Unit 6 Review (Solutions)

1. a) $x^2 - 2x + 1 = 0$

$a=1 \quad b=-2 \quad c=1$

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

$= \frac{2 \pm 0}{2} = \frac{2}{2} = 1 \quad \therefore x = 1$ (order 2)

b) $2g^2 - 3g + 11 = 0$

$g = \frac{3 \pm \sqrt{9-4(2)(11)}}{2(2)}$

$= \frac{3 \pm \sqrt{-79}}{4}$

$\therefore$ No Real Solution

c) $2d^2 = -7d$

$2d^2 + 7d = 0 \quad a=2, b=7, c=0$

$d = \frac{-7 \pm \sqrt{49-4(2)(0)}}{4}$

$= \frac{-7 \pm 7}{4}$

$d_1 = \frac{-7+7}{4} = 0 \quad d_2 = \frac{-7-7}{4} = \frac{-14}{4} = \frac{-7}{2}$

$\therefore d = 0, -\frac{7}{2}$

d) $(x-1)(x+3) = 6$

$x^2 + 3x - x - 3 = 6$

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

$a=1, b=2, c=-9$

$x = \frac{-2 \pm \sqrt{4-4(1)(-9)}}{2(1)}$

$= \frac{-2 \pm \sqrt{40}}{2} = \frac{-2 \pm 6.3}{2}$

$x_1 = \frac{-2+6.3}{2} = 2.15$

$x_2 = \frac{-2-6.3}{2} = -4.15$

2. a) $x^2 + 3x - 40 = 0$

$(x+8)(x-5) = 0$

$\therefore x = -8, 5$

(To factor: 2 numbers that multiply to $-40$ but add to 3)

b) $4a^2 - 12a + 9$

$(a)(c) = 4(9) = 36$

$\therefore$ Two #s that multiply to 36 but add to $-12$

$4a^2 - 6a - 6a + 9 = 0$

$2a(a-3) - 3(2a-3) = 0$

$(2a-3)(2a-3) = 0$

$a = \frac{3}{2}$ (order 2)

c) $b^2 - 5b + 84 = 0$

$(b-12)(b+7) = 0$

$b = 12, -7$

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

$x^2 + 3x - 2x - 6 = 3x + 6 + 2x$

$x^2 + x - 6 = 5x + 6 \Rightarrow x^2 - 4x - 12 = 0 \Rightarrow (x-6)(x+2) = 0$

$x = 6, -2$

③ a) $y=(-3x^2-30x)-80$
$= -3(x^2+10x+25-25)-80$
$=-3(x+5)^2+75-80$
$= -3(x+5)^2-5$
$V(-5,-5)$

b) $y=(4x^2-16x)+9$
$=4(x^2-4x)+9$
$=4(x^2-4x+4-4)+9$
$=4(x-2)^2-7$
$\therefore V(2,-7)$, $4(-4)+9=-16+9$

c) $y=4x^2-8x-35$
$=4(x^2-2x+1-1)-35$
$=4(x-1)^2-39$
$V(1,-39)$

d) $y=-2x^2+12x-1$
$=-2(x^2-6x)-1$
$=-2(x^2-6x+9-9)-1$
$=-2(x-3)^2+17$ $V(3,17)$

④ a) $y=x^2+7x-30$
$=(x+10)(x-3)$
zeros: $-10, 3$
$x_v=\frac{-10+3}{2}=\frac{-7}{2}=-3.5$

$y_v=(-3.5)^2+7(-3.5)-30$
$=-42.25$

$V(-3.5,-42.25)$

b) $y=5x^2-15x$
$=5x(x-3)$
zeros: $0, 3$
$x_v=\frac{0+3}{2}=1.5$

$y_v=5(1.5)^2-15(1.5)$
$=-11.25$

$V(1.5,-11.25)$

c) $y=x^2-25$
$=(x-5)(x+5)$
zeros: $5, -5$

$x_v=\frac{5+(-5)}{2}=0$

$y_v=0^2-25$
$=-25$

$V(0,-25)$

d) $y=2x^2+x-10$
$=2x^2+5x-4x-10$
$=x(2x+5)-2(2x+5)$

$=(x-2)(2x+5)$
zeros: $2, \frac{-5}{2}$

$x_v=\frac{2+\left(\frac{-5}{2}\right)}{2}=-0.25$

$y_v=-10.125$
$\therefore V(-0.25,-10.125)$

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

x-intercepts: 2, −4

y-int: $-2(0-2)(0+4)$

$= 16$

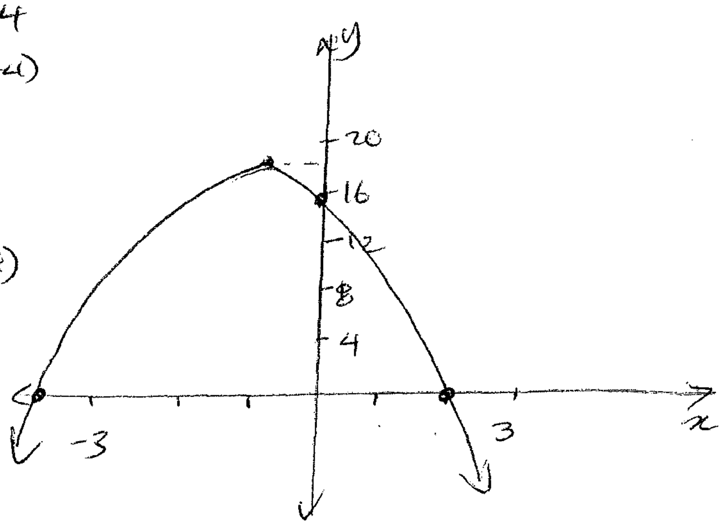
$x_v = \frac{2+(-4)}{2} = -1$

$y_v = -2(-1-2)(-1+4)$

$= -2(-3)(3)$

$= 18$

$\therefore V(-1, 18)$




(6) $h = -4t^2 + 16t$

To find max height, complete the square or find h using average of zeros.

$h = -4t(t-4)$

$t = 0, 4$

$\therefore t = \frac{0+4}{2} = 2$

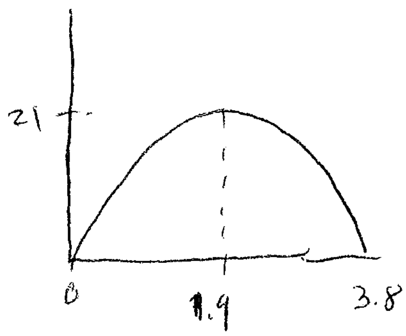
$h = -4(2)^2 + 16(2)$

$= -16 + 32$

$= 16$

$\therefore$ After 2 seconds max height was 16 m.

(7)




$\therefore h = -5(t-1.9)^2 + 21$

Since $V(1.9, 21)$

⑧ $-0.6d^2+3.25d=-7.1$

$-0.6d^2+3.25d+7.1=0$

$a=-0.6,\ b=3.25,\ c=7.1$

$$d=\frac{-3.25\pm\sqrt{3.25^2-4(-0.6)(7.1)}}{2(-0.6)}$$

$$=\frac{-3.25\pm\sqrt{27.603}}{-1.2}=\frac{-3.25\pm5.25}{-1.2}$$

$$d_1=\frac{-3.25-5.25}{-1.2}=7.08 \qquad d_2=\frac{-3.25+5.25}{-1.2}=-1.\overline{6}$$

inadmissible

$\therefore$ 7.08 m covered

⑨ $(x)(x+2)=5624$ * Let $x$ and $x+2$ represent 2 even consectutive numbers

$x^2+2x-5624=0$

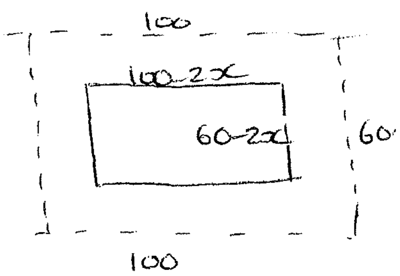
Use QF or factor: $(x+76)(x-74)=0$

$x=-76$ or $x=74$

QF. $x=\frac{-2\pm\sqrt{2^2-4(1)(-5624)}}{2}=\frac{-2\pm150}{2}$ $x_1=-76$, $x_2=74$

$\therefore$ The numbers are $-76$ and $-74$ OR 74 and 76.

⑩




$A=(60-2x)(100-2x)$

$A=(0.9)(100)(60)=5400$

$\therefore 5400=6000-120x-200x+4x^2$

$\therefore 4x^2-320x+600=0$

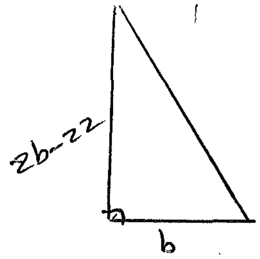
divide by 4: $x^2-80x+150=0$

$$x=\frac{80\pm\sqrt{80^2-4(1)(150)}}{2}=\frac{80\pm76.16}{2}$$

$\therefore x_1=\frac{80+76.16}{2}=78.08$ OR $x_2=\frac{80-76.16}{2}=1.92$

$60-2x=60-2(78.08)<0$ $\therefore$ inadmissible $\therefore$ Max width $=1.9$ m

(11)




Let the base be represented by $b$.

$A_\Delta = \frac{bh}{2}$

$\frac{(b)(2b-22)}{2} = 60$

$2b^2 - 22b = 120$

$2b^2 - 22b - 120 = 0$

$b^2 - 11b - 60 = 0 \rightarrow$ FACTOR / QF

$(b-15)(b+4) = 0$

$b = 15$ or $b = -4 \rightarrow$ inadmissible.

$\therefore$ base $= 15$ inches  height $= 2b - 22$

$= 30 - 22$

$= 8$ inches.

(12) Let $x$ represent number of price reductions.

Let $R$ represent the Revenue.

Price $= 10 - 0.5x$

Photographs sold $= 30 + 2x$

$R = (10 - 0.5x)(30 + 2x)$

$150 = 300 + 20x - 15x - x^2$

$x^2 - 5x - 150 = 0$

$(x = 15 \quad x \; x + 10 \quad ) = 0$

$x = 15$  $x = -10$

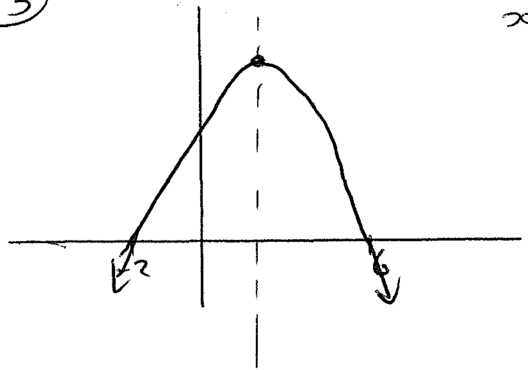
$\hookrightarrow$ This means price would have to increase.

Price $= 10 - 0.5(-10) = \$15$

$\hookrightarrow$ Price $= 10 - 0.5(15) = \$2\text{-}50$

$\therefore$ At $\$2\text{-}50$ or $\$15$, the revenue will be $\$150$.

(13)




$x_v = \frac{-2+6}{2} = \frac{4}{2} = 2$  $\therefore (2, 50)$ is the vertex

$y = a(x+2)(x-6)$  sub $x = 2$ $y = 50$

$50 = a(4)(-4)$

$a = \frac{50}{-16} = -\frac{25}{9}$

$\boxed{\therefore y = -\frac{25}{9}(x+2)(x-6)}$