

Factoring Review NOTES

If possible, factor the polynomials below.

1. $x^2 + 7x + 12$

$(x+4)(x+3)$

2. $x^2 + 18x + 45$

$(x+15)(x+3)$

3. $x^2 + 23x - 24$

$(x+24)(x-1)$

4. $x^2 - 13x - 30$

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

5. $x^2 - 22x + 40$

$(x-20)(x-2)$

6. $4x^2 + 8x + 3$

$$\begin{array}{l} r+A=8 \\ r \cdot A=12 \end{array} \quad \begin{array}{l} 1 \cdot 12 \\ \textcircled{2 \cdot 6} \\ 3 \cdot 4 \end{array}$$

$$\begin{aligned} &(4x^2 + 6x)(2x+3) \\ &2x(2x+3) + 1(2x+3) \\ &\boxed{(2x+1)(2x+3)} \end{aligned}$$

7. $6x^2 + 19x + 10$

$$\begin{array}{l} r+A=19 \\ r \cdot A=60 \end{array} \quad \begin{array}{l} 1 \cdot 60 \\ 2 \cdot 30 \\ 3 \cdot 20 \\ \textcircled{4 \cdot 15} \\ 5 \cdot 12 \\ 6 \cdot 10 \end{array}$$

$6x^2 + 4x + 15x + 10 = 0$

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

$$\boxed{(2x+5)(3x+2)}$$

10. $4x^2 - 25$

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

8. $3x^2 - 11x + 10$

$$\begin{array}{l} r+A=-11 \\ r \cdot A=30 \end{array} \quad \begin{array}{l} 1 \cdot 30 \\ 2 \cdot 15 \\ 3 \cdot 10 \\ \textcircled{5 \cdot 6} \end{array}$$

$3x^2 - 5x - 6x + 10$

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

$\boxed{(3x-5)(x-2)}$

11. $9x^2 - 4$

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

12. $16x^2 - 25$

$(4x-5)(4x+5)$

9. $2x^2 + 5x - 12$

$$\begin{array}{l} r+A=5 \\ r \cdot A=-24 \end{array} \quad \begin{array}{l} 1 \cdot 24 \\ 2 \cdot 12 \\ \textcircled{3 \cdot 8} \\ 4 \cdot 6 \end{array}$$

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

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

$\boxed{(x+4)(2x-3)}$

13. $4x^2 + 49$

prime

Solving Review NOTES

Solve the polynomials below.

1. $y = x^2 + 7x + 12$

$$0 = (x+4)(x+3)$$

$$x+4=0 \quad x+3=0$$

$$\boxed{x=-4}$$

$$\boxed{x=-3}$$

2. $y = x^2 + 4x + 4$

$$0 = (x+2)(x+2)$$

$$\boxed{x=-2} \text{ double root}$$

3. $y = 2x^2 + 5x - 12$

$$\begin{array}{l} r+s=5 \\ r \cdot s = -12 \end{array} \quad \begin{array}{l} 1, 24 \\ 2, 12 \\ \textcircled{3, 8} \\ 4, 6 \end{array}$$

$$0 = 2x^2 + 8x - 3x - 12$$

$$0 = 2x(x+4) - 3(x+4)$$

$$0 = (2x-3)(x+4)$$

$$2x-3=0 \quad x+4=0$$

$$2x=3$$

$$\boxed{x=3/2}$$

$$\boxed{x=-4}$$

4. $y = 9x^2 - 49$

$$0 = (3x-7)(3x+7)$$

$$3x-7=0 \quad 3x+7=0$$

$$\boxed{x=7/3}$$

$$\boxed{x=-7/3}$$

Write Polynomial Given Roots NOTES

Given these roots, write the original polynomial (don't forget that imaginary and complex roots have a conjugate! They come in pairs!)

1. Roots are
- $x = 2$
- and
- $x = -5$

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

2. Roots are
- $x = -6$
- and
- $x = -3$

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

3. Roots are
- $x = 1$
- ,
- $x = -1$
- , and
- $x = 3$

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

4. Root is
- $x = -5i$

$$y = (x+5i)(x-5i)$$

$$y = x^2 + 25$$

5. Roots are
- $x = 3$
- ,
- $x = -2$
- ,
- $x = 0$
- ,
- $x = 7$

$$y = (x-3)(x+2)(x-0)(x-7)$$

6. Roots are
- $x = 2$
- and
- $x = -4i$
- ,
- $4i$

$$y = (x-2)(x+4i)(x-4i)$$

$$y = (x-2)(x^2+16)$$

$$y = x^3 - 2x^2 + 16x - 32$$

7. Root is
- $x = 3 + 4i$
- ,
- $3 - 4i$

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

$$y = x^2 - 3x + 4ix - 3x + 9 + 12i - 4ix + 12i - 16i^2$$

$$y = x^2 - 6x + 25$$

8. Roots are
- $x = -1$
- and
- $x = 2 - 3i$

$$y = (x+1)(x-2+3i)(x-2-3i)$$

$$y = (x+1)(x^2 - 4x + 13)$$

$$y = x^3 + x^2 - 4x^2 - 4x + 13x + 13$$

$$y = x^3 - 3x^2 + 9x + 13$$

