

3A

1)  $8.5 \times 10^7$

2)  $3.41 \times 10^{-1}$

3)  $3.8 \times 10^{-4}$

4)  $9.7 \times 10^9$

5)  $(7.3 \times 10^{-5}) \times (5.4 \times 10^{-3}) =$   
 $39.42 \times 10^{-8} = 3.942 \times 10^{-7}$

6)  $(5.8 \times 10^7) \times (6.5 \times 10^2) =$   
 $37.7 \times 10^9 = 3.77 \times 10^{10}$

7)  $(9.8 \times 10^{-2}) \times (6.0 \times 10^{-3}) =$   
 $58.8 \times 10^{-5} = 5.88 \times 10^{-4}$

8)  $(1.8 \times 10^9) \times (2.4 \times 10^6) =$   
 $4.32 \times 10^{15}$

9)  $(2.7 \times 10^4) \div (9.0 \times 10^{-3}) =$   
 $.3 \times 10^7 = 3 \times 10^6$

10)  $(2.1 \times 10^{-3}) \div (3.4 \times 10^5) =$   
 $.62 \times 10^{-8} = 6.2 \times 10^{-9}$

11)  $(4.2 \times 10^{-4}) \div (6.0 \times 10^{-5}) =$   
 $.7 \times 10^1 = 7.0 \times 10^0 = 7$

12)  $(6.8 \times 10^9) \div (4.3 \times 10^5) =$   
 $1.58 \times 10^4$

13)  $\frac{\cancel{2}x^{\cancel{6}}}{\cancel{x}^5 y^{-2}} - \frac{\cancel{8}x^{\cancel{2}}y^{\cancel{2}}}{\cancel{x}^2} + \frac{7x^3 y^0}{x^4 y^2} =$   
 $-6y^2 + 7x^{-1}y^{-2}$

14)  $\frac{AX^3}{X^{-3}} - \frac{BX^3}{B^{-1}} + \frac{ABX}{X^2 B^2} =$   
 $AX^6 - B^2 X^3 + AB^{-1} X^{-1}$

15)  $3AB^{-1} + \frac{13AB^{-1}}{A^{-2}B^1} + \frac{3}{A^{-1}B} =$   
 $3AB^{-1} + 13A^3 + 3AB^{-1} = 13A^3 + 6AB^{-1}$

16)  $3X^{-1}Y^2 + 12X^2Y^{-2}$

3B

1)  $3.6 \times 10^8$

2)  $1.0 \times 10^{-7}$

3)  $5.9 \times 10^{-3}$

4)  $4.25 \times 10^5$

5)  $(6.3 \times 10^{-3}) \times (1.2 \times 10^6) =$   
 $7.56 \times 10^3$

6)  $(1.6 \times 10^4) \times (7.0 \times 10^{-3}) =$   
 $11.2 \times 10^1 = 1.12 \times 10^2$

7)  $(9.2 \times 10^{-1}) \times (9.0 \times 10^{-4}) =$   
 $82.8 \times 10^{-5} = 8.28 \times 10^{-4}$

8)  $(2.3 \times 10^6) \times (4.0 \times 10^{12}) =$

$9.2 \times 10^{18}$

9)  $(2.4 \times 10^{-3}) \div (3.0 \times 10^{-6}) =$   
 $.8 \times 10^3 = 8.0 \times 10^2$

10)  $(2.9 \times 10^7) \div (1.5 \times 10^4) =$   
 $1.93 \times 10^3$

11)  $(9.6 \times 10^{12}) \div (2.0 \times 10^{-2}) =$   
 $4.8 \times 10^{14}$

12)  $(1.6 \times 10^{-4}) \div (8.0 \times 10^{-6}) =$   
 $.2 \times 10^2 = 2.0 \times 10^1 = 20$

13)  $R^{12}R^{-3}R^6R^{-1}S^3 + R^3R^{-2}R^0R^{-1} =$   
 $R^{14}S^3 + 1$

14)  $\frac{\cancel{2}x^{\cancel{4}}y^{\cancel{4}}}{\cancel{x}^1 y^1} + \frac{\cancel{8}x^{\cancel{4}}y^{\cancel{4}}}{\cancel{x}^1 y^1} - \frac{\cancel{3} \cdot \cancel{1}x^{\cancel{2}}y^{\cancel{3}}}{\cancel{x}^2 y^2} =$   
 $10x^4y^4 - \frac{x^2y^3}{3}$

15)  $16A^0B^4 + \frac{4B^4}{B^2B^5} - 4A =$   
 $16B^4 + \frac{4}{B^3} - 4A$

16)  $2A^4B^{-3}C^3 + A^4B^{-3}C^3 = \frac{3A^4C^3}{B^3}$

3C

1)  $6.2 \times 10^4$

2)  $7.5 \times 10^{-1}$

3)  $4.8 \times 10^{-3}$

4)  $3.08 \times 10^6$

$$5) (6.2 \times 10^4)(7.5 \times 10^{-1}) =$$

$$(6.2 \times 7.5)(10^4 \times 10^{-1}) =$$

$$(46.5)(10^3) =$$

$$(4.65 \times 10^1)(10^3) = 4.65 \times 10^4$$

$$6) (3.08 \times 10^6)(4.8 \times 10^{-3}) =$$

$$(3.08 \times 4.8)(10^6 \times 10^{-3}) =$$

$$(14.784)(10^3) =$$

$$(1.4784 \times 10^1)(10^3) = 1.4784 \times 10^4$$

$$7) (3.08 \times 10^6) \div (7.5 \times 10^{-1}) =$$

$$(3.08 \div 7.5)(10^6 \div 10^{-1}) =$$

$$(.4107)(10^{6-(-1)}) =$$

$$(4.107 \times 10^{-1})(10^7) = 4.107 \times 10^6$$

$$8) (6.2 \times 10^4) \div (4.8 \times 10^{-3}) =$$

$$(6.2 \div 4.8)(10^4 \div 10^{-3}) =$$

$$(1.29)(10^{4-(-3)}) =$$

$$1.29 \times 10^7$$

9)  $8X^2Y - X^2Y^2 + 2X^2Y = 10X^2Y - X^2Y^2$

10)  $4X + 12X^5 + 8$

11)  $4A + 9A + 8AB = 13A + 8AB$

12)  $2B + 3AB - 5B = 3AB - 3B$

$$13) \frac{\cancel{75}A^{\cancel{15}}}{\cancel{5}AX} - \frac{\cancel{50}AX}{\cancel{5}AX} = \frac{15AY}{X} - 10$$

$$14) \frac{\cancel{72}X^{\cancel{4}}}{\cancel{9}X} + \frac{\cancel{36}X^{\cancel{10}}}{\cancel{9}X} = 4X + 10$$

$$15) \frac{Y(2Y)}{(X+1)(2Y)} + \frac{3(X+1)}{2Y(X+1)} =$$

$$\frac{2Y^2 + 3X + 3}{2YX + 2Y}$$

$$16) \frac{3B}{7B} + \frac{7A}{7B} = \frac{3B + 7A}{7B}$$

17)  $10^{12}$

18)  $Y^7$

19)  $3X^2Y - 4XY^2$

$$20) \frac{Y^2X^3}{YX} + \frac{Y^4}{XY} = YX^2 + \frac{Y^3}{X}$$

3D

1)  $2.5 \times 10^7$

2)  $3.9 \times 10^{-5}$

3)  $1.4 \times 10^{-8}$

4)  $7.6 \times 10^2$

$$5) (1.4 \times 10^{-8})(3.9 \times 10^{-5}) =$$

$$(1.4 \times 3.9)(10^{-8+(-5)}) =$$

$$(5.46)(10^{-13}) =$$

$$(5.46)(10^{-13}) = 5.46 \times 10^{-13}$$

$$6) (2.5 \times 10^7)(7.6 \times 10^2) =$$

$$(2.5 \times 7.6)(10^7 \times 10^2) =$$

$$(19)(10^9) =$$

$$(1.9 \times 10^1)(10^9) = 1.9 \times 10^{10}$$

$$7) (1.4 \times 10^{-8}) \div (3.9 \times 10^{-5}) =$$

$$(1.4 \div 3.9)(10^{-8-(-5)}) =$$

$$(.359)(10^{-3}) =$$

$$(3.59 \times 10^{-1})(10^{-3}) = 3.59 \times 10^{-4}$$

$$8) (2.5 \times 10^7) \div (7.6 \times 10^2) =$$

$$(2.5 \div 7.6)(10^{7-2}) =$$

$$(.329)(10^5) =$$

$$(3.29 \times 10^{-1})(10^5) = 3.29 \times 10^4$$

9)  $X^2Y - 4Y^1X^2 - 3X^1Y$

10)  $30X^1Y^{-2} - 11X^1Y^{-4} - X^3Y^{-2}$

$$11) 13A - 2A - \frac{1}{6B^2} = 11A - \frac{1}{6B^2}$$

12)  $3AB^2 - 17BA - 42AB^{-2}$

$$13) \frac{\cancel{48}B^{\cancel{2}}Y}{\cancel{24}B^{\cancel{2}}} + \frac{\cancel{72}B^{\cancel{3}}Y}{\cancel{24}B^{\cancel{3}}} = 2Y + 3Y = 5Y$$

$$14) \frac{\cancel{21}X^{\cancel{3}}}{\cancel{14}X^{\cancel{2}}} - \frac{\cancel{35}XY}{\cancel{14}X^{\cancel{2}}} = \frac{3X - 5Y}{2}$$

$$15) \frac{2X(X-2)}{(Y+1)(X-2)} + \frac{7(Y+1)}{(X-2)(Y+1)} =$$

$$\frac{2X^2 - 4X + 7Y + 7}{(Y+1)(X-2)}$$

$$16) \frac{A(A^2)}{7(A^2)} + \frac{7(7)}{A^2(7)} = \frac{A^3 + 49}{7A^2}$$

$$17) -2^{-6} = \frac{-1}{2^6} = -\frac{1}{64}$$

18)  $A^{-1}B^6$

19)  $6A^{-1}B^6 - 10A^{-2}B^2$

$$20) \frac{X^3Y}{XY^{-2}} + \frac{XY}{X^3Y^{-2}} = X^2Y^3 + X^{-2}Y^3$$

3E

1)  $9.4 \times 10^3$

2)  $5.3 \times 10^{-7}$

3)  $1.2 \times 10^{-2}$

4)  $1.6 \times 10^5$

5)  $(9.4 \times 10^3)(1.2 \times 10^{-2}) =$   
 $(9.4 \times 1.2)(10^3 \times 10^{-2}) =$   
 $(11.28)(10^1) =$   
 $(1.128 \times 10^1)(10^1) = 1.128 \times 10^2$

6)  $(1.6 \times 10^5)(5.3 \times 10^{-7}) =$   
 $(1.6 \times 5.3)(10^5 \times 10^{-7}) =$   
 $8.48 \times 10^{-2}$

7)  $(9.4 \times 10^3) \div (1.2 \times 10^{-2}) =$   
 $(9.4 \div 1.2)(10^{3-(-2)}) =$   
 $(7.83)(10^5) =$   
 $7.83 \times 10^5$

8)  $(1.6 \times 10^5) \div (5.3 \times 10^{-7}) =$   
 $(1.6 \div 5.3)(10^{5-(-7)}) =$   
 $(.302)(10^{12}) =$   
 $(3.02 \times 10^1)(10^{12}) = 3.02 \times 10^{11}$

9)  $25X^{-2}Y - 11X^{-2}Y - 2Y^2 = 14X^{-2}Y - 2Y^2$

10)  $13XY^{-1} - 7X^3Y^2 + 5XY^{-4}$

11)  $3A^2B^{-1} - 4B^2A - 4A^2B$

12)  $4B^2 + 3AB - 5B^2 = 3AB - B^2$

13)  $\frac{6X^2}{12X} + \frac{4X^3}{12X} = \frac{X}{2} + \frac{X^2}{3}$

14)  $\frac{32X^2}{8X} + \frac{4X}{8X} + \frac{16}{8X} =$   
 $4X + \frac{1}{2} + \frac{2}{X}$

15)  $\frac{4(A)}{(A+5)(A)} + \frac{6(A+5)}{A(A+5)} =$

$$\frac{4A^2 + 6A + 30}{A(A+5)}$$

16)  $\frac{X}{X^2Y} + \frac{2Y(X)}{XY(X)} = \frac{X+2XY}{X^2Y} =$   
 $\frac{1+2Y}{XY}$

17)  $(-16)^{-1} = \frac{1}{-16}$

18)  $3^4A^2B^{-2}C^{-4} = 81A^2B^{-2}C^{-4}$

19)  $5^2A^{-2}B^{-3} + 5^2A^3B^{-1} =$   
 $25A^{-2}B^{-3} + 25A^3B^{-1}$

20)  $\frac{X^4}{Y^0} + \frac{Y^3X^2}{YX^3} = X^4 + \frac{Y^2}{X}$

4A

1)  $9\sqrt{2}$

2)  $5\sqrt{7} - 2\sqrt{5}$

3)  $-2\sqrt{X}$

4)  $20\sqrt{3}$

5)  $6\sqrt{30}$

6)  $\frac{10\sqrt{5}}{2\sqrt{5}} = 5$

7)  $18\sqrt{XY}$

8)  $\frac{16\sqrt{20}}{8\sqrt{10}} = 2\sqrt{2}$

9)  $\frac{5\sqrt{2}}{\sqrt{2}\sqrt{2}} = \frac{5\sqrt{2}}{2}$

10)  $\frac{4\sqrt{6}\sqrt{3}}{\sqrt{3}\sqrt{3}} = \frac{4\sqrt{18}}{3} = \frac{4\sqrt{2 \cdot 9}}{3} = \frac{12\sqrt{2}}{3} = 4\sqrt{2}$

11)  $\frac{\sqrt{12}}{\sqrt{6}} = \sqrt{2}$

12)  $\frac{9\sqrt{27}\sqrt{2}}{\sqrt{2}\sqrt{2}} = \frac{9\sqrt{54}}{2} = \frac{9\sqrt{9 \cdot 6}}{2} = \frac{27\sqrt{6}}{2}$

13)  $\frac{(6)2\sqrt{5}}{(6)\sqrt{5}} + \frac{(5)4\sqrt{6}}{(5)6} = \frac{12\sqrt{5}}{6} + \frac{20\sqrt{6}}{30} = \frac{6\sqrt{5} + 10\sqrt{6}}{15}$

14)  $-3\sqrt{24} - 2\sqrt{36} = -3\sqrt{4 \cdot 6} - 2(6) = -6\sqrt{6} - 12$

15)  $\frac{(7)X\sqrt{2}}{(7)2} + \frac{(2)X\sqrt{7}}{(2)7} = \frac{7X\sqrt{2} + 2X\sqrt{7}}{14}$

16)  $8\sqrt{10} - 4\sqrt{4 \cdot 5} = 8\sqrt{10} - 8\sqrt{5}$