Answer Key

1	$(k-3)x^2+4x+k>0$ for all values of x Discriminant <0 $16-4k(k-3)<0$ $4k^2-12k-16>0$ $k^2-3k-4>0$ $(k-4)(k+1)>0$ $k>4$ or $k<-1$ Since $k-3>0, k>3$ $\therefore k>4$	
2	Length of the base $=\frac{2(58+8\sqrt{5})}{7+3\sqrt{5}}$ $=\frac{116+16\sqrt{5}}{7+3\sqrt{5}}\times\frac{7-3\sqrt{5}}{7-3\sqrt{5}}$ $=\frac{812-348\sqrt{5}+112\sqrt{5}-240}{49-45}$ $=\frac{572-236\sqrt{5}}{4}$ $=143-59\sqrt{5}$ cm	
3	$\log_4(2y)=\log_{16}(y-3)+3\log_9 3$ $\log_4(2y)=\frac{\log_4(y-3)}{\log_4 16}+3\frac{\log_3 3}{\log_3 9}$ $\log_4(2y)=\frac{\log_4(y-3)}{2}+\frac{3}{2}$ $2\log_4(2y)=\log_4(y-3)+3$ $\log_4(2y)^2-\log_4(y-3)=3$ $\log_4\frac{(2y)^2}{y-3}=3$ $\therefore \frac{4y^2}{y-3}=4^3$ $4y^2=64(y-3)$ $y^2=16(y-3)$ $y^2-16y+48=0$ $(y-4)(y-12)=0$ $\therefore y=4$ or $y=12$	
4	(a) $f(-2)=0$ $-8a-2b+10=0$ $8a+2b=10$ $4a+b=5$ ------{1} $f(1)=18$ $a+b=11$ ------{2} {1} – {2}: $3a=-6\rightarrow a=-2$ $-2+b=11\rightarrow b=13$	(b) $=-2x^3+x^2+13x+6$ $=(x+2)(-2x^2+5x+3)$ $=(x+2)(3-x)(2x+1)$ (c) Let $x=y-1$ $-(y-1+2)(y-1+3)(2(y-1)+1)=0$ $-(y+1)(y-4)(2y-1)=0$ $y=-1,4,0.5$

5	Let $\frac{10x^2-7x+10}{(3x-2)(x^2+2)} = \frac{A}{3x-2} + \frac{Bx+C}{x^2+2}$ $10x^2 - 7x + 10 = A(x^2+2) + (Bx+C)(3x-2)$ Sub $x = \frac{2}{3}$ to get $A = 4$ Sub $x = 0$ to get $C = -1$ Sub $x = 1$ (or any other value) to get $B = 2$ $$\frac{10x^2-7x+10}{(3x-2)(x^2+2)} = \frac{4}{3x-2} + \frac{2x-1}{x^2+2}$$
6	(a) $grad\ (BC) = \frac{8-6}{2-8} = -\frac{1}{3}$ $grad\ (AB) = 3$ Eqn AB is $\frac{y-8}{x-2} = 3$ $y = 3x + 2$ (b) When $x = 0, y = 2$ $A(0,2)$ (c) Grad. of perpendicular bisector = 3 Midpoint (BC) = $\left(\frac{2+8}{2}, \frac{8+6}{2}\right)$ Eqn is $\frac{y-7}{x-5} = 3$ $y = 3x - 8$ (d) $3y = 4x - 14$ $3(3x-8) = 4x - 14$ $9x - 24 = 4x - 14$ $5x = 10$ $x = 2$ $y = 3(2) - 8$ $y = -2$ $D(2,-2)$
7	(a) $RHS = \frac{\tan\theta\sin\theta}{1-\cos\theta}$ $= \frac{\frac{\sin\theta}{\cos\theta}\sin\theta}{1-\cos\theta}$ $= \frac{\frac{\sin^2\theta}{\cos\theta}}{1-\cos\theta}$ $= \frac{1-\cos^2\theta}{(1-\cos\theta)\cos\theta}$ $= \frac{(1-\cos\theta)(1+\cos\theta)}{(1-\cos\theta)\cos\theta}$ $= \frac{1+\cos\theta}{\cos\theta}$ $= \frac{1}{\cos\theta} + 1$ $= \sec\theta + 1$ (b) $\frac{\tan\theta\sin\theta}{1-\cos\theta} = \frac{3}{4}\sec^2\theta$ $1 + \sec\theta = \frac{3}{4}\sec^2\theta$ $3\sec^2\theta - 4\sec\theta - 4 = 0$ $(\sec\theta - 2)(3\sec\theta + 2) = 0$ $\sec\theta = 2\ or \sec\theta = -\frac{2}{3}$ $\cos\theta = \frac{1}{2}$ $\theta = \frac{\pi}{3}, \frac{5\pi}{3} = 1.05, 5.24$ $or\ \cos\theta = -\frac{3}{2}\ (no\ solution)$

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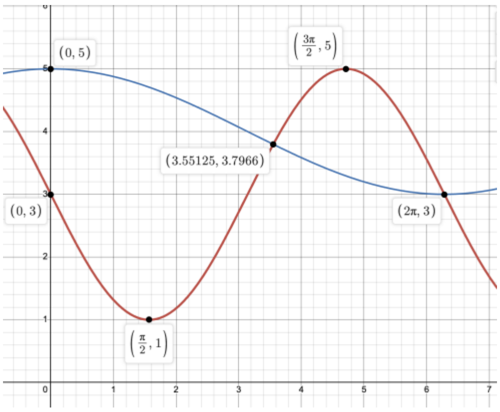
(a) $f(x) = 4 + \cos\frac{1}{2}x$

The period is 720° 4π and the amplitude is 1

(b) $g(x) = 3 - 2\sin x$

The period is 360° or 2π and the amplitude is 2

(c)



(d) $\cos\frac{1}{2}x = -1 - 2\sin x$

$4 + \cos\frac{1}{2}x = 3 - 2\sin x$

$y = 4 + \cos\frac{1}{2}x$

$y = 3 - 2\sin x$

The number of solutions is 2