

5E

1) $(X + 6)(X - 4)$

2) $(X + 9)(X + 1)$

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

4) $(8 - X)(8 + X)$

5) $(2X - 5)(X - 6)$

6) $(3X - 1)(X + 3)$

7) $(4X - 3)(X - 4)$

8) $(X - 3)(X + 2)$

$$9) \begin{array}{l} 2X^2 - 18X + 36 = 0 \\ 2(X^2 - 9X + 18) = 0 \\ 2(X - 6)(X - 3) = 0 \\ X = 6 \quad X = 3 \end{array} \quad \begin{array}{l} 2(6)^2 - 18(6) + 36 = 0 \\ 72 - 108 + 36 = 0 \quad 0 = 0 \quad \checkmark \\ 2(3)^2 - 18(3) + 36 = 0 \\ 18 - 54 + 36 = 0 \quad 0 = 0 \quad \checkmark \end{array}$$

$$10) \begin{array}{l} 9X^2 - 24X + 16 = 0 \\ (3X - 4)(3X - 4) = 0 \\ X = 4/3 \end{array} \quad \begin{array}{l} 9(4/3)^2 - 24(4/3) + 16 = 0 \\ 16 - 32 + 16 = 0 \quad 0 = 0 \quad \checkmark \end{array}$$

11) $\frac{(Y)(X - 3)}{(Y) 2X} - \frac{X - 2(X)}{2Y(X)} =$

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

12) $\frac{8X - 2}{X^2 + 5X + 6} - \frac{(X + 2)(X + 2)}{(X + 3)(X + 2)} =$

$$\frac{8X - 2 - X^2 - 4X - 4}{X^2 + 5X + 6} = \frac{-X^2 + 4X - 6}{X^2 + 5X + 6}$$

13) $\frac{4 + \frac{1}{4}}{6 - 1\frac{2}{3}} = \frac{\frac{17}{4} \cdot \frac{3}{13}}{\frac{18}{3} \cdot \frac{8}{12}} = \frac{51}{52}$

14) $\frac{\frac{5X}{2} + \frac{2}{2}}{\frac{(3X)2X}{(3X)} - \frac{4}{3X}} = \frac{\frac{5X + 2}{2} \cdot \frac{3X}{6X^2 - 4}}{\frac{6X^2 - 4}{3X} \cdot \frac{3X}{6X^2 - 4}} = \frac{15X^2 + 6X}{12X^2 - 8}$

15) $\frac{4\sqrt{20} \cdot \sqrt{5}}{5\sqrt{6}} = 4\sqrt{5}$

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

17) $9\sqrt{4}\sqrt{10} = 9(2)\sqrt{10} = 18\sqrt{10}$

18) $\frac{6\sqrt{7}}{\sqrt{7}\sqrt{7}} + \frac{9\sqrt{5}}{\sqrt{5}\sqrt{5}} =$

$$\frac{6\sqrt{7}(5)}{7(5)} + \frac{9\sqrt{5}(7)}{5(7)} =$$

$$\frac{30\sqrt{7} + 63\sqrt{5}}{35}$$

19) $\frac{\frac{2}{(26 \times 10^3)} \cdot \frac{2}{(4 \times 10^{-5})}}{\frac{(18 \times 10^5)}{1} \cdot \frac{(2 \times 10^8)}{1}} =$

$$\frac{4 \times 10^{-2}}{1 \times 10^{13}} = 4 \times 10^{-15}$$

20) $\frac{(X + 2)(X + 5)}{(X + 2)(X + 2)} = \frac{X + 5}{X + 2}$

6A

1) $4^3 = 64$

2) X^2

3) $2^2 = 4$

4) $16^{3/4} = 8$

5) $\frac{1}{9}$

6) $\left(\frac{2}{3}\right)^3 = \frac{8}{27}$

7) $2^3 = 8$

8) X^B

9) 6

10) $9^2 = 81$

11) $(X^{1/2})^{1/2} = X^{1/4}$

12) $[(125)^{1/3}]^2 = 5^2 = 25$

13) $(B^5)^{1/3} = B^{5/3}$

14) $(64^{1/3})^{1/2} = 4^{1/2} = 2$

15) $(36^{1/2})^3 = 6^3 = 216$

16) $(25^{1/2})^{1/2} = 5^{1/2} \text{ or } \sqrt{5}$

17) $[(64)^{1/6}]^{-3} = 64^{-1/2} = \frac{1}{8}$

18) $(81^{1/4})^{1/2} = 3^{1/2} \text{ or } \sqrt{3}$

19) $[(A^{16})^{1/2}]^{1/2} = A^4$

20) $(8^{1/3})^5 = 2^5 = 32$

6B

1) $2^4 = 16$

2) $2^{1/6}$

3) $X^{3/4}$

4) $(-3)^{2/3} = 9^{1/3}$

5) $\frac{1}{2}$

6) $\frac{2}{3}$

7) $3^4 = 81$

8) B^2

9) $5^{-1} = \frac{1}{5}$

10) $9^{1/2} = 3$

11) $[(X^4)^{1/2}]^{1/2} = X$

12) $[(64)^{1/3}]^4 = 4^4 = 256$

13) $(8^5)^{1/3} = 8^{5/3} = 2^5 = 32$

14) $(16^{1/4})^{1/2} = 2^{1/2} \text{ or } \sqrt{2}$

15) $(49^{1/2})^2 = 49$

16) $(A^8)^{1/4} = A^2$

17) $[(216)^{1/3}]^{-2} = 6^{-2} = \frac{1}{36}$

18) $(100^{1/2})^{1/2} = 10^{1/2} \text{ or } \sqrt{10}$

19) $(81^{1/2})^{1/2} = 9^{1/2} = 3$

20) $(32^{1/5})^4 = 2^4 = 16$

6C

1) $(2)^3 = 8$

2) $5^2 = 25$

3) $X^{6/3} = X^2$

4) $(10)^5 = 100,000$

5) $(X^{1/2})^{1/3} = X^{1/6}$

6) $[(27)^{1/3}]^2 = 3^2 = 9$

7) $[(16)^{1/4}]^{1/2} = (2)^{1/2}$

8) $(25^{1/2})^4 = 25^2 = 625$

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

10) $(5X-1)(5X+1)$

11) $(2X+1)(X-3)$

12) $(\frac{1}{3}X - \frac{6}{5})(\frac{1}{3}X + \frac{6}{5})$

$$13) \begin{array}{l} 5X^2 - 25X + 30 = 0 \\ 5(X^2 - 5X + 6) = 0 \\ 5(X-2)(X-3) = 0 \\ X = 2, 3 \end{array} \quad \begin{array}{l} 5(2)^2 - 25(2) + 30 = 0 \\ 20 - 50 + 30 = 0 \quad 0=0 \quad \checkmark \\ 5(3)^2 - 25(3) + 30 = 0 \\ 45 - 75 + 30 = 0 \quad 0=0 \quad \checkmark \end{array}$$

$$14) \begin{array}{l} X^2 + 10X + 25 = 0 \\ (X+5)(X+5) = 0 \\ X = -5 \end{array} \quad \begin{array}{l} (-5)^2 + 10(-5) + 25 = 0 \\ 25 - 50 + 25 = 0 \quad 0=0 \quad \checkmark \end{array}$$

15) $\frac{(X+4)7X}{(X+4)X+2} - \frac{(X+2)2X}{(X+2)X+4} =$

$$\frac{7X(X+4) - 2X(X+2)}{(X+4)(X+2)} =$$

$$\frac{7X^2 + 28X - 2X^2 - 4X}{(X+4)(X+2)} =$$

$$\frac{5X^2 + 24X}{X^2 + 6X + 8}$$

16) $\frac{(X-5)3X}{(X-5)(X+5)} - \frac{5X}{X^2-25} + \frac{(X+5)8}{(X+5)(X-5)} =$

$$\frac{(3X^2 - 15X) - 5X + 8X + 40}{X^2 - 25} =$$

$$\frac{3X^2 - 12X + 40}{X^2 - 25}$$

17) $\frac{4X}{X} - \frac{1}{X} = \frac{4X-1}{X} \cdot \frac{2X}{2X^2+1} =$

$$\frac{2X^2 + 1}{2X} + \frac{1}{2X} = \frac{2X^2+1}{2X} \cdot \frac{2X}{2X^2+1} =$$

$$\frac{8X-2}{2X^2+1}$$

18) $\frac{X(X+1)(X-1)}{2(X+3)(X+5)} \cdot \frac{X(X-3)(X+3)}{(X+1)(X+1)} =$

$$\frac{X^2(X-1)(X-3)}{2(X+3)(X+1)}$$

19) $\frac{4\sqrt{2}\sqrt{5}}{\sqrt{5}\sqrt{5}} = \frac{4\sqrt{10}}{5}$

20) $\frac{7\sqrt{2}}{\sqrt{8}\sqrt{2}} - \frac{8}{\sqrt{9}} = \frac{7\sqrt{2}}{4(3)} - \frac{8(4)}{3(4)} =$

$$\frac{21\sqrt{2} - 32}{12}$$

6D

1) $(27)^2 = 729$

2) $9^2 = 81$

3) $32^2 = 1024$

4) $(4)^3 = 64$

5) $(64^{1/2})^{1/3} = 8^{1/3} = 2$

6) $(8^{1/3})^5 = 8^{5/3} = 32$

7) $[(125)^{1/3}]^{1/2} = (5)^{1/2} \text{ or } \sqrt{5}$

8) $[(100)^{1/2}]^4 = 100^2 = 10,000$

9) $(X+3)(X+3)$

10) $(X+5)(X-5)$

11) $(X-11)(X+9)$

12) $(2X-3)(2X-3)$

$$13) \begin{array}{l} X^2 + X - 42 = 0 \\ (X+7)(X-6) = 0 \\ X = -7, 6 \end{array} \quad \begin{array}{l} (-7)^2 + (-7) - 42 = 0 \\ 49 - 7 - 42 = 0 \quad 0=0 \quad \checkmark \\ (6)^2 + (6) - 42 = 0 \\ 36 + 6 - 42 = 0 \quad 0=0 \quad \checkmark \end{array}$$

$$14) \begin{array}{l} X^2 - 2X - 15 = 0 \\ (X-5)(X+3) = 0 \\ X = 5, -3 \end{array} \quad \begin{array}{l} (5)^2 - 2(5) - 15 = 0 \\ 25 - 10 - 15 = 0 \quad 0=0 \quad \checkmark \\ (-3)^2 - 2(-3) - 15 = 0 \\ 9 + 6 - 15 = 0 \quad 0=0 \quad \checkmark \end{array}$$

15) $(X+4) = 7(X-8)$

$$\begin{array}{l} X+4 = 7X-56 \\ 60 = 6X \\ 10 = X \end{array}$$

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

$$\frac{X^2 - 5X + 6 - X + 4 + X^2 + 7X + 12}{X^2 - 9}$$

$$\frac{2X^2 + X + 22}{X^2 - 9}$$

17) $\frac{2(Y)}{X(Y)} + \frac{3(X)}{Y(X)} = \frac{2Y+3X}{XY} \cdot \frac{XY}{2} =$

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

18) $\frac{(X-5)(X+5)}{2(X-3)(X+3)} \cdot \frac{2X(X-3)}{5(X-5)} =$

$$\frac{X(X+5)}{5(X+3)}$$

19) $\frac{8\sqrt{10}}{\sqrt{10}\sqrt{10}} = \frac{8\sqrt{10}}{10} = \frac{4\sqrt{10}}{5}$

20) $\frac{6\sqrt{2}}{\sqrt{2}\sqrt{2}} - \frac{3\sqrt{6}}{\sqrt{6}\sqrt{6}} = \frac{6\sqrt{2}}{2} - \frac{3\sqrt{6}}{6} =$

$$3\sqrt{2} - \frac{\sqrt{6}}{2}$$

6E

1) $(7)^3 = 343$

2) $5^4 = 625$

3) $10^5 = 100,000$

4) $(-8)^2 = 64$

5) $(81^{1/2})^{1/2} = 81^{1/4} = 3$

6) $[(36)^{1/2}]^3 = 6^3 = 216$

7) $[(X^8)^{1/4}]^{1/2} = X^{8/8} = X$

8) $(1000^{1/3})^{-5} = 10^{-5} = \frac{1}{100,000}$ or $\frac{1}{10^5}$

9) $(X-2)(X-2)$

10) $(X+5)(X+5)$

11) $(X-6)(X-6)$

12) $(3X-1)(X+5)$

$$13) \begin{array}{l} 3X^2 + 15X - 42 = 0 \\ 3(X^2 + 5X - 14) = 0 \\ 3(X+7)(X-2) = 0 \\ X = -7, 2 \end{array} \quad \begin{array}{l} 3(-7)^2 + 15(-7) - 42 = 0 \\ 147 - 105 - 42 = 0 \quad \checkmark \\ 3(2)^2 + 15(2) - 42 = 0 \\ 12 + 30 - 42 = 0 \quad \checkmark \end{array}$$

$$14) \begin{array}{l} X^2 - X - 20 = 0 \\ (X-5)(X+4) = 0 \\ X = 5, -4 \end{array} \quad \begin{array}{l} (5)^2 - (5) - 20 = 0 \\ 25 - 5 - 20 = 0 \quad \checkmark \\ (-4)^2 - (-4) - 20 = 0 \\ 16 + 4 - 20 = 0 \quad \checkmark \end{array}$$

$$15) \frac{8(2X)}{3X(2X)} - \frac{2(3X)}{2X(3X)} - \frac{5}{6X^2} =$$

$$\frac{16X - 6X - 5}{6X^2} = \frac{10X - 5}{6X^2}$$

$$16) \frac{(X-3)(X+2)}{(X-2)(X+2)} - \frac{4X+3}{X^2-4} - \frac{(X+3)(X-2)}{(X+2)(X-2)} =$$

$$\frac{X^2 - X - 6 - 4X - 3 - X^2 - X + 6}{X^2 - 4} =$$

$$\frac{-6X - 3}{X^2 - 4}$$

$$17) \frac{1}{9} - \frac{X(3)}{3(3)} = \frac{1-3X}{9} = \frac{1-3X}{24} \cdot \frac{24}{24} = \frac{24 - 72X}{24 \cdot 24} = \frac{24 - 72X}{576}$$

$$\frac{X(2)}{12(2)} + \frac{5(3)}{8(3)} = \frac{2X+15}{24} = \frac{2X+15}{24} \cdot \frac{24}{24} = \frac{24X + 360}{576}$$

$$\frac{8 - 24X}{6X + 45}$$

$$18) \frac{(X-8)(X+2)}{(X+2)} \cdot \frac{(X-4)}{(X-4)(X-4)} =$$

$$\frac{X-8}{X-4}$$

$$19) \frac{\sqrt{5}\sqrt{3}}{\sqrt{3}\sqrt{3}} = \frac{\sqrt{15}}{3}$$

$$20) \frac{1\sqrt{7}}{\sqrt{7}\sqrt{7}} - \frac{2\sqrt{2}}{\sqrt{8}\sqrt{2}} = \frac{\sqrt{7}}{7} - \frac{2\sqrt{2}}{4} =$$

$$\frac{\sqrt{7}(2)}{7(2)} - \frac{\sqrt{2}(7)}{2(7)} =$$

$$\frac{2\sqrt{7} - 7\sqrt{2}}{14}$$

7A

1) i

2) $7i$

3) $8X^3i$

4) $\frac{11}{12}i$

5) $2i + 10i = 12i$

6) $2(3i) + 6 = 6i + 6$

7) $\sqrt{4X^2}\sqrt{5}\sqrt{-1} = 2Xi\sqrt{5}$

8) $i\sqrt{A} + i\sqrt{B}$

9) $3\sqrt{-1}\sqrt{4}\sqrt{3} + 4\sqrt{-1}\sqrt{8}\sqrt{2} = 6i\sqrt{3} + 36i\sqrt{2}$

10) $13i - 18i = -5i$

11) $10i + 4$

12) $X\sqrt{3} + 2i$

13) $(i^2)(i^2) = (-1)(-1) = 1$

14) $i^8 = (i^2)(i^2)(i^2)(i^2) = (-1)(-1)(-1)(-1) = 1$

15) $(i^2)(i^2)(i) = (-1)(-1)(i) = i$

16) $i^9 = (i^2)(i^2)(i^2)(i^2)(i) = (-1)(-1)(-1)(-1)(i) = i$

17) $(-120)(i^2) = 120$

18) $3(i)(13) = 3(i^2)(13) = -39$

19) $\sqrt{-1}\sqrt{-1}\sqrt{36} = 6i^2 = -6$

20) $2(15)(6)(2i) = 360i$

7B

1) $15i$

2) $11i$

3) $7A^2i$

4) $\frac{10}{5}i = 2i$

5) $8i - 4i = 4i$

6) $18 - 4i$

7) $\sqrt{-1}\sqrt{9X^8}\sqrt{5X^1} = 3X^4i\sqrt{5X}$

8) $XY^2i + XY^2$

9) $6\sqrt{-1}\sqrt{2}\sqrt{100} - 5\sqrt{25} = 68\sqrt{2}(10) - 5(5) = 60i\sqrt{2} - 25$

10) $4i\sqrt{2} + 10i\sqrt{2} = 14i\sqrt{2}$

11) $3Ai + 9Ai = 12Ai$

12) $X^2i + 4X^2i = 5X^2i$

13) $6(-1)(-1) = 6$

14) $i^{10} = (i^2)(i^2)(i^2)(i^2)(i^2) = (-1)(-1)(-1)(-1)(-1) = -1$

15) $(i^2)(i^2)(i^2)(i) = (-1)(-1)(-1)(i) = -i$

16) $i^8 = (i^2)(i^2)(i^2)(i^2) = (-1)(-1)(-1)(-1) = 1$

17) $50i^2 = -50$

18) $14i^2 = -14$

19) -75

20) $6(13i)(2)(9i) = 1404i^2 = -1404$