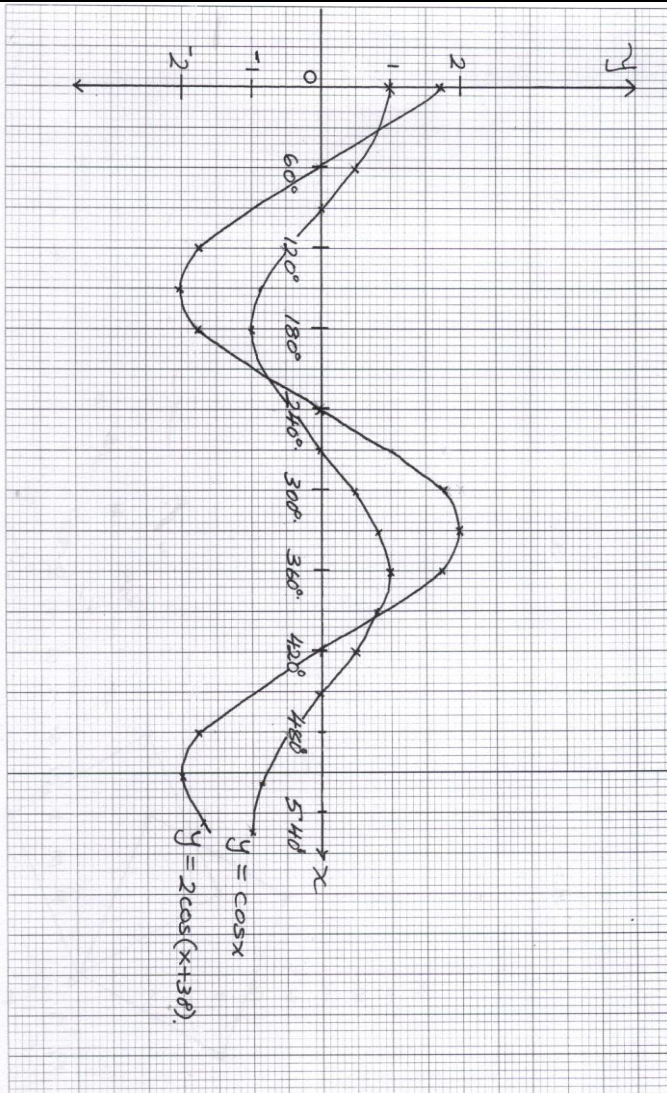


2. Trigonometry 2

1	$\sin \frac{5}{2}x = -\frac{1}{2}$ $\frac{5}{2}x = 210^\circ, 330^\circ, 390^\circ$ $x = 84^\circ, 132^\circ, 156^\circ$	B ₁ B ₁	Allow for any 2 ✓ angles																														
2	<p>a)</p> <table border="1"> <thead> <tr> <th>X⁰</th> <th>60⁰</th> <th>120⁰</th> <th>180⁰</th> <th>240⁰</th> <th>300⁰</th> <th>360⁰</th> <th>420⁰</th> <th>480⁰</th> <th>540⁰</th> </tr> </thead> <tbody> <tr> <td>cosX</td> <td>0.50</td> <td>-0.50</td> <td></td> <td>-0.5</td> <td></td> <td>1.00</td> <td>0.50</td> <td>-0.5</td> <td>-1.0</td> </tr> <tr> <td>2cos(x+30)</td> <td>0.00</td> <td></td> <td>-1.73</td> <td></td> <td>1.73</td> <td>1.73</td> <td>0.00</td> <td>-1.73</td> <td>-1.73</td> </tr> </tbody> </table> <p>b)</p> <p>i) Period = 3600</p> <p>ii) Phase angle = 300</p>	X ⁰	60 ⁰	120 ⁰	180 ⁰	240 ⁰	300 ⁰	360 ⁰	420 ⁰	480 ⁰	540 ⁰	cosX	0.50	-0.50		-0.5		1.00	0.50	-0.5	-1.0	2cos(x+30)	0.00		-1.73		1.73	1.73	0.00	-1.73	-1.73	B2 B1 B1	allow B1 for 7 ✓ values ✓ values to 2 d.p. apply ow-1 if given to other d.p
X ⁰	60 ⁰	120 ⁰	180 ⁰	240 ⁰	300 ⁰	360 ⁰	420 ⁰	480 ⁰	540 ⁰																								
cosX	0.50	-0.50		-0.5		1.00	0.50	-0.5	-1.0																								
2cos(x+30)	0.00		-1.73		1.73	1.73	0.00	-1.73	-1.73																								



S₁

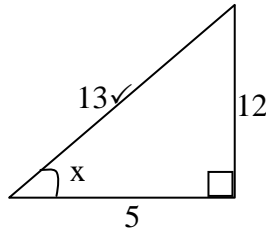
P₁ for all values ✓ly Plotted

C₁ smooth curve
y = cos x

C₁ smooth curve
y = 2cos(x+30°)

c)	$37.5^{\circ} \leq x \leq 217.5^{\circ}$ $397.5^{\circ} \leq x \leq 540^{\circ}$	B ₁ B ₁	Allow ± 0.5
		10	

$$\begin{aligned}
 1. \quad & 5 \sin x + \cos x \\
 & = 5 \left[\frac{12}{13} \right] - \frac{5}{13} \\
 & = \frac{60}{13} - \frac{5}{13} = \frac{55}{13} \\
 & = \frac{12}{13}
 \end{aligned}$$



$$2. \quad \frac{2 \cos 3\theta}{1} = \frac{1}{2}$$

$$\cos 3\theta = 0.5$$

$$3\theta = \cos^{-1} 0.5$$

$$\frac{3}{3} \theta = \frac{60^{\circ}}{3}, \frac{300^{\circ}}{3}, \frac{420^{\circ}}{3}, \frac{66^{\circ}}{3}, \frac{78^{\circ}}{3}, \frac{102^{\circ}}{3}$$

$$\therefore \theta = 20^{\circ}, 100^{\circ}, 140^{\circ}, 220^{\circ}, 260^{\circ}, 340^{\circ}$$

✓ Identification of exact number of quadrants to satisfy the equation.

✓ Values of at least 4 soln. of θ

$$3.. \quad \frac{1/2 \times \sqrt{3}/2}{\sqrt{3}/2 \times 1/\sqrt{2}}$$

$$\frac{\sqrt{3}/4}{\sqrt{3}/2 - 1/\sqrt{2}} \times \frac{\sqrt{3}/2 + 1/\sqrt{2}}{\sqrt{3}/2 + 1/\sqrt{2}}$$

$$\frac{3/8 + \sqrt{3}/4\sqrt{2}}{3/4 - 1/2} = \frac{3/8 + \sqrt{3}/4\sqrt{2}}{1/4}$$

$$= 3/2 + \sqrt{3}/\sqrt{2}$$

$$\begin{aligned}
 4. \quad a) \quad & b^2 = a^2 + c^2 - 2ac \cos B \\
 & b^2 = 7^2 + 5^2 - 2 \cdot 5 \cdot 7 \cos 100 \\
 & = 74 - 70(-0.173648) \\
 & = 74 + 12.15537 \\
 & b^2 = 86.15537 \\
 & b = 9.28199
 \end{aligned}$$

$$AC = 9.3 \text{ km}$$

$$b) \quad \frac{9.3}{\sin 100} = \frac{5}{\sin \theta}$$

$$\sin \theta = \frac{5 \sin 100}{9.3} = 0.529466$$

$$\theta = 31.9694$$

$$\theta \simeq 32^{\circ}$$

$$32 - 20 = 12^{\circ}$$

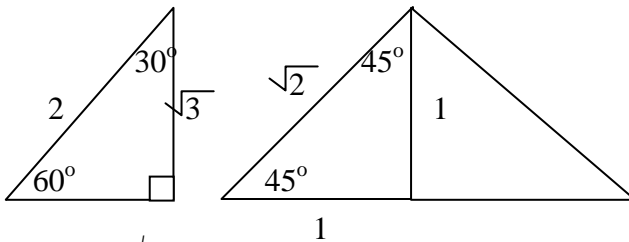
$$\text{Bearing} = 360^{\circ} - 12^{\circ} = 348^{\circ}$$

c) 020^0

5.

$$\begin{aligned} \overline{\sin 60} &= \frac{\sqrt{3}/2}{1} \\ \overline{\sin 45} &= \frac{1/\sqrt{2}}{2} - \frac{\sqrt{3}/\sqrt{2}}{\sqrt{2}} \\ &= \frac{1}{2\sqrt{2}} - \frac{\sqrt{3}}{\sqrt{2}} \\ &= \frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{2} \\ &= \frac{\sqrt{6} - 2\sqrt{2}}{4} \end{aligned}$$

6.



$$1 + \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2}$$

$$1 + \frac{\sqrt{3} \times 2\sqrt{2}}{2\sqrt{2} \times 2\sqrt{2}}$$

$$\frac{1}{1} + \frac{2\sqrt{6}}{4}$$

$$\frac{4 + 2\sqrt{6}}{4}$$

$$7. \quad \frac{\sqrt{5}(2\sqrt{2} + \sqrt{5}) + \sqrt{2}(2\sqrt{2} - \sqrt{5})}{(2\sqrt{2})^2 - (\sqrt{5})^2}$$

$$\frac{2\sqrt{10} + 5 + 4 - \sqrt{10}}{8 - 5}$$

$$\frac{9 + \sqrt{10}}{3}$$

$$3 + \frac{1}{3}\sqrt{10}$$

$$\begin{aligned} 8. a) \quad b^2 &= a^2 + c^2 - 2ac \cos B \\ b^2 &= 7^2 + 5^2 - 2 \cdot 5 \cdot 7 \cos 100 \\ &= 74 - 70(-0.173648) \\ &= 74 + 12.15537 \\ b^2 &= 86.15537 \\ b &= 9.28199 \\ AC &= 9.3 \text{ km} \end{aligned}$$

$$b) \frac{9.3}{\sin 100} = \frac{5}{\sin \theta}$$

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$$\theta \simeq 32^\circ$$

$$32 - 20 = 12^\circ$$

$$\begin{aligned} \text{Bearing} &= 360^\circ - 12^\circ \\ &= 348^\circ \end{aligned}$$

$$c) 020^\circ$$