1a	percentage increase = $\frac{3500\times12-38000}{38000}\times100\%$ M1 $=10.5\%$ A1	
1b	$A=5000(1+\frac{1.8}{100})^{10}=5976.51$ M1 Interest earned = 5976.51 – 5000 M1 =\$976.51 (nearest cent) A1	
1c	Cost of hotel in Switzerland = $\frac{140\times4}{0.7}\times\frac{101.8}{100}$ M1 =\$814.40 Cost of hotel in London = $120\times3\times1.73\times\frac{101.8}{100}$ M1 =\$634.01 Total cost = \$814.40 + \$634.01 M1 =\$1448 (nearest dollar) A1	
2a	$\frac{4x+3}{2}\geq1-3x$ $4x+3\geq2-6x$ $10x\geq-1$ M1 $x\geq-\frac{1}{10}$ A1	
2b	$3x+2y=-3$ – –1 $8x-\frac{10}{3}y=-12\frac{1}{3}$ – –2 $24x-10y=-37$ – –3 $15x+10y=-15$ – –4 $39x=-52$ M1 $x=-\frac{4}{3}$ A1 $y=\frac{1}{2}$ A1	
2c	$\frac{3x}{x-5}+\frac{6}{2x+3}=2$ $\frac{3x(2x+3)}{(x-5)(2x+3)}+\frac{6(x-5)}{(x-5)(2x+3)}=2$ M1 $3x(2x+3)+6(x-5)=2(x-5)(2x+3)$ $6x^2+9x+6x-30=2(2x^2-10x+3x-15)$ $6x^2+15x-30=4x^2-14x-30$ $2x^2+29x=0$ M1 $x(2x+29)=0$ $x=0$ or $x=-\frac{29}{2}$ A1 each	

2d	$2^{500} = 2^{5(100)} = 32^{100}$ $3^{300} = 3^{3(100)} = 27^{100}$ $4^{200} = 4^{2(100)} = 16^{100}$ M1 $4^{200} < 3^{300} < 2^{500}$ A1	
2e	$\left(\frac{x^4}{y^6}\right)^{-2}$ $= \frac{x^{-8}}{y^{-12}}$ M1 $= \frac{y^{12}}{x^8}$ A1	
3a	4.5	
3c	$3x + \frac{5}{x} = 12$ $3x + \frac{5}{x} - 4 = 8$ $y = 8$ M1 $x = 0.40 \, or \, 3.60$ A1	
3dii	$x = 1.10 \, or \, 2.80$ A1 each	
3diii	$\frac{3x+4}{2} = 3x + \frac{5}{x} - 4$ M1 $3x + 4 = 6x + \frac{10}{x} - 8$ $3x^2 + 4x = 6x^2 + 10 - 8x$ $3x^2 - 12x + 10 = 0$ $A = -12; B = 10$ A1 each	
4a	In 1 min, larger pipe fills $\frac{1}{x}$ of tank. In 1 min, smaller pipe fills $\frac{1}{x+10}$ of tank. In 1 min, both pipes fill $\frac{1}{x} + \frac{1}{x+10}$ of tank. M1 $\frac{1}{x} + \frac{1}{x+10} = \frac{1}{20}$ $\frac{(x+10)+x}{x(x+10)} = \frac{1}{20}$ M1 $20(2x+10) = x(x+10)$ $40x + 200 = x^2 + 10x$ M1 $x^2 - 30x - 200 = 0 \, (shown)$	

4b	$x = \dfrac{-(-30) \pm \sqrt{(-30)^2 - 4(1)(-200)}}{2(1)}$ $= \dfrac{30 \pm \sqrt{1700}}{2}$ M1 $= 35.6 \, or \, -5.62 (rej)$ A1 each	
4c	$\dfrac{1}{45.61} \times 20$ M1 $= 43.9\%$ A1	
5ai	$\sin 27.5° = \dfrac{AD}{15.3}$ M1 $AD = 7.06$	
5aii	$AC = \sqrt{15.3^2 - 7.06^2}$ M1 $= 13.6$	
5aiii	$\tan 35.6° = \dfrac{13.6}{AB}$ M1 $AB = \dfrac{13.6}{\tan 35.6°}$ $= 19.0$	
5b	Angle of depression = angle of elevation of D from B $\tan \angle AOE = \dfrac{7.06}{19.0}$ M1 $\angle AOE = 20.4°$ A1	
5c	$BC = \sqrt{13.6^2 + 19.0^2} = 23.37$ M1 $\dfrac{1}{2} \times 23.37 \times AP = \dfrac{1}{2} \times 13.6 \times 19.0$ M1 $AP = 11.1 \text{m}$ A1	
5d	$BD = \sqrt{7.06^2 + 19.0^2} = 20.27$ M1 $20.27^2 = 23.37^2 + 15.3^2 - 2(23.37)(15.3) \cos \angle BCD$ M1 $\angle BCD = 58.9°$ A1	
6a	$\overrightarrow{TD} =$ **s** M1 $\overrightarrow{TC} = \overrightarrow{TD} + \overrightarrow{DC}$ **= s + 4r** A1	
6bi	Since $\overrightarrow{TC} = 3\overrightarrow{PQ}$, so $TC // PQ$. M1 $\angle TCD = \angle PQD \, (corr \angle s)$ $\angle CTD = \angle QPD (corr \angle s)$ M1 By AA property, triangles TCD and PQD are similar. M1	

6bii	$\frac{Area\triangle TCD}{Area\triangle PQD}=\left(\frac{3PQ}{PQ}\right)^2=9$ M1 $\frac{Area\triangle TCD}{Area\triangle CAD}=\left(\frac{TD}{AD}\right)=\frac{1}{6}$ M1 $Area\triangle PQD : Area\triangle TCD : Area\ of\ \ paralle\log ram$ 1 : 9 1 : 12 1 : 9 : 108 1 : 108 A1	
7ai	$\angle OAB = 37°\ (isos\Delta)$ M1 $\angle AOB = 180-37-37 = 106°\left(sum\ of\ \angle s\ in\ a\ \Delta\right)$ M1 $\angle ADB = 106\div 2 = 53°\left(\angle \text{at centre} = 2\ \angle \text{at circumference}\right)$ A1	
7aii	$\angle OBD = 180-22-37-37-53$ M1 $=31°$(sum of $\angle$s in a Δ) A1	
7aiii	$\angle AED = 180-37-31$ $=112°$ (opp angles of a cyclic quad)	
7b	Let the radius be *r*. $\frac{\text{Area of sector } AOB}{\pi r^2}=\frac{106}{360}$ Area of sector $AOB=\frac{106°}{360°}\times\pi r^2$ M1 Area of ΔAOB $=\frac{1}{2}r^2\sin 106°$ M1 $22.5=\frac{106°}{360°}\times\pi r^2-\frac{1}{2}r^2\sin 106°$ $22.5=0.4444r^2$ $r=7.12cm$ A1	
7c	$\sin 37°=\frac{OF}{7.116}$ M1 $OF=4.28cm$ A1	
8ai	40.5 minutes M1	
8aii	Q3=46 Q1=39 M1 for either Q1 or Q3 IQR=7 A1	
8aiii	$\frac{15}{140}\times 100\%$ M1 $=10.7\%$ A1	
8b	1. The women generally ran slower than the men as their median timing (43.4 min) is greater compared to the men (40.5 min). M1 2. The timings of the women are more consistent as their IQR (4) is lower compared to the men (7). M1	

8ci	$\frac{62}{280}=\frac{31}{140}$ M1	
8cii	$\frac{78}{280}=\frac{39}{140}$ M1	
8d	$\frac{123}{280}\times\frac{122}{279}$ M1 $=0.192$ A1	
9a	7 A1	
9b	$\begin{pmatrix}40\\35\\30\end{pmatrix}$ A1	
9c	$\mathbf{M}=\mathbf{HF}$ $=\begin{pmatrix}12 & 15 & 16\\10 & 13 & 14\end{pmatrix}\begin{pmatrix}40\\35\\30\end{pmatrix}$ $=\begin{pmatrix}1485\\1275\end{pmatrix}$ A1 each	
9d	Each element represents the total amount earned by the fitness studio for the morning and afternoon sessions respectively. A1	
9e	$5(1485+1275)=\$13800$ A1	
10a	$0.8\times3700=\$2960$ M1	
10b	$\frac{0.4}{100}\times40000$ M1 $=\$160$ A1	
10c	<u>DBS Multiplier</u> Salary credited = $0.8\times4500=\$3600$ Eligible transactions = \$4100 - \$4300 M1 Interest earned $=\frac{0.4}{100}\times40000$ $=\$160$ M1 <u>OCBC 360</u> $1.2+0.3+0.05=1.55\%$ M1 Interest earned $=\frac{1.55}{100}\times40000$ $=\$620$ M1	

	<u>UOB One</u> Interest earned first \$15000 $= \frac{0.5}{100} \times 15000$ $= \$75$ Interest earned next \$15000 $= \frac{0.55}{100} \times 15000$ $= \$82.50$ Interest earned next \$10000 $= \frac{0.65}{100} \times 10000$ $= \$65$ M1 Total interest $= 75 + 82.50 + 65 = \$222.50$ M1 Mr Lim should change to the OCBC account as it pays higher interest on his \$40000 savings. M1	