1a	$4m+6n=58 ------(1)$ $3m+5n=46 ------(2)$ $\left.\begin{array}{l}12m+18n=174 ---(3)\\ 12m+20n=184 ---(4)\end{array}\right\}$ $(3)-(4)$ $-2n=-10$ $n=5$ $m=7$
b	$\dfrac{3x}{2x^2-50}-\dfrac{1}{x-5}$ $=\dfrac{3x}{2(x-5)(x+5)}-\dfrac{1}{x-5}$ $=\dfrac{3x-2(x+5)}{2(x-5)(x+5)}$ $=\dfrac{x-10}{2(x-5)(x+5)}$
ci	-5
ii	$x=\sqrt[3]{\dfrac{25y}{7z+2}}$ $x^3=\dfrac{25y}{7z+2}$ $x^3(7z+2)=25y$ $y=\dfrac{x^3(7z+2)}{25}$
d	$\dfrac{2x+3}{(3x+1)(x-1)}-2=0$ $\dfrac{2x+3}{(3x+1)(x-1)}=2$ $2x+3=2(3x+1)(x-1)$ $2x+3=6x^2-4x-2$ $6x^2-6x-5=0$ $x=1.54 \quad \text{or} \quad -0.541$
2ai	(a) 40.5
	(b) 35.5
	(c) $\begin{array}{l}42-33\\ =9\end{array}$

ii	$\frac{90-69}{100}\times 100\%$ $=21\%$
bi	$\left(\frac{5}{20}\times\frac{9}{19}\right)+\left(\frac{9}{20}\times\frac{5}{19}\right)$ $=\frac{9}{38}$
ii	$\left(\frac{6}{20}\times\frac{14}{19}\times\frac{13}{18}\right)+\left(\frac{14}{20}\times\frac{6}{19}\times\frac{13}{18}\right)+\left(\frac{14}{20}\times\frac{13}{19}\times\frac{6}{18}\right)$ $=\frac{91}{190}$
3a	$20000\times 4=80000$ $\frac{80000}{40}\times 100$ $=\$200000$
b	$I=\frac{(55000)(0.97)(3)}{100}$ $=\$1600.50$ $1600.50+\left(\frac{10}{100}\times 55000\right)$ $=\$7100.50$ $A=55000\left(1+\frac{3.78}{100}\right)^3$ $=\$61475.72916$ $I=61475.72916-55000$ $=\$6475.73$ Wayne should choose package A as it will generate a higher interest.
c	$(150\times 7)+(380\times 6)$ $=3330\text{AUD}$ $\left(\frac{3330}{0.91}\times 1.02\right)$ $=3732.527$ $\approx \$3733$

4a	Let $\angle QEC = \theta$ $\angle QEC = \angle ECD = \theta$ (Alternate angles are equal) $\angle AEF = \angle QEC = \theta$ (Angle bisector) $\angle CED = 180 - 2\theta$ (Sum of angles on a straight line) $\angle EDC = 180 - (180 - 2\theta) - \theta = \theta$ (Sum of angles in a triangle) Since $\angle ECD = \angle EDC,\ EC = ED$
b	$\angle AFE = \angle QFC$ (Vertically opposite angles are equal) $\angle ECF = 90 - \theta$ (Angle in a semi-circle) $\angle FCQ = 90 - (90 - \theta) = \theta$ (Tangent perpendicular to radius) $\angle AEF = \angle FCQ = \theta$ Triangle AEF and QCF are similar. (AA)
c	$\angle CED = 360 - 2(61) - 180 = 58$ Area of sector $ECD = \dfrac{58}{360} \times \pi (14)^2$ $= 99.20451468$ Area of triangle $ECD = \dfrac{1}{2}(14)^2 \sin 58$ $= 83.10871342$ Area of segment $CD = 99.20451468 - 83.10871342$ $= 16.0958$ ≈ 16.1
5a	$192 - 180 = 12$ $\angle ABC = 137 - 12$ $= 125$ (shown)
b	$AC^2 = 35^2 + 68^2 - 2(35)(68)\cos 125$ $AC^2 = 8579.223037$ $AC = 92.62409966$ ≈ 92.6
c	$\angle DBC = 125 - 85 = 40$ $\angle BDC = 180 - 40 - 70 = 70$ $\dfrac{DC}{\sin 40} = \dfrac{68}{\sin 70}$ $DC = 46.5147$ ≈ 46.5

d	Area of triangle $= \frac{1}{2}(68)^2 \sin 40$ $= 1486.124954$ $1486.124954 = \frac{1}{2} \times 46.5147 \times h$ $h = 63.89915247$ ≈ 63.9
e	$\tan 40.5 = \frac{h}{68}$ $h = 58.07748661$ $\tan\theta = \frac{58.07748661}{63.89915247}$ $\theta = 42.3$
6a	$\overrightarrow{AD} = \mathbf{6p}$ $\overrightarrow{DB} = \overrightarrow{DA} + \overrightarrow{AB}$ $= \mathbf{-6p + 6p + 4q}$ $= \mathbf{4q}$ $\overrightarrow{DE} = \mathbf{2q}$
b	$\overrightarrow{AE} = \overrightarrow{AD} + \overrightarrow{DE}$ $= \mathbf{6p + 2q}$ $\overrightarrow{AG} = \mathbf{3p + q}$
c	$\overrightarrow{BG} = \overrightarrow{BA} + \overrightarrow{AG}$ $= \mathbf{-6p - 4q + 3p + q}$ $= \mathbf{-3p - 3q}$
d	$\overrightarrow{GF} = \overrightarrow{GA} + \overrightarrow{AF}$ $= \mathbf{-3p - q + 2p}$ $= \mathbf{-p - q}$ $\overrightarrow{BG} = 3\overrightarrow{GF}$ $\overrightarrow{BG}$ is parallel to $\overrightarrow{GF}$ and there is a common point G; therefore B, G and F lie on a straight line.

e	$\dfrac{\text{the area of triangle } ABF}{\text{the area of triangle } ABD}=\dfrac{1}{3}$ $\dfrac{\text{the area of triangle } ABD}{\text{the area of parellogram } ABCD}=\dfrac{1}{2}=\dfrac{3}{6}$ $\dfrac{\text{the area of triangle } ABF}{\text{the area of parellogram } ABCD}=\dfrac{1}{6}$
7a	-1
c	From the graph, there is only one intersection point between the line $y=k$ and the curve for some values of k hence there is only one solution for some values of k.
di	$x^3-9x-4=0$ $\dfrac{x^3}{4}-\dfrac{9x}{4}-1=0$ $\dfrac{x^3}{4}-2x+1=\dfrac{1}{4}x+2$ $y=\dfrac{1}{4}x+2$
ii	$x=-0.45$ or -2.75
8a	$T_5=(5\times 7)+24=59$
b	$n(n+2)+4n+4$ $=n^2+2n+4n+4$ $=n^2+6n+4$
c	$T_{p-1}=(p-1)^2+6(p-1)+4$ $=p^2-2p+1+6p-6+4$ $=p^2+4p-1$ $(p^2+4p-1)+(p^2+6p+4)$ $=2p^2+10p+3$
d	$2p^2+10p+3=303$ $2p^2+10p-300=0$ $p=10$ or -15 (NA)
9a	$115+5500+4000$ $=\$9615$

b	$\frac{x}{70}+\frac{x+32}{80}=4\frac{3}{20}$ $\frac{80x+70(x+32)}{5600}=\frac{83}{20}$ $\frac{150x+2240}{5600}=\frac{83}{20}$ $150x+2240=23240$ $x=140$ Total distance $=140+140+32=312$ Amount of fuel used $=\frac{312}{100}\times 8.8=27.456$ Cost $=(27.456\times 1.70)+350+90=486.6752$ $\frac{486.6752}{100}\times 1.20=\$584.01024$ Jim is incorrect as the tips included is less than 20% of the amount he should be paying.