Name:

Level 2 Further Maths

Trigonometric Equations

Corbettmaths

Ensure you have: Pencil or pen

Guidance

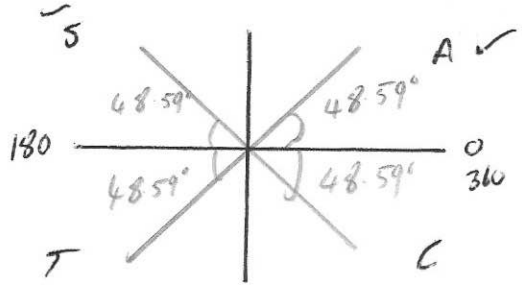
1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Revision for this topic

www.corbettmaths.com/more/further-maths/

1. Solve $sin\theta = 0.75$ for $0° \leq \theta \leq 180°$

$\sin^{-1} 0.75 = 48.59°$

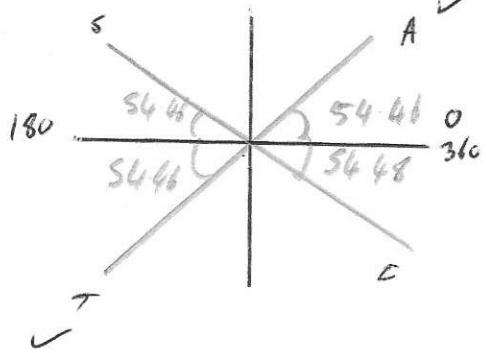


48.59° , 131.41°

(2)

2. Solve $tan\theta = 1.4$ for $0° \leq \theta \leq 360°$

$\tan^{-1} 1.4 = 54.46°$

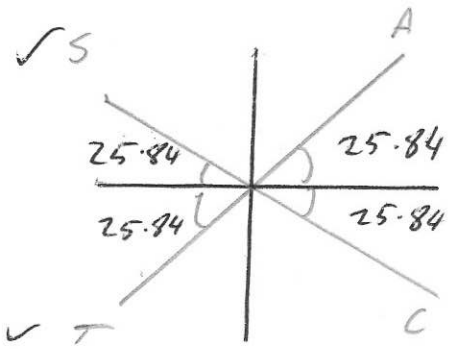


54.46° , 234.46°

(2)

3. Solve $cos\theta = -0.9$ for $0° \leq \theta \leq 360°$

$\cos^{-1} 0.9 = 25.84°$



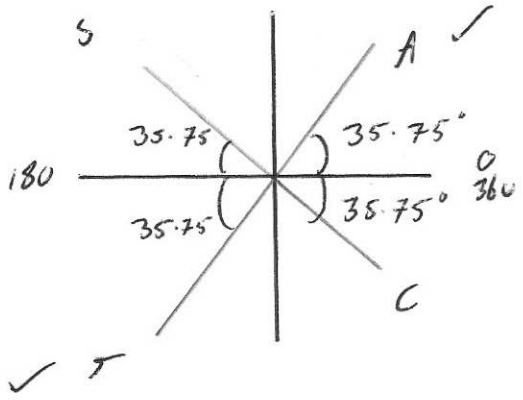
154.16° , 205.84°

(2)

4. Solve $2tan\theta = 1.44$ for $0° \leq \theta \leq 360°$

$\tan\theta = 0.72$

$\theta = 35.75°$



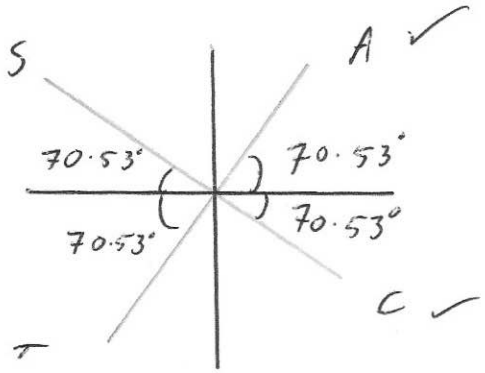
35.75°, 215.75°

(3)

5. Solve $3cos\theta = 1$ for $0° \leq \theta \leq 360°$

$\cos\theta = \frac{1}{3}$

$\theta = 70.53°$



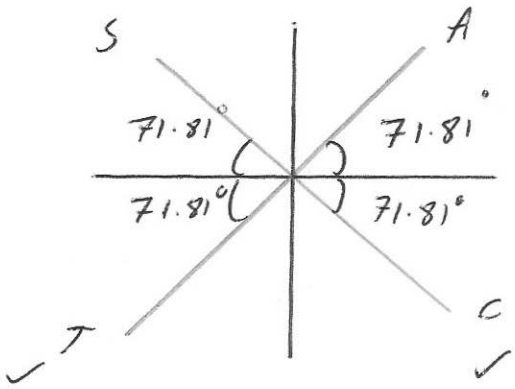
70.53°, 289.47°

(3)

6. Solve $2 + sin\theta = 1.05$ for $0° \leq \theta \leq 360°$

$\sin\theta = 0.95$

$\theta = 71.81°$



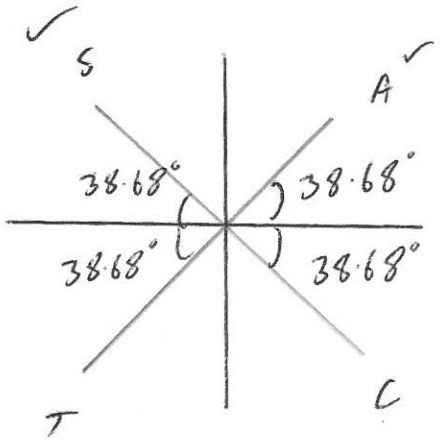
251.81°, 288.19°

(3)

7. Solve $8sin\theta - 5 = 0$ for $0° \leq \theta \leq 360°$

$\sin\theta = \frac{5}{8}$

$\theta = 38.68°$



38.68°, 141.32°

(3)

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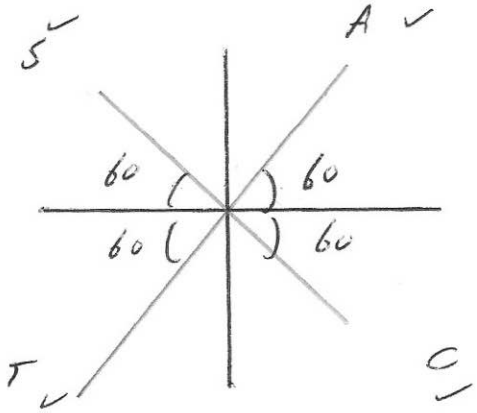
8. Solve $cos^2x = \frac{1}{4}$ for $0° \leq x \leq 360°$

$\cos x = \pm\frac{1}{2}$



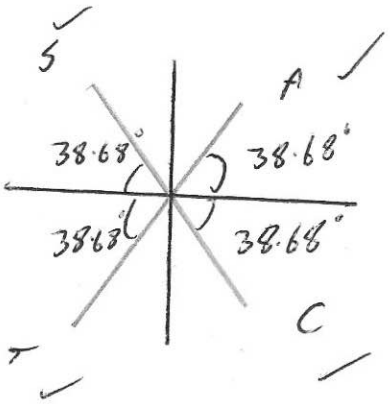
60°, 120°, 240°, 300°

(3)

9. Solve $64sin^2x = 25$ for $0° \leq x \leq 360°$

$\sin x = \pm \frac{5}{8}$

$x = 38.68°$



38.68, 141.32, 218.68, 321.32

(4)

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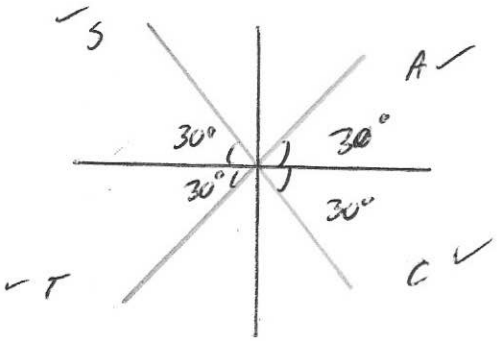
10. Solve $3tan^2\theta - 1 = 0$ for $0° \leq \theta \leq 180°$

$\tan^2\theta = \frac{1}{3}$

$\tan\theta = \pm 0.577$

$\theta = 30°$



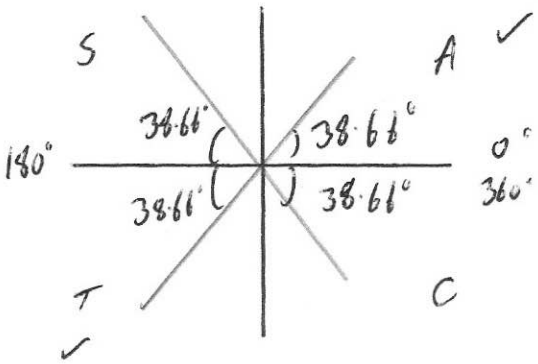
30°, 150°

(4)

11. Solve $5sinx = 4cosx$ for $0° \leq x \leq 360°$

$\tan x = 0.8$

$x = 38.66°$



38.66°, 218.66°

(4)

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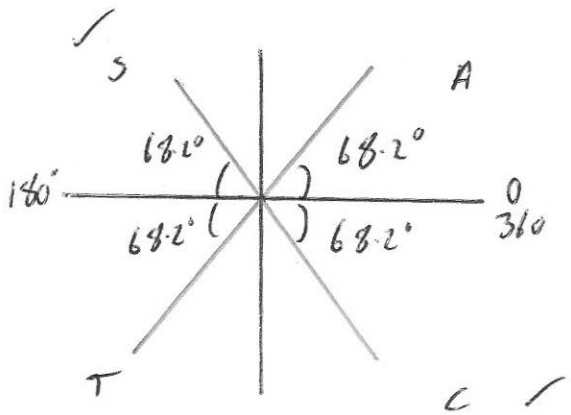
12. Solve $10cos\theta + 4sin\theta = 0$ for $90° \leq \theta \leq 360°$

$10\cos\theta = -4\sin\theta$

$10 = -4\tan\theta$

$\tan\theta = -2.5$

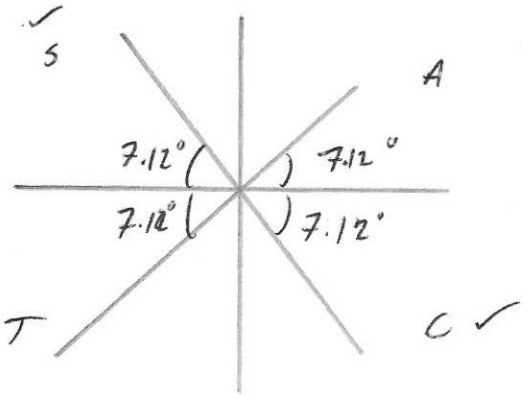


111.8°, 291.8°

(4)

13. Solve $-cosx = 8sinx$ for $0° \leq x \leq 360°$

$-\frac{1}{8} = \tan x$



172.88°, 352.88°

(4)

14. Solve $tan^2x - 2tanx = 0$ for $0° \leq x \leq 360°$

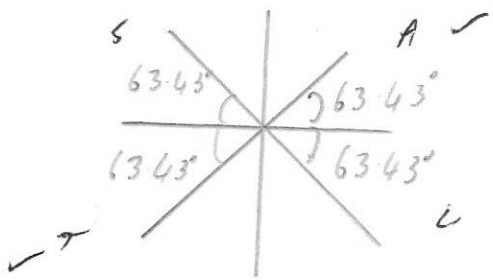
$\tan x(\tan x - 2) = 0$

$\tan x = 0$

$x = 0, 180°, 360°$

$\tan x = 2$

$x = 63.43°$



0°, 63.4°, 180°, 243.4°, 360°

(5)

15. Solve $4cos^2\theta - 3cos\theta = 0$ for $0° \leq \theta \leq 360°$

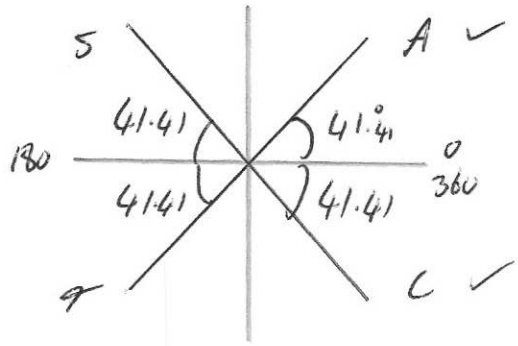
$\cos\theta(4\cos\theta - 3) = 0$

$\cos\theta = 0$

$\theta = 90°, 270°$

$\cos\theta = \frac{3}{4}$

$\theta = 41.41°$



41.41°, 90°, 270°, 318.59°

(4)

16. Solve $2cos^2\theta - cos\theta - 1 = 0$ for $0° \leq \theta \leq 360°$

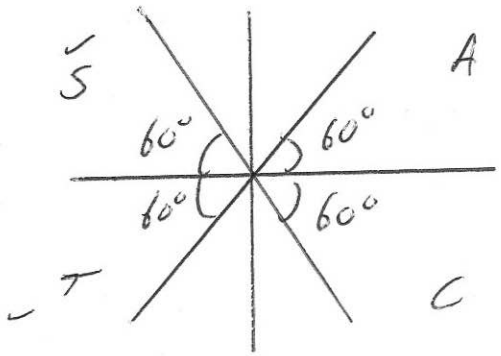
$(\cos\theta - 1)(2\cos\theta + 1) = 0$

$\cos\theta = 1$

$\theta = 0°, 360°$

$\cos\theta = -\frac{1}{2}$

$\theta = 60°$



0°, 120°, 240°, 360°

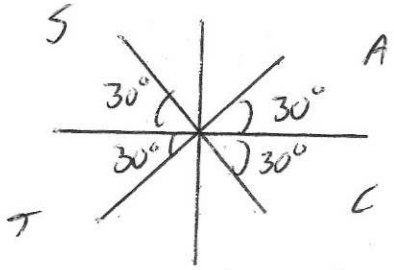
(4)

17. Solve $4sin^2\theta + 4sin\theta - 3 = 0$ for $0° \leq \theta \leq 360°$

$x = \sin\theta$

$(2x - 1)(2x + 3) = 0$

$\sin\theta = \frac{1}{2}$ or $\sin\theta = -\frac{3}{2}$ ×



30°, 150°

(4)

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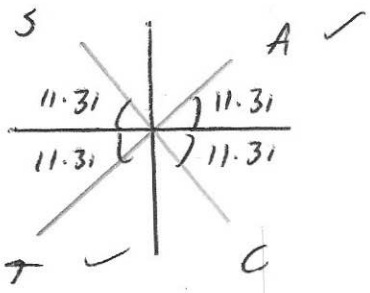
18. Solve $5tan^2\theta - 6tan\theta = -1$ for $0° \leq \theta \leq 360°$

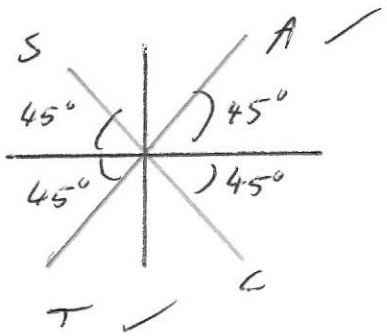
$5\tan^2\theta - 6\tan\theta + 1 = 0$

$(5\tan\theta - 1)(\tan\theta - 1) = 0$

$\tan\theta = \frac{1}{5}$ $\tan\theta = 1$

$\theta = 11.31°$ $45°$





11.31°, 45°, 191.31°, 225°

(5)

19. (a) Prove $cos^2x - 2sin^2x \equiv 3cos^2x - 2$

$\cos^2 x - 2(1 - \cos^2 x)$

$\cos^2 x - 2 + 2\cos^2 x$

$3\cos^2 x - 2$

QED

(2)

(b) Hence, work out the values of x between $0°$ and $360°$ for which

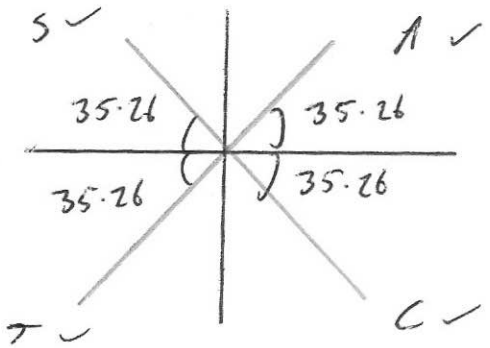
$cos^2 - 2sin^2x = 0$

$3\cos^2 x - 2 = 0$

$\cos^2 x = \frac{2}{3}$

$\cos x = \pm\sqrt{\frac{2}{3}}$

$x = 35.26$



35.26, 144.74, 215.26, 324.74°

(4)

20. (a) Show that $2cos^2\theta \equiv 2 - 2sin^2\theta$

$2(1 - \sin^2\theta)$

$= 2 - 2\sin^2\theta$

QED

(2)

(b) Hence solve $2cos^2\theta - sin\theta = 1$ for $0° \leq \theta \leq 360°$

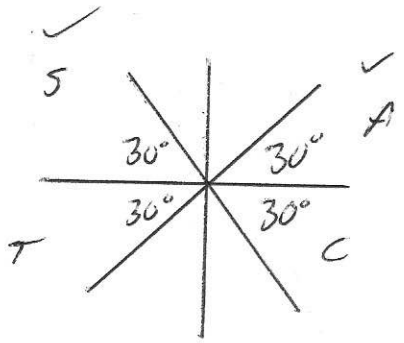
$2 - 2\sin^2\theta - \sin\theta = 1$

$0 = 2\sin^2\theta + \sin\theta - 1$

$(2\sin\theta - 1)(\sin\theta + 1) = 0$

$\sin\theta = \frac{1}{2}$ $\quad$ $\sin\theta = -1$

$\theta = 30°$ $\quad$ $\theta = 270°$



30°, 150°, 270°

(4)

21. Show that $3cos^2\theta \equiv 3 - 3sin^2\theta$

$3(1 - \sin^2\theta)$

$3 - 3\sin^2\theta$

QED

(2)

(b) Hence solve $3cos^2\theta - 5sin\theta = 1$ for $0° \leq \theta \leq 360°$

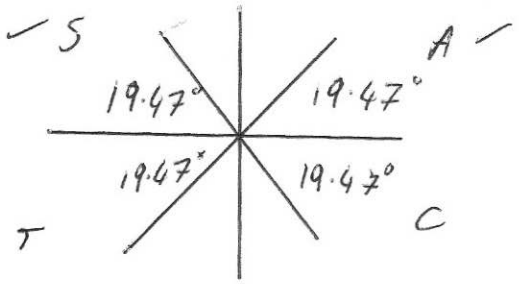
$3 - 3\sin^2\theta - 5\sin\theta = 1$

$0 = 3\sin^2\theta + 5\sin\theta - 2$

$(3\sin\theta - 1)(\sin\theta + 2) = 0$

$\sin\theta = \frac{1}{3}$ $\quad$ $\sin\theta = -2$ ×

$\theta = 19.47°$



19.47° , 160.53°

(4)

22. Solve $6sin^2\theta + 7cos\theta - 8 = 0$ for $0° \leq \theta \leq 360°$

$6(1 - \cos^2\theta) + 7\cos\theta - 8 = 0$

$6 - 6\cos^2\theta + 7\cos\theta - 8 = 0$

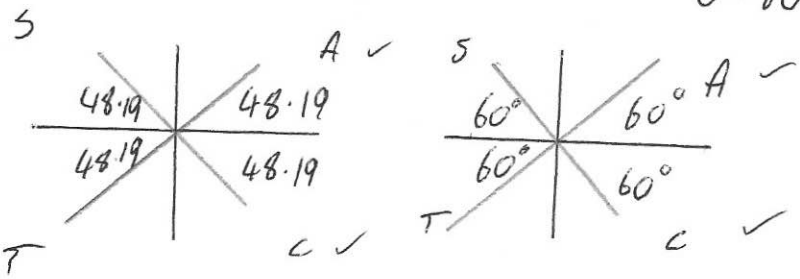
$-6\cos^2\theta + 7\cos\theta - 2 = 0$

$0 = 6\cos\theta - 7\cos\theta + 2$

$(3\cos\theta - 2)(2\cos\theta - 1) = 0$

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

$\theta = 60°$



48.19°, 60°, 300°, 311.81°

(7)