a^3b^4c^2 \quad 2 \cdot 3 \cdot 5$
 GCF = $2ab^2c^2$ LCM = $420a^3b^4c^5$

$$9x^3y \quad 3^2$$

$$25x^2yz \quad 5^2$$

$$12y^2 \quad 2^2 \cdot 3$$

GCF = y LCM = $900x^3y^2z$

⑬ $32x^5y^2 - 2xy^6$
 $2xy^2(16x^4 - y^4)$
 $2xy^2(4x^2 + y^2)(4x^2 - y^2)$
 $2xy^2(4x^2 + y^2)(2x+y)(2x-y)$
 $3a^2 - 6ab + 3b^2$
 $3(a^2 - 2ab + b^2) = 3(a-b)^2$



$$\begin{aligned} (14) \quad & 2x^2 + 7xy - 15y^2 \\ & 2x^2 + 10xy - 3xy - 15y^2 \\ & 2x(x+5y) - 3y(x+5y) \\ & (x+5y)(2x-3y) \end{aligned}$$

$$\begin{aligned} & 12a^2 + 14ab - 6b^2 \\ & 2(6a^2 + 7ab - 3b^2) \\ & 2(6a^2 + 9ab - 2ab - 3b^2) \\ & 2[3a(2a+3b) - b(2a+3b)] \\ & 2(2a+3b)(3a-b) \end{aligned}$$

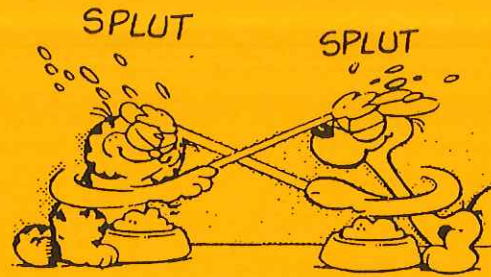
$$\begin{aligned} (15) \quad & \text{nickels } n \\ & \text{dimes } n+3 \\ & \text{quarters } 22 - (2n+3) = 19-2n \end{aligned}$$

$$\begin{aligned} & 5n + 10(n+3) + 25(19-2n) = 225 \\ & 5n + 10n + 30 + 475 - 50n = 225 \\ & -35n = -280 \\ & n = 8 \\ & 19 - 2n = 3 \text{ quarters} \end{aligned}$$

$$\begin{aligned} & \text{nickels } n \\ & \text{dimes } 2n \\ & \text{quarters } 4n \end{aligned}$$

$$\begin{aligned} & 5n + 10(2n) + 25(4n) = 250 \\ & 5n + 20n + 100n = 250 \\ & 125n = 250 \\ & n = 2 \text{ nickels} \end{aligned}$$

$$\begin{aligned} (16) \quad & .30(12) + .80(n) = .50(12+n) \\ & 3.6 + .8n = 6 + .5n \\ & .3n = 2.4 \\ & n = 8 \text{ ounces} \\ & .25(6) - 0(n) = .75(6-n) \\ & 1.5 = 4.5 - .75n \\ & .75n = 3 \\ & n = 4 \ell \end{aligned}$$



$$\begin{aligned} (17) \quad & \frac{R}{\text{Jon}} \cdot \frac{T}{4} = \frac{D}{180} \\ & \frac{r}{\text{Lisa}} \cdot \frac{3\frac{3}{4}}{4} = \frac{15r}{4} \end{aligned}$$

$$\frac{15r}{4} = 180$$

$$15r = 720 \quad r = 48 \text{ mph}$$

$$\begin{aligned} & \frac{R}{\text{Scott}} \cdot \frac{T}{t} = \frac{D}{36t} \\ & \frac{R}{\text{Brad}} \cdot \frac{T}{t-1} = \frac{D}{32t-32} \end{aligned}$$

$$36t + (32t-32) = 172$$

$$68t - 32 = 172$$

$$68t = 204$$

$$t = 3$$

$$10:30 + 3 \text{ hrs} = 1:30$$



$$\begin{aligned} (18) \quad & \begin{array}{|c|} \hline x+3 \\ \hline \begin{array}{|c|} \hline x \\ \hline x+2 \\ \hline \end{array} \\ \hline x+5 \\ \hline \end{array} \quad \begin{aligned} & (x+3)(x+5) - x(x+2) = 33 \\ & x^2 + 8x + 15 - x^2 - 2x = 33 \\ & 6x + 15 = 33 \\ & 6x = 18 \\ & x = 3 \end{aligned} \end{aligned}$$

Photo is 3 by 5 inches

$$\begin{aligned} & \begin{array}{|c|} \hline x+4 \\ \hline \begin{array}{|c|} \hline x \\ \hline x+4 \\ \hline \end{array} \\ \hline x+8 \\ \hline \end{array} \quad \begin{aligned} & (x+4)(x+8) - x(x+4) = 56 \\ & x^2 + 12x + 32 - x^2 - 4x = 56 \\ & 8x + 32 = 56 \\ & 8x = 24 \\ & x = 3 \end{aligned} \end{aligned}$$

outside dimensions: 7 by 11 ft.

$$\begin{aligned}
 (19) \quad & 4a^2x^4 - b^2x^4 + b^2y^4 - 4a^2y^4 \\
 & x^4(4a^2 - b^2) + y^4(b^2 - 4a^2) \\
 & x^4(4a^2 - b^2) - y^4(4a^2 - b^2) \\
 & (4a^2 - b^2)(x^4 - y^4) \\
 & (2a + b)(2a - b)(x^2 + y^2)(x^2 - y^2) \\
 & (2a + b)(2a - b)(x^2 + y^2)(x + y)(x - y)
 \end{aligned}$$

$$\begin{aligned}
 & 16y^2 - 16 + x^4 - y^2x^4 \\
 & 16(y^2 - 1) + x^4(1 - y^2) \\
 & 16(y^2 - 1) - x^4(y^2 - 1) \\
 & (y^2 - 1)(16 - x^4) \\
 & (y + 1)(y - 1)(4 + x^2)(4 - x^2) \\
 & (y + 1)(y - 1)(4 + x^2)(2 + x)(2 - x)
 \end{aligned}$$

	<u>now</u>	<u>2 ago</u>	<u>In 2</u>
matty	$4n$	$4n - 2$	
Felipe	$5n$		$5n + 2$

$$\begin{aligned}
 2(4n - 2) &= 5n + 2 \\
 8n - 4 &= 5n + 2 \\
 3n &= 6 \\
 n &= 2 \\
 5n + 1 &= 11 \text{ years old}
 \end{aligned}$$

	<u>now</u>	<u>In 3</u>	<u>4 ago</u>
Margaret	n	$n + 3$	
Judy	$4n$		$4n - 4$

$$\begin{aligned}
 4(n + 3) &= 3(4n - 4) \\
 4n + 12 &= 12n - 12 \\
 -8n &= -24 \\
 n &= 3 \quad 12 - 3 = 9 \text{ years}
 \end{aligned}$$

