# Friendship Junior High School
# Seventh Grade Advanced Math Packet


# *Exploring Topics In Algebra*

Algebra Units 14-18

Working With Polynomials
Linear Equations
Linear Systems
Factoring
Quadratic Equations

UNIT 14: ANSWER KEY

# *Working With Polynomials*

## 1. MULTIPLYING BINOMIALS

① $(x+1)(x+3)$
$x^2+3x+x+3$
$x^2+4x+3$

② $(n-5)(n-2)$
$n^2-2n-5n+10$
$n^2-7n+10$

③ $(3x+2)(x-3)$
$3x^2-9x+2x-6$
$3x^2-7x-6$

④ $(a-4)(3a-1)$
$3a^2-a-12a+4$
$3a^2-13a+4$

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

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

⑦ $(3a+2b)(a+b)$
$3a^2+3ab+2ab+2b^2$
$3a^2+5ab+2b^2$

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

⑨ $(2n-m)(n-2m)$
$2n^2-4nm-nm+2m^2$
$2n^2-5nm+2m^2$

⑩ $(4x+y)(2x+y)$
$8x^2+4xy+2xy+y^2$
$8x^2+6xy+y^2$

⑪ $(2n+5)(3n-2)$
$6n^2-4n+15n-10$
$6n^2+11n-10$

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

⑬ $(x-y)(2x-3y)$
$2x^2-3xy-2xy+3y^2$
$2x^2-5xy+3y^2$

⑭ $(2a+b)(3a-b)$
$6a^2-2ab+3ab-b^2$
$6a^2+ab-b^2$

⑮ $(2n-m)(3n-4m)$
$6n^2-8nm-3nm+4m^2$
$6n^2-11nm+4m^2$

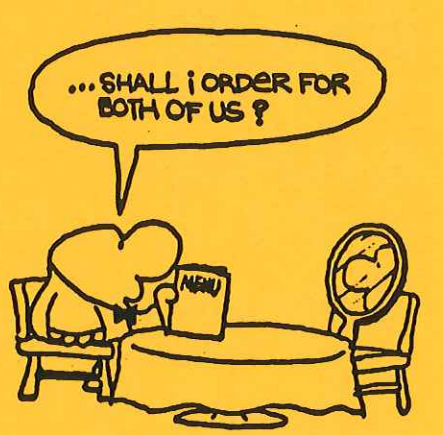
⑯ $(2a+3b)(a-b)$
$2a^2-2ab+3ab-3b^2$
$2a^2+ab-3b^2$

⑰ $(x+2y)(3x+4y)$
$3x^2+4xy+6xy+8y^2$
$3x^2+10xy+8y^2$

⑱ $(2n+7)(5n-3)$
$10n^2-6n+35n-21$
$10n^2+29n-21$

⑲ $(4x-1)(3x-8)$
$12x^2-32x-3x+8$
$12x^2-35x+8$

⑳ $(5a-3)(4a+5)$
$20a^2+25a-12a-15$
$20a^2+13a-15$




## 2. SPECIAL PRODUCTS

① $(n+2)^2$
$n^2+4n+4$

② $(x-5)^2$
$x^2-10x+25$

③ $(3x+y)^2$
$9x^2+6xy+y^2$

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# *Working With Polynomials*

④ $(n-4m)^2$
$n^2-8nm+16m^2$

⑤ $(2a-3b)^2$
$4a^2-12ab+9b^2$

⑥ $(4x+5y)^2$
$16x^2+40xy+25y^2$

⑦ $(a-7b)^2$
$a^2-14ab+49b^2$

⑧ $(4x+3)^2$
$16x^2+24x+9$

⑨ $(n+1)(n-1)$
$n^2-1$

⑩ $(x+3)(x-3)$
$x^2-9$

⑪ $(x+y)(x-y)$
$x^2-y^2$

⑫ $(2a+b)(2a-b)$
$4a^2-b^2$

⑬ $(3n+4)(3n-4)$
$9n^2-16$

⑭ $(a+5b)(a-5b)$
$a^2-25b^2$

⑮ $(2x+7y)(2x-7y)$
$4x^2-49y^2$

⑯ $(n+3m)(n-3m)$
$n^2-9m^2$

⑰ $(3x+2y)(x-6y)$
$3x^2-18xy+2xy-12y^2$
$3x^2-16xy-12y^2$

⑱ $(2n-m)(5n+4m)$
$10n^2+8nm-5nm-4m^2$
$10n^2+3nm-4m^2$

⑲ $(8a+2b)(3a+4b)$
$24a^2+32ab+6ab+8b^2$
$24a^2+38ab+8b^2$

⑳ $(x-5y)(3x-7y)$
$3x^2-7xy-15xy+35y^2$
$3x^2-22xy+35y^2$

## 3. DIVIDING POLYNOMIALS

① $x+6 \;\overline{)\; x^2+12x+36}$

$x+6$

$x^2+6x$

$6x+36$

$6x+36$

② $x+3 \;\overline{)\; x^2+7x+12}$

$x+4$

$x^2+3x$

$4x+12$

$4x+12$

③ $a-7 \;\overline{)\; a^2-2a-35}$

$a+5$

$a^2-7a$

$5a-35$

$5a-35$

④ $2x+7 \;\overline{)\; 2x^2-3x-35}$

$x-5$

$2x^2+7x$

$-10x-35$

$-10x-35$

⑤ $3n+4 \;\overline{)\; 3n^2-14n-24}$

$n-6$

$3n^2+4n$

$-18n-24$

$-18n-24$


⑥ $5x-7 \;\overline{)\; 10x^2+x-21}$

$2x+3$

$10x^2-14x$

$15x-21$

$15x-21$

# Working With Polynomials

⑦ $(6x+2)\overline{)30x^2-32x-14}$

$5x-7$

$30x^2+10x$

$-42x-14$

$-42x-14$

⑧ $(2a-3b)\overline{)2a^2+5ab-12b^2}$

$a+4b$

$2a^2-3ab$

$8ab-12b^2$

$8ab-12b^2$

⑨ $(4n+1)\overline{)4n^3-11n^2-3n-7}$

$n^2-3n-7$

$4n^3+n^2$

$-12n^2-3n$

$-12n^2-3n$

$-28n-7$

$-28n-7$

⑩ $(2x-3)\overline{)6x^3-11x^2-x+6}$

$3x^2-x-2$

$6x^3-9x^2$

$-2x^2-x$

$-2x^2+3x$

$-4x+6$

$-4x+6$

⑪ $(2x-3)\overline{)10x^2-3x-15}$

$5x+6+3/2x-3$

$10x^2-15x$

$12x-15$

$12x-18$

$3$

⑫ $(7x+1)\overline{)14x^2+65x+8}$

$2x+9-1/7x+1$

$14x^2+2x$

$63x+8$

$63x+9$

$-1$

⑬ $(n+2)\overline{)3n^3+8n^2+n-7}$

$3n^2+2n-3-1/n+2$

$3n^3+6n^2$

$2n^2+n$

$2n^2+4n$

$-3n-7$

$-3n-6$

$-1$

⑭ $(a+1)\overline{)a^3+a^2+a+2}$

$a^2+1+1/a+1$

$a^3+a^2$

$a+2$

$a+1$

$1$

UNIT 14: ANSWER KEY

# Working With Polynomials

## REVIEW & PRACTICE

① $(n+7)(n-5)$
$n^2-5n+7n-35$
$n^2+2n-35$

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

③ $(3a+4)(2a+6)$
$6a^2+18a+8a+24$
$6a^2+26a+24$

④ $(4a+3b)(3a-2b)$
$12a^2-8ab+9ab-6b^2$
$12a^2+ab-6b^2$

⑤ $(8x+3)(3x-5)$
$24x^2-40x+9x-15$
$24x^2-31x-15$

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

⑦ $(n-5)^2$
$n^2-10n+25$

⑧ $(3x+1)^2$
$9x^2+6x+1$

⑨ $(2x-y)^2$
$4x^2-4xy+y^2$

⑩ $(x-4y)^2$
$x^2-8xy+16y^2$

⑪ $(3n+4)^2$
$9n^2+24n+16$

⑫ $(x+5)(x-5)$
$x^2-25$

⑬ $(2n+3)(2n-3)$
$4n^2-9$

⑭ $(3a+b)(3a-b)$
$9a^2-b^2$

⑮ $(4x+3y)(4x-3y)$
$16x^2-9y^2$

⑯ $x-1 \overline{)4x^2-9x+5}$ → $4x-5$
$4x^2-4x$
$-5x+5$
$-5x+5$

⑰ $2n-3 \overline{)6n^2-n-12}$ → $3n+4$
$6n^2-9n$
$8n-12$
$8n-12$

⑱ $3x+4 \overline{)15x^2+8x-16}$ → $5x-4$
$15x^2+20x$
$-12x-16$
$-12x-16$

⑲ $2x+3 \overline{)2x^3+9x^2+11x+3}$ → $x^2+3x+1$
$2x^3+3x^2$
$6x^2+11x$
$6x^2+9x$
$2x+3$
$2x+3$

⑳ $x-5 \overline{)2x^3-15x^2+28x-15}$ → $2x^2-5x+3$
$2x^3-10x^2$
$-5x^2+28x$
$-5x^2+25x$
$3x-15$
$3x-15$

㉑ $2x+5 \overline{)10x^2+19x-12}$ → $5x-3+\frac{3}{2x+5}$
$10x^2+25x$
$-6x-12$
$-6x-15$
$3$

㉒ $n+3 \overline{)3n^3+11n^2+4n-4}$ → $3n^2+2n-2+\frac{2}{n+3}$
$3n^3+9n^2$
$2n^2+4n$
$2n^2+6n$
$-2n-4$
$-2n-6$
$2$

UNIT 14: ANSWER KEY

# *Working With Polynomials*

## PRACTICE TEST #1

① $(n-4)(n-5)$
$n^2-5n-4n+20 = n^2-9n+20$

② $(3x-4)(2x+7)$
$6x^2+21x-8x-28 = 6x^2+13x-28$

③ $(n-3)^2 = n^2-6n+9$

④ $(2x+5)(2x-5) = 4x^2-25$

⑤
$$\begin{array}{r} 3n-5 \\ n+4 \overline{)\,3n^2+7n-20} \\ \underline{3n^2+12n} \\ -5n-20 \\ \underline{-5n-20} \end{array}$$

⑥
$$\begin{array}{r} 3x^2+4x+3+\frac{2}{2x+3} \\ 2x+3 \overline{)\,6x^3+17x^2+18x+11} \\ \underline{6x^3+9x^2} \\ 8x^2+18x \\ \underline{8x^2+12x} \\ 6x+11 \\ \underline{6x+9} \\ 2 \end{array}$$

## PRACTICE TEST #2

① $(x+4)(x+7)$
$x^2+7x+4x+28 = x^2+11x+28$

② $(4n-3)(3n+5)$
$12n^2+20n-9n-15 = 12n^2+11n-15$

③ $(3n+7)(3n-7) = 9n^2-49$

④ $(3x+4)^2 = 9x^2+24x+16$

⑤
$$\begin{array}{r} 5x+2 \\ x-3 \overline{)\,5x^2-13x-6} \\ \underline{5x^2-15x} \\ 2x-6 \\ \underline{2x-6} \end{array}$$

⑥
$$\begin{array}{r} 2n^2-n-5\frac{-3}{3n+2} \\ 3n+2 \overline{)\,6n^3+n^2-17n-13} \\ \underline{6n^3+4n^2} \\ -3n^2-17n \\ \underline{-3n^2-2n} \\ -15n-13 \\ \underline{-15n-10} \\ -3 \end{array}$$

# Cumulative Review

**REVIEW & PRACTICE**

① $(-8)-(-10)$
$(-8)+(+10)=2$

② $(-3)+(-5)-(-6)-(+7)+(+8)$
$(-3)+(-5)+(+6)+(-7)+(+8)$
$(+14)+(-15)=-1$

③ $(-2)^3=-8$

④ $(-6)-\boxed{(-3)(+4)}+(-2)$
$(-6)-(-12)+(-2)$
$(-6)+(+12)+(-2)$
$(+12)+(-8)=4$

⑤ $-3^2-(-2)^2$
$-9-(+4)$
$-9+(-4)=-13$

⑥ $(-1)(-2)(+3)(-1)(-2)$
$+12$

⑦ $2a-b$
$2(-1)-(-2)$
$(-2)-(-2)$
$(-2)+(+2)=0$

⑧ $3c-2a^2$
$3(-3)-2(-1)^2$
$3(-3)-2(+1)$
$(-9)-(+2)$
$(-9)+(-2)=-11$

⑨ $abc-a^2b^2$
$(-1)(-2)(-3)-(-1)^2(-2)^2$
$(-1)(-2)(-3)-(+1)(+4)$
$(-6)-(+4)$
$(-6)+(-4)=-10$

⑩ $-2(a+b)^2$
$-2((-1)+(-2))^2$
$-2(-3)^2$
$-2(+9)=-18$

⑪ $5a-2b-3a+4b$
$2a+2b$

⑫ $a^2+a^2b-2ab^2-3a^2b-4a^2$
$-3a^2-2a^2b-2ab^2$

⑬ $3(2x-y)-2(x+3y)$
$6x-3y-2x-6y$
$4x-9y$

⑭ $x(x-3y)-2(xy+3x^2)$
$x^2-3xy-2xy-6x^2$
$-5x^2-5xy$

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

⑯ $\sqrt{120}=\sqrt{(2\cdot2)\cdot2\cdot3\cdot5}$
$2\sqrt{30}$

⑰ $3\sqrt{72}=3\sqrt{(2\cdot2)\cdot2(3\cdot3)}$
$18\sqrt{2}$

⑱ $(\sqrt{5})^2=5$

⑲ $(2\sqrt{3})(5\sqrt{6})$
$10\sqrt{18}=10\sqrt{2(3\cdot3)}$
$30\sqrt{2}$

⑳ $(\sqrt{8})(\sqrt{12})=\sqrt{96}$
$\sqrt{(2\cdot2)(2\cdot2)\cdot2\cdot3}$
$4\sqrt{6}$

㉑ $\sqrt{28}-2\sqrt{7}+3\sqrt{63}$
$\sqrt{(2\cdot2)}7-2\sqrt{7}+3\sqrt{(3\cdot3)}7$
$2\sqrt{7}-2\sqrt{7}+9\sqrt{7}$
$9\sqrt{7}$

㉒ $a^2+b^2=c^2$
$(2)^2+(6)^2=c^2$
$4+36=c^2$
$40=c^2$
$\sqrt{40}=c$
$\sqrt{(2\cdot2)2\cdot5}=2\sqrt{10}$
$c=2\sqrt{10}$ m

㉓ $a^2+b^2=c^2$
$(3)^2+b^2=(12)^2$
$9+b^2=144$
$b^2=135$
$b=\sqrt{135}$
$b=\sqrt{(3\cdot3)3\cdot5}$
$b=3\sqrt{15}$ m

# Cumulative Review

(24) $3(n-4)=n-6$
$3n-12=n-6$
$-n \quad -n$
$2n-12=-6$
$+12 \quad +12$
$2n=6$
$(1/2)(2n)=(1/2)(6)$
$n=3$

(25) $4(x-3)-2(3x+5)=2x-2$
$4x-12-6x-10=2x-2$
$-2x \quad -2x$
$-2x-22=2x-2$
$+22 \quad +22$
$-4x-22=-2$
$-4x=20$
$(-1/4)(-4x)=(-1/4)(20)$
$x=-5$

(26) $3(a+2) \geq 24$
$3a+6 \geq 24$
$-6 \quad -6$
$3a \geq 18$
$(1/3)(3a) \geq (1/3)(18)$
$a \geq 6$

(27) $x-3<3(x-2)+5$
$x-3<3x-6+5$
$-3x \quad -3x$
$x-3<3x-1$
$-2x-3<-1$
$+3 \quad +3$
$-2x<2$
$(-1/2)(-2x)>(-1/2)(2)$
$x>-1$
don't forget to flip the sign

(28) $2n+5>5n-13$
$-5n \quad -5n$
$-3n+5>-13$
$-5 \quad -5$
$-3n>-18$
sign flip
$(-1/3)(-3n)<(-1/3)(-18)$
$n<6$


(29) $2(x+3) \leq 4(x-1)$
$2x+6 \leq 4x-4$
$-4x \quad -4x$
$-2x+6 \leq -4$
$-6 \quad -6$
$-2x \leq -10$
sign flip
$(-1/2)(-2x) \geq (-1/2)(-10)$
$x \geq 5$





(30) $(5n+3)-(2n-2)=n-3$
$5n+3-2n+2=n-3$
$3n+5=n-3$
$-n \quad -n$
$2n+5=-3$
$-5 \quad -5$
$2n=-8$
$(1/2)(2n)=(1/2)(-8)$ $n=-4$

# Cumulative Review

(31) $4n-(2n-6)=n+1$
$4n-2n+6=n+1$
$2n+6=n+1$
$n+6=1$
$n=-5$

(32) $(3ab)(2a^2b^3)$
$6a^3b^4$

(33) $(-2xy^2)^2(-x^2y)^3$
$(+4x^2y^4)(-x^6y^3)$
$-4x^8y^7$

(34) $(-2a)^3(2a)^2$
$(-8a^3)(4a^2)$
$-32a^5$

(35) $\frac{12x^2yz^3}{8xz}$
$\frac{3xyz^2}{2}$

(36) $\frac{-3a^2b^{-3}c}{6a^{-4}b^2c^{-3}}$
$\frac{-a^6c^4}{2b^5}$

(37) $\frac{-15x^{-2}y^{-3}z}{10x^{-5}yz^{-1}} = \frac{-3x^3z^2}{2y^4}$

(38) $-3xy(-xy^2)^{-2}$
$-3xy(x^{-2}y^{-4}) = -3x^{-1}y^{-3} = \frac{-3}{xy^3}$

(39) $ab(3ab)^{-2} = ab(3^{-2}a^{-2}b^{-2})$
$3^{-2}a^{-1}b^{-1} = \frac{1}{9ab}$

(40) $(x+5)(x-4)$
$x^2-4x+5x-20 = x^2+x-20$

(41) $(a+b)(a-2b)$
$a^2-2ab+ab-2b^2 = a^2-ab-2b^2$

(42) $(3x+y)(2x-y)$
$6x^2-3xy+2xy-y^2 = 6x^2-xy-y^2$

(43) $(4n-3)(2n+1)$
$8n^2+4n-6n-3 = 8n^2-2n-3$

(44) $(a+4)^2 = a^2+8a+16$

(45) $(2n-m)^2 = 4n^2-4nm+m^2$

(46) $(x+3)(x-3) = x^2-9$

(47) $(3a-2b)(3a+2b) = 9a^2-4b^2$

# Cumulative Review

(48) $2x+3 \overline{)6x^3+5x^2+2x+15}$

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

$6x^3+9x^2$

$-4x^2+2x$

$-4x^2-6x$

$8x+15$

$8x+12$

$3$

(49) $n+2 \overline{)5n^3+11n^2-4n-6}$

$5n^2+n-6+\frac{6}{n+2}$

$5n^3+10n^2$

$n^2-4n$

$n^2+2n$

$-6n-6$

$-6n-12$

$6$

(50) $3a+1 \overline{)3a^3-11a^2-7a-7}$

$a^2-4a-1-\frac{6}{3a+1}$

$3a^3+a^2$

$-12a^2-7a$

$-12a^2-4a$

$-3a-7$

$-3a-1$

$-6$


## PRACTICE TEST

① $(-1)^3-\boxed{(-2)(-3)}+(-5)$

$(-1)-(+6)+(-5)$

$(-1)+(-6)+(-5)=-12$

② $3x-5y$

$3(2)-5(-2)$

$(6)-(-10)$

$(6)+(+10)=16$

③ $3xz^2-y^3$

$3(2)(-1)^2-(-2)^3$

$3(2)(1)-(-8)$

$(6)-(-8) = (6)+(+8)=14$

④ $3a-4ab+5a-b^2+2ab$

$8a-2ab-b^2$

⑤ $2(x-3y)-3(2x+3y)$

$2x-6y-6x-9y$

$-4x-15y$

⑥ $\sqrt{108}=\sqrt{\boxed{2\cdot2}\cdot\boxed{3\cdot3}\cdot3}=6\sqrt{3}$

⑦ $(3\sqrt{2})^2=9(2)=18$

⑧ $\sqrt{12}-4\sqrt{3}+\sqrt{27}$

$\sqrt{\boxed{2\cdot2}\cdot3}-4\sqrt{3}+\sqrt{\boxed{3\cdot3}\cdot3}$

$2\sqrt{3}-4\sqrt{3}+3\sqrt{3}$

$\sqrt{3}$

# Cumulative Review

⑨ $a^2+b^2=c^2$

$(4)^2+(8)^2=c^2$

$16+64=c^2$

$c^2=80$

$c=\sqrt{80}=\sqrt{(2\cdot2)(2\cdot2)5}=4\sqrt{5}$ m

⑩ $3(n-5)=n+7$

$3n-15=n+7$ (−n, +15)

$2n-15=7$ (+15)

$2n=22$

$(1/2)(2n)=(1/2)(22)$

$n=11$

⑪ $2x-3\le 4(x-2)+7$

$2x-3\le 4x-8+7$

$2x-3\le 4x-1$ (−4x)

$-2x-3\le -1$ (+3)

$-2x\le 2$ sign flip

$(-1/2)(-2x)\ge(-1/2)(2)$

$x\ge -1$

⑫ $3(n-2)>7n+14$

$3n-6>7n+14$ (−7n)

$-4n-6>14$ (+6)

$-4n>20$ sign flip

$(-1/4)(-4n)<(-1/4)(20)$

$n<-5$


⑬ $(3n-4)-(n+4)=-2$

$3n-4-n-4=-2$

$2n-8=-2$ (+8)

$2n=6$

$(1/2)(2n)=(1/2)(6)$

$n=3$

⑭ $(-2xy^2)^2(-xy)^3$

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

⑮ $\frac{-12a^{-2}bc^3}{8ab^{-3}c^2}=\frac{-3b^4c}{2a^3}$

⑯ $(n-3)(n+7)$

$n^2+7n-3n-21=n^2+4n-21$

⑰ $(2a+b)(3a-2b)$

$6a^2-4ab+3ab-2b^2$

$6a^2-ab-2b^2$

⑱ $(x-2y)^2=x^2-4xy+4y^2$

⑲ $(3a+2)(3a-2)=9a^2-4$

⑳

$$\begin{array}{r} 3n^2-2n+5-\frac{6}{n+4} \\ n+4\ \overline{)\ 3n^3+10n^2-3n+14} \\ \underline{3n^3+12n^2} \\ -2n^2-3n \\ \underline{-2n^2-8n} \\ 5n+14 \\ \underline{5n+20} \\ -6 \end{array}$$

UNIT 15: ANSWER KEY

# *Linear Equations*

## 1. UNDERSTANDING SLOPE

① $-8/4 = -2$

② $5/3$

③ $0/7 = 0$

④ $2/6 = 1/3$

⑤ $6/6 = 1$

⑥ $-2/5$

⑦ $-4/6 = -2/3$

⑧ $-10/2 = -5$

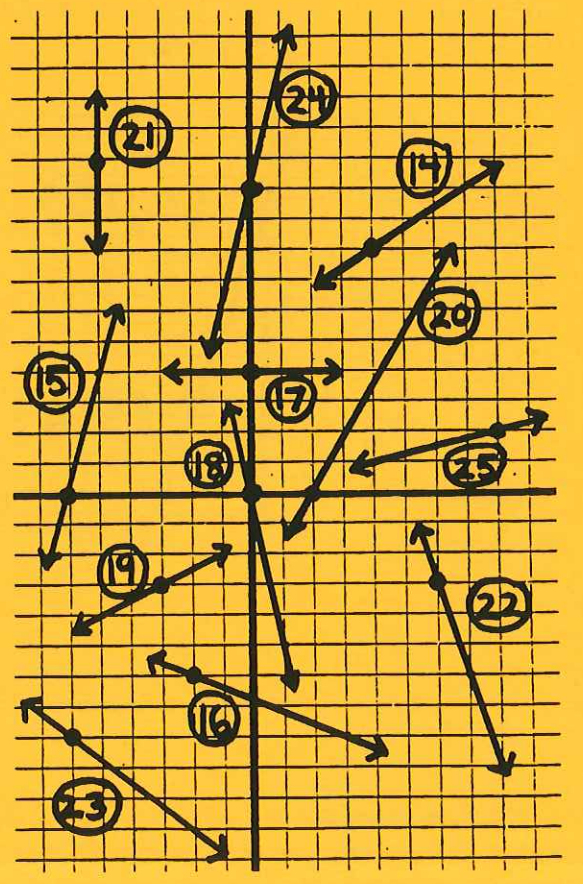
⑨ $2/8 = 1/4$

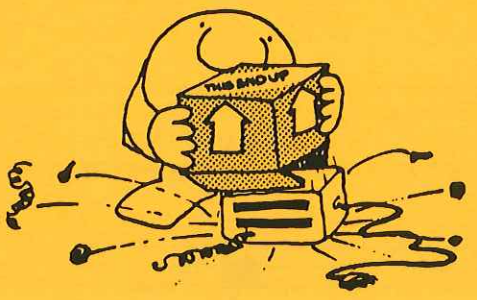
⑩ $5/3$

⑪ $2/4 = 1/2$

⑫ $-3/3 = -1$

⑬ $-5/0$ = undefined



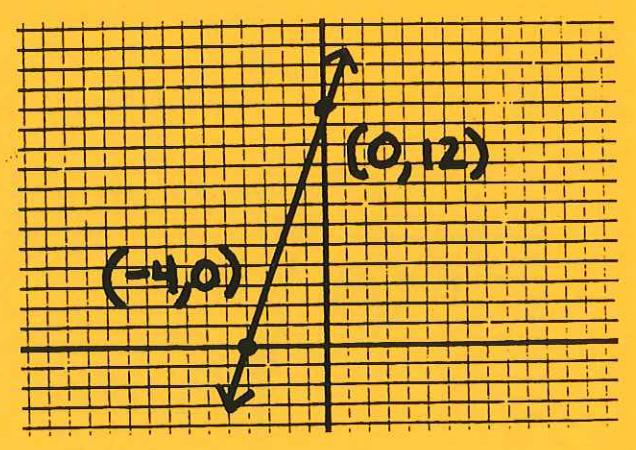

## 2. SLOPE-INTERCEPT FORM

① $y = 3x + 12$

$m = 3$ slope (m) = 3

$b = 12$ y-int (b) = 12

x-int ($-b/m$) = $-4$




② $y = x + 5$

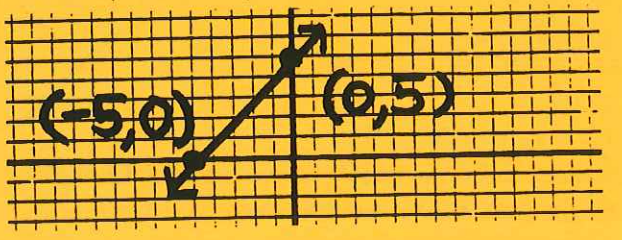
$m = 1$

$b = 5$

slope (m) = 1

y-int (b) = 5

x-int ($-b/m$) = $-5$



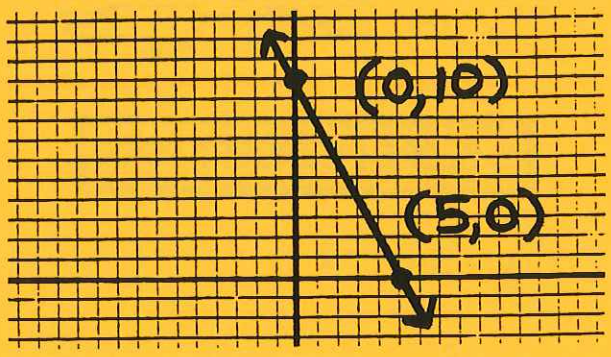
UNIT 15: ANSWER KEY

# *Linear Equations*

③ $y = -2x + 10$

$m = -2$
$b = 10$

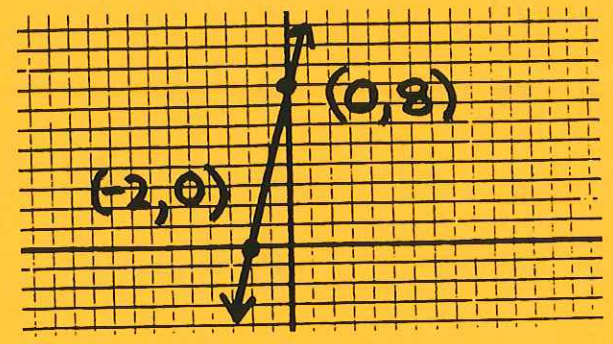
slope (m) = -2
y-int (b) = 10
x-int ($-b/m$) = 5




⑥ $y = 4x + 8$

$m = 4$
$b = 8$

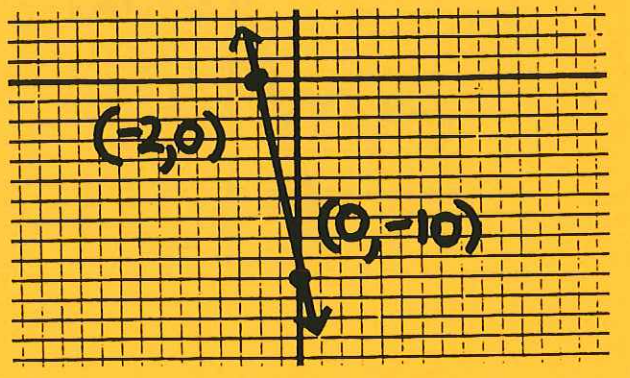
slope (m) = 4
y-int (b) = 8
x-int ($-b/m$) = -2




④ $y = -5x - 10$

$m = -5$
$b = -10$

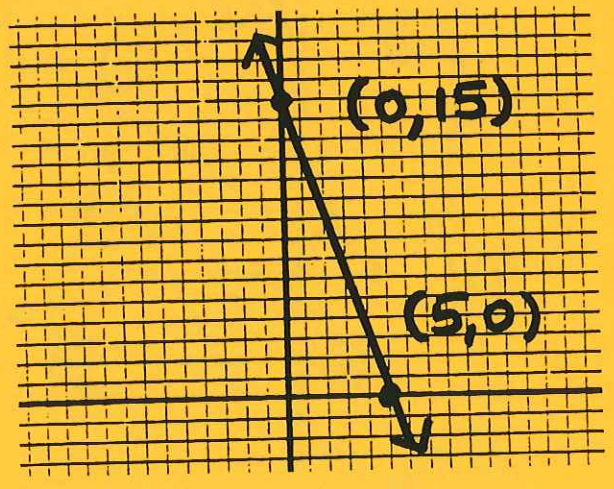
slope (m) = -5
y-int (b) = -10
x-int ($-b/m$) = -2




⑦ $y = -3x + 15$

$m = -3$
$b = 15$

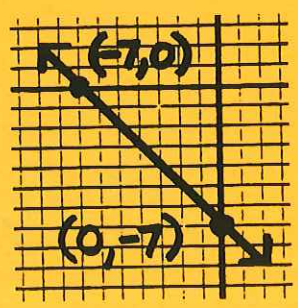
slope (m) = -3
y-int (b) = 15
x-int ($-b/m$) = 5




⑤ $y = -x - 7$

$m = -1$
$b = -7$

slope (m) = -1
y-int (b) = -7
x-int ($-b/m$) = -7



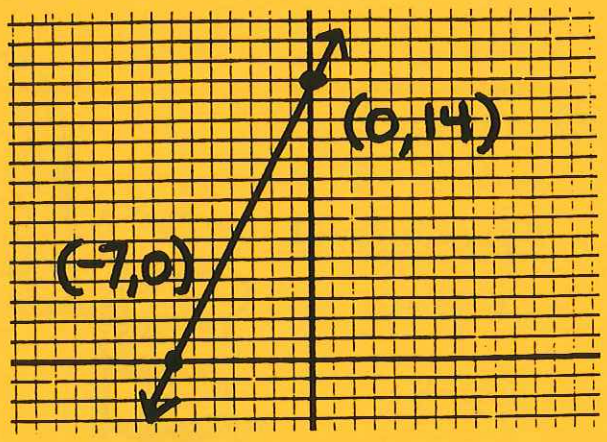

...I'M AFRAID TO LOOK DOWN..

# *Linear Equations*

⑧ $y = 2x + 14$

$m = 2$
$b = 14$

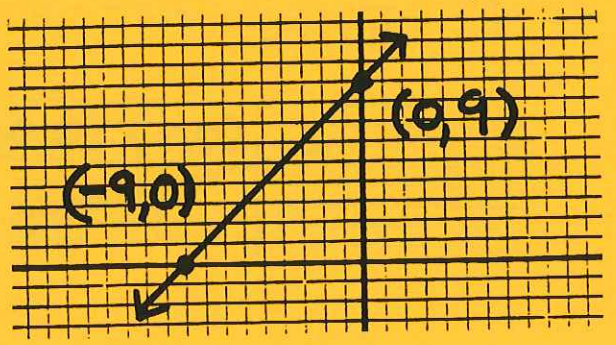
Slope (m) = 2
y-int (b) = 14
x-int $(-b/m)$ = −7




⑨ $y = x - 9$

$m = 1$
$b = -9$

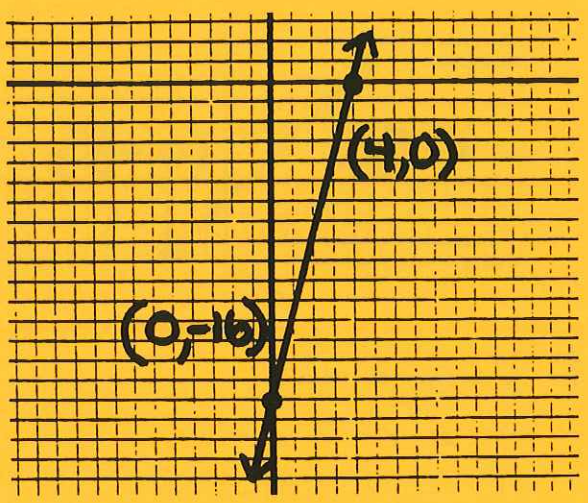
Slope (m) = 1
y-int (b) = −9
x-int $(-b/m)$ = 9




⑩ $y = -4x - 16$

$m = -4$
$b = -16$

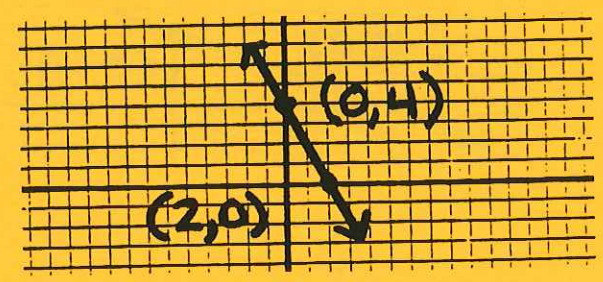
Slope (m) = −4
y-int (b) = −16
x-int $(-b/m)$ = −4




⑪ $2x + y = 4$
$-2x \quad -2x$
$y = -2x + 4$

$m = -2$
$b = 4$

Slope (m) = −2
y-int (b) = 4
x-int $(-b/m)$ = 2



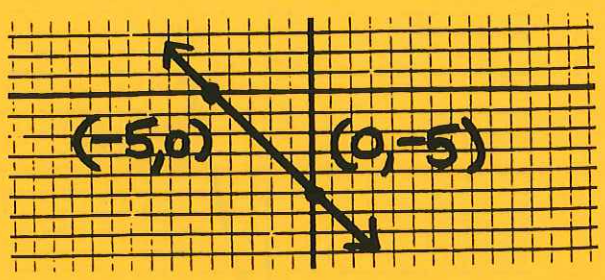

⑫ $x + y = -5$
$-x \quad -x$
$y = -x - 5$

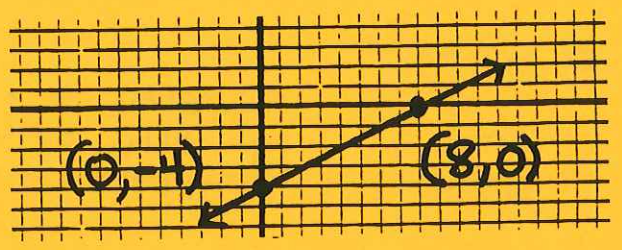
$m = -1$
$b = -5$

Slope (m) = −1
y-int (b) = −5
x-int $(-b/m)$ = −5

UNIT 15: ANSWER KEY

# *Linear Equations*




(13) $\overset{-x}{x} - 3y = \overset{-x}{-12}$

$-3y = -x - 12$

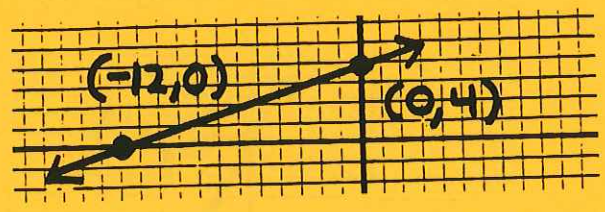
$(-\frac{1}{3})(-3y) = (-\frac{1}{3})(-x-12)$

$y = \frac{1}{3}x + 4$

$m = 1/3$
$b = 4$

Slope $(m) = 1/3$
y-int $(b) = 4$
x-int $(-\frac{b}{m}) = -12$

$\frac{-b}{m} = \frac{-(4)}{1/3} = -4 \times \frac{3}{1} = -12$




(14) $\overset{-x}{x} - 2y = \overset{-x}{8}$

$-2y = -x + 8$

$(-\frac{1}{2})(-2y) = (-\frac{1}{2})(-x+8)$

$y = \frac{1}{2}x - 4$

$m = 1/2$
$b = -4$

Slope $(m) = 1/2$
y-int $(b) = -4$
x-int $(-\frac{b}{m}) = 8$

$\frac{-b}{m} = \frac{-(-4)}{1/2} = \frac{4}{1/2} = 4 \times \frac{2}{1} = 8$

(15) $\overset{-x}{x} + 4y = \overset{-x}{8}$

$4y = -x + 8$

$(\frac{1}{4})(4y) = (\frac{1}{4})(-x+8)$

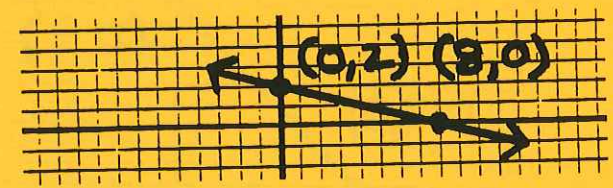
$y = -\frac{1}{4}x + 2$

$m = -1/4$
$b = 2$

Slope $(m)$
$-1/4$

y-int $(b) = 2$ x-int $(-b/m) = 8$

$\frac{-b}{m} = \frac{-(2)}{-1/4} = \frac{2}{1/4} = 2 \times \frac{4}{1} = 8$




(16) $\overset{-x}{x} + 3y = \overset{-x}{6}$

$3y = -x + 6$

$(\frac{1}{3})(3y) = (\frac{1}{3})(-x+6)$

$y = -\frac{1}{3}x + 2$

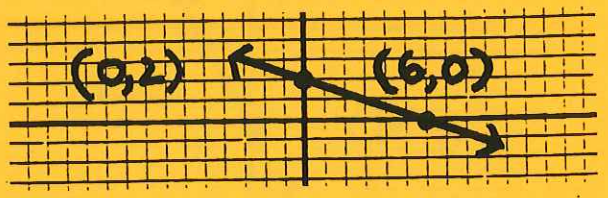
$m = -1/3$
$b = 2$

continued

# *Linear Equations*

Slope (m) $= -1/3$
y-int (b) $= 2$
x-int $(-b/m) = 6$

$\frac{-b}{m} = \frac{-(2)}{-1/3} = \frac{2}{1/3} = 2 \times \frac{3}{1} = 6$




(17) $2x + 3y = 12$ (−2x, −2x)

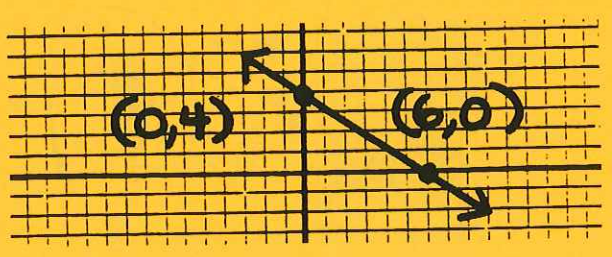
$3y = -2x + 12$

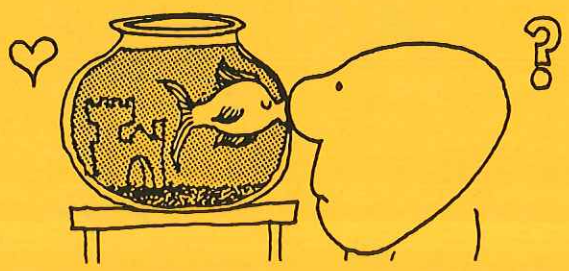
$(\frac{1}{3})(3y) = (\frac{1}{3})(-2y + 12)$ $\quad m = -2/3$

$y = \frac{-2}{3}x + 4$ $\quad b = 4$

Slope (m) $= -2/3$
y-int (b) $= 4$
x-int $(-b/m) = 6$

$\frac{-b}{m} = \frac{-(4)}{-2/3} = \frac{4}{2/3} = 4 \times \frac{3}{2} = \frac{12}{2} = 6$



(18) $3x - 4y = 12$ (−3x, −3x)

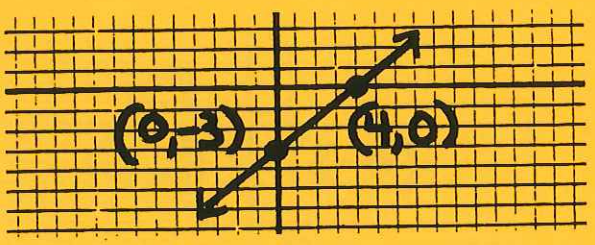
$-4y = -3x + 12$

$(\frac{-1}{4})(-4y) = (\frac{-1}{4})(-3x + 12)$ $\quad m = 3/4$

$y = \frac{3}{4}x - 3$ $\quad b = -3$

Slope (m) $= 3/4$
y-int (b) $= -3$
x-int $(-b/m) = 4$

$\frac{-b}{m} = \frac{-(-3)}{3/4} = \frac{3}{3/4} = 3 \times \frac{4}{3} = 4$




(19) $2x + 5y = -10$ (−2x, −2x)

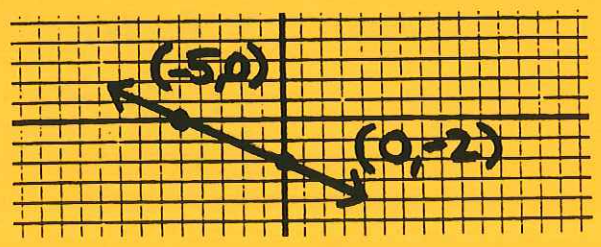
$5y = -2x - 10$

$(\frac{1}{5})(5y) = (\frac{1}{5})(-2x - 10)$ $\quad m = -2/5$

$y = \frac{-2}{5}x - 2$ $\quad b = -2$

Slope (m) $= -2/5$
y-int (b) $= -2$
x-int $(-b/m) = -5$

$\frac{-b}{m} = \frac{-(-2)}{-2/5} = \frac{2}{-2/5} = 2 \times \frac{-5}{2} = -5$



# Linear Equations

(20) $3x^{-3x} - 2y = 6^{-3x}$

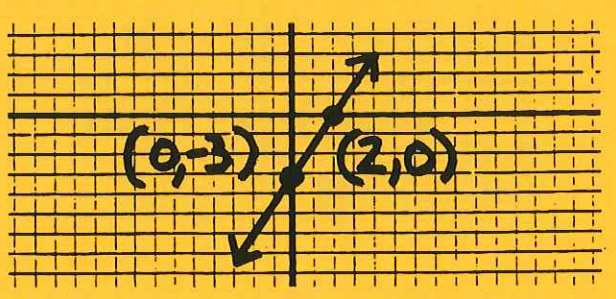
$-2y = -3x + 6$

$(-\frac{1}{2})(-2y) = (-\frac{1}{2})(-3x+6)$ $\quad m = 3/2$

$y = \frac{3}{2}x - 3$ $\quad b = -3$

slope (m) = 3/2
y-int (b) = −3
x-int ($-b/m$) = 2

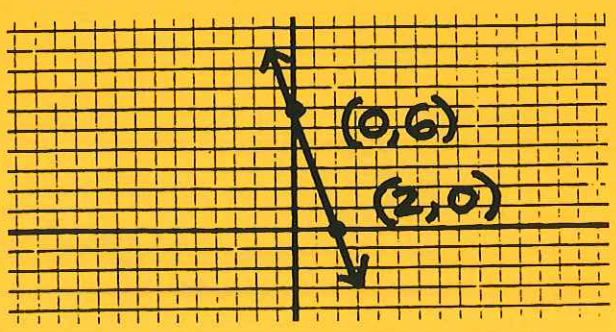
$\frac{-b}{m} = \frac{-(-3)}{3/2} = \frac{3}{3/2} = 3 \times \frac{2}{3} = 2$




## 3. STANDARD FORM

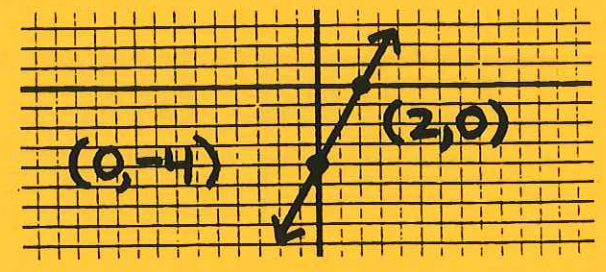
(1) $3x + y = 6$

A = 3 $\quad$ slope ($-A/B$) = −3
B = 1 $\quad$ y-int ($C/B$) = 6
C = 6 $\quad$ x-int ($C/A$) = 2



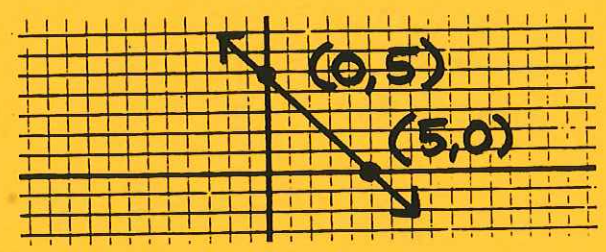

(2) $2x - y = 4$

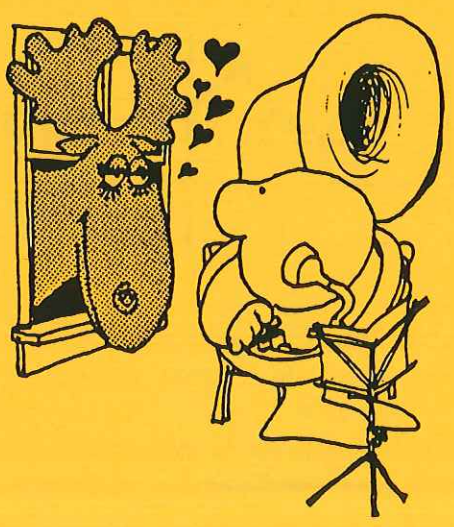
A = 2 $\quad$ slope ($-A/B$) = 2
B = −1 $\quad$ y-int ($C/B$) = −4
C = 4 $\quad$ x-int ($C/A$) = 2




(3) $x + y = 5$

A = 1 $\quad$ slope ($-A/B$) = −1
B = 1 $\quad$ y-int ($C/B$) = 5
C = 5 $\quad$ x-int ($C/A$) = 5

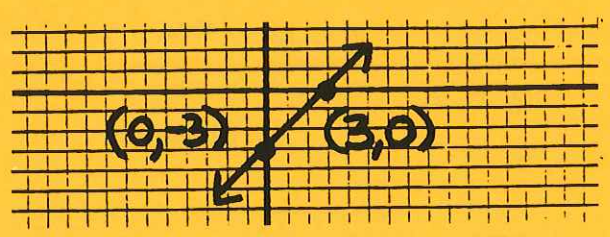


# *Linear Equations*

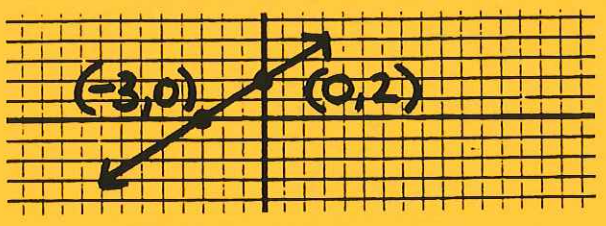
④ $x - y = 3$

$A = 1$ Slope $(-A/B) = 1$
$B = -1$ y-int $(C/B) = -3$
$C = 3$ x-int $(C/A) = 3$



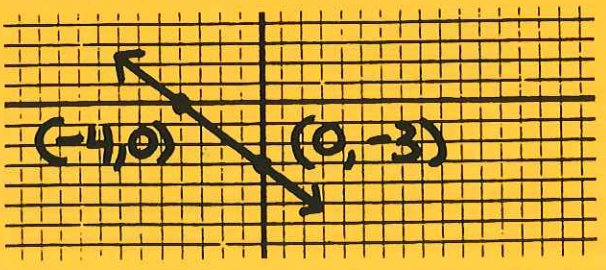

⑤ $2x - 3y = -6$

$A = 2$ Slope $(-A/B) = 2/3$
$B = -3$ y-int $(C/B) = 2$
$C = -6$ x-int $(C/A) = -3$



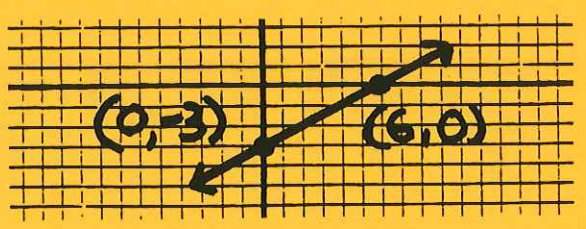

⑥ $3x + 4y = -12$

$A = 3$ Slope $(-A/B) = -3/4$
$B = 4$ y-int $(C/B) = -3$
$C = -12$ x-int $(C/A) = -4$




⑦ $x - 2y = 6$

$A = 1$ Slope $(-A/B) = 1/2$
$B = -2$ y-int $(C/B) = -3$
$C = 6$ x-int $(C/A) = 6$

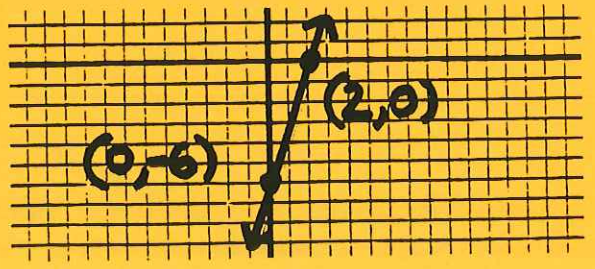



⑧ $5x + 4y = 20$

$A = 5$ Slope $(-A/B) = -5/4$
$B = 4$ y-int $(C/B) = 5$
$C = 20$ x-int $(C/A) = 4$


⑨ $3x - y = 6$

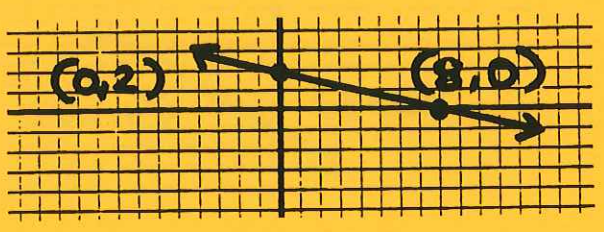
$A = 3$ slope $(-A/B) = 3$
$B = -1$ y-int $(C/B) = -6$
$C = 6$ x-int $(C/A) = 2$



# Linear Equations

⑩ $x+4y=8$

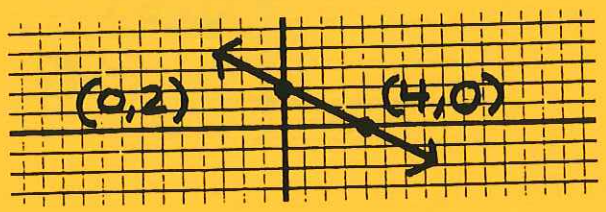
$A=1$ Slope $(-A/B) = -1/4$
$B=4$ y-int $(C/B) = 2$
$C=8$ x-int $(C/A) = 8$




⑪ $\overset{+x}{2y} = -\overset{+x}{x} + 4$

$x+2y=4$

$A=1$ Slope $(-A/B) = -1/2$
$B=2$ y-int $(C/B) = 2$
$C=4$ x-int $(C/A) = 4$

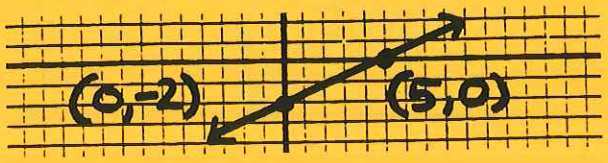



⑫ $\overset{-2x}{5y} = \overset{-2x}{2x} - 10$

$-2x+5y=-10$ → "A" must be positive

$2x-5y=10$

$A=2$ Slope $(-A/B) = 2/5$
$B=-5$ y-int $(C/B) = -2$
$C=10$ x-int $(C/A) = 5$



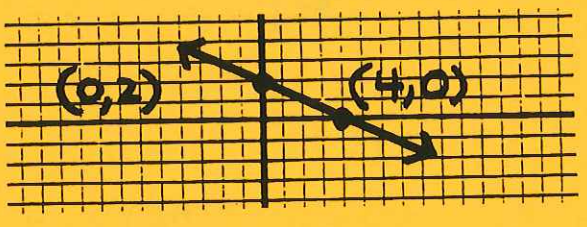

⑬ $\overset{+4x}{8y} = \overset{+4x}{-4x} + 16$

$4x+8y=16$ → divide by common factor

$\frac{1}{4}(4x+8y=16)$

$x+2y=4$

$A=1$ Slope $(-A/B) = -1/2$
$B=2$ y-int $(C/B) = 2$
$C=4$ x-int $(C/A) = 4$




⑭ $\overset{+1/4x}{y} = \overset{+1/4x}{-\frac{1}{4}x} - 2$

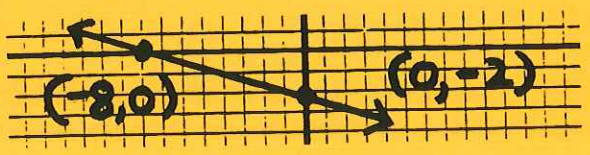
$\frac{1}{4}x+y=-2$ → no fractions

$4(\frac{1}{4}x+y=-2)$

$x+4y=-8$

$A=1$ Slope $(-A/B) = -1/4$
$B=4$ y-int $(C/B) = -2$
$C=-8$ x-int $(C/A) = -8$

...EVERY NOW AND THEN I WISH IT WAS THEN INSTEAD OF NOW...



# *Linear Equations*

⑮ $3y = 3x + 9$ (−3x, −3x)

$-3x + 3y = 9$ → "A" must be positive

$3x - 3y = -9$

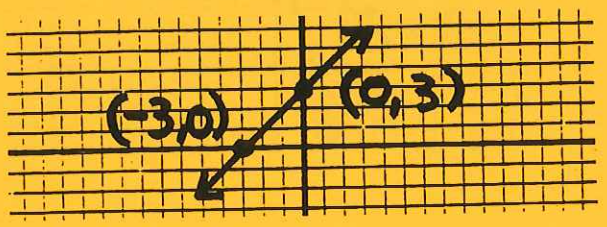
$\frac{1}{3}(3x - 3y = -9)$ → divide by the common factor

$x - y = -3$

$A = 1$ slope $(-A/B) = 1$

$B = -1$ y-int $(C/B) = 3$

$C = -3$ x-int $(C/A) = -3$




⑯ $y = -\frac{2}{3}x + 4$ (+⅔x, +⅔x)

$\frac{2}{3}x + y = 4$ → no fractions

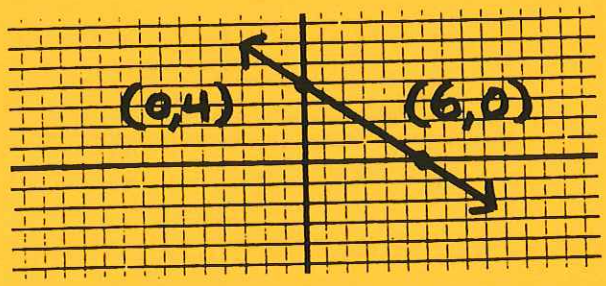
$3(\frac{2}{3}x + y = 4)$

$2x + 3y = 12$

$A = 2$ slope $(-A/B) = -2/3$

$B = 3$ y-int $(C/B) = 4$

$C = 12$ x-int $(C/A) = 6$



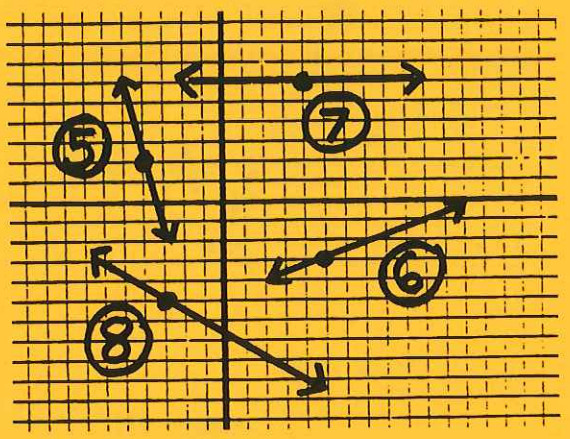

## REVIEW & PRACTICE

① $-4/8 = -1/2$

② undefined

③ 0

④ $6/2 = 3$




⑨ $y = 4x + 8$

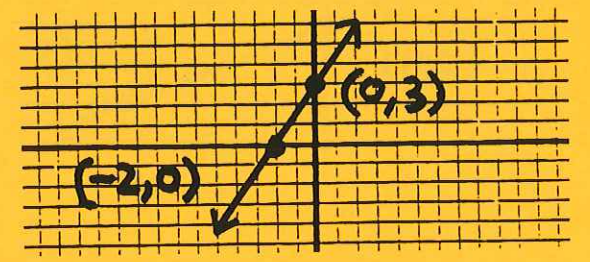
$m = 4$

$b = 8$

slope $(m) = 4$

y-int $(b) = 3$

x-int $(-b/m) = -2$

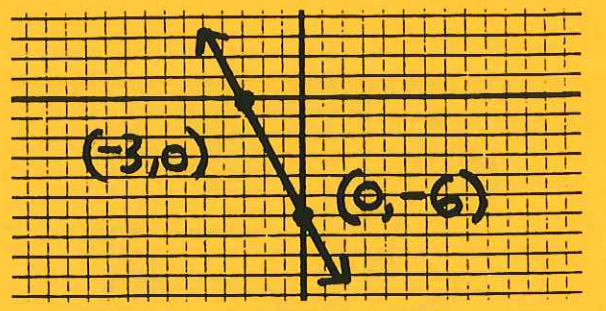



# *Linear Equations*

⑩ $y = -2x - 6$

$m = -2$
$b = -6$

Slope (m) $= -2$
y-int (b) $= -6$
x-int $(-b/m) = -3$

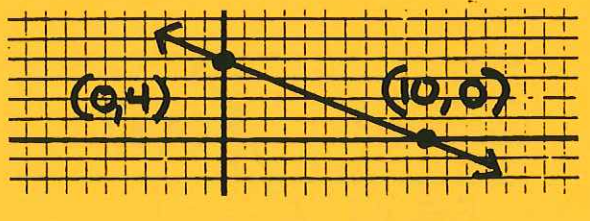



⑪ $y = -2/5\,x + 4$

$m = -2/5$
$b = 4$

Slope (m) $= -2/5$
y-int (b) $= 4$
x-int $(-b/m) = 10$

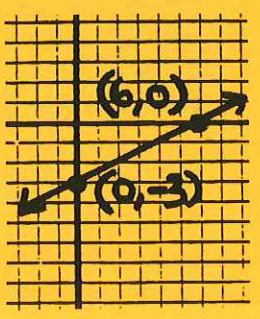
$\frac{-b}{m} = \frac{-(4)}{-2/5} = \frac{4}{2/5} = 4 \times \frac{5}{2} = 10$




⑫ $y = \frac{1}{2}x - 3$ $\quad m = \frac{1}{2}$ $\quad b = -3$

Slope (m) $= \frac{1}{2}$
y-int (b) $= -3$
x-int $(\frac{-b}{m}) = 6$

$\frac{-b}{m} = \frac{-(-3)}{\frac{1}{2}} = 3 \times \frac{2}{1}$




⑬ $3x - y = -6$ (−3x, −3x)

$-y = -3x - 6$
$y = 3x + 6$

$m = 3$
$b = 6$

Slope (m) $= 3$
y-int (b) $= 6$
x-int $(-b/m) = -2$

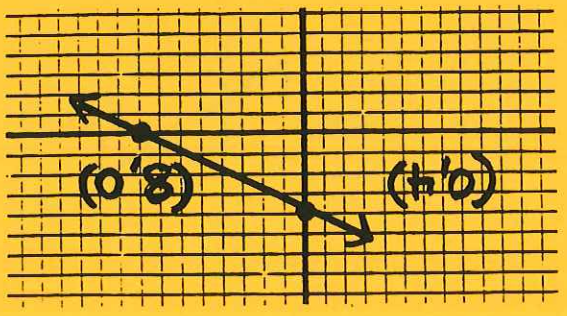

⑭ $x + 2y = 8$ (−x, −x)

$2y = -x + 8$
$\frac{1}{2}(2y = -x + 8)$
$y = -\frac{1}{2}x + 4$

$m = -1/2$
$b = 4$

Slope (m) $= -1/2$
y-int (b) $= 4$
x-int $(-b/m) = 8$

$\frac{-b}{m} = \frac{-(4)}{-1/2} = \frac{4}{1/2} = 4 \times \frac{2}{1} = 8$



UNIT 15: ANSWER KEY

# *Linear Equations*

⑮ $2x + 3y = 18$ (−2x)

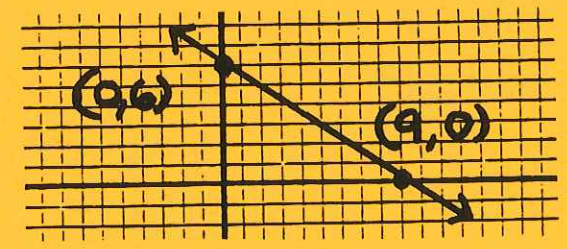
$3y = -2x + 18$

$\frac{1}{3}(3y = -2x + 18)$ $\quad m = -2/3$

$y = \frac{-2}{3}x + 6$ $\quad b = 6$

Slope (m) $= -2/3$
y-int (b) $= 6$
x-int $(-b/m) = 9$

$\frac{-b}{m} = \frac{-(6)}{-2/3} = \frac{6}{2/3} = 6 \times \frac{3}{2} = 9$




⑯ $3x - 4y = 12$ (−3x)

$-4y = -3x + 12$

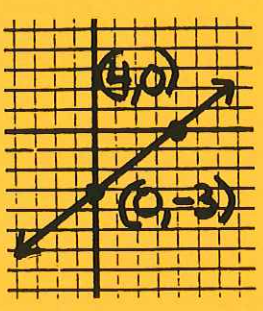
$-\frac{1}{4}(-4y = -3x + 12)$ $\quad m = 3/4$

$y = 3/4\,x - 3$ $\quad b = -3$

Slope (m) $= 3/4$
y-int (b) $= -3$
x-int $(-b/m) = 4$

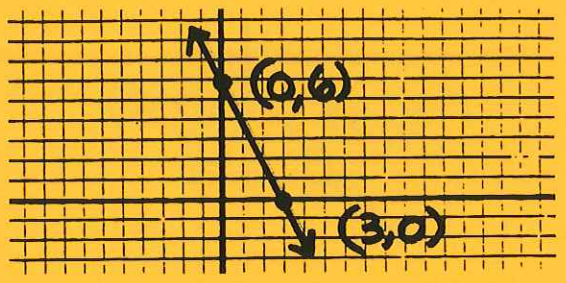
$\frac{-b}{m} = \frac{-(-3)}{3/4}$

$\frac{3}{3/4} = 3 \times \frac{4}{3} = 4$



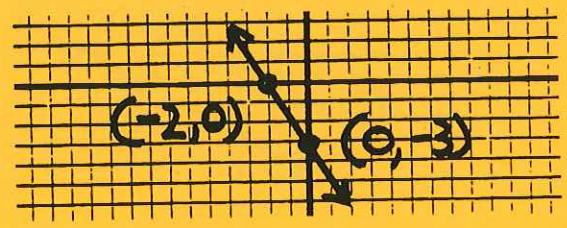

⑰ $2x + y = 6$

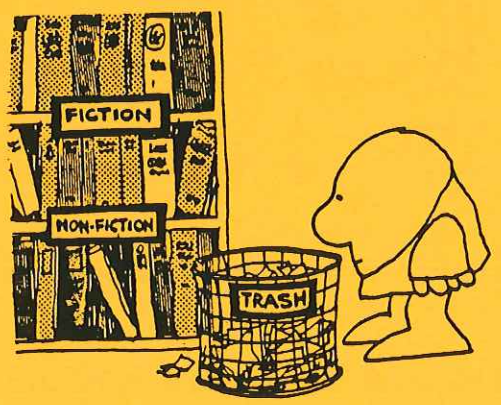
$A = 2$ $\quad$ slope $(-A/B) = -2$
$B = 1$ $\quad$ y-int $(C/B) = 6$
$C = 6$ $\quad$ x-int $(C/A) = 3$




⑱ $3x + 2y = -6$

$A = 3$ $\quad$ slope $(-A/B) = -3/2$
$B = 2$ $\quad$ y-int $(C/B) = -3$
$C = -6$ $\quad$ x-int $(C/A) = -2$



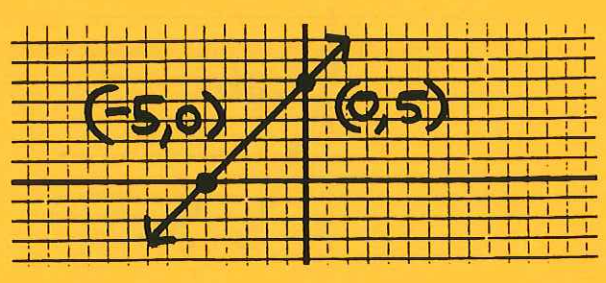



UNIT 15: ANSWER KEY

# *Linear Equations*

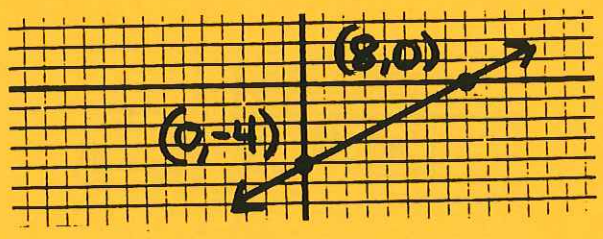
⑲ $x - y = -5$

$A = 1$ Slope $(-A/B) = 1$
$B = -1$ y-int $(C/B) = 5$
$C = -5$ x-int $(C/A) = -5$




⑳ $x - 2y = 8$

$A = 1$ Slope $(-A/B) = 1/2$
$B = -2$ y-int $(C/B) = -4$
$C = 8$ x-int $(C/A) = 8$



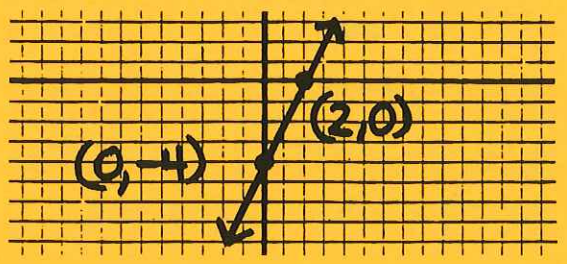

$-2x \quad -2x$

㉑ $y = 2x - 4$

$-2x + y = -4$ → "A" must be (+)

$2x - y = 4$

$A = 2$ Slope $(-A/B) = 2$
$B = -1$ y-int $(C/B) = -4$
$C = 4$ x-int $(C/A) = 2$




$+\frac{2}{3}x \quad +\frac{2}{3}x$

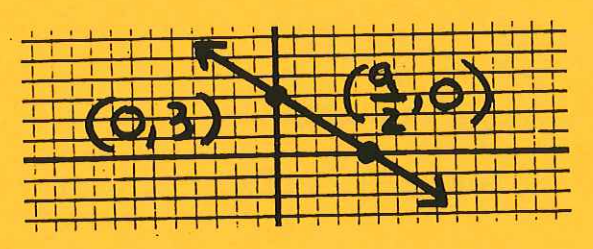
㉒ $y = -\frac{2}{3}x + 3$

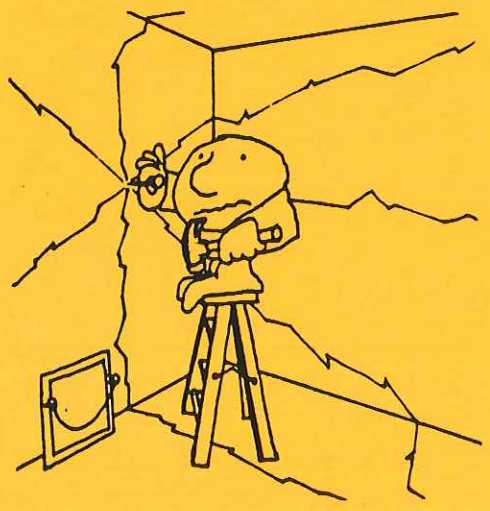
$\frac{2}{3}x + y = 3$ → no fractions

$3\left(\frac{2}{3}x + y = 3\right)$

$2x + 3y = 9$

$A = 2$ Slope $(-A/B) = -2/3$
$B = 3$ y-int $(C/B) = 3$
$C = 9$ x-int $(C/A) = 9/2$



# *Linear Equations*

(23) $2x - \frac{2}{3}y = -4$ → no fractions

$3(2x - \frac{2}{3}y = -4)$

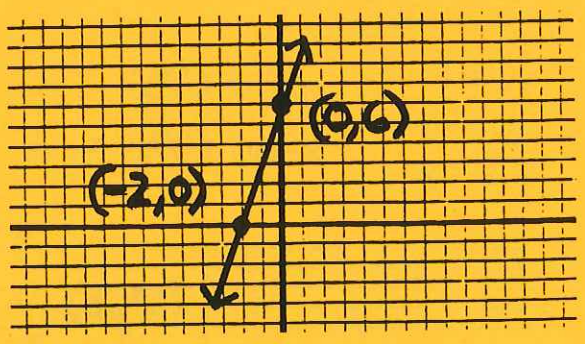
$6x - 2y = -12$ → divide by common factor

$3x - y = -6$

$A = 3$ Slope $(-A/B) = 3$

$B = -1$ y-int $(C/B) = 6$

$C = -6$ x-int $(C/A) = -2$




(24) $2y = \frac{1}{2}x + 4$ (−½x, −½x)

$-\frac{1}{2}x + 2y = 4$ → no fractions

$2(-\frac{1}{2}x + 2y = 4)$

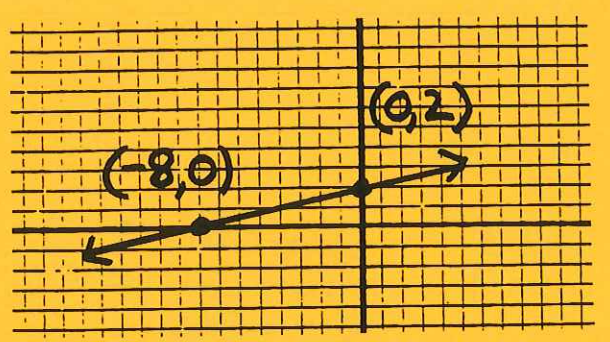
$-x + 4y = 8$ → "A" must be (+)

$x - 4y = -8$

$A = 1$ Slope $(-A/B) = 1/4$

$B = -4$ y-int $(C/B) = 2$

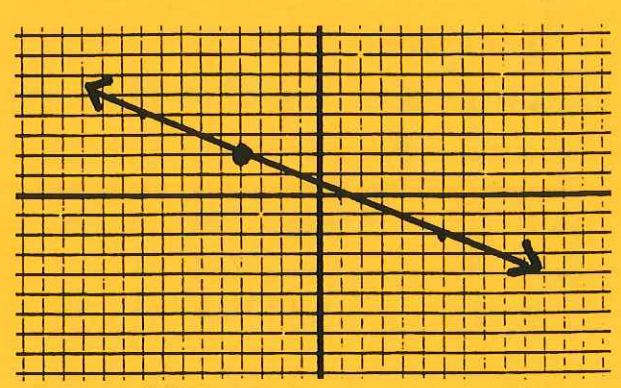
$C = -8$ x-int $(C/A) = -8$




UNIT 15: ANSWER KEY

# *Linear Equations*

**PRACTICE TEST #1**

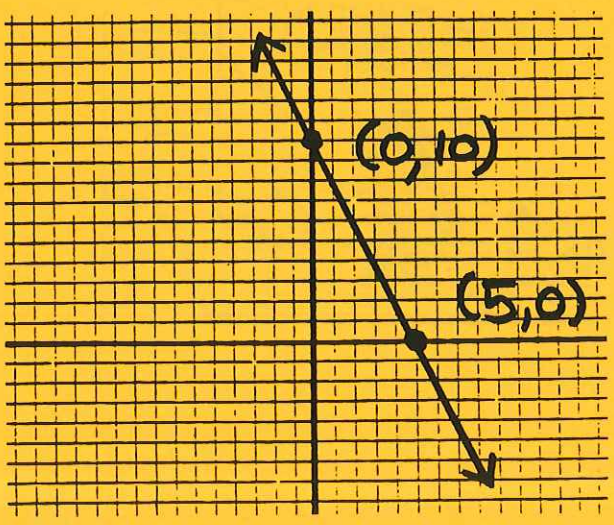
① 

② $y = 3x - 9$

$m = 3$ slope $(m) = 3$
$b = -9$ y-int $(b) = -9$
x-int $(-b/m) = 3$

③ $y = -2x + 10$

$m = -2$ y-int $(b) = 10$
$b = 10$ x-int $(\frac{-b}{m}) = 5$

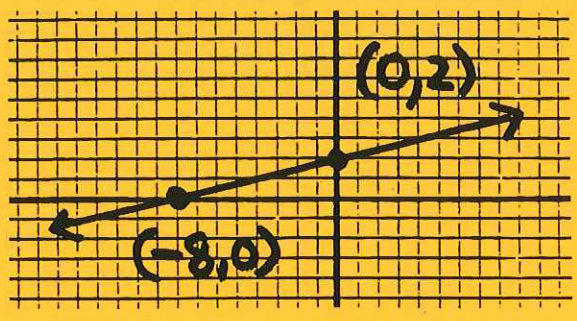



④ $3x + 2y = -18$

$A = 3$ slope $(-A/B) = -3/2$
$B = 2$ y-int $(C/B) = -9$
$C = -18$ x-int $(C/A) = -6$

⑤ $x - 4y = -8$

$A = 1$ y-int $(C/B) = 2$
$B = -4$ x-int $(C/A) = -8$
$C = -8$




⑥ $2x - 3y = -15$

$-2x \quad -2x$

$-3y = -2x - 15$

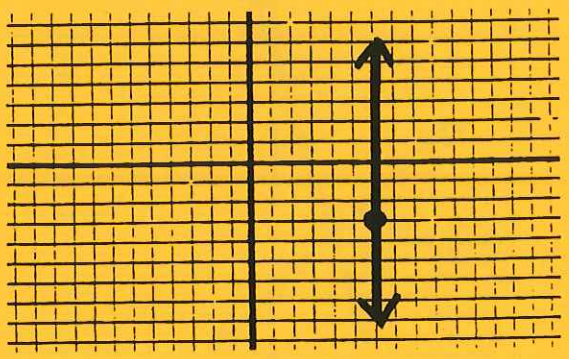
$-\frac{1}{3}(-3y = -2x - 15)$

$y = \frac{2}{3} + 5$

UNIT 15: ANSWER KEY

# *Linear Equations*

**PRACTICE TEST #2**

① 

② $y = -2x - 14$

$m = -2$ slope $(m) = -2$

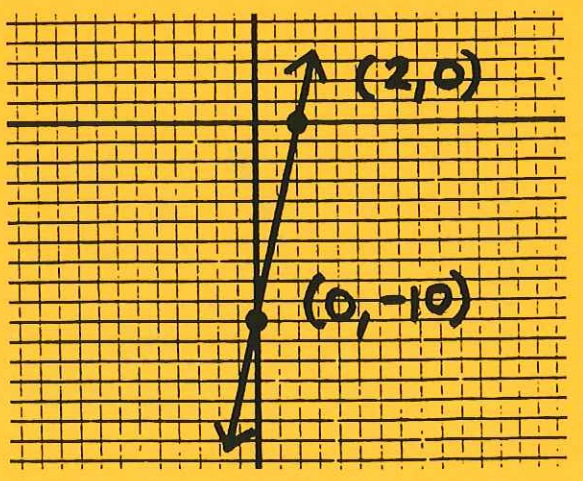
$b = -14$ y-int $(b) = -14$

x-int $(-b/m) = -7$

③ $y = 5x - 10$

$m = 5$ y-int $(b) = -10$

$b = -10$ x-int $(-b/m) = 2$




④ $4x - 5y = 20$

$A = 4$ slope $(-A/B) = 4/5$

$B = -5$ y-int $(C/B) = -4$

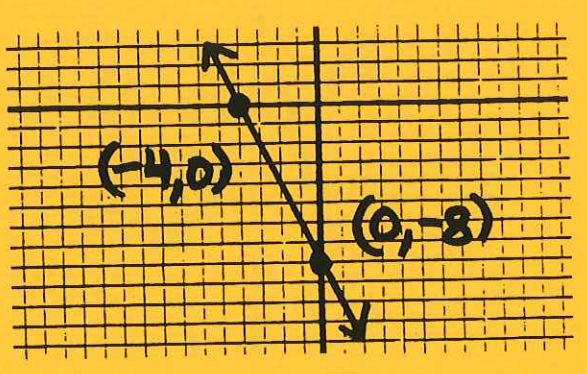
$C = 20$ x-int $(C/A) = 5$

⑤ $2x + y = -8$

$A = 2$ y-int $(C/B) = -8$

$B = 1$ x-int $(C/A) = -4$

$C = -8$




⑥ $x^{-x} - 2y = -7^{-x}$

$-2y = -x - 7$

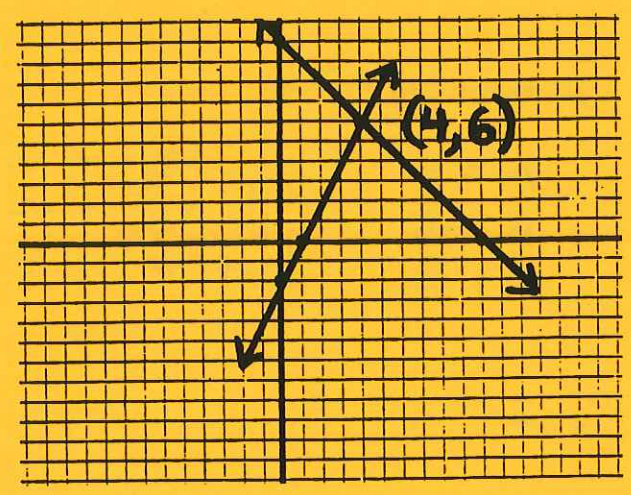
$-\frac{1}{2}(-2y = -x - 7)$

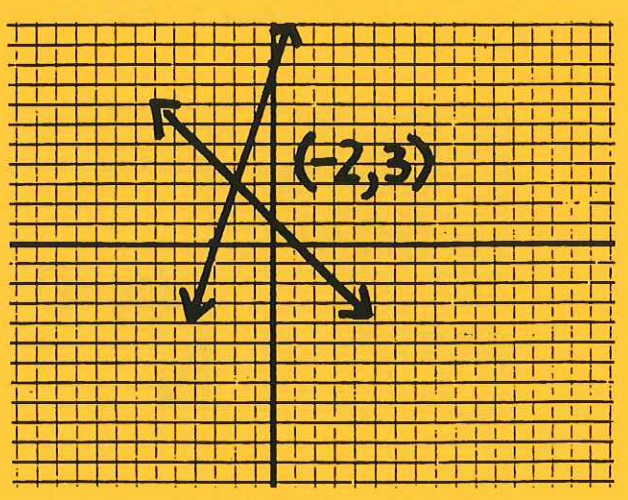
$y = \frac{1}{2}x + \frac{7}{2}$

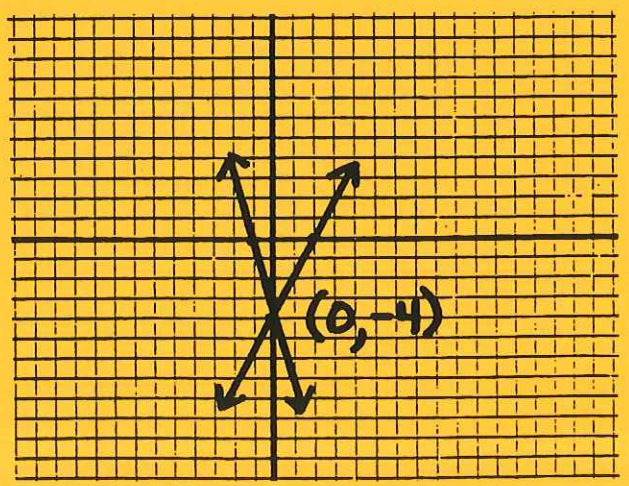
UNIT 16: ANSWER KEY

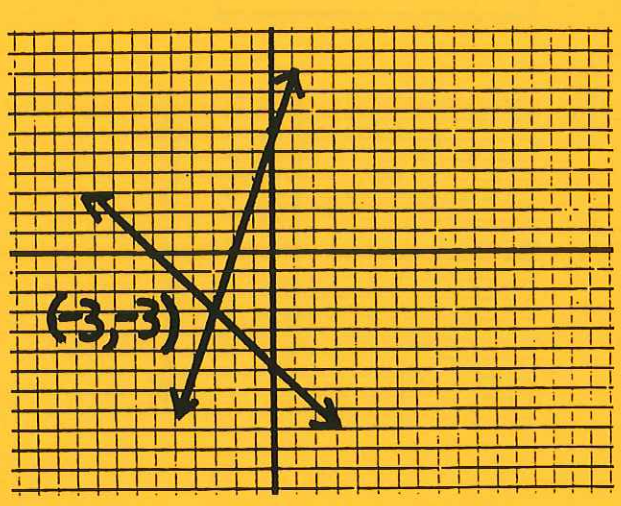
# *Linear Systems*

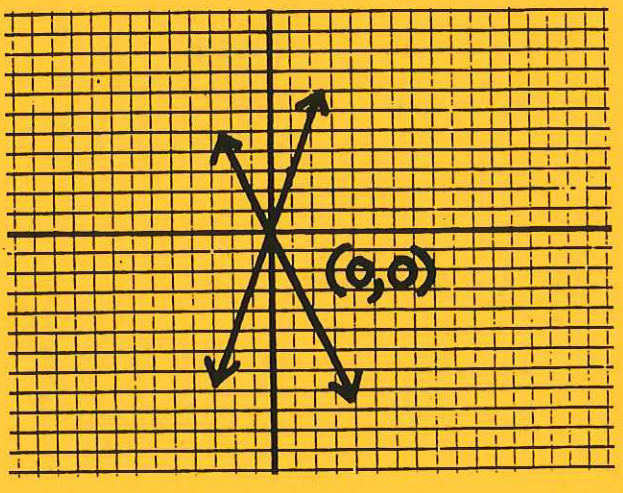
## 1. GRAPHING SYSTEMS

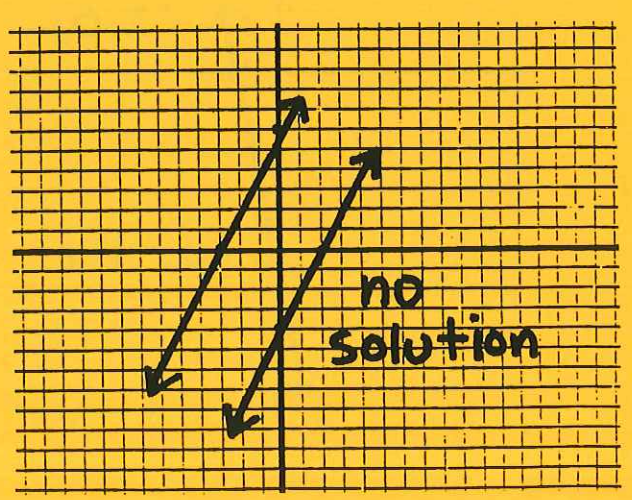
① 


② 


③ 


④ 

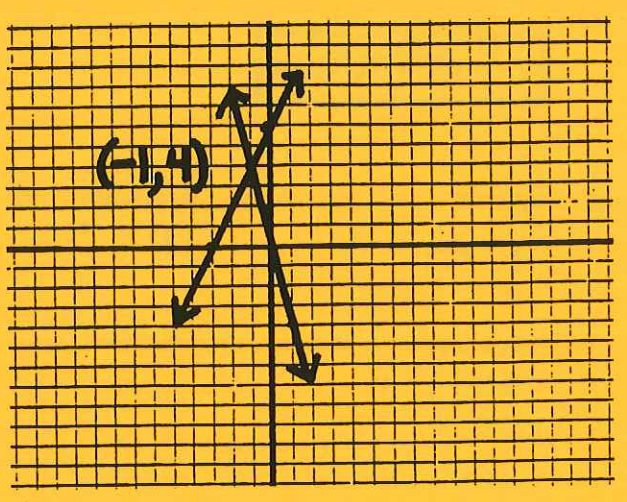

⑤ 


⑥ 

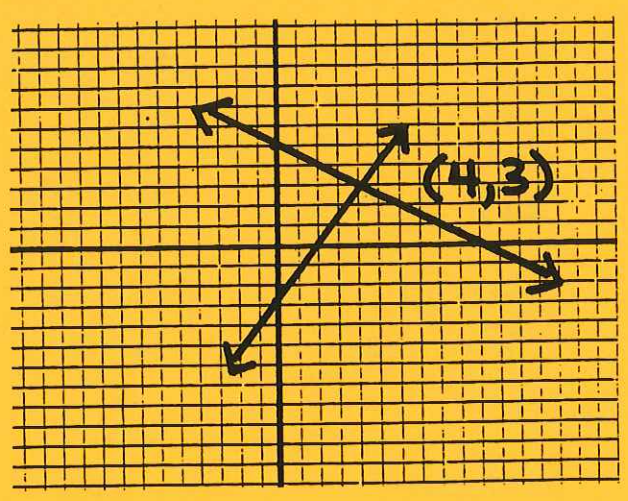
UNIT 16: ANSWER KEY

# *Linear Systems*

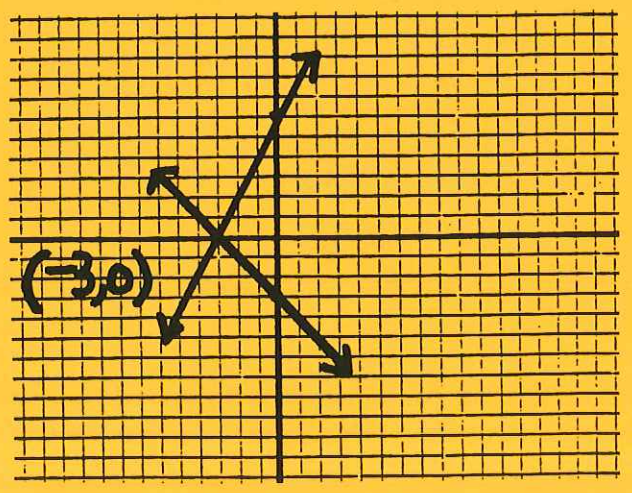
⑦



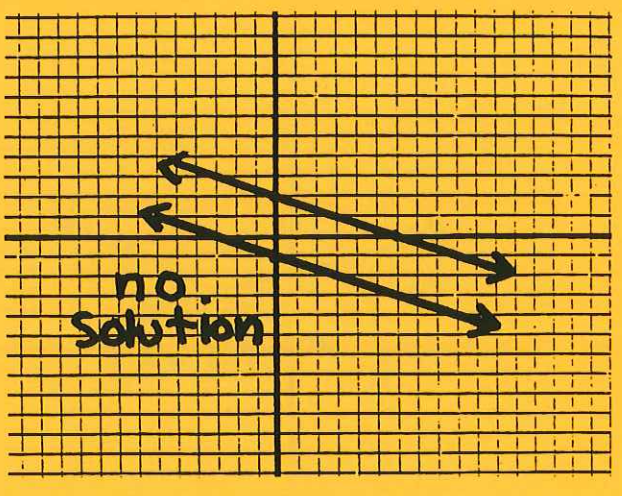

⑧



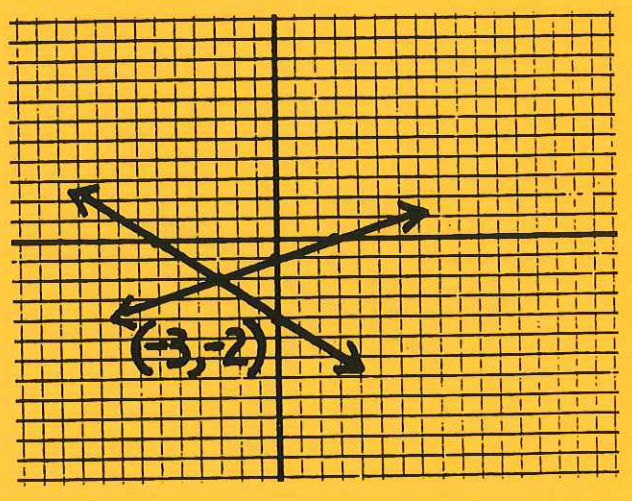

⑨



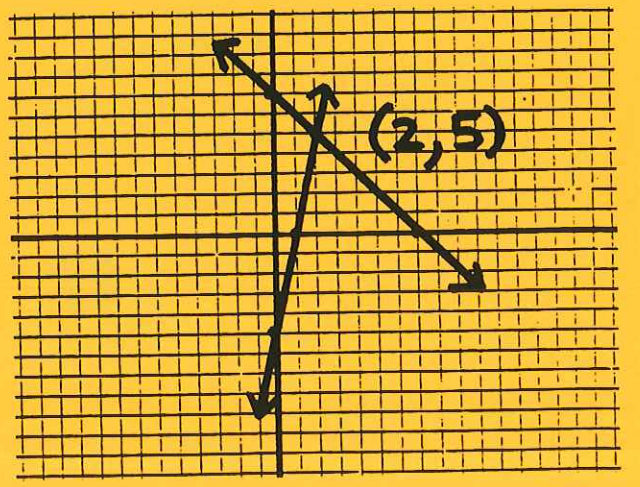

⑩




⑪



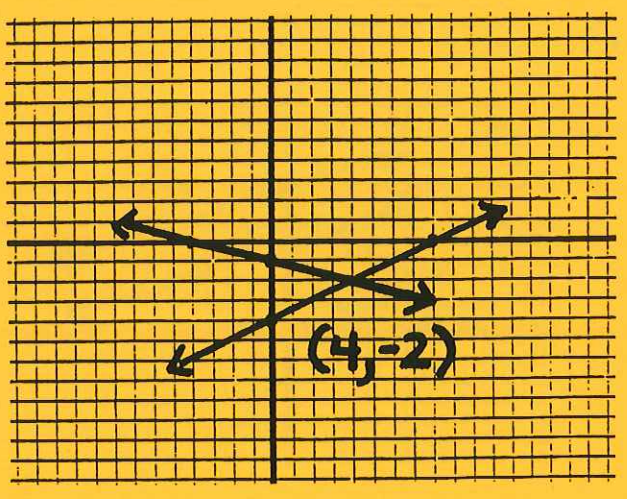

⑫



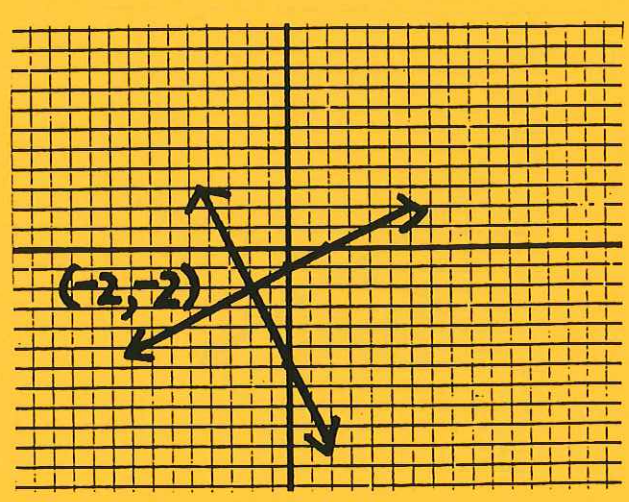
UNIT 16: ANSWER KEY

# *Linear Systems*

(13)




(14)





## 2. SUBSTITUTION

① $y = 2$
$3x + 2y = 16$

$3x + 2(2) = 16$
$3x + 4 = 16$
$-4 \quad -4$
$3x = 12$
$(\frac{1}{3})(3x) = (\frac{1}{3})(12)$
$x = 4$

$(4, 2)$

② $x = -3$
$2x + y = -2$

$2(-3) + y = -2$
$-6 \quad +6$
$-6 + y = -2$
$y = 4$

$(-3, 4)$

③ $3x - 4y = -3$
$2y + 4 = -2$
$-4 \quad -4$

$2y = -6$
$(\frac{1}{2})(2y) = (\frac{1}{2})(-6)$
$y = -3$

$3x - 4(-3) = -3$
$3x - (-12) = -3$
$3x + 12 = -3$
$-12 \quad -12$
$3x = -15$
$(\frac{1}{3})(3x) = (\frac{1}{3})(-15)$
$x = -5$

$(-5, -3)$

④ $2x - y = -8$
$3x - 1 = -4$
$+1 \quad +1$

$3x = -3$
$(\frac{1}{3})(3x) = (\frac{1}{3})(-3)$
$x = -1$

$2(-1) - y = -8$
$-2 \quad +2$
$-2 - y = -8$
$+2 \quad +2$
$-y = -6$
$y = 6$

$(-1, 6)$

⑤ $2x - 5 = 3$
$+5 \quad +5$
$5x + 4y = 4$

$2x = 8$
$(\frac{1}{2})(2x) = (\frac{1}{2})(8)$
$x = 4$

$5(4) + 4y = 4$
$20 \quad -20$
$20 + 4y = 4$
$-20$
$4y = -16$
$(\frac{1}{4})(4y) = (\frac{1}{4})(-16)$
$y = -4$

cont.

# *Linear Systems*

(4, -4)

⑥ $3y + 7 = 1$
$4x - 7y = 2$

$3y = -6$
$(\frac{1}{3})(3y) = (\frac{1}{3})(-6)$
$y = -2$

$4x - 7(-2) = 2$
$4x + 14 = 2$
$4x = -12$
$(\frac{1}{4})(4x) = (\frac{1}{4})(-12)$
$x = -3$

(-3, -2)

⑦ $y = x + 8$
$2x + y = -1$

$2x + (x+8) = -1$
$3x + 8 = -1$
$3x = -9$
$(\frac{1}{3})(3x) = (\frac{1}{3})(-9)$
$x = -3$

$y = (-3) + 8$
$y = 5$

(-3, 5)

⑧ $x = 3y - 3$
$3x - 4y = 6$

$3(3y-3) - 4y = 6$
$9y - 9 - 4y = 6$
$5y - 9 = 6$
$5y = 15$
$(\frac{1}{5})(5y) = (\frac{1}{5})(15)$
$y = 3$

$x = 3(3) - 3$
$x = 9 - 3$
$x = 6$

(6, 3)

⑨ $3x - 2y = 5$
$y = 2x - 2$

$3x - 2(2x-2) = 5$
$3x - 4x + 4 = 5$
$-x + 4 = 5$
$-x = 1$
$x = -1$

$y = 2(-1) - 2$
$y = -2 - 2$
$y = -4$

(-1, -4)

⑩ $2x - 3y = 5$
$x = 2y - 6$

$2(2y-6) - 3y = -5$
$4y - 12 - 3y = -5$
$y - 12 = -5$
$y = 7$

$x = 2(7) - 6$
$x = 14 - 6$
$x = 8$

(8, 7)

⑪ $2x + y = 8$
$3x - 5y = -1$

$2x + y = 8$
$y = 8 - 2x$

$3x - 5(8-2x) = -1$
$3x - 40 + 10x = -1$
$13x - 40 = -1$
$13x = 39$
$(\frac{1}{13})(13x) = (\frac{1}{13})(39)$
$x = 3$

$y = 8 - 2(3)$
$y = 8 - 6$
$y = 2$

(3, 2)

# *Linear Systems*

(12) $x-2y=7$
$4x-2y=-2$

$x-2y \overset{+2y}{=} 7 \overset{+2y}{}$
$x=7+2y$

$4(7+2y)-2y=-2$
$28+8y-2y=-2$
$28 \overset{-28}{+} 6y = -2 \overset{-28}{}$
$6y=-30$
$(\frac{1}{6})(6y)=(\frac{1}{6})(-30)$
$y=-5$

$x=7+2(-5)$
$x=7-10$
$x=-3$

$(-3,-5)$

(13) $2x-3y=6$
$3x-y=-5$

$3x \overset{-3x}{-} y = -5 \overset{-3x}{}$
$-y=-5-3x$
$y=5+3x$

$2x-3(5+3x)=6$
$2x-15-9x=6$
$-7x-15 \overset{+15}{=} 6 \overset{+15}{}$
$-7x=21$
$(\frac{-1}{7})(-7x)=(\frac{-1}{7})(21)$
$x=-3$

$y=5+3x$
$y=5+3(-3)$
$y=5-9$
$y=-4$

$(-3,-4)$


(14) $3x-2y=7$
$4x-y=1$

$4x \overset{-4x}{-} y = 1 \overset{-4x}{}$
$-y=1-4x$
$y=-1+4x$

$3x-2(-1+4x)=7$
$3x+2-8x=7$
$-5x+2 \overset{-2}{=} 7 \overset{-2}{}$
$-5x=5$
$(\frac{-1}{5})(-5x)=(\frac{-1}{5})(5)$
$x=-1$

$y=-1+4x$
$y=-1+4(-1)$
$y=-1-4$
$y=-5$

$(-1,-5)$

(15) $3x-y=1$
$5x-2y=4$

$3x \overset{-3x}{-} y = 1 \overset{-3x}{}$
$-y=1-3x$
$y=-1+3x$

$5x-2(-1+3x)=4$
$5x+2-6x=4$
$-x+2 \overset{-2}{=} 4 \overset{-2}{}$
$-x=2$
$x=-2$

$y=-1+3x$
$y=-1+3(-2)$
$y=-1-6$
$y=-7$

$(-2,-7)$

# Linear Systems

⑯ $3x - y = 3$
$2x - 3y = -12$

$3x^{-3x} - y = 3^{-3x}$
$-y = 3 - 3x$
$y = -3 + 3x$

$2x - 3(-3 + 3x) = -12$
$2x + 9 - 9x = -12$
$-7x + 9^{-9} = -12^{-9}$
$-7x = -21$
$(\frac{-1}{7})(-7x) = (\frac{-1}{7})(-21)$
$x = 3$

$y = -3 + 3x$
$y = -3 + 3(3)$
$y = -3 + 9$
$y = 6$

$(3, 6)$

⑰ $2x - y = -10$
$3x + 5y = -2$

$2x^{-2x} - y = -10^{-2x}$
$-y = -10 - 2x$
$y = 10 + 2x$

$3x + 5(10 + 2x) = -2$
$3x + 50 + 10x = -2$
$13x + 50^{-50} = -2^{-50}$
$13x = -52$
$(\frac{1}{13})(13x) = (\frac{1}{13})(-52)$
$x = -4$

$y = 10 + 2x$
$y = 10 + 2(-4)$
$y = 10 - 8$
$y = 2$

$(-4, 2)$

⑱ $3x - y = 15$
$3x + 2y = 6$

$3x^{-3x} - y = 15^{-3x}$
$-y = 15 - 3x$
$y = -15 + 3x$

$3x + 2(-15 + 3x) = 6$
$3x - 30 + 6x = 6$
$9x - 30^{+30} = 6^{+30}$
$9x = 36$
$(\frac{1}{9})(9x) = (\frac{1}{9})(36)$
$x = 4$

$y = -15 + 3x$
$y = -15 + 3(4)$
$y = -15 + 12$
$y = -3$

$(4, -3)$

⑲ $4y - x = -2$
$2y - 3x = 14$

$4y^{-4y} - x = -2^{-4y}$
$-x = -2 - 4y$
$x = 2 + 4y$

$2y - 3(2 + 4y) = 14$
$2y - 6 - 12y = 14$
$-10y - 6^{+6} = 14^{+6}$
$-10y = 20$
$(\frac{-1}{10})(-10y) = (\frac{-1}{10})(20)$
$y = -2$

$x = 2 + 4y$
$x = 2 + 4(-2)$
$x = 2 + (-8)$
$x = -6$

$(-6, -2)$

⑳ $2y - x = 7$
$-3y - 4x = 6$

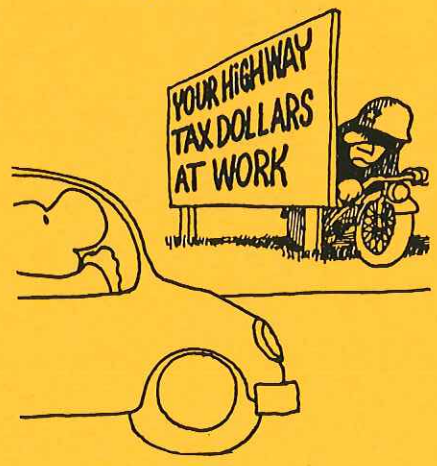
$2y^{-2y} - x = 7^{-2y}$
$-x = 7 - 2y$
$x = -7 + 2y$

# *Linear Systems*

$-3y-4(-7+2y)=6$
$-3y+28-8y=6$
$-11y+28^{-28}=6^{-28}$
$-11y=-22$
$(\frac{-1}{11})(-11y)=(\frac{-1}{11})(-22)$
$y=2$

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

$(-3,2)$




## 3. ELIMINATION

① $2x+3y=13$
$3x-3y=-3$
$5x=10$
$(\frac{1}{5})(5x)=(\frac{1}{5})(10)$
$x=2$

$2x+3y=13$
$2(2)+3y=13$
$4^{-4}+3y=13^{-4}$
$3y=9$
$(\frac{1}{3})(3y)=(\frac{1}{3})(9)$
$y=3$

$(2,3)$

② $3x-2y=2$
$5x+2y=30$
$8x=32$
$(\frac{1}{8})(8x)=(\frac{1}{8})(32)$
$x=4$

$3x-2y=2$
$3(4)-2y=2$
$12^{-12}-2y=2^{-12}$
$-2y=-10$
$(\frac{-1}{2})(-2y)=(\frac{-1}{2})(-10)$
$y=5$

$(4,5)$

③ $4x+3y=12$
$-4x-2y=-4$
$y=8$

$4x+3y=12$
$4x+3(8)=12$
$4x+24^{-24}=12^{-24}$
$4x=-12$

$(\frac{1}{4})(4x)=(\frac{1}{4})(-12)$
$x=-3$

$(-3,8)$

④ $2x-3y=33$
$-2x-5y=7$
$-8y=40$
$(\frac{-1}{8})(-8y)=(\frac{-1}{8})(40)$
$y=-5$

$2x-3y=33$
$2x-3(-5)=33$
$2x+15^{-15}=33^{-15}$
$2x=18$
$(\frac{1}{2})(2x)=(\frac{1}{2})(18)$
$x=9$

$(9,-5)$

⑤ $5x-2y=-14$
$2x+y=-11 \quad \times 2$

$5x-2y=-14$
$4x+2y=-22$
$9x=-36$
$(\frac{1}{9})(9x)=(\frac{1}{9})(-36)$
$x=-4$

$2x+y=-11$
$2(-4)+y=-11$
$y=-3 \quad (-4,-3)$

# *Linear Systems*

⑥ $3x + 4y = -7$
$2x - y = -12$ mult. by 4

$3x + 4y = -7$
$8x - 4y = -48$
$11x = -55$
$(1/11)(11x) = (1/11)(-55)$
$x = -5$

$3x + 4y = -7$
$3(-5) + 4y = -7$
$-15 \overset{+15}{} + 4y = -7 \overset{+15}{}$
$4y = 8$
$(1/4)(4y) = (1/4)(8)$
$y = 2$

$(-5, 2)$

⑦ $5x + 6y = 22$
$3x - 2y = 30$ mult. by 3

$5x + 6y = 22$
$9x - 6y = 90$
$14x = 112$
$(1/14)(14x) = (1/14)(112)$
$x = 8$

$3x - 2y = 30$
$3(8) - 2y = 30$
$-2y = 6$
$(-1/2)(-2y) = (-1/2)(6)$
$y = -3$

$(8, -3)$

⑧ $4x - 3y = -1$
$-2x + 4y = -12$ mult. by 2

$4x - 3y = -1$
$-4x + 8y = -24$
$5y = -25$
$(1/5)(5y) = (1/5)(-25)$
$y = -5$

$4x - 3y = -1$
$4x - 3(-5) = -1$
$4x + 15 \overset{-15}{} = -1 \overset{-15}{}$
$4x = -16$
$(1/4)(4x) = (1/4)(-16)$
$x = -4$

$(-4, -5)$

⑨ $3x + 2y = 8$ mult. by $-3$
$5x + 3y = 11$ mult. by 2

$-9x - 6y = -24$
$10x + 6y = 22$
$x = -2$

$3x + 2y = 8$
$3(-2) + 2y = 8$
$2y = 14$
$(1/2)(2y) = (1/2)(14)$
$y = 7$

$(-2, 7)$

# *Linear Systems*

(10) $3x+4y=4$ mult. by $-2$
$2x+5y=19$ mult. by $3$

$-6x-8y=-8$
$6x+15y=57$
$7y=49$
$(1/7)(7y)=(1/7)(49)$
$y=7$

$2x+5y=19$
$2x+5(7)=19$
$2x+35^{-35}=19^{-35}$
$2x=-16$
$(1/2)(2x)=(1/2)(-16)$
$x=-8$

$(-8,7)$

(11) $3x-5y=12$ mult. by $2$
$4x-2y=16$ mult. by $-5$

$6x-10y=24$
$-20x+10y=-80$
$-14x=-56$
$(-1/14)(-14x)=(-1/14)(-56)$
$x=4$

$3x-5y=12$
$3(4)-5y=12$
$12^{-12}-5y=12$
$-5y=0$
$y=0$

$(4,0)$

(12) $2x-3y=3$ mult. by $4$
$5x-4y=-10$ mult. by $-3$

$8x-12y=12$
$-15x+12y=30$
$-7x=42$
$(-1/7)(-7x)=(-1/7)(42)$
$x=-6$

$2x-3y=3$
$2(-6)-3y=3$
$-12^{+12}-3y=3^{+12}$
$-3y=15$
$(-1/3)(-3y)=(-1/3)(15)$
$y=-5$

$(-6,-5)$


(13) $5x-7y=-13$ mult. by $-2$
$2x-5y=-3$ mult. by $5$

$-10x+14y=26$
$10x-25y=-15$
$-11y=11$

# *Linear Systems*

$(-1/11)(-11y) = (-1/11)(11)$
$y = -1$

$2x - 5y = -3$
$2x - 5(-1) = -3$
$2x + 5^{-5} = -3^{-5}$
$2x = -8$
$(1/2)(2x) = (1/2)(-8)$
$x = -4$

$(-4, -1)$

(14) $4x - 3y = -9$ mult. by 2
$-5x + 2y = -1$ mult. by 3

$8x - 6y = -18$
$-15x + 6y = -3$
$-7x = -21$
$(-1/7)(7x) = (-1/7)(-21)$
$x = 3$

$4x - 3y = -9$
$4(3) - 3y = -9$
$12^{-12} - 3y = -9^{-12}$
$-3y = -21$
$(-1/3)(-3y) = (-1/3)(-21)$
$y = 7$

$(3, 7)$

(15) $2x - 2y = -18$ div. by 2
$4x + 4y = 12$ div. by 4

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

$x - y = -9$
$(-3)^{+3} - y = -9^{+3}$
$-y = -6$
$y = 6$

$(-3, 6)$

(16) $3x + 3y = 6$ div. by 3
$7x - 7y = 42$ div. by 7

$x + y = 2$
$x - y = 6$
$2x = 8$
$(1/2)(2x) = (1/2)(8)$
$x = 4$

$x + y = 2$
$(4)^{-4} + y = 2^{-4}$
$y = -2$

$(4, -2)$

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# *Linear Systems*

## 4. PROBLEM SOLVING

| | Rate | × Time | = Dist. |
|---|---|---|---|
| ① Downstream | r+c | 4 | 48 |
| Upstream | r−c | 6 | 48 |

$4r + 4c = 48$ div. by 4
$6r - 6c = 48$ div. by 6

$r + c = 12$
$\underline{r - c = 8}$
$2r = 20$
$r = 10$

$r + c = 12$
$(10) + c = 12$
$c = 2$

Boat: 10 mph Current: 2 mph

| | Rate | × Time | = Dist. |
|---|---|---|---|
| ② Downstream | r+c | 3 | 60 |
| Upstream | r−c | 6 | 60 |

$3r + 3c = 60$ div. by 3
$6r - 6c = 60$ div. by 6

$r + c = 20$
$\underline{r - c = 10}$
$2r = 30$
$r = 15$

$r + c = 20$
$(15) + c = 20$
$c = 5$

Boat: 15 mph Current: 5 mph

| | Rate | × Time | = Dist. |
|---|---|---|---|
| ③ Upstream | r−c | 5 | 30 |
| Downstream | r+c | 2 | 28 |

$5r - 5c = 30$ div. by 5
$2r + 2c = 28$ div. by 2

$r - c = 6$
$\underline{r + c = 14}$
$2r = 20$
$r = 10$

$r + c = 14$
$(10) + c = 14$
$c = 4$

Boat: 10 mph Current: 4 mph

| | Rate | × Time | = Dist. |
|---|---|---|---|
| ④ With wind | r+w | 2 | 600 |
| Against Wind | r−w | 2 | 520 |

$2r + 2w = 600$
$\underline{2r - 2w = 520}$
$4r = 1120$
$r = 280$

$2r + 2w = 600$
$2(280) + 2w = 600$
$2w = 40$
$w = 20$

Plane: 280 mph Wind: 20 mph

# Linear Systems

⑤

| | Rate | × Time | = Dist. |
|---|---|---|---|
| With Wind | r+w | 1/3 | 150 |
| Against Wind | r−w | 1/2 | 175 |

$\frac{1}{3}r + \frac{1}{3}w = 150$ mult. by 3
$\frac{1}{2}r - \frac{1}{2}w = 175$ mult. by 2

$r + w = 450$
$r - w = 350$
$2r = 800$
$r = 400$

$r + w = 450$
$(400) + w = 450$
$w = 50$

Plane: 400 mph Wind: 50 mph

⑥

| | Rate | × Time | = Dist. |
|---|---|---|---|
| With Wind | r+w | 3 | 1800 |
| Against Wind | r−w | 4 | 2000 |

$3r + 3w = 1800$ div. by 3
$4r - 4w = 2000$ div. by 4

$r + w = 600$
$r - w = 500$
$2r = 1100$
$r = 550$

$r + w = 600$
$(550) + w = 600$
$w = 50$

Plane: 550 mph Wind: 50 mph

⑦

| | Rate | × Time | = Dist. |
|---|---|---|---|
| With Wind | r+w | 3/4 | 300 |
| Against Wind | r−w | 1/2 | 150 |

$\frac{3}{4}r + \frac{3}{4}w = 300$ mult. by 4/3
$\frac{1}{2}r - \frac{1}{2}w = 150$ mult. by 2

$r + w = 400$
$r - w = 300$
$2r = 700$
$r = 350$

$r + w = 400$
$(350) + w = 400$
$w = 50$

Plane: 350 mph Wind: 50 mph

⑧

| | Rate | × Time | = Dist. |
|---|---|---|---|
| With Wind | r+w | 3/2 | 600 |
| Against Wind | r−w | 2 | 600 |

$\frac{3}{2}r + \frac{3}{2}w = 600$ mult. by 2/3
$2r - 2w = 600$ div. by 2

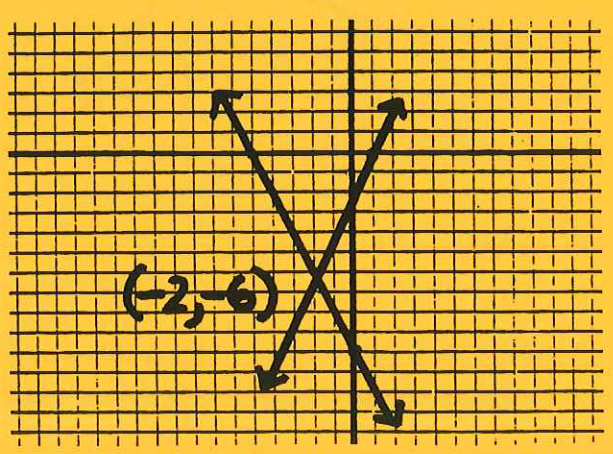
$r + w = 400$
$r - w = 300$
$2r = 700$
$r = 350$

$r + w = 400$
$(350) + w = 400$
$w = 50$

Plane: 350 mph Wind: 50 mph

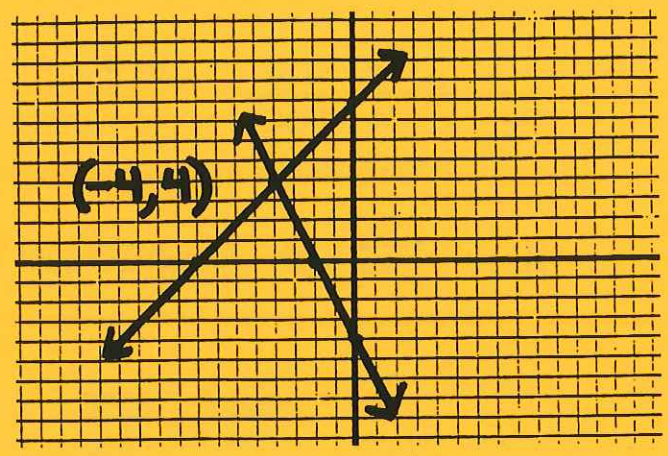
**REVIEW & PRACTICE**

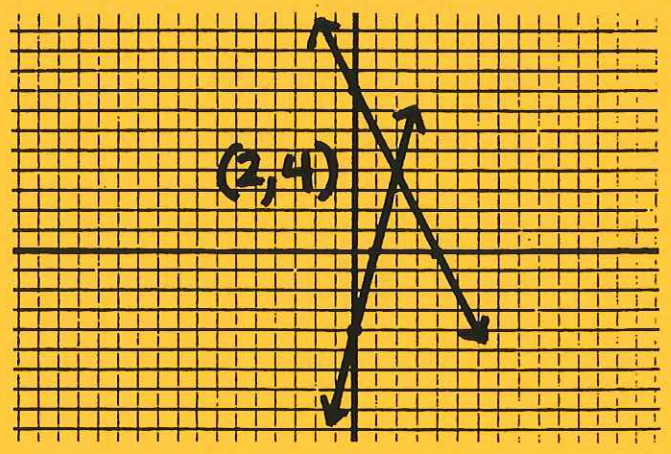
①

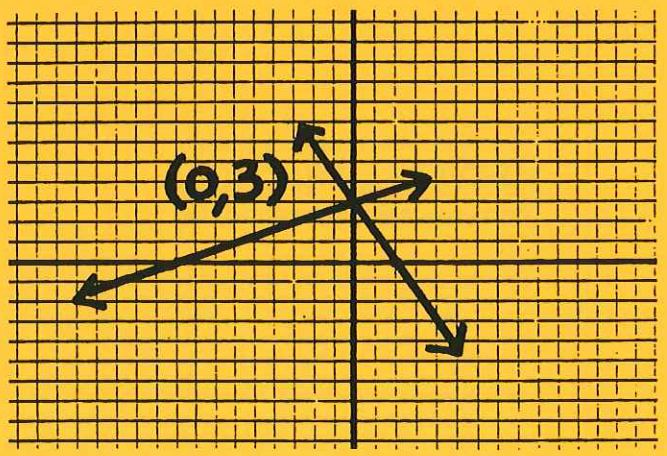


UNIT 16: ANSWER KEY

# *Linear Systems*

② 


③ 


④ 


⑤ $y = 5$

$2x - 3y = -21$

$2x - 3(5) = -21$

$2x - 15 = -21$ (+15)

$2x = -6$

$(\frac{1}{2})(2x) = (\frac{1}{2})(-6)$

$x = -3$

$(-3, 5)$

⑥ $x = 3$

$3x + 2y = -5$

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

$9 + 2y = -5$ (−9)

$2y = -14$

$(\frac{1}{2})(2y) = (\frac{1}{2})(-14)$

$y = -7$

$(3, -7)$

⑦ $2x + 7 = -1$

$3x + 4y = 12$

$2x + 7 = -1$ (−7)

$2x = -8$

$(\frac{1}{2})(2x) = (\frac{1}{2})(-8)$

$x = -4$

$3x + 4y = 12$

$3(-4) + 4y = 12$

$-12 + 4y = 12$ (+12)

$4y = 24$

$(\frac{1}{4})(4y) = (\frac{1}{4})(24)$

$y = 6$

$(-4, 6)$

⑧ $3y - 11 = 16$

$3x - 2y = -3$

$3y - 11 = 16$ (+11)

$3y = 27$

$(\frac{1}{3})(3y) = (\frac{1}{3})(27)$

$y = 9$

$3x - 2y = -3$

$3x - 2(9) = -3$

$3x - 18 = -3$ (+18)

$3x = 15$

$(\frac{1}{3})(3x) = (\frac{1}{3})(15)$

$x = 5$

$(5, 9)$

⑨ $3x - y = 3$

$-4x + 3y = 1$

$3x - y = 3$ (−3x)

$-y = 3 - 3x$

$y = -3 + 3x$

$-4x + 3y = 1$

$-4x + 3(-3 + 3x) = 1$

$-4x - 9 + 9x = 1$

$5x - 9 = 1$ (+9)

$5x = 10$

$(\frac{1}{5})(5x) = (\frac{1}{5})(10)$

$x = 2$

$y = -3 + 3x$

$y = -3 + 3(2)$

$y = 3$

$(2, 3)$

UNIT 16: ANSWER KEY

# *Linear Systems*

⑩ $3x-7y=-5$
$x-5y=1$

$x-5y \overset{+5y}{=} 1 \overset{+5y}{}$
$x=1+5y$

$3x-7y=-5$
$3(1+5y)-7y=-5$
$3+15y-7y=-5$
$3 \overset{-3}{+} 8y = -5 \overset{-3}{}$
$8y=-8$
$(\frac{1}{8})(8y)=(\frac{1}{8})(-8)$
$y=-1$

$x=1+5y$
$x=1+5(-1)$
$x=-4$

$(-4,-1)$

⑪ $7x-2y=-8$
$3x-y=-5$

$3x \overset{-3x}{-} y = -5 \overset{-3x}{}$
$-y=-5-3x$
$y=5+3x$

$7x-2y=-8$
$7x-2(5+3x)=-8$
$7x-10-6x=-8$
$x-10 \overset{+10}{=} -8 \overset{+10}{}$
$x=2$

$y=5+3x$
$y=5+3(2)$
$y=11$

$(2,11)$

⑫ $-4x-y=6$
$3x+2y=3$

$-4x \overset{+4x}{-} y = 6 \overset{+4x}{}$
$-y=6+4x$
$y=-6-4x$

$3x+2y=3$
$3x+2(-6-4x)=3$
$3x-12-8x=3$
$-5x-12 \overset{+12}{=} 3 \overset{+12}{}$
$-5x=15$
$(\frac{-1}{5})(-5x)=(\frac{-1}{5})(15)$
$x=-3$

$y=-6-4x$
$y=-6-4(-3)$
$y=6$

$(-3,6)$

⑬ $2x+3y=7$ mult. by 3
$-3x-4y=-8$ mult. by 2

$6x+9y=21$
$-6x-8y=-16$
$y=5$

$2x+3y=7$
$2x+3(5)=7$
$2x+15 \overset{-15}{=} 7 \overset{-15}{}$
$2x=-8$
$(\frac{1}{2})(2x)=(\frac{1}{2})(-8)$
$x=-4$

$(-4,5)$

⑭ $3x-2y=-10$ mult. by 3
$7x-3y=-10$ mult. by $-2$

$9x-6y=-30$
$-14x+6y=20$
$-5x=-10$
$x=2$

$3x-2y=-10$
$3(2)-2y=-10$
$6 \overset{-6}{-} 2y = -10 \overset{-6}{}$
$-2y=-16$
$(\frac{-1}{2})(-2y)=(\frac{-1}{2})(-16)$
$y=8$

$(2,8)$

UNIT 16: ANSWER KEY

# *Linear Systems*

(15) $2x-2y=-2$ div. by 2
$3x+3y=33$ div. by 3

$x-y=-1$
$x+y=11$
$2x=10$
$x=5$

$x+y=11$
$(5)+y=11$
$y=6$ (5, 6)

(16) $5x+5y=15$ div. by 5
$3x-3y=-33$ div. by 3

$x+y=3$
$x-y=-11$
$2x=-8$
$x=-4$

$x+y=3$
$(-4)+y=3$
$y=7$ (-4, 7)

(17) $4x-3y=-12$ mult. by 2
$5x-2y=-1$ mult. by -3

$8x-6y=-24$
$-15x+6y=3$
$-7x=-21$
$x=3$

$4x-3y=-12$
$4(3)-3y=-12$
$12-3y=-12$
$-3y=-24$
$(-\frac{1}{3})(-3y)=(-\frac{1}{3})(-24)$
$y=8$ (3, 8)

(18) $6x-3y=6$
$-3x+7y=41$ mult. by 2

$6x-3y=6$
$-6x+14y=82$
$11y=88$
$y=8$

$6x-3y=6$
$6x-3(8)=6$
$6x-24=6$
$6x=30$
$(\frac{1}{6})(6x)=(\frac{1}{6})(30)$
$x=5$ (5, 8)

# *Linear Systems*

(19)

| | Rate | × Time | = Dist. |
|---|---|---|---|
| Downstream | r+c | 4 | 36 |
| Upstream | r-c | 6 | 18 |

$4r + 4c = 36$ div. by 4
$6r - 6c = 18$ div. by 6

$r + c = 9$
$r - c = 3$
$2r = 12$
$r = 6$

$r + c = 9$
$(6) + c = 9$
$c = 3$

Boat: 6mph Current: 3mph

(20)

| | Rate | × Time | = Dist. |
|---|---|---|---|
| Downstream | r+c | 5 | 55 |
| Upstream | r-c | 11 | 55 |

$5r + 5c = 55$ div. by 5
$11r - 11c = 55$ div. by 11

$r + c = 11$
$r - c = 5$
$2r = 16$
$r = 8$

$r + c = 11$
$(8) + c = 11$
$c = 3$

Boat: 8mph Current: 3mph

(21)

| | Rate | × Time | = Dist. |
|---|---|---|---|
| With Wind | r+w | 2/3 | 280 |
| Against Wind | r-w | 3/4 | 225 |

$\frac{2}{3}r + \frac{2}{3}w = 280$ mult. by $\frac{3}{2}$
$\frac{3}{4}r - \frac{3}{4}w = 225$ mult. by $\frac{4}{3}$

$r + w = 420$
$r - w = 300$
$2r = 720$
$r = 360$

$r + w = 420$
$(360) + w = 420$
$w = 60$

Plane: 360 mph Wind: 60 mph

(22)

| | Rate | × Time | = Dist. |
|---|---|---|---|
| With Wind | r+w | 3/2 | 960 |
| Against Wind | r-w | 3 | 960 |

$\frac{3}{2}r + \frac{3}{2}w = 960$ mult. by $\frac{2}{3}$
$3r - 3w = 960$ div. by 3

$r + w = 640$
$r - w = 320$
$2r = 960$
$r = 480$

$r + w = 640$
$(480) + w = 640$
$w = 160$

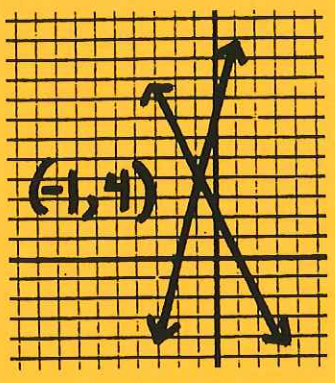
Plane: 480 mph Wind: 160 mph

UNIT 16: ANSWER KEY

# *Linear Systems*

**PRACTICE TEST #1**

① $y = 4x + 8$
$2x + y = 2$




② $2x + 5 = -7$
$3x + 4y = -2$

$2x + 5^{-5} = -7^{-5}$
$2x = -12$
$(1/2)(2x) = (1/2)(-12)$
$x = -6$

$3x + 4y = -2$
$3(-6) + 4y = -2$
$-18^{+18} + 4y = -2^{+18}$
$4y = 16$
$(1/4)(4y) = (1/4)(16)$
$y = 4$

$(-6, 4)$

③ $2x - y = 5$
$3x + 2y = 4$

$-y = -2x + 5$
$y = 2x - 5$

$3x + 2y = 4$
$3x + 2(2x - 5) = 4$
$3x + 4x - 10 = 4$
$7x - 10^{+10} = 4^{+10}$
$7x = 14$
$(1/7)(7x) = (1/7)(14)$
$x = 2$

$y = 2x - 5$
$y = 2(2) - 5$
$y = -1$

$(2, -1)$

④ $3x + 2y = 6$
$4x - 2y = 22$
$7x = 28$
$x = 4$

$3x + 2y = 6$
$3(4) + 2y = 6$
$12^{-12} + 2y = 6^{-12}$
$2y = -6$
$(1/2)(2y) = (1/2)(-6)$
$y = -3$

$(4, -3)$

⑤ $4x - 2y = -6$ div. by 2
$3x - 3y = -15$ div. by -3

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

$2x - y = -3$
$2(2) - y = -3$
$4^{-4} - y = -3^{-4}$
$-y = -7$
$y = 7$

$(2, 7)$

⑥

| | Rate | × Time | = Dist. |
|---|---|---|---|
| Downstream | r+c | 1/2 | 9 |
| Upstream | r-c | 3/2 | 9 |

$\frac{1}{2}r + \frac{1}{2}c = 9$ mult. by 2
$\frac{3}{2}r - \frac{3}{2}c = 9$ mult. by 2/3

$r + c = 18$
$r - c = 6$
$2r = 24$
$r = 12$

$r + c = 18$
$(12) + c = 18$
$c = 6$

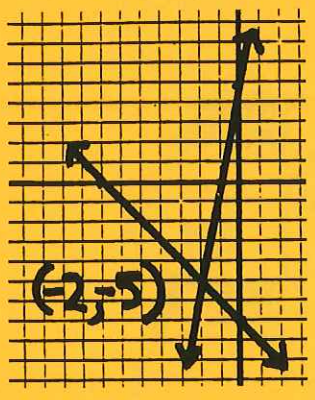

Boat: 12mph Current: 6 mph

UNIT 16: ANSWER KEY

# *Linear Systems*

**PRACTICE TEST #2**

① $y = 5x + 5$
$x + y = -7$




② $2x - 5y = -5$
$3y - 4 = 5$

$3y - 4 \overset{+4}{} = 5 \overset{+4}{}$
$3y = 9$
$(1/3)(3y) = (1/3)(9)$
$y = 3$

$2x - 5y = -5$
$2x - 5(3) = -5$
$2x - 15 \overset{+15}{} = -5 \overset{+15}{}$
$2x = 10$
$(1/2)(2x) = (1/2)(10)$
$x = 5$

$(5, 3)$

③ $3x - y = 8$
$5x + 4y = 2$

$-y = -3x + 8$
$y = 3x - 8$

$5x + 4y = 2$
$5x + 4(3x - 8) = 2$
$5x + 12x - 32 = 2$
$17x - 32 \overset{+32}{} = 2 \overset{+32}{}$
$17x = 34$
$(1/17)(17x) = (1/17)(34)$
$x = 2$

$y = 3x - 8$
$y = 3(2) - 8$
$y = -2$

$(2, -2)$

④ $2x - 3y = -9$
$-2x + 5y = 19$
$2y = 10$
$y = 5$

$2x - 3y = -9$
$2x - 3(5) = -9$
$2x - 15 \overset{+15}{} = -9 \overset{+15}{}$
$2x = 6$
$(1/2)(2x) = (1/2)(6)$
$x = 3$

$(3, 5)$

⑤ $5x + 3y = 3$ mult. by 4
$2x - 4y = 22$ mult. by 3

$20x + 12y = 12$
$6x - 12y = 66$
$26x = 78$
$x = 3$

$5x + 3y = 3$
$5(3) + 3y = 3$
$15 \overset{-15}{} + 3y = 3 \overset{-15}{}$
$3y = -12$
$(1/3)(3y) = (1/3)(-12)$
$y = -4$

$(3, -4)$

⑥

| | Rate | × Time | = Dist. |
|---|---|---|---|
| Against wind | $r - w$ | $2/3$ | 320 |
| With wind | $r + w$ | $3/4$ | 465 |

$\frac{2}{3}r - \frac{2}{3}w = 320$ mult. by $3/2$
$\frac{3}{4}r + \frac{3}{4}w = 465$ mult. by $4/3$

$r - w = 480$
$r + w = 620$
$2r = 1100$
$r = 550$

Plane: 550 mph

$r + w = 620$
$(550) + w = 620$
$w = 70$

Wind: 70 mph

UNIT 17: ANSWER KEY

# *Factoring*

## 1. GREATEST COMMON FACTOR

① $3$

② $3xy$

③ $2a$

④ $1$

⑤ $6b$

⑥ $5ab^2$

⑦ $8a^2b$

⑧ $4x^2$

⑨ $3(x^2y+3y^2+2)$

⑩ $5(a^2+2ab-3b^2)$

⑪ $2ab(a^2b-8ab^2+4)$

⑫ $3xy(x^2+3y+12)$

⑬ not factorable

⑭ $xy^2(z+x^2-xyz^2)$

⑮ $x(24xy^2+12y+1)$

⑯ $7abc(4ab+3ac-2)$

⑰ $4x(3a+5b+8c)$

⑱ $a(1+ab+a^2b^3)$

⑲ $x^3(a+5b+9c)$

⑳ $a^3(14x+19y+11z)$

㉑ $3x(2x-3y+8xy^2)$

㉒ $10a^2b(2-3ab^2+4b)$

㉓ $5x^2y^2(1-2xy-3x^2y^2)$

㉔ $a(1+b+bc+bcd)$


## 2. DIFF. OF PERFECT SQUARES

① Yes

② No

③ No

④ Yes

⑤ Yes

⑥ Yes

⑦ No

⑧ No

⑨ $x^2-y^2$
$(x+y)(x-y)$

⑩ $n^2-16$
$(n+4)(n-4)$

# *Factoring*

(11) $a^2-1$
$(a+1)(a-1)$

(12) $a^4-1$
$(a^2+1)(a^2-1)$
$(a^2+1)(a+1)(a-1)$

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

(14) $a^2+b^2$
not factorable

(15) $x^4-y^4$
$(x^2+y^2)(x^2-y^2)$
$(x^2+y^2)(x+y)(x-y)$

(16) $25x^2-4y^2$
$(5x+2y)(5x-2y)$

(17) $3a^3-12ab^2$
$3a(a^2-4b^2)$
$3a(a+2b)(a-2b)$

(18) $6m^2-24n^2$
$6(m^2-4n^2)$
$6(m+2n)(m-2n)$

(19) $16ax^4-a^5$
$a(16x^4-a^4)$
$a(4x^2+a^2)(4x^2-a^2)$
$a(4x^2+a^2)(2x+a)(2x-a)$

(20) $15n^3-60m^2n$
$15n(n^2-4m^2)$
$15n(n+2m)(n-2m)$

(21) $8x^2+4y^2$
$4(2x^2+y^2)$

(22) $2xy^4-162x$
$2x(y^4-81)$
$2x(y^2+9)(y^2-9)$
$2x(y^2+9)(y+3)(y-3)$

(23) $8x^3y-98xy^3$
$2xy(4x^2-49y^2)$
$2xy(2x+7y)(2x-7y)$

(24) $5n^3-10nm^2$
$5n(n^2-2m^2)$

(25) $12x^2y^3+8xy^4-16xy^3$
$4xy^3(3x+2y-4)$

(26) $9ab^2-27a^2b^3+18a^2b^2$
$9ab^2(1-3ab+2a)$

# Factoring

(27) $6x^2-9xy^3+12x^2y$
$3x(2x-3y^3+4xy)$

(28) $a^2b^3c-a^3b^2c^2+a^2b^2c^2$
$a^2b^2c(b-ac+c)$

(29) $a^4b^4-1$
$(a^2b^2+1)(a^2b^2-1)$
$(a^2b^2+1)(ab+1)(ab-1)$

(30) $16x^5y^3-4xy$
$4xy(4x^4y^2-1)$
$4xy(2x^2y+1)(2x^2y-1)$

(31) $2a^2b^3-72a^2b$
$2a^2b(b^2-36)$
$2a^2b(b+6)(b-6)$

## 3. FACTORING TRINOMIALS

① $y^2+12y+27$ $(y+3)(y+9)$

② $x^2+9x+20$ $(x+5)(x+4)$

③ $m^2-12m+27$ $(m-9)(m-3)$

④ $b^2-11b+28$ $(b-4)(b-7)$

⑤ $c^2+3c+6$ not factorable

⑥ $r^2-12r+20$ $(r-10)(r-2)$

⑦ $a^2+22a+21$ $(a+21)(a+1)$

⑧ $c^2+10c+20$ not factorable

⑨ $a^2+5a-50$ $(a+10)(a-5)$

⑩ $b^2+2b-48$ $(b+8)(b-6)$

⑪ $x^2-10x+39$ not factorable

⑫ $c^2-2cd-8d^2$ $(c-4d)(c+2d)$

⑬ $a^2+2ab-3b^2$ $(a+3b)(a-b)$

⑭ $a^2-4ab-32b^2$ $(a-8b)(a+4b)$

⑮ $m^2-mn-6n^2$ $(m-3n)(m+2n)$

⑯ $x^2-4xy-5y^2$ $(x-5y)(x+y)$

⑰ $3x^2+15x-108$
$3(x^2+5x-36)$
$3(x+9)(x-4)$

# *Factoring*

(18) $5n^2-15n-90$
$5(n^2-3n-18)$
$5(n-6)(n+3)$

(19) $4a^2+8ab-12b^2$
$4(a^2+2ab-3b^2)$
$4(a+3b)(a-b)$

(20) $5x^2-20xy+20y^2$
$5(x^2-4xy+4y^2)$
$5(x-2y)(x-2y)$

(21) $3x^3-3x^2y-18xy^2$
$3x(x^2-xy-6y^2)$
$3x(x-3y)(x+2y)$

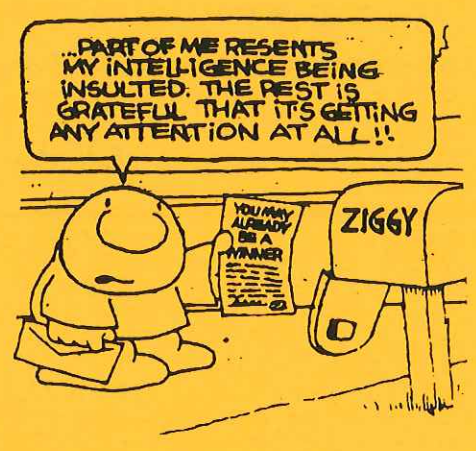
(22) $4ab^2-8abc+4ac^2$
$4a(b^2-2bc+c^2)$
$4a(b-c)(b-c)$

(23) $3x^3-3xy^2$
$3x(x^2-y^2)$
$3x(x+y)(x-y)$

(24) $12ab^2-3a^3$
$3a(4b^2-a^2)$
$3a(2b+a)(2b-a)$

(25) $2x^5y-2xy$
$2xy(x^4-1)$
$2xy(x^2+1)(x^2-1)$
$2xy(x^2+1)(x+1)(x-1)$

(26) $16a^5b^2-81ab^6$
$ab^2(16a^4-81b^4)$
$ab^2(4a^2+9b^2)(4a^2-9b^2)$
$ab^2(4a^2+9b^2)(2a+3b)(2a-3b)$




## 4. GROUPING TERMS

① $4b^2+5b-6$
$4b^2+8b-3b-6$
$4b(b+2)-3(b+2)$
$(b+2)(4b-3)$

$(4)(-6)=-24$
$-24$
$(8)+(-3)=5$

② $4y^2-17y-15$
$4y^2+20y-3y-15$
$4y(y+5)-3(y+5)$
$(y+5)(4y-3)$

$(4)(-15)=-60$
$-60$
$(20)+(-3)=-17$

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

$(2)(-6)=-12$
$-12$
$(-4)+(3)=-1$

UNIT 17: ANSWER KEY

# *Factoring*

④ $3a^2-4a-15$

$3a^2-9a+5a-15$

$3a(a-3)+5(a-3)$

$(a-3)(3a+5)$

$(3)(-15)=-45$

$-45$

$(-9)+(5)=-4$

⑤ $5b^2-13b-10$

not factorable

$(5)(-10)=-50$

$-50$

$\times\times\times$

⑥ $4y^2-16y+7$

$4y^2-2y-14y+7$

$2y(2y-1)-7(2y-1)$

$(2y-1)(2y-7)$

$(4)(7)=28$

$28$

$(-2)+(-14)=-16$

⑦ $6x^2+7x+2$

$6x^2+4x+3x+2$

$2x(3x+2)+1(3x+2)$

$(3x+2)(2x+1)$

$(6)(2)=12$

$12$

$(4)+(3)=7$

⑧ $6n^2-11n+4$

$6n^2-3n-8n+4$

$3n(2n-1)-4(2n-1)$

$(2n-1)(3n-4)$

$(6)(4)=24$

$24$

$(-3)+(-8)=-11$

⑨ $2a^2+5ab-3b^2$

$2a^2+6ab-ab-3b^2$

$2a(a+3b)-b(a+3b)$

$(a+3b)(2a-b)$

$(2)(-3)=-6$

$-6$

$(6)+(-1)=5$

⑩ $2x^2-5xy-3y^2$

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

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

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

$(2)(-3)=-6$

$-6$

$(-6)+(1)=-5$

⑪ $15x^2-13xy+2y^2$

$(15)(2)=30$

$(-10)+(-3)=-13$

$15x^2-10xy-3xy+2y^2$

$5x(3x-2y)-1(3x-2y)$

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

⑫ $4a^2-8ab+3b^2$

$(4)(3)=12$

$(-6)+(-2)=-8$

$4a^2-6ab-2ab+3b^2$

$2a(2a-3b)-b(2a-3b)$

$(2a-3b)(2a-b)$

⑬ $9a^2+24ab+12b^2$

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

$(3)(4)=12$

$(6)+(2)=8$

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

$3[3a(a+2b)+2b(a+2b)]$

$3(a+2b)(3a+2b)$

# *Factoring*

⑭ $8x^2 + 8xy - 30y^2$

$2(4x^2+4xy-15y^2)$

$(4)(-15) = -60$

$(10)+(-6) = 4$

$2(4x^2+10xy-6xy-15y^2)$

$2[2x(2x+5y)-3y(2x+5y)]$

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

⑮ $18x^2 - 21xy + 6y^2$

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

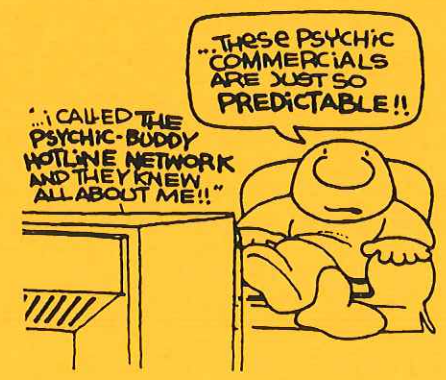
$(6)(2) = 12$

$(-4)+(-3) = -7$

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

$3[2x(3x-2y)-y(3x-2y)]$

$3(3x-2y)(2x-y)$




⑯ $24a^3b - 44a^2b + 12ab$

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

$(6)(3) = 18$

$(-9)+(-2) = -11$

$4ab(6a^2-9a-2a+3)$

$4ab[3a(2a-3)-1(2a-3)]$

$4ab(2a-3)(3a-1)$

⑰ $12n^4 - 2n^3 - 2n^2$

$2n^2(6n^2-n-1)$

$(6)(-1) = -6$

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

$2n^2(6n^2-3n+2n-1)$

$2n^2[3n(2n-1)+1(2n-1)]$

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

⑱ $4x^2y^2 + 5xy^2 - 6y^2$

$y^2(4x^2+5x-6)$

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

$(8)+(-3) = 5$

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

$y^2[4x(x+2)-3(x+2)]$

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

# *Factoring*

⑲ $6a^3+15a^2b-9ab^2$

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

$(2)(-3) = -6$

$(6)+(-1) = 5$

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

$3a[2a(a+3b)-b(a+3b)]$

$3a(a+3b)(2a-b)$

⑳ $x^4-1$

$(x^2+1)(x^2-1)$

$(x^2+1)(x+1)(x-1)$

㉑ $x^2-3x-18$

$(x-6)(x+3)$

㉒ $n^2-10n+16$

$(n-8)(n-2)$

㉓ $16a^2-9b^2$

$(4a+3b)(4a-3b)$

㉔ $x^2-7x+12$

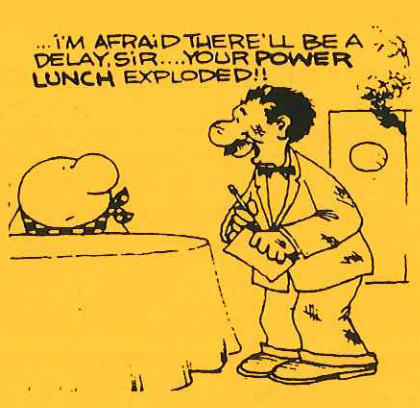
$(x-4)(x-3)$

㉕ $a^4-b^4$

$(a^2+b^2)(a^2-b^2)$

$(a^2+b^2)(a+b)(a-b)$

Remember to factor expressions completely




## REVIEW & PRACTICE

① $4xy^2-6x^2y+2xy$

$2xy(2y-3x+1)$

② $36a^2b^2-12ab$

$12ab(3ab-1)$

③ $3x^5y-3x+6xy$

$3x(x^4-1+2y)$

④ $9x^2-16y^2$

$(3x+4y)(3x-4y)$

⑤ $a^2b^2-1$

$(ab+1)(ab-1)$

⑥ $x^4-81y^4$

$(x^2+9y^2)(x^2-9y^2)$

$(x^2+9y^2)(x+3y)(x-3y)$

⑦ $a^2+17a+72$

$(a+9)(a+8)$

# Factoring

⑧ $x^2-15xy+36y^2$
$(x-12y)(x-3y)$

⑨ $n^2-5nm-14m^2$
$(n-7m)(n+2m)$

⑩ $3a^2-10ab-8b^2$
$(3)(-8) = -24$
$(-12)+(2) = -10$
$3a^2-12ab+2ab-8b^2$
$3a(a-4b)+2b(a-4b)$
$(a-4b)(3a+2b)$

⑪ $4x^2-4xy-3y^2$
$(4)(-3) = -12$
$(-6)+(2) = -4$
$4x^2-6xy+2xy-3y^2$
$2x(2x-3y)+y(2x-3y)$
$(2x-3y)(2x+y)$

⑫ $6a^2-19a+10$
$(6)(10) = 60$
$(-15)+(-4) = -19$
$6a^2-15a-4a+10$
$3a(2a-5)-2(2a-5)$
$(2a-5)(3a-2)$

⑬ $2a^2-8b^2$
$2(a^2-4b^2)$
$2(a+2b)(a-2b)$

⑭ $3n^2+9n-12$
$3(n^2+3n-4)$
$3(n+4)(n-1)$

⑮ $4x^2y-6xy^2+10xy^3$
$2xy(2x-3y+5y^2)$

⑯ $x^2+6x+8$
$(x+4)(x+2)$

⑰ $16x^4-1$
$(4x^2+1)(4x^2-1)$
$(4x^2+1)(2x+1)(2x-1)$

⑱ $2x^2+7x+3$
$(2)(3) = 6$
$(6)+(1) = 7$
$2x^2+6x+x+3$
$2x(x+3)+1(x+3)$
$(x+3)(2x+1)$

⑲ $12a^3-24a^2b$
$12a^2(a-2b)$

⑳ $3a^2+5ab+2b^2$
$(3)(2) = 6$
$(3)+(2) = 5$ (continued)

# Factoring

$3a^2+3ab+2ab+2b^2$
$3a(a+b)+2b(a+b)$
$(a+b)(3a+2b)$

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

(22) $x^4-x^2y^2$
$x^2(x^2-y^2)$
$x^2(x+y)(x-y)$

(23) $6abc-3ab+9a^2b$
$3ab(2c-1+3a)$

(24) $2x^2+7x+5$
$(2)(5)=10$
$(5)+(2)=7$

$2x^2+5x+2x+5$
$x(2x+5)+1(2x+5)$
$(2x+5)(x+1)$

(25) $36a^2-25$
$(6a+5)(6a-5)$

(26) $2a^2+10a+12$
$2(a^2+5a+6)$
$2(a+3)(a+2)$

(27) $6a^2+11a+3$
continued

$(6)(3)=18$
$(9)+(2)=11$

$6a^2+9a+2a+3$
$3a(2a+3)+1(2a+3)$
$(2a+3)(3a+1)$

(28) $x^2y^2z^2-xy^3+x^2yz$
$xy(xyz^2-y^2+xz)$


(29) $8a^2+12ab+4b^2$
$4(2a^2+3ab+b^2)$
$(2)(1)=2$
$(2)+(1)=3$
$4(2a^2+2ab+ab+b^2)$
$4[2a(a+b)+b(a+b)]$
$4(a+b)(2a+b)$

(30) $81n^4-1$
$(9n^2+1)(9n^2-1)$
$(9n^2+1)(3n+1)(3n-1)$

# *Factoring*

(31) $3n^2-9n+6$

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

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

(32) $x^2+x-2$

$(x+2)(x-1)$

(33) $6a^2+5a-6$

$(6)(-6)=-36$

$(-4)+(9)=5$

$6a^2-4a+9a-6$

$2a(3a-2)+3(3a-2)$

$(3a-2)(2a+3)$

(34) $18x^2-24x^3$

$6x^2(3-4x)$

(35) $a^3-9a$

$a(a^2-9)$

$a(a+3)(a-3)$

(36) $x^2-3xy-10xy$

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

(37) $2a^4+7a^3+6a^2$

$a^2(2a^2+7a+6)$

continued

$(2)(6)=12$

$(4)+(3)=7$

$a^2(2a^2+4a+3a+6)$

$a^2[2a(a+2)+3(a+2)]$

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

(38) $a^4b^3-a^3b^4$

$a^3b^3(a-b)$

(39) $64a^2-49b^2$

$(8a+7b)(8a-7b)$

# *Factoring*

## PRACTICE TEST #1

① $6x^2y^2 - 9xy^3z$

$3xy^2(2x - 3yz)$

② $16a^2 - b^2$

$(4a+b)(4a-b)$

③ $2n^2 - 14n + 24$

$2(n^2 - 7n + 12)$

$2(n-3)(n-4)$

④ $6x^4 - 6$

$6(x^4 - 1)$

$6(x^2+1)(x^2-1)$

$6(x^2+1)(x+1)(x-1)$

⑤ $2a^2 - 5a - 12$

$(2)(-12) = -24$

$(-8)+(3) = -5$

$2a^2 - 8a + 3a - 12$

$2a(a-4) + 3(a-4)$

$(a-4)(2a+3)$

⑥ $12x^2 + 14xy - 6y^2$

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

$(6)(-3) = -18$ continued

$-18$

$(9)+(-2) = 7$

$2(6x^2 + 9xy - 2xy - 3y^2)$

$2[3x(2x+3y) - y(2x+3y)]$

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

## PRACTICE TEST #2

① $4a^3b - 8a^2bc + 12ab$

$4ab(a^2 - 2ac + 3)$

② $a^2 - 5a - 14$

$(a-7)(a+2)$

③ $98x^2 - 2$

$2(49x^2 - 1)$

$2(7x+1)(7x-1)$

④ $81a^4 - 16b^4$

$(9a^2+4b^2)(9a^2-4b^2)$

$(9a^2+4b^2)(3a+2b)(3a-2b)$

⑤ $4x^2 - 18xy + 18y^2$

$2(2x^2 - 9xy + 9y^2)$

$(2)(9) = 18$

$(-6)+(-3) = -9$

$2(2x^2 - 6xy - 3xy + 9y^2)$

$2[2x(x-3y) - 3y(x-3y)]$

$2(x-3y)(2x-3y)$

⑥ $8n^2 - 16n + 6$

$2(4n^2 - 8n + 3)$

$(4)(3) = 12$

$(-6)+(-2) = -8$

$2(4n^2 - 6n - 2n + 3)$

$2[2n(2n-3) - 1(2n+3)]$

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