

17. $35 = -16t^2 + 75$

$16t^2 = 40$

$t^2 = \frac{40}{16} = \frac{5}{2}$

$t = \sqrt{\frac{5}{2}}$

$t = \frac{\sqrt{10}}{2} \approx 1.5811388$

$t \approx 1.58$ seconds

19. $h = -16t^2 + 288t$

$-16t^2 + 288t > 1040$

$-16t^2 + 288t - 1040 > 0$ (Divide by -16)

$t^2 - 18t + 65 < 0$

$(t - 5)(t - 13) < 0$

18. $R = -\frac{1}{20}(n^2 - 240n), 80 \leq n \leq 160$

$R = -\frac{1}{20}(n^2 - 240n + 14,400) + 720$

$R = -\frac{1}{20}(n - 120)^2 + 720$

 $n = 120$ passengers will produce a maximum revenueCritical numbers: $t = 5, 13$

Test intervals:

 t must be positivePositive: $(0, 5)$ Negative: $(5, 13)$ Positive: $(13, \infty)$ Solution: $(5, 13)$ $5 < t < 13$ seconds**Cumulative Test for Chapters 4–6**

$$\begin{aligned}
 1. \left(\frac{2x^{-4}y^3}{3x^5y^{-3}z^0} \right)^{-2} &= \left(\frac{2x^{(-4)+(-5)}y^{3+(3)}}{3} \right)^{-2} \\
 &= \left(\frac{2x^{-9}y^6}{3} \right)^{-2} = \left(\frac{2y^6}{3x^9} \right)^{-2} = \left(\frac{3x^9}{2y^6} \right)^2 \\
 &= \frac{9x^{18}}{4y^{12}}
 \end{aligned}$$

2. $(4 \times 10^3)^2 = 4^2 \times 10^6 = 16 \times 10^6 = 1.6 \times 10^7$

$$\begin{array}{r}
 3. \quad \frac{2x^3 - 2x^2 - x + \frac{-4}{2x-1}}{2x-1} \\
 \underline{4x^4 - 6x^3 + 0x^2 + x - 4} \\
 4x^4 - 2x^3 \\
 \underline{-4x^3 + 0x^2} \\
 -4x^3 + 2x^2 \\
 \underline{-2x^2 + x} \\
 -2x^2 + x \\
 \underline{-2x^2 + x}
 \end{array}$$

$$4. \frac{x^2 + 8x + 16}{18x^2} \cdot \frac{2x^4 + 4x^3}{x^2 - 16} = \frac{(x+4)^2}{18x^2} \cdot \frac{2x^3(x+2)}{(x-4)(x+4)} = \frac{x(x+4)(x+2)}{9(x-4)}$$

$$\begin{aligned} 5. \frac{2}{x} - \frac{x}{x^3 + 3x^2} + \frac{1}{x+3} &= \frac{2}{x} - \frac{x}{x^2(x+3)} + \frac{1}{x+3} \\ &= \frac{2}{x} - \frac{1}{x(x+3)} + \frac{1}{x+3} \\ &= \frac{2\left(\frac{x+3}{x(x+3)}\right) - \frac{1}{x(x+3)}\left(\frac{1}{1}\right) + \frac{1}{x+3}\left(\frac{x}{x}\right)}{x(x+3)} \\ &= \frac{2x+6}{x(x+3)} - \frac{1}{x(x+3)} + \frac{x}{x(x+3)} \\ &= \frac{2x+6-1+x}{x(x+3)} \\ &= \frac{3x+5}{x(x+3)} \end{aligned}$$

$$\begin{aligned} 6. \frac{\left(\frac{x-y}{y-x}\right)}{\left(\frac{x-y}{xy}\right)} &= \frac{\left(\frac{x-y}{y-x}\right)}{\left(\frac{x-y}{xy}\right)} \cdot \frac{xy}{xy} \\ &= \frac{x^2 - y^2}{x - y} \\ &= \frac{(x-y)(x+y)}{x-y} \\ &= x + y \end{aligned}$$

$$\begin{aligned} 7. \sqrt{-2}(\sqrt{-8} + 3) &= i\sqrt{2}(2i\sqrt{2} + 3) \\ &= 2i^2 \cdot 2 + 3i\sqrt{2} \\ &= -4 + 3i\sqrt{2} \end{aligned}$$

$$\begin{aligned} 8. (3 - 4i)^2 &= 3^2 + 2(3)(-4i) + (4i)^2 \\ &= 9 - 24i + 16i^2 \\ &= 9 - 16 - 24i \\ &= -7 - 24i \end{aligned}$$

$$\begin{aligned} 9. \left(\frac{t^{1/2}}{t^{1/4}}\right)^2 &= \frac{t}{t^{1/2}} = t^{1-1/2} \\ &= t^{1/2} \end{aligned}$$

$$\begin{aligned} 10. 10\sqrt{20x} + 3\sqrt{125x} &= 10\sqrt{4 \cdot 5x} + 3\sqrt{25 \cdot 5x} \\ &= 20\sqrt{5x} + 15\sqrt{5x} \\ &= 35\sqrt{5x} \end{aligned}$$

$$11. (\sqrt{2x} - 3)^2 = 2x - 6\sqrt{2x} + 9$$

$$\begin{aligned} 12. \frac{6}{\sqrt{10} - 2} &= \frac{6}{\sqrt{10} - 2} \cdot \frac{\sqrt{10} + 2}{\sqrt{10} + 2} \\ &= \frac{6(\sqrt{10} + 2)}{10 - 4} \\ &= \frac{6(\sqrt{10} + 2)}{6} \\ &= \sqrt{10} + 2 \end{aligned}$$

$$\begin{aligned} 13. \frac{1 - 2i}{4 + i} &= \frac{1 - 2i}{4 + i} \cdot \frac{4 - i}{4 - i} \\ &= \frac{4 - i - 8i + 2i^2}{16 - i^2} = \frac{4 - 9i - 2}{16 + 1} \\ &= \frac{2 - 9i}{17} = \frac{2}{17} - \frac{9}{17}i \end{aligned}$$

14. $\frac{1}{x} + \frac{4}{10-x} = 1$
 $x(10-x)\left(\frac{1}{x} + \frac{4}{10-x}\right) = (1)x(10-x)$
 $10-x+4x = 10x-x^2$
 $x^2-7x+10 = 0$
 $(x-5)(x-2) = 0$
 $x = 5 \quad x = 2$

Check: $\frac{1}{5} + \frac{4}{10-5} \stackrel{?}{=} 1$ $\frac{1}{2} + \frac{4}{10-2} \stackrel{?}{=} 1$
 $\frac{1}{5} + \frac{4}{5} \stackrel{?}{=} 1$ $\frac{1}{2} + \frac{4}{8} \stackrel{?}{=} 1$
 $\frac{5}{5} \stackrel{?}{=} 1$ $\frac{1}{2} + \frac{1}{2} \stackrel{?}{=} 1$
 $1 = 1$ $1 = 1$

15. $\frac{x-3}{x} + 1 = \frac{x-4}{x-6}$
 $x(x-6)\left(\frac{x-3}{x} + 1\right) = \left(\frac{x-4}{x-6}\right)x(x-6)$
 $(x-6)(x-3) + x(x-6) = x(x-4)$
 $x^2-9x+18+x^2-6x = x^2-4x$
 $x^2-11x+18 = 0$
 $(x-9)(x-2) = 0$
 $x = 9 \quad x = 2$

Check: $\frac{9-3}{9} + 1 \stackrel{?}{=} \frac{9-4}{9-6}$ $\frac{2-3}{2} + 1 \stackrel{?}{=} \frac{2-4}{2-6}$
 $\frac{6}{9} + 1 \stackrel{?}{=} \frac{5}{3}$ $\frac{-1}{2} + \frac{2}{2} \stackrel{?}{=} \frac{-2}{-4}$
 $\frac{2}{3} + \frac{3}{3} \stackrel{?}{=} \frac{5}{3}$ $\frac{1}{2} = \frac{1}{2}$
 $\frac{5}{3} = \frac{5}{3}$

16. $\sqrt{x} - x + 12 = 0$
 $\sqrt{x} = x - 12$
 $(\sqrt{x})^2 = (x-12)^2$
 $x = x^2 - 24x + 144$
 $0 = x^2 - 25x + 144$
 $0 = (x-16)(x-9)$
 $x = 16 \quad x = 9$
 Not a solution

Check: $\sqrt{16} - 16 + 12 \stackrel{?}{=} 0$ $\sqrt{9} - 9 + 12 \stackrel{?}{=} 0$
 $4 - 16 + 12 \stackrel{?}{=} 0$ $3 - 9 + 12 \stackrel{?}{=} 0$
 $0 = 0$ $6 \neq 0$

17. $\sqrt{5-x} + 10 = 11$
 $\sqrt{5-x} = 1$
 $(\sqrt{5-x})^2 = 1^2$
 $5-x = 1$
 $-x = -4$
 $x = 4$

Check: $\sqrt{5-4} + 10 \stackrel{?}{=} 11$
 $\sqrt{1} + 10 \stackrel{?}{=} 11$
 $11 = 11$

18. $(x - 5)^2 + 50 = 0$

$$(x - 5)^2 = -50$$

$$x - 5 = \pm \sqrt{-50}$$

$$x = 5 \pm 5i\sqrt{2}$$

19. $3x^2 + 6x + 2 = 0$

$$x^2 + 2x + 1 = -\frac{2}{3} + 1$$

$$(x + 1)^2 = \frac{1}{3}$$

$$x + 1 = \pm \sqrt{\frac{1}{3}}$$

$$x = -1 \pm \frac{\sqrt{3}}{3} = \frac{-3 \pm \sqrt{3}}{3}$$

20. $\pi r_2^2(5) = \pi r_1^2(3)$

$$r_2^2 = \frac{3}{5}r_1^2$$

$$r_2 = \sqrt{\frac{3r_1^2}{5}}$$

$$r_2 = \frac{\sqrt{15}r_1}{5}$$

$$r_2 = r_1 \frac{\sqrt{15}}{5}$$

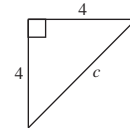
21. $c = \sqrt{4^2 + 4^2}$

$$= \sqrt{32}$$

$$P = 4(4) + 4(\sqrt{32})$$

$$P = 16 + 16\sqrt{2} \text{ inches}$$

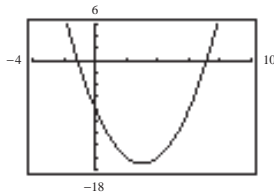
$$P \approx 38.6 \text{ inches}$$



22. $y = x^2 - 6x - 8$

Keystrokes:

$\boxed{Y=}$ $\boxed{X,T,\theta}$ $\boxed{x^2}$ $\boxed{-}$ $\boxed{6}$ $\boxed{X,T,\theta}$ $\boxed{-}$ $\boxed{8}$ $\boxed{\text{GRAPH}}$



Estimate of x -intercepts ≈ -1.12 and 7.12

$$x^2 - 6x - 8 = 0$$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(-8)}}{2(1)}$$

$$x = \frac{6 \pm \sqrt{36 + 32}}{2}$$

$$x = \frac{6 \pm \sqrt{68}}{2}$$

$$x \approx -1.12 \text{ and } 7.12$$

23. $x = -2$ and $x = 6$

$$(x + 2) = 0 \quad (x - 6) = 0$$

$$(x + 2)(x - 6) = 0$$

$$x^2 - 6x + 2x - 12 = 0$$

$$x^2 - 4x - 12 = 0$$