

9A

- 1) $X^2 + 6X + 9$
- 2) $A^2 - 6A + 9$
- 3) $9X^2 + 24X + 16$
- 4) $4X^2 + 4X + 1$
- 5) $(X + 4)^2$
- 6) $(X - 9)^2$
- 7) $(A + 8)^2$
- 8) $(A - 8)^2$
- 9) $X^3 + 3X^2(5) + 3X(5)^2 + 5^3 =$
 $X^3 + 15X^2 + 75X + 125$
- 10) $(3X)^3 - 3(3X)^2(2) + 3(3X)(2)^2 - (2)^3 =$
 $27X^3 - 54X^2 + 36X - 8$
- 11) $(2A)^3 + 3(2A)^2(2B) + 3(2A)(2B)^2 + (2B)^3 =$
 $8A^3 + 24A^2B + 24AB^2 + 8B^3$
- 12) $X^3 - 3X^2(1) + 3X(1)^2 - (1)^3 =$
 $X^3 - 3X^2 + 3X - 1$
- 13) $Y^3 - 3Y^2(1/4) + 3Y(1/4)^2 - (1/4)^3 =$
 $Y^3 - 3/4 Y^2 + 3/16 Y - 1/64$
- 14) $(2R)^3 + 3(2R)^2(3) + 3(2R)(3)^2 + 3^3 =$
 $8R^3 + 36R^2 + 54R + 27$
- 15)

			1			
		1		1		
	1		2		1	
1		3		3		1
1	4		6		4	1
1	5	10		10	5	1

9B

- 1) $A^2 - 8A + 16$
- 2) $X^2 - 2XY + Y^2$
- 3) $4X^2 + 20X + 25$
- 4) $9X^2 - 12X + 4$
- 5) $(B + 10)^2$
- 6) $(X - 1)^2$
- 7) $(X - 2)^2$
- 8) $(R + 12)^2$
- 9) $X^3 - 3X^2(10) + 3X(10)^2 - (10)^3 =$
 $X^3 - 30X^2 + 300X - 1000$
- 10) $(2X)^3 + 3(2X)^2(1) + 3(2X)(1)^2 + (1)^3 =$
 $8X^3 + 12X^2 + 6X + 1$
- 11) $A^3 + 3A^2B + 3AB^2 + B^3$
- 12) $X^3 - 3X^2(5) + 3X(5)^2 - (5)^3 =$
 $X^3 - 15X^2 + 75X - 125$
- 13) $P^3 - 3P^2(1/3) + 3P(1/3)^2 - (1/3)^3 =$
 $P^3 - P^2 + 1/3 P - 1/27$
- 14) $(4F)^3 + 3(4F)^2(2) + 3(4F)(2)^2 + 2^3 =$
 $64F^3 + 96F^2 + 48F + 8$

$$15) \begin{array}{cccccccc} & & & 1 & & 5 & 10 & 10 & 5 & 1 \\ & & 1 & & 6 & 15 & 20 & 15 & 6 & 1 \\ & 1 & & 7 & 21 & 35 & 35 & 21 & 7 & 1 \\ 1 & & 8 & 28 & 56 & 70 & 56 & 28 & 8 & 1 \end{array}$$

9C

- 1) $X^2 + 10X + 25$
- 2) $4X^2 - 12X + 9$
- 3) $(2X + 5)^2$
- 4) $(X - 7)^2$
- 5) $X^3 + 3X^2(4) + 3X(4)^2 + 4^3$
 $X^3 + 12X^2 + 48X + 64$
- 6) $X^3 - 3X^2(4) + 3X(4)^2 - 4^3$
 $X^3 - 12X^2 + 48X - 64$
- 7) $(2X)^3 + 3(2X)^2(1) + 3(2X)(1)^2 + 1^3$
 $8X^3 + 12X^2 + 6X + 1$
- 8) $(3X)^3 - 3(3X)^2(2) + 3(3X)(2)^2 - (2)^3$
 $27X^3 - 54X^2 + 36X - 8$
- 9) $13 - 2i\sqrt{5}$
- 10) $(3X - \sqrt{5})(3X + \sqrt{5})$
- 11) $\frac{4\sqrt{6}(2\sqrt{8}-1)}{(2\sqrt{8}+1)(2\sqrt{8}-1)} = \frac{8\sqrt{48}-4\sqrt{6}}{4 \cdot 8 - 1}$
 $\frac{8\sqrt{16}\sqrt{3}-4\sqrt{6}}{31} = \frac{32\sqrt{3}-4\sqrt{6}}{31}$
- 12) $\frac{7}{(4-3i)(4+3i)} = \frac{28+21i}{16-9i^2} = \frac{28+21i}{25}$
- 13) $(8i)(2i\sqrt{2}) =$
 $16i^2\sqrt{2} = -16\sqrt{2}$
- 14) $i^6 = (i^2)(i^2)(i^2) = -1$
- 15) $(1000)^{1/2} = \sqrt{1000} =$
 $\sqrt{100}\sqrt{10} = 10\sqrt{10}$
- 16) $(X^2)^4 = X^8$
- 17) $2X^2 + 2X - 12 = 0$ $2(-3)^2 + 2(-3) - 12 = 0$
 $2(X^2 + X - 6) = 0$ $18 - 6 - 12 = 0 \quad \checkmark$
 $2(X+3)(X-2) = 0$ $2(2)^2 + 2(2) - 12 = 0$
 $X = -3, 2$ $8 + 4 - 12 = 0 \quad \checkmark$
- 18) $\frac{(X-4)(\cancel{X+1})}{(X+3)(\cancel{X-2})} \cdot \frac{X(\cancel{X-2})}{-6(\cancel{X+1})} = \frac{X^2 - 4X}{-6X - 18}$
- 19) $5\sqrt{\frac{8}{3}} - 6\sqrt{\frac{18}{7}} =$
 $\frac{5\sqrt{8}\sqrt{3}}{\sqrt{3}\sqrt{3}} - \frac{6\sqrt{18}\sqrt{7}}{\sqrt{7}\sqrt{7}} =$
 $\frac{5\sqrt{4 \cdot 6}}{3} - \frac{6\sqrt{9 \cdot 14}}{7} =$
 $\frac{10\sqrt{6}}{3} - \frac{18\sqrt{14}}{7} = \frac{70\sqrt{6} - 54\sqrt{14}}{21}$
- 20) $\frac{2X^2}{2} - \frac{X}{2} = \frac{2\cancel{X^2} - \cancel{X}}{2} \cdot \frac{3}{5\cancel{X}} =$
 $\frac{3X}{3} + \frac{2X}{3} = \frac{\cancel{3X} + \cancel{2X}}{\cancel{3}} \cdot \frac{\cancel{3}}{\cancel{5X}} =$
 $\frac{3(2X-1)}{10} = \frac{6X-3}{10}$

9D

1) $X^2 + 14X + 49$

2) $9X^2 - 24X + 16$

3) $(X - 3)^2$

4) $(2X + 4)^2$

5) $X^3 + 3X^2(2) + 3X(2)^2 + 2^3$
 $X^3 + 6X^2 + 12X + 8$

6) $X^3 - 3(X^2)(1/5) + 3(X)(1/5)^2 - (1/5)^3$
 $X^3 - 3/5 X^2 + 3/25 X - 1/125$

7) $(3X)^3 + 3(3X)^2(2) + 3(3X)(2)^2 + 2^3$
 $27X^3 + 54X^2 + 36X + 8$

8) $(2X)^3 - 3(2X)^2(3) + 3(2X)(3)^2 - 3^3$
 $8X^3 - 36X^2 + 54X - 27$

9) $5 + \sqrt{-4}$ or $5 + 2i$

10) $(\sqrt{2}X - \sqrt{15})(\sqrt{2}X + \sqrt{15})$

11) $\frac{10\sqrt{15}(3\sqrt{5} - 8)}{3\sqrt{5} + 8)(3\sqrt{5} - 8)} = \frac{30\sqrt{75} - 80\sqrt{15}}{9(5) - 64}$
 $\frac{30\sqrt{25} \cdot \sqrt{3} - 80\sqrt{15}}{-19} = \frac{150\sqrt{3} - 80\sqrt{15}}{-19}$

12) $\frac{5(2 - 6i)}{(2 + 6i)(2 - 6i)} = \frac{10 - 30i}{4 - 36i^2} = \frac{10 - 30i}{40} = \frac{1 - 3i}{4}$

13) $(7i)(3\sqrt{-1}\sqrt{4}\sqrt{2}) = (7i)(3i \cdot 2\sqrt{2}) =$
 $42^2 \sqrt{2} = -42\sqrt{2}$

14) $-i$

15) $(\frac{1}{2})^{-3} = 2^3 = 8$

16) $(X^{1/2})^{-3} = X^{-3/2}$

17) $[2X^2 = 5/2X + 3] \cdot 2 \quad 4(-3/4)^2 - 5(-3/4) - 6 = 0$
 $4X^2 - 5X - 6 = 0 \quad 9/4 + 15/4 - 24/4 = 0 \checkmark$
 $(4X + 3)(X - 2) = 0 \quad 4(2)^2 - 5(2) - 6 = 0$
 $X = -3/4, 2 \quad 16 - 10 - 6 = 0 \checkmark$

18) $\frac{6(X - 7)}{(X + 1)} \cdot \frac{(X - 1)(X + 1)}{-9(X - 1)} = \frac{6X - 42}{-9} = \frac{2X - 14}{-3}$

19) $2\sqrt{\frac{3}{5}} - X\sqrt{20} =$
 $\frac{2\sqrt{3}\sqrt{5}}{\sqrt{5}\sqrt{5}} - \frac{X\sqrt{4}\sqrt{5}}{1} =$

$\frac{2\sqrt{15}}{5} - \frac{2X\sqrt{5}(5)}{(5)} =$

$\frac{2\sqrt{15} - 10X\sqrt{5}}{5}$

20) $\frac{(5)^2}{(5)} - \frac{3X + 4}{5} = \frac{10 - 3X - 4}{5}$
 $\frac{(3)3X}{(3)} + \frac{2 + X}{3} = \frac{9X + 2 + X}{3} =$

$\frac{6 - 3X}{5} \cdot \frac{3}{10X + 2} = \frac{18 - 9X}{50X + 10}$
 $\frac{10X + 2}{3} \cdot \frac{3}{10X + 2}$

9E

1) $X^2 + 16X + 64$

2) $16X^2 + 8X + 1$

3) $(X + 4)^2$

4) $(3X + 2)^2$

5) $X^3 + 3X^2(6) + 3X(6)^2 + 6^3$
 $X^3 + 18X^2 + 108X + 216$

6) $(2X)^3 + 3(2X)^2(5) + 3(2X)(5)^2 + 5^3$
 $8X^3 + 60X^2 + 150X + 125$

7) $X^3 + 3X^2(4) + 3X(4)^2 + 4^3$
 $X^3 + 12X^2 + 48X + 64$

8) $X^3 - 3X^2(2/3) + 3X(2/3)^2 - (2/3)^3$
 $X^3 - 2X^2 + 4/3 X - 8/27$

9) $6 - 3\sqrt{-9}$ or $6 - 3(3i) = 6 - 9i$

10) $(10X - \sqrt{83})(10X + \sqrt{83})$

11) $\frac{5\sqrt{7}(2\sqrt{7} + 3)}{(2\sqrt{7} - 3)(2\sqrt{7} + 3)} = \frac{10(7) + 15\sqrt{7}}{4(7) - 9}$
 $\frac{70 + 15\sqrt{7}}{19}$

12) $\frac{4(10 + 7i)}{(10 - 7i)(10 + 7i)} = \frac{40 + 28i}{100 - 49i^2} = \frac{40 + 28i}{149}$

13) $(-10)(\sqrt{-1}\sqrt{25}\sqrt{3})$
 $(-10)(5i\sqrt{3}) = -50i\sqrt{3}$

14) $8i^3 = 8 \cdot i^2 \cdot i = -8i$

15) $(3)^{-5} = \frac{1}{3^5} = \frac{1}{243}$

16) $(X^3)^{-2} = \frac{1}{(X^3)^2} = \frac{1}{X^6}$

17) $X(5X - 3) = 0 \quad 5(0)^2 - 3(0) = 0$
 $X = 0, 3/5 \quad 0 = 0 \checkmark$
 $5(3/5)^2 - 3(3/5) = 0$
 $9/5 - 9/5 = 0 \checkmark$

18) $25 - X^2 = -(X^2 - 25)$
 $\frac{X(X + 5)}{(X + 5)(X - 5)} \cdot \frac{10(X - 5)}{(X + 5)} = \frac{10X}{-X - 5}$

19) $3\sqrt{\frac{2}{7}} - 7\sqrt{\frac{3}{X}}$
 $\frac{3\sqrt{2}\sqrt{7}}{\sqrt{7}\sqrt{7}} - \frac{7\sqrt{3}\sqrt{X}}{\sqrt{X}\sqrt{X}} =$

$\frac{3\sqrt{14}(X)}{7(X)} - \frac{7\sqrt{3X}(7)}{X(7)} =$
 $\frac{3X\sqrt{14} - 49\sqrt{3X}}{7X}$

20) $\frac{(2)1}{(2)} + \frac{4 - 5X}{2} = \frac{6 - 5X}{2} \cdot \frac{X + 3}{X + 3} =$
 $\frac{X + 3}{4} = \frac{X + 3}{4} \cdot \frac{X + 3}{X + 3} =$
 $\frac{12 - 10X}{X + 3}$