

study guide

$$1. \begin{array}{r|rrr} 8 & 1 & -7 & -11 \\ & \downarrow & 8 & 8 \\ \hline & 1 & 1 & -3 \end{array} \quad X-1 \quad R-3$$

$$2. \begin{array}{r|rrr} 4 & 5 & 0 & -15 \\ & \downarrow & 30 & 180 \\ \hline & 5 & 30 & 145 \end{array} \quad 5X+30 \quad r \ 145$$

$$3. \begin{array}{r|rrrr} -7 & 1 & 2 & -20 & 4 \\ & \downarrow & -7 & 35 & 95 \\ \hline & 1 & -5 & -15 & 99 \end{array} \quad X^2-5X-15 \quad r \ 99$$

4 to use synthetic division, divide through by

$$(x + \frac{3}{2}) \quad (4x^3 - \frac{27}{2}x^2 - 25x - \frac{15}{2})$$

$$\begin{array}{r|rrrr} -\frac{3}{2} & 4 & -\frac{27}{2} & -25 & -\frac{15}{2} \\ & & -\frac{27}{2} & 0 & +\frac{75}{2} \\ \hline & 4 & 0 & -25 & 0 \end{array} \quad 4x^2 - 25$$

$4x^2 - 25$ is a difference of cubes
 $(2x+5)(2x-5)$

$$5. \begin{array}{r|rrr} -5 & 1 & 10 & 18 \\ & & -5 & -35 \\ \hline & 1 & 5 & -7 \end{array} \quad X+5 \quad r \ -7$$

$$6. \begin{array}{r|rrrrr} 3 & 1 & 0 & 0 & -3 & 0 & 2 \\ & \downarrow & 3 & 9 & 27 & 72 & 216 \\ \hline & 1 & 3 & 9 & 24 & 72 & 218 \end{array} \quad X^4+3X^3+9X^2+24X+72 \quad R218$$

$$\begin{array}{r|rrr}
 7 & 5 & 1 & 0 & -28 \\
 & & \downarrow & 5 & 25 \\
 \hline
 & & 1 & 5 & -3
 \end{array}
 \quad x+5 \quad r-3$$

$$\begin{aligned}
 8. \quad & 3(4)^3 - 8(4)^2 + 12(4) - 1 \\
 & 3(64) - 8(16) + 48 - 1 \\
 & 192 - 128 + 47 \\
 & \underline{111} \quad \text{no}
 \end{aligned}$$

$$\begin{aligned}
 9. \quad & 4(-3)^3 - 36(-3) \\
 & -108 + 108 \\
 & 0 \quad \text{yes}
 \end{aligned}$$

$$\begin{aligned}
 10 \quad f(-1) = 5 \quad \text{so} \quad & (-1)^2 - 3(-1) + b = 5 \\
 & 1 + 3 + b = 5 \\
 & 4 + b = 5 \\
 & b = 1
 \end{aligned}$$

$$12. (3x+5)(3x-5)$$

$$13. (1+3y)(1-3y)$$

$$14. (x+4y)(x-4y)$$

$$15. 2(16x^2-9)$$

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

$$16. \quad a = 4c \quad b = 1 \quad (4c+1)(16c^2-4c+1)$$

$$17. \quad a = 2y \quad b = 3 \quad (2y+3)(4y^2-6y+9)$$

$$18. \quad a = 3x \quad b = 4y \quad (3x-4y)(9x^2+12xy+16y^2)$$

$$19. \quad a = x^2 \quad b = 4 \quad (x^2-4)(x^4+4x^2+16)$$

20 $(x+3)^5$ 6 terms

$$\frac{1x^5}{x^5} + \frac{5x^4(3)}{15x^4} + \frac{10x^3(3)^2}{90x^3} + \frac{10x^2(3)^3}{270x^2} + \frac{5x(3)^4}{405x} + \frac{1(3)^5}{243}$$

21 $(2x+3y)^6$ 7 terms but only need 2nd

$$\frac{1(2x)^6}{6(32x^6)} \frac{6(2x)^5(3y)}{6(32x^5)(3y)} = \boxed{576x^5y}$$

22 $(x-2)^4$ where will x^2 term be.

$$\frac{1x^4}{4x^3} \frac{6x^2(-2)^2}{4} \frac{1}{1}$$

★
 $\boxed{-24x^2}$

23 $f(x) = 2(x+5)^3 + 1$

expand $(x+5)^3$

$$\underline{x^3 + 3(x^2)(5) + 3(x)5^2 + 5^3}$$

$$2[x^3 + 15x^2 + 75x + 75] + 1$$

$$2x^3 + 30x^2 + 150x + 150 + 1$$

$$\boxed{2x^3 + 30x^2 + 150x + 151}$$

24 use calculator to find real roots

$$\boxed{x = -4} \quad \boxed{x = -3}$$

$$\begin{array}{r|rrrrr} -4 & 2 & 11 & 8 & -1 & 40 \\ & \downarrow & -8 & -12 & 16 & -60 \end{array}$$

$$\begin{array}{r|rrrrr} -3 & 2x^3 & 3 & -4 & 15 & 0 \\ & \downarrow & -6 & 9 & -15 & \end{array}$$

$$2x^2 - 3x + 5 = 0$$

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

use
quadratic
formula

$$\rightarrow \frac{3 \pm \sqrt{9 - 4(2)(5)}}{4}$$

$$\frac{3 \pm \sqrt{9 - 40}}{4}$$

$$\frac{3 \pm \sqrt{-31}}{4}$$

$$\boxed{x = \frac{3 + i\sqrt{31}}{4}}$$

$$25 \quad x^4 - 4x^3 + 8x^2 - 16x + 16$$

repeated root @ $x=2$

$$\begin{array}{r|rrrrr} 2 & 1 & -4 & 8 & -16 & 16 \\ & \downarrow & 2 & -4 & 8 & -16 \\ 2 & 1x^3 & -2 & 4 & -8 & 0 \\ & \downarrow & 2 & 0 & 8 & \end{array}$$

$$1x^3 - 2 \quad 4 \quad 0$$

$$x^2 + 4$$

$$x^2 + 4 = 0$$

$$x^2 = -4$$

$$x = \pm \sqrt{-4}$$

$$= \pm 2i$$

(you could also use quadratic formula)

$$26. \quad x=0, \quad x = -\frac{3}{2}, \quad x=1, \quad x = \frac{2}{3}$$

$$2x+3=0$$

$$x-1=0$$

$$3x-2=0$$

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

$$27. \quad x=5, \quad x=2, \quad x = -\frac{3}{7}$$

$$x-5=0$$

$$x-2=0$$

$$7x+3=0$$

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

$$28. \quad y = 2.23x^2 - 3.73x + .27$$

$$y=3 \text{ when } x = -0.55 \text{ or } x = 2.23$$

$$y = 16.66 \text{ when } x = -2$$

$$29. \quad y = 14.5x^2 - 9.3x + 2.6$$

$$\text{When } x=12, \quad y = 1,979 \text{ ft}$$

$$\text{When } y=490, \quad x = 6.13 \text{ seconds}$$