

8.2 pg 451

$$3 \text{ a) } x^2 + 2 = y \quad y = 14 - 4x \quad \therefore x^2 + 2 = 14 - 4x$$

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

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

$$x = -6 \quad x = 2$$

$$y = 14 - 4(-6) \quad y = 14 - 4(2)$$

$$y = 38 \quad y = 6$$

$$(-6, 38) \quad (2, 6)$$

$$b) \begin{cases} 2x^2 - 4x + y = 3 \\ 4x^2 - 8x + 2y = 6 \end{cases}$$

$$\frac{4x - 2y = -7}{4x^2 - 4x = -1}$$

$$4x^2 - 4x + 1 = 0$$

$$(2x-1)(2x-1) = 0$$

$$x = 1/2$$

$$4x - 2y = -7$$

$$4(1/2) - 2y = -7$$

$$2 - 2y = -7$$

$$-2y = -9$$

$$y = 9/2 \quad (1/2, 9/2)$$

$$c) \begin{cases} 7d^2 + 5d - t - 8 = 0 \\ 5d - t + 10 = 0 \end{cases} \quad 10d - 2t = -40$$

$$\frac{7d^2 - 28 = 0}{7d^2 = 28}$$

$$d^2 = 4$$

$$d = \pm 2$$

$$10(2) - 2t = -40$$

$$-2t = -60$$

$$t = 30 \quad (2, 30)$$

$$10(-2) - 2t = -40$$

$$-2t = -20$$

$$t = 10 \quad (-2, 10)$$

$$d) \begin{cases} 3x^2 + 4x - 8 = y \\ y = 2x^2 + 4x - 3 \end{cases} \quad 3x^2 + 4x - 8 = 2x^2 + 4x - 3$$

$$x^2 = 5$$

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

$$y + 3 = 2\sqrt{5}^2 + 4\sqrt{5} \quad y + 3 = 2(-\sqrt{5})^2 + 4\sqrt{5}$$

$$y + 3 = 2(5) + 4\sqrt{5} \quad y + 3 = 2(5) - 4\sqrt{5}$$

$$y = 7 + 4\sqrt{5} \quad y = 7 - 4\sqrt{5}$$

$$(\sqrt{5}, 7 + 4\sqrt{5}) \quad (-\sqrt{5}, 7 - 4\sqrt{5})$$

$$(2.24, 15.94) \quad (-2.24, -1.94)$$

pg 451

3e)  $y = x^2 - 2x - 6$      $y = 2x^2 - x + 3$      $2x^2 - x + 3 = x^2 - 2x - 6$

$x^2 + x + 9 = 0$

$b^2 - 4ac = -35$

∴ no solution

4a)  $6x^2 - 3x + 5 = 2y$      $2x^2 + x + 4 = y$

$4x^2 + 2x + 8 = 2y$

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

$(2x + 1)(x - 3) = 0$

$x = -\frac{1}{2}$      $x = 3$

$x = 3$

$y = 2(3)^2 + 3 + 4$

$y = 18 + 7$      $(3, 25)$

$x = -\frac{1}{2}$

$y = 2(-\frac{1}{2})^2 - \frac{1}{2} + 4$

$y = \frac{1}{2} - \frac{1}{2} + 4$      $(-\frac{1}{2}, 4)$

4c) ~~900~~  $2p^2 - 4p - 6 = -2m$      $5m = 5p^2 + 10p - 8$

$10p^2 - 20p - 30 = -10m$

$10p^2 + 20p - 16 = 10m$

$20p^2 - 46 = 0$

$20p^2 = 46$

$p^2 = 2.3$

$p = \pm\sqrt{2.3}$

$(1.52, 3.73)$

$(-1.52, -2.33)$

4e)  $4h^2 - 6 = 8t$      $6h^2 - 9 = 12t$

$2h^2 - 3 = 4t$      $2h^2 - 3 = 4t$

same equation ∴ infinite solutions.

5c)  $9x^2 - 48x + 3y + 3 = 0$      $-5x^2 - 6x + y - 2 = 0$

$-15x^2 - 18x + 3y - 6 = 0$

$24x^2 - 30x + 9 = 0$

$8x^2 - 10x + 3 = 0$

$(4x - 3)(2x - 1) = 0$

$x = \frac{3}{4}$      $x = \frac{1}{2}$

$(\frac{3}{4}, \frac{149}{16})$

$(.75, 9.3125)$

$(\frac{1}{2}, \frac{25}{4})$

$(.5, 6.25)$

6a) yes.

b)  $n = 7 + m^2$

$2m^2 - 2(7 + m^2) = -1$

$2m^2 - 14 - 2m^2 = -1$

$-14 = -1$  ? no solution

pg 452

7a)

$$5x + 2y = 12$$

$$x^2 - 2x + 2y = 7$$

same signs  $\therefore$  subtract.

$$12m^2 - 4m - 8n = -3$$

$$9m^2 - m - 8n = 2$$

same signs  $\therefore$  subtract

b)  $-5x - 2y = 12$

$$x^2 - 2x + 2y = 7$$

different signs  $\therefore$  add

c) adjust, depending on sign

8.  $m(2)^2 - 8 = 16$

$$4m - 8 = 16$$

$$4m = 24$$

$$m = 6$$

$$m(2)^2 + 2(8) = n$$

$$(6)(4) + 16 = n$$

$$n = 40$$

9. a)  $5x - 1 + 2x + y + 14 = 60$

$$7x + y = 47$$

b)  $\frac{1}{2}(2x)(5x - 1) = 10y$

$$5x^2 - x = 10y$$

c)  $y = 47 - 7x$

$$10y = 5x^2 - x$$

$$10y = \frac{-70x + 470}{5x^2 + 69x - 470 = 0}$$

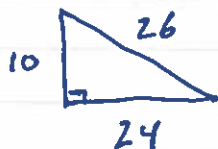
$$5x^2 + 69x - 470 = 0$$

$$x = -18.8 \text{ (discard)}$$

$$x = 5$$

$$y = 47 - 7(5)$$

$$y = 12$$



Area 120 (12y) ✓

Perimeter 60 ✓

Hilary

10 a)  $x - y = -30$  ( $\therefore y$  is larger)  
 $y + 3 + x^2 = 189$

b)  $x - y = -30$   
 $x + 30 = y$

$(x + 30) + 3 + x^2 = 189$   
 $x^2 + x + 33 = 189$   
 $x^2 + x - 156 = 0$   
 $(x + 13)(x - 12) = 0$   
 $x = -13 \quad x = 12$   
 $y = ~~17~~ \quad y = 42$

$(-13, 17)$   
 $(12, 42)$

c) check in eqn (2)  
 $17 + 3 + (-13)^2 = 189 \checkmark$   
 $42 + 3 + (12)^2 = 189 \checkmark$

11 a)  $2\pi r = 3\pi r^2$

b)  $2r = 3r^2$   
 $0 = 3r^2 - 2r$   
 $0 = r(3r - 2)$   
 $r = 0 \quad r = \frac{2}{3}$

discard  $r = \frac{2}{3}$  cm  $C = 2\pi(\frac{2}{3}) = \frac{4\pi}{3}$  cm  
 $A = \pi(\frac{2}{3})^2 = \frac{4\pi}{9}$  cm<sup>2</sup>

12. a)  $\frac{5}{32}(d - 20)^2 = -\frac{5}{32}(d - 20)^2 + 62.5$

$\frac{10}{32}(d - 20)^2 = 62.5$

$(d - 20)^2 = 200$

$d - 20 = \pm \sqrt{200}$

$d = 20 \pm \sqrt{200}$

$d = 5.86 \text{ m}, 34.14 \text{ m}$

b) 31.25 J

c) GDC



$x_{\min} 0$   
 $x_{\max} 40$   
 $y_{\min} 0$   
 $y_{\max} 80$

d) symmetry above + below 34.14 means sum of PE and KE are constant

$$13. a) -4.9x^2 + 2015 = -10.15x + 980$$

$$-4.9x^2 + 10.15x + 1035 = 0$$

$$y_1 = -4.9x^2 + 10.15x + 1035$$

$$y_2 = 0$$

calc intersect

$$x = 15.606136$$

15.6 seconds.

$$b) y = -10.15(15.6) + 980$$

$$y = 821.6 \quad 821.6 \text{ m}$$

$$14 c) \begin{array}{l|l} -1 & 2 \\ 0 & 0 \\ 1 & 2 \\ 2 & 8 \end{array}$$

quad reg

$$y = 2x^2$$

$$\begin{array}{l|l} -5 & 4 \\ -4 & 1 \\ -3 & 0 \\ -2 & 1 \end{array}$$

quad reg

$$y = x^2 + 6x + 9$$

$$d) 2x^2 = x^2 + 6x + 9$$

$$x^2 - 6x - 9 = 0$$

$$x = \frac{6 \pm \sqrt{72}}{2}$$

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

$$x = 3 \pm 3\sqrt{2}$$

$$x = 7.24 \quad x = -1.24$$

$$(-1.24, 3.09) \quad (7.24, 104.91)$$

$$16 b) -\frac{5}{1600}x^2 + 200 = 1.19x$$

$$y_1 = -\frac{5}{1600}x^2 + 200$$

$$y_2 = 1.19x$$

calc intersect

$$x = 126.2 \quad y = 150.2$$

height 150.2 m

$$19 a) 4x - 2 = 2x^2 - 4x + 6$$

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

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

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

$$x = 2$$

$$y = 6 \quad (2, 6)$$

b) tangent  $y = 4x - 2$  slope 4

$\therefore$  normal slope  $-\frac{1}{4}$  pt (2, 6)

$$y - 6 = -\frac{1}{4}(x - 2) \quad (\text{point slope})$$

$$\text{or} \\ y = -\frac{1}{4}x + \frac{13}{2}$$

$$c) -\frac{1}{4}x + \frac{13}{2} = 2x^2 - 4x + 6 \quad \downarrow \times 4 \\ -x + 26 = 8x^2 - 16x + 24$$

$$0 = 8x^2 - 15x - 2$$

$$0 = (8x + 1)(x - 2)$$

$$\uparrow \\ x = -\frac{1}{8}$$

$$\uparrow \\ x = 2 \quad (\text{point A})$$

$$y = \frac{1}{32} + \frac{13}{2} = \frac{209}{32} \quad \left(-\frac{1}{8}, \frac{209}{32}\right)$$

$$\text{distance } (2, 6) \rightarrow \left(-\frac{1}{8}, \frac{209}{32}\right) \quad \sqrt{\Delta x^2 + \Delta y^2}$$

$$d = \sqrt{\left(\frac{17}{8}\right)^2 + \left(\frac{17}{32}\right)^2}$$

$$d = 2.19$$

20.  $y = \frac{2x-1}{x}$

$$\frac{x}{x+2} + y - 2 = 0$$

$$\frac{x}{x+2} + \frac{2x-1}{x} - 2 = 0$$

$$\frac{x^2}{x(x+2)} + \frac{(2x-1)(x+2)}{x(x+2)} - \frac{2(x)(x+2)}{x(x+2)} = 0$$

$$x^2 + 2x^2 + 3x - 2 - 2x^2 - 4x = 0$$

$$x^2 - x - 2 = 0$$

$$(x-2)(x+1) = 0$$

$$x = 2 \quad x = -1$$

$$y = \frac{3}{2} \quad y = 3$$

$$(2, \frac{3}{2}) \quad (-1, 3)$$