

Cambridge International AS & A Level

MATHEMATICS (9709) P3

TOPIC WISE QUESTIONS + ANSWERS | COMPLETE SYLLABUS



Chapter 3

Trigonometry



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84. 9709_w20_qp_31 Q: 6

- (a) Express $\sqrt{6} \cos \theta + 3 \sin \theta$ in the form $R \cos(\theta - \alpha)$, where $R > 0$ and $0^\circ < \alpha < 90^\circ$. State the exact value of R and give α correct to 2 decimal places. [3]

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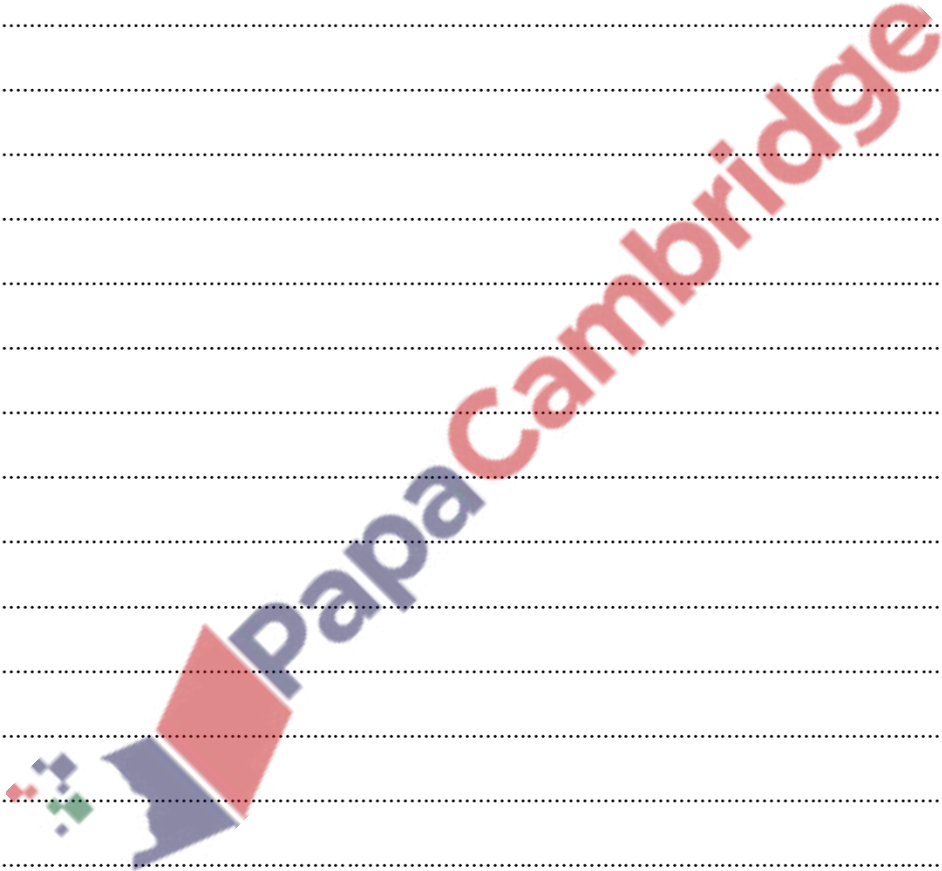
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(b) Hence solve the equation $\sqrt{6} \cos \frac{1}{3}x + 3 \sin \frac{1}{3}x = 2.5$, for $0^\circ < x < 360^\circ$.

[4]

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86. 9709_m19_qp_32 Q: 3

- (i) Given that $\sin(\theta + 45^\circ) + 2 \cos(\theta + 60^\circ) = 3 \cos \theta$, find the exact value of $\tan \theta$ in a form involving surds. You need not simplify your answer. [4]

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- (ii) Hence solve the equation $\sin(\theta + 45^\circ) + 2 \cos(\theta + 60^\circ) = 3 \cos \theta$ for $0^\circ < \theta < 360^\circ$. [2]

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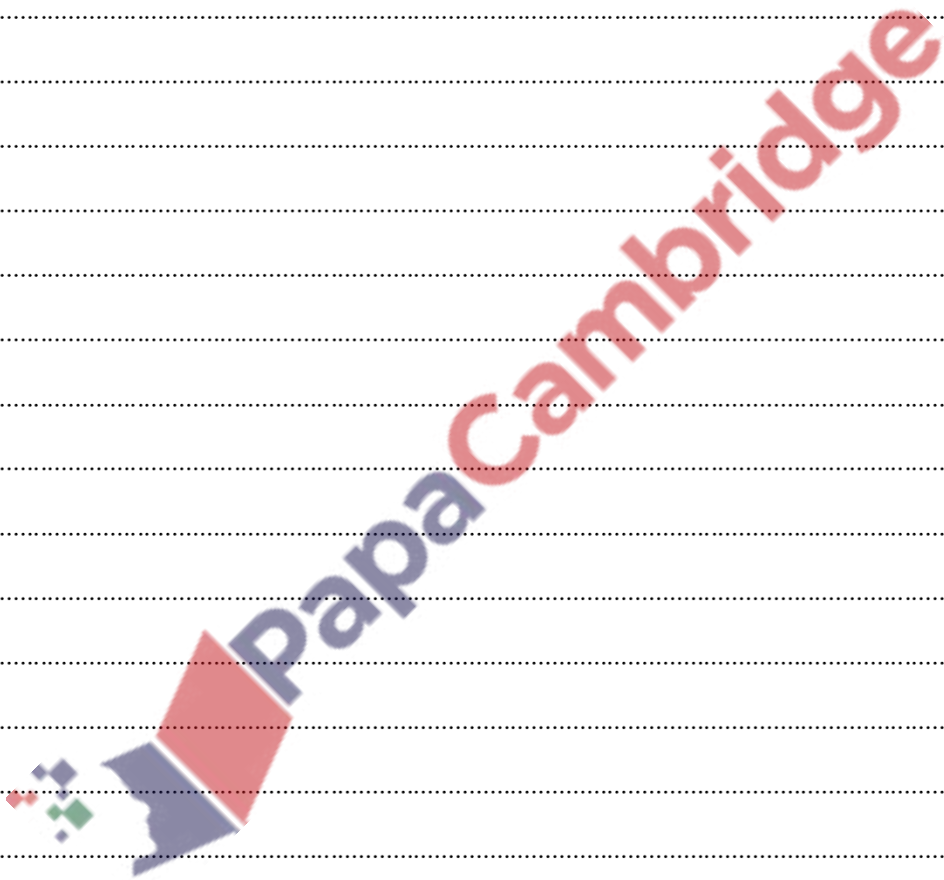
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89. 9709_s19_qp_32 Q: 3

Showing all necessary working, solve the equation $\cot 2\theta = 2 \tan \theta$ for $0^\circ < \theta < 180^\circ$. [5]

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92. 9709_s18_qp_32 Q: 2

Showing all necessary working, solve the equation $\cot \theta + \cot(\theta + 45^\circ) = 2$, for $0^\circ < \theta < 180^\circ$. [5]

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96. 9709_m17_qp_32 Q: 4

- (i) Express $8 \cos \theta - 15 \sin \theta$ in the form $R \cos(\theta + \alpha)$, where $R > 0$ and $0^\circ < \alpha < 90^\circ$, stating the exact value of R and giving the value of α correct to 2 decimal places. [3]

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(ii) Hence solve the equation

$$2 \sin(x - 30^\circ) - \cos x = 1,$$

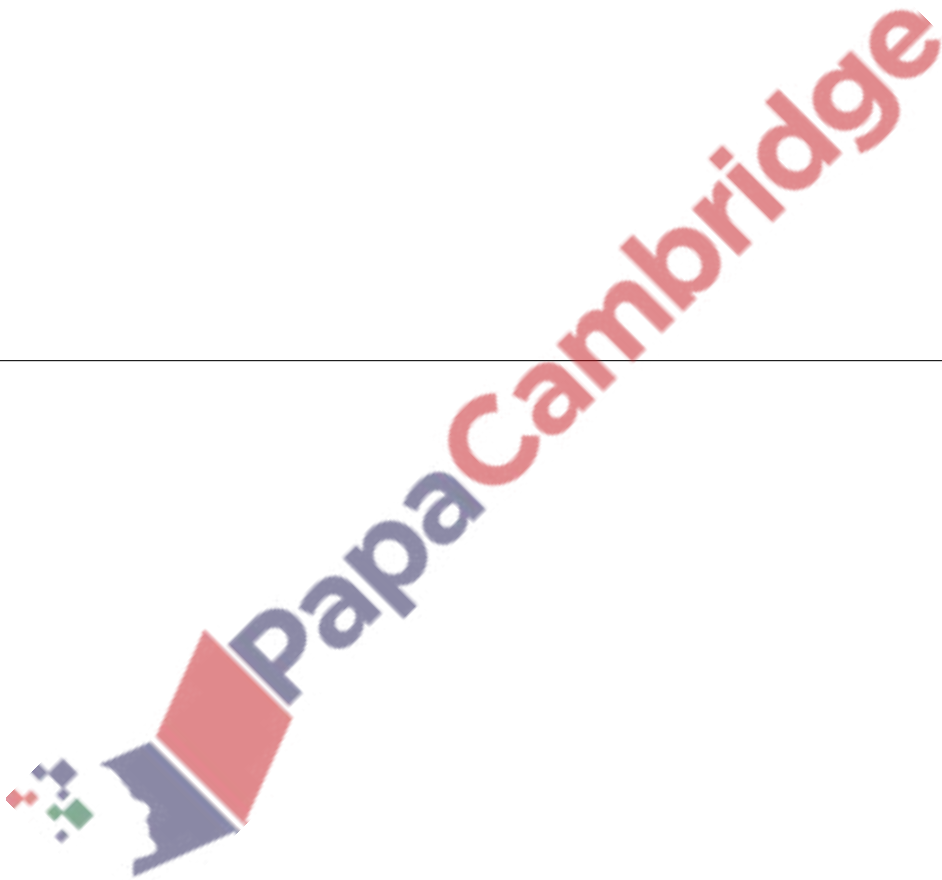
for $0^\circ < x < 180^\circ$.

[3]

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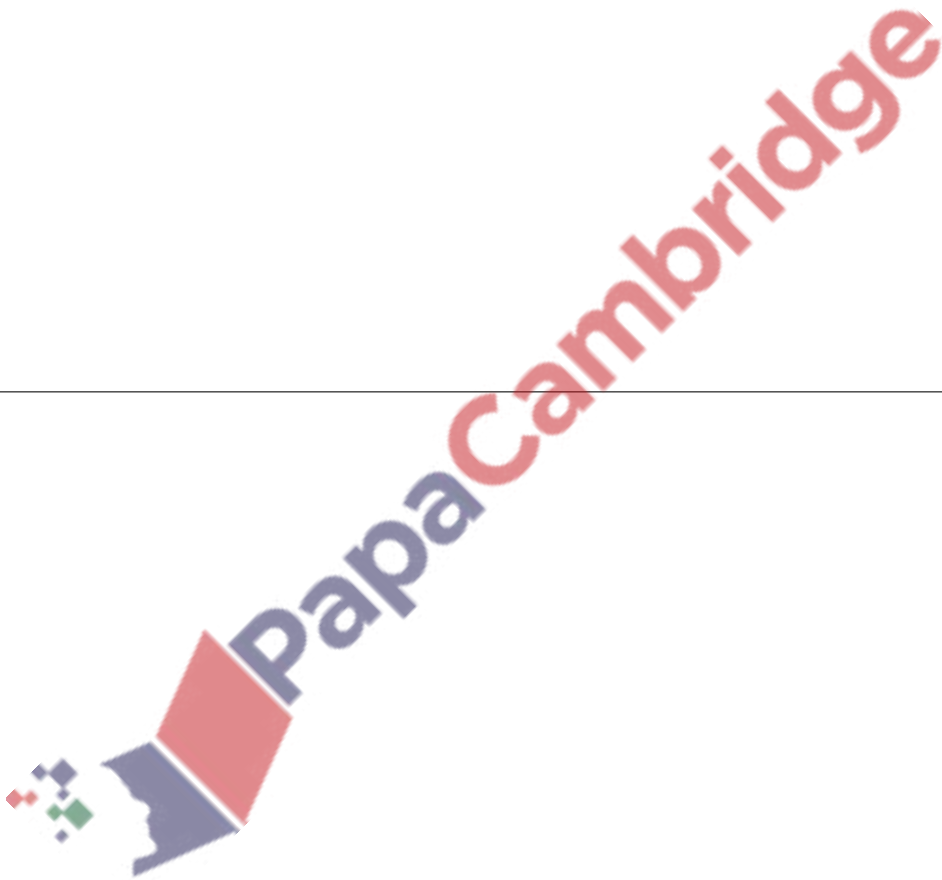
(ii) Hence sketch the graph of $y = \tan(45^\circ + x) + \tan(45^\circ - x)$ for $0^\circ \leq x \leq 90^\circ$.

[3]




102. 9709_m16_qp_32 Q: 2

Express the equation $\tan(\theta + 45^\circ) - 2 \tan(\theta - 45^\circ) = 4$ as a quadratic equation in $\tan \theta$. Hence solve this equation for $0^\circ \leq \theta \leq 180^\circ$. [6]



103. 9709_s16_qp_31 Q: 3

By expressing the equation $\operatorname{cosec} \theta = 3 \sin \theta + \cot \theta$ in terms of $\cos \theta$ only, solve the equation for $0^\circ < \theta < 180^\circ$. [5]

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104. 9709_s16_qp_32 Q: 5

(i) Prove the identity $\cos 4\theta - 4 \cos 2\theta \equiv 8 \sin^4 \theta - 3$. [4]

(ii) Hence solve the equation

$$\cos 4\theta = 4 \cos 2\theta + 3,$$

for $0^\circ \leq \theta \leq 360^\circ$. [4]

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105. 9709_s16_qp_33 Q: 3

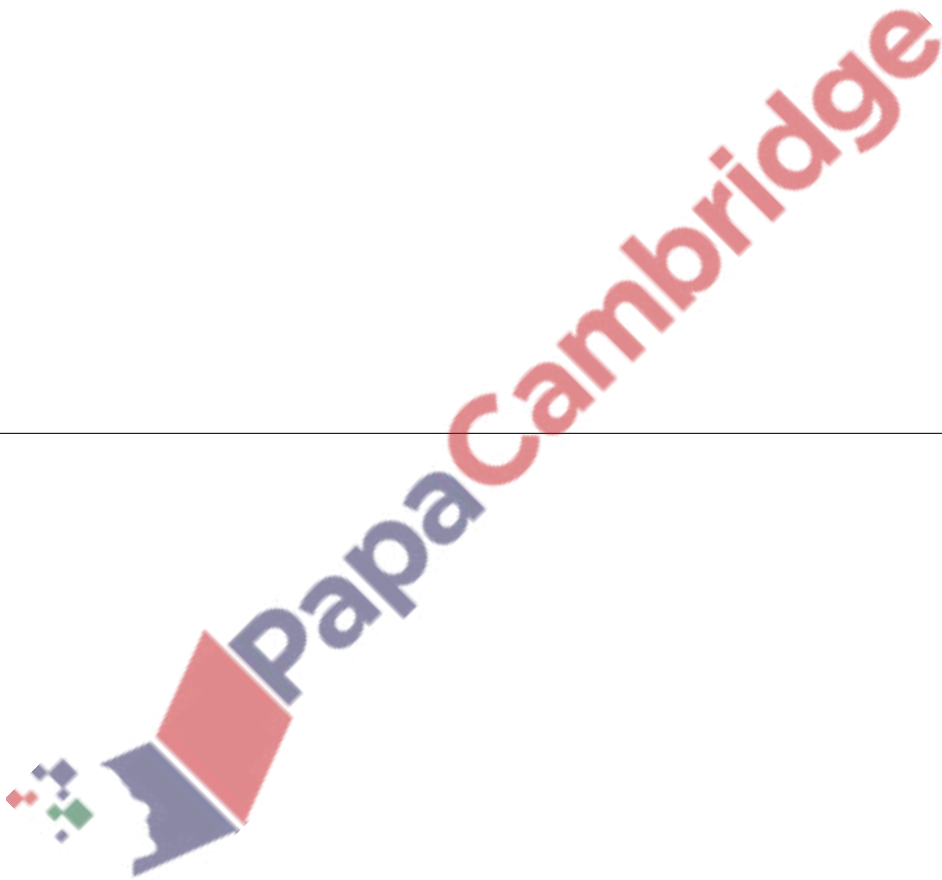
(i) Express $(\sqrt{5}) \cos x + 2 \sin x$ in the form $R \cos(x - \alpha)$, where $R > 0$ and $0^\circ < \alpha < 90^\circ$, giving the value of α correct to 2 decimal places. [3]

(ii) Hence solve the equation

$$(\sqrt{5}) \cos \frac{1}{2}x + 2 \sin \frac{1}{2}x = 1.2,$$

for $0^\circ < x < 360^\circ$.

[3]




106. 9709_w16_qp_31 Q: 3

Express the equation $\sec \theta = 3 \cos \theta + \tan \theta$ as a quadratic equation in $\sin \theta$. Hence solve this equation for $-90^\circ < \theta < 90^\circ$. [5]

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107. 9709_w16_qp_33 Q: 3

Express the equation $\cot 2\theta = 1 + \tan \theta$ as a quadratic equation in $\tan \theta$. Hence solve this equation for $0^\circ < \theta < 180^\circ$. [6]

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108. 9709_s15_qp_32 Q: 4

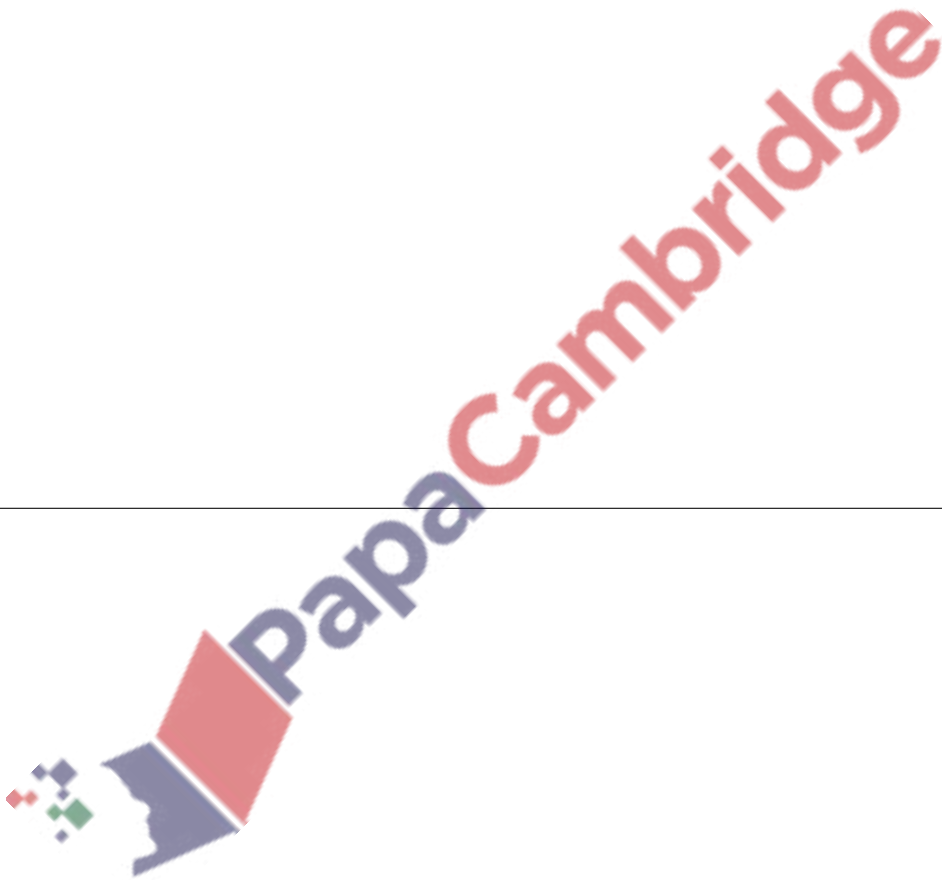
(i) Express $3 \sin \theta + 2 \cos \theta$ in the form $R \sin(\theta + \alpha)$, where $R > 0$ and $0^\circ < \alpha < 90^\circ$, stating the exact value of R and giving the value of α correct to 2 decimal places. [3]

(ii) Hence solve the equation

$$3 \sin \theta + 2 \cos \theta = 1,$$

for $0^\circ < \theta < 180^\circ$.

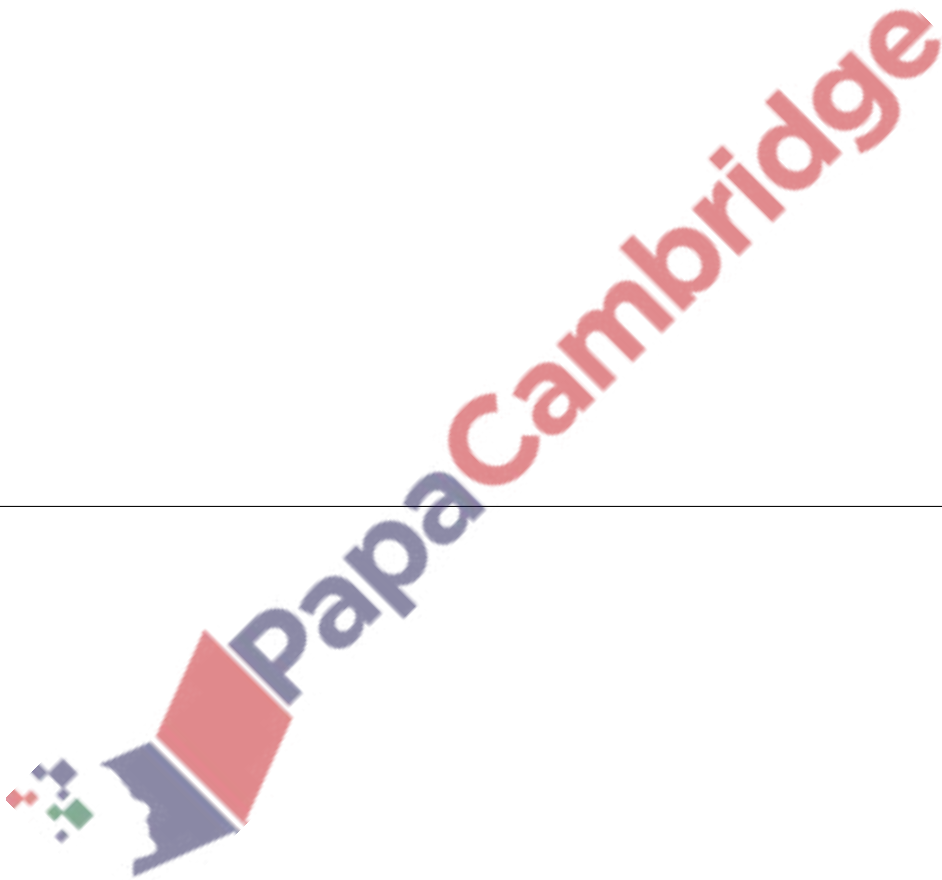
[3]



109. 9709_s15_qp_33 Q: 3

Solve the equation $\cot 2x + \cot x = 3$ for $0^\circ < x < 180^\circ$.

[6]

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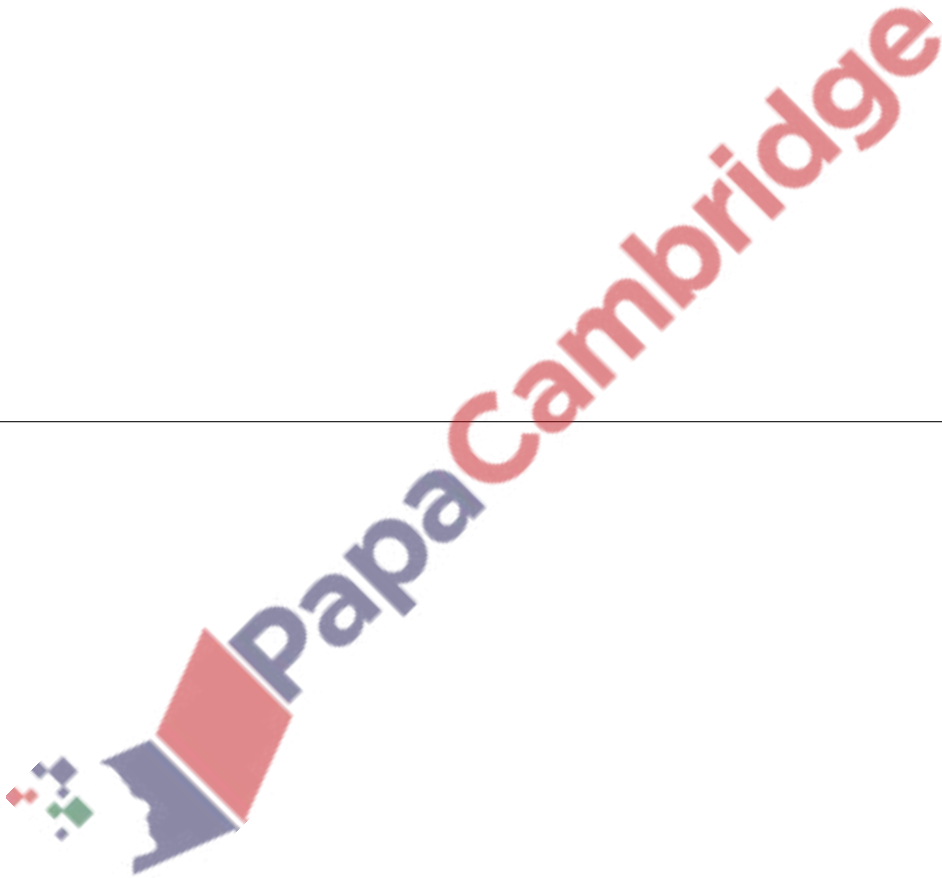
110. 9709_w15_qp_31 Q: 3

The angles θ and ϕ lie between 0° and 180° , and are such that

$$\tan(\theta - \phi) = 3 \quad \text{and} \quad \tan \theta + \tan \phi = 1.$$

Find the possible values of θ and ϕ .

[6]



111. 9709_w15_qp_33 Q: 6

The angles A and B are such that

$$\sin(A + 45^\circ) = (2\sqrt{2}) \cos A \quad \text{and} \quad 4 \sec^2 B + 5 = 12 \tan B.$$

Without using a calculator, find the exact value of $\tan(A - B)$.

[8]

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