IGCSE Higher WK 4 answers

1/ a) $(x-7)(x+3)=0$ $x=7$ $x=-3$

b) $(x+25)(x+2)=0$ $x=-25$ & -2

c) $x^2-4x+3=0$ $(x-3)(x-1)=0$ $x=3$ & 1

d) $x^2-11x+30=0$ $(x-5)(x-6)=0$ $x=5$ & 6

e) $x^2+5x-36=0$ $(x+9)(x-4)=0$ $x=-9$ & 4

f) $(x+7)(x-7)=0$ $x=\pm 7$

2/ g) $x^2-x-90=0$ $(x-10)(x+9)=0$ $x=10$ & -9

h) $x^2-3x-18=0$ $(x-6)(x+3)=0$ $x=6$ & -3

i) $x^2+5x-14=0$ $(x-2)(x+7)=0$ $x=2$ & -7

2/ a) $x=-0.551$ $x=-5.45$

b) $x=-0.586$ $=-3.41$

c) $x=13.2$ $=0.836$

d) $x=7.12$ $=-1.12$

e) $x=2.78$ $=0.719$

f) $x=1.61$ $=0.532$

g) $2x^2+8x-1=0$ $x=0.121$ $=-4.12$

h) $x^3-3x-24=0$ $x=6.62$ $=-3.62$

i) $x^2+5x+6-5=0$ $x^2+5x+1=0$ $x=-0.209$ & -4.79

3/ When $b^2-4ac=0$ 1 solution

$b^2-4ac=+ve$ 2 solutions

$b^2-4ac=-ve$ No solutions

4/ a) 2 b) 2 c) 1 d) 0 e) 0 f) 2

5/ a) $(3x+1)(x+2)$ $x=-\frac{1}{3}$ $x=-2$

b) $(2x+3)(x+4)$ $x=-\frac{3}{2}$ $x=-4$

c) $(3x+4)(x-7)$ $x=-\frac{4}{3}$ $x=7$

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

6/ a) $(x+4)^2-16$

b) $(x-6)^2-36$

c) $(x+2)^2-4$

d) $(x-\frac{3}{2})^2-\frac{9}{4}$

e) $(x+2)^2+2$

f) $(x-3)^2-1$

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

h) $(x+\frac{9}{2})^2-\frac{81}{4}-2$

$\Rightarrow (x+\frac{9}{2})^2-\frac{89}{4}$

7, Turning points for Q6,

a, $(-4, -16)$ b, $(6, -36)$ c, $(-2, -4)$ d, $(\frac{3}{2}, -\frac{9}{4})$

e, $(-3, 2)$ f, $(3, -1)$ g, $(-1, -3)$ h, $(-\frac{9}{28}, -\frac{89}{4})$

8, a, $(x-4)(x+2)$

b, roots are $4, -2$

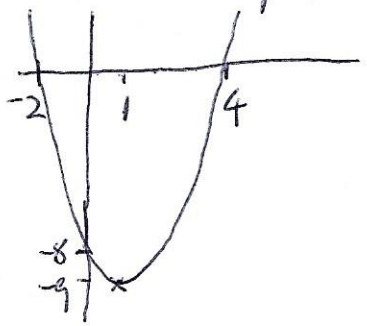
c, crosses y axis at -8

d, $(x-1)^2-9$

e, Turning point $(1, -9)$

f, Turning point is a minimum as equation is positive so curve is upwards & turning point is at the base

g,



9, b) c) & e)

10 a, $(x-4)^2-16+11=0$

$(x-4)^2-5=0$

$(x-4)^2=5$

$x=4\pm\sqrt{5}$

b, $(x+5)^2-25+18=0$

$(x+5)^2-7=0$

$(x+5)^2=7$

$x=-5\pm\sqrt{7}$

c, $(x-2)^2-9=0$

$x-2=\pm\sqrt{9}$

$x=2\pm3$

$x=5 \quad x=-1$

d, $(x-6)^2-33=0$

$x=6\pm\sqrt{33}$

11, $(x+3)^2 - 9 + 10 = 0$

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

$(x+3)^2 = -1$ ← Can't solve

$x+3 = \pm\sqrt{-1}$ ← as can't root a negative number

therefore there are No solutions

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

$(x-3)^2 - 9 - 9 = 0$

$(x-3)^2 - 18 = 0$ $\quad x = 3 \pm \sqrt{18}$

13, a) $2(x^2+2x) - 5$

$2[(x+1)^2 - 1] - 5$

$2(x+1)^2 - 2 - 5$

$2(x+1)^2 - 7$

TP = $(-1, -7)$

b) $3(x^2+4x) + 4$

$3[(x+2)^2 - 4] + 4$

$3(x+2)^2 - 12 + 4$

$3(x+2)^2 - 8$

TP = $(-2, -8)$

c) $2(x^2+5x) + 9$

$2[(x+5/2)^2 - 25/4] + 9$

$2(x+5/2)^2 - 25/2 + 9$

$2(x+5/2)^2 - 7/2$

TP = $(-5/2, -7/2)$

14, a) $(x-4)^2 - 12$ $\quad p = 4$ $\quad q = -12$

b) Minimum point = $(4, -12)$

15 a) $(x+3)^2 - 2$

b) $(x+3)^2 - 2 = 0$

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

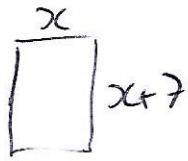
$x = -3 \pm \sqrt{2}$

16 $x(x+3) = 88$

$x^2 - 3x - 88 = 0$

$(x-11)(x+8) = 0$

$x = 11$ & $x = -8$

17/ 

$x(x+7) = 60$

$x^2 + 7x - 60 = 0$

$(x+12)(x-5) = 0$

$x = -12$ & $+5$

x must be positive

$\therefore x = 5$ cm

width $= 5$ cm

height $= 5+7 = 12$ cm

18/ Area of rectangle

$(x-6)(x-3)$

$x^2 - 9x + 18$

Area of square

$(x-7)(x-7)$

$x^2 - 14x + 49$

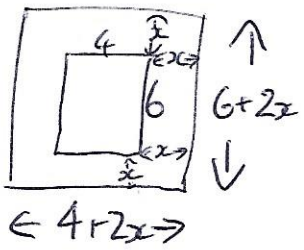
$x^2 - 9x + 18 = 24 + x^2 - 14x + 49$

$x^2 - 9x + 18 = x^2 - 14x + 73$ $+14x$

$5x + 18 = 73$

$5x = 55$ -18

$\boxed{x = 11}$

19/ 

Area of pond $= 6 \times 4 = 24\text{m}$

Area of path $= (6+2x)(4+2x) - 24$

$24 + 12x + 8x + 4x^2 - 24$

$= 20x + 4x^2$

$20x + 4x^2 = 24$ make = to 0

$\div 4$ $4x^2 + 20x - 24 = 0$

$x^2 + 5x - 6 = 0$

$(x+6)(x-1) = 0$

$x = -6$ or $x = 1$ (remember x must be positive)

$\therefore x = 1\text{m}$

20/ $h = 0$ when stone falls into the sea

$\therefore 80 + 3t - 5t^2 = 0$ rearrange

$5t^2 - 3t - 80 = 0$

can't factorise so use formula $\frac{3 \pm \sqrt{9 - 4 \times 5 \times -80}}{10}$

$t = 4.31$ seconds $= 4.31$ or -3.71 (positive)