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1. 4037/11/M/J/16 Q9

(i) Show that $2\cos x \cot x + 1 = \cot x + 2\cos x$ can be written in the form $(a\cos x - b)(\cos x - \sin x) = 0$, where a and b are constants to be found. [4]

(ii) Hence, or otherwise, solve $2\cos x \cot x + 1 = \cot x + 2\cos x$ for $0 < x < \pi$. [3]

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2. 4037/12/M/J/16 Q5

(i) Show that $(1 - \cos\theta)(1 + \sec\theta) = \sin\theta\tan\theta$. [4]

(ii) Hence solve the equation $(1 - \cos\theta)(1 + \sec\theta) = \sin\theta$ for $0 \leqslant \theta \leqslant \pi$ radians. [3]

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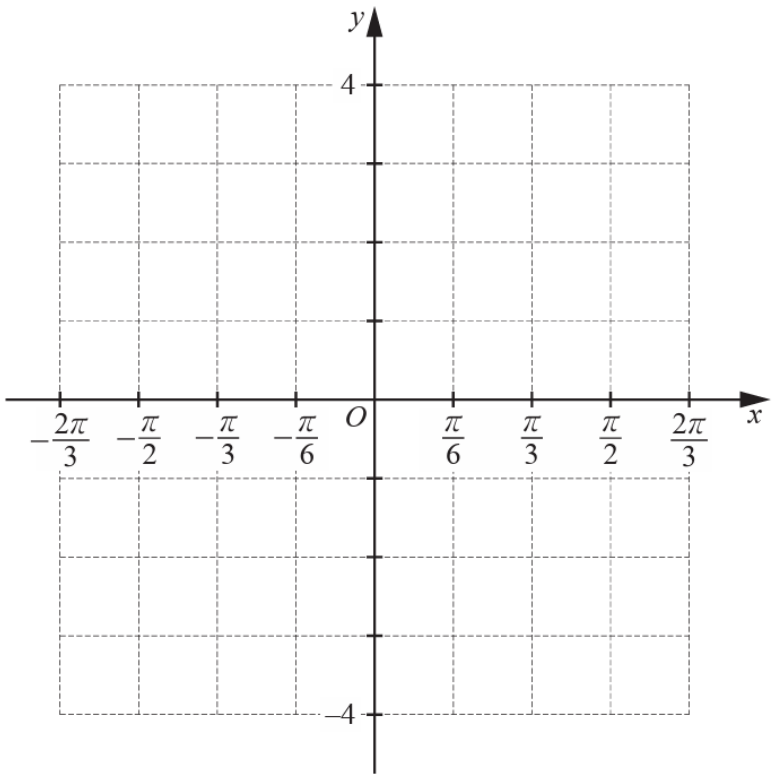
3. 4037/21/M/J/16 Q9

(a) Given that $y = a\tan bx + c$ has period $\frac{\pi}{4}$ radians and passes through the points $(0, -2)$ and $\left(\frac{\pi}{16}, 0\right)$, find the value of each of the constants a, b and c. [3]

$a =$ ..... $b =$ ..... $c =$ .....

(b) **(i)** On the axes below, draw the graph of $y = 2\cos 3x + 1$ for $-\frac{2\pi}{3} \leqslant x \leqslant \frac{2\pi}{3}$ radians. [3]



(ii) Using your graph, or otherwise, find the exact solutions of $(2\cos 3x + 1)^2 = 1$ for $-\frac{2\pi}{3} \leqslant x \leqslant \frac{2\pi}{3}$ radians. [2]

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4. 4037/22/M/J/16 Q12

Solve the equation

(i) $8\sin^2 A + 2\cos A = 7$ for $0° \leqslant A \leqslant 180°$, [4]

(ii) $\text{cosec}\,(3B + 1) = 2.5$ for $0 \leqslant B \leqslant \pi$ radians. [4]

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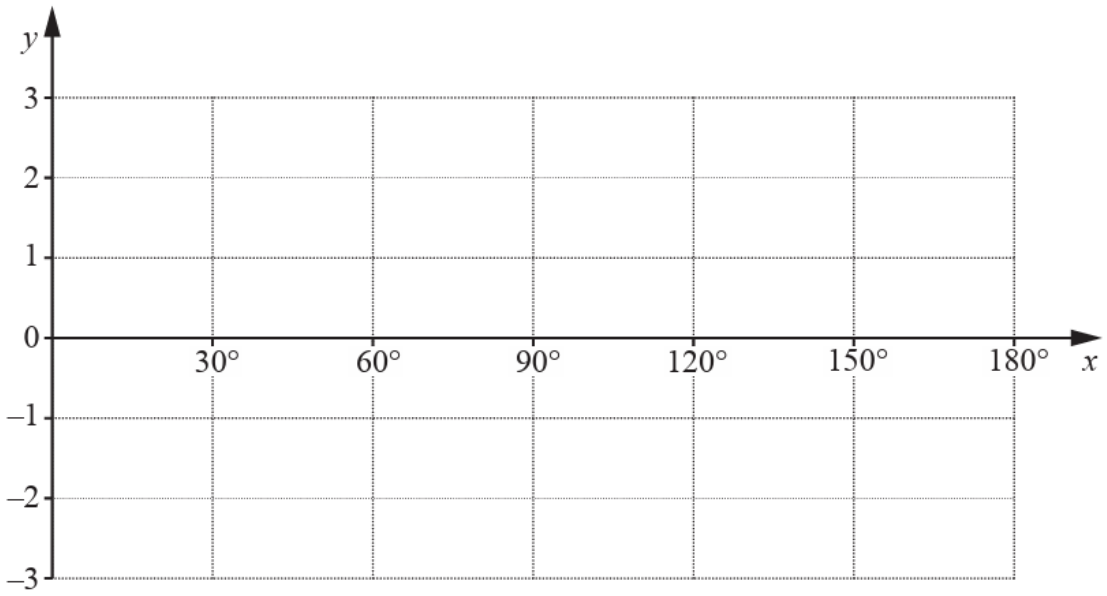
5. 4037/13/O/N/16 Q1

On the axes below, sketch the graph of $y = |2\cos 3x|$ for $0 \leqslant x \leqslant 180°$. [3]



6. 4037/13/O/N/16 Q8

(a) (i) Show that $\dfrac{\operatorname{cosec}\theta}{\operatorname{cosec}\theta - \sin\theta} = \sec^2\theta$. [3]

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(ii) Hence solve $\dfrac{\operatorname{cosec}\theta}{\operatorname{cosec}\theta - \sin\theta} = 4$ for $0° < \theta < 360°$. [3]

7. 4037/22/O/N/16 Q6

(i) Prove that $\dfrac{\cos x}{1+\tan x} - \dfrac{\sin x}{1+\cot x} = \cos x - \sin x$. [4]

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(ii) Hence solve the equation $\frac{\cos x}{1+\tan x} - \frac{\sin x}{1+\cot x} = 3\sin x - 4\cos x$ for $-180° < x < 180°$. [4]

8. 4037/12/M/J/17 Q6(a)

(i) Show that $\frac{\operatorname{cosec}\theta}{\cot\theta + \tan\theta} = \cos\theta$. [4]

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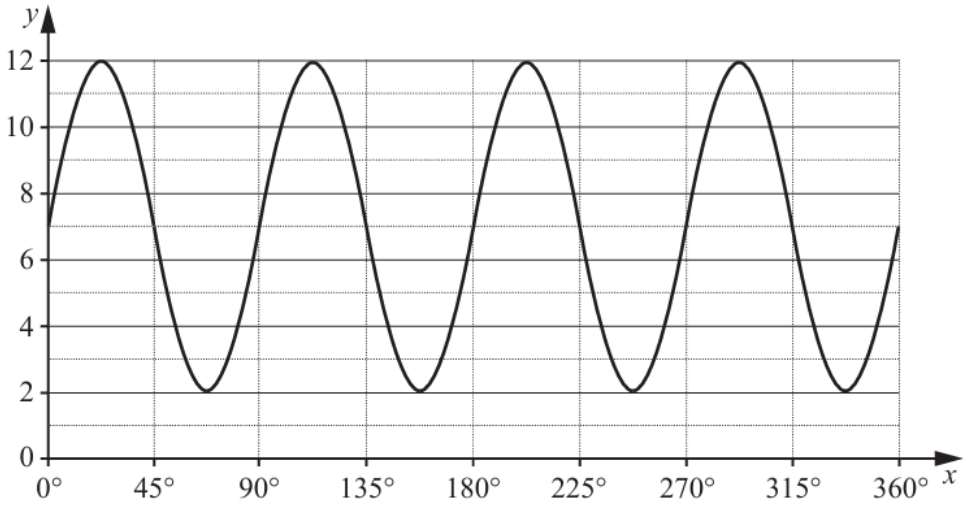
9. 4037/21/M/J/17 Q4

(a) Given that $y = 7\cos 10x - 3$, where the angle x is measured in degrees, state

(i) the period of y, [1]

(ii) the amplitude of y. [1]

(b)



Find the equation of the curve shown, in the form $y = ag(bx) + c$, where $g(x)$ is a trigonometric function and a, b and c are integers to be found. [4]

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10. 4037/21/M/J/17 Q11

(i) Prove that $\sin x(\cot x + \tan x) = \sec x$. [4]

(ii) Hence solve the equation $|\sin x(\cot x + \tan x)| = 2$ for $0^\circ \leqslant x \leqslant 360^\circ$. [4]

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11. 4037/22/M/J/17 Q10

Solve the equation

(i) $4\sin\left(3x-\frac{\pi}{4}\right)=3$ for $0\leqslant x\leqslant\frac{\pi}{2}$ radians, [4]

(ii) $2\tan^2 y+\sec^2 y=14\sec y+3$ for $0°\leqslant y\leqslant 360°$. [5]

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12. 4037/12/O/N/17 Q2

The graph of $y = a\sin(bx) + c$ has an amplitude of 4, a period of $\frac{\pi}{3}$ and passes through the point $\left(\frac{\pi}{12},\ 2\right)$. Find the value of each of the constants a, b and c. [4]

13. 4037/12/O/N/17 Q11

(a) Solve $2\cot(\phi + 35^\circ) = 5$ for $0^\circ \leqslant \phi \leqslant 360^\circ$. [4]

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(b) **(i)** Show that $\dfrac{\sec\theta}{\cot\theta+\tan\theta}=\sin\theta$. [3]

(ii) Hence solve $\dfrac{\sec 3\theta}{\cot 3\theta+\tan 3\theta}=-\dfrac{\sqrt{3}}{2}$ for $-\dfrac{\pi}{2}\leqslant\theta\leqslant\dfrac{\pi}{2}$, giving your answers in terms of π. [4]

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14. 4037/13/O/N/17 Q1

Given that $y = 2\sec^2\theta$ and $x = \tan\theta - 5$, express y in terms of x. [2]

15. 4037/13/O/N/17 Q4

The graph of $y = a\cos(bx) + c$ has an amplitude of 3, a period of $\frac{\pi}{4}$ and passes through the point $\left(\frac{\pi}{12}, \frac{5}{2}\right)$. Find the value of each of the constants a, b and c. [4]

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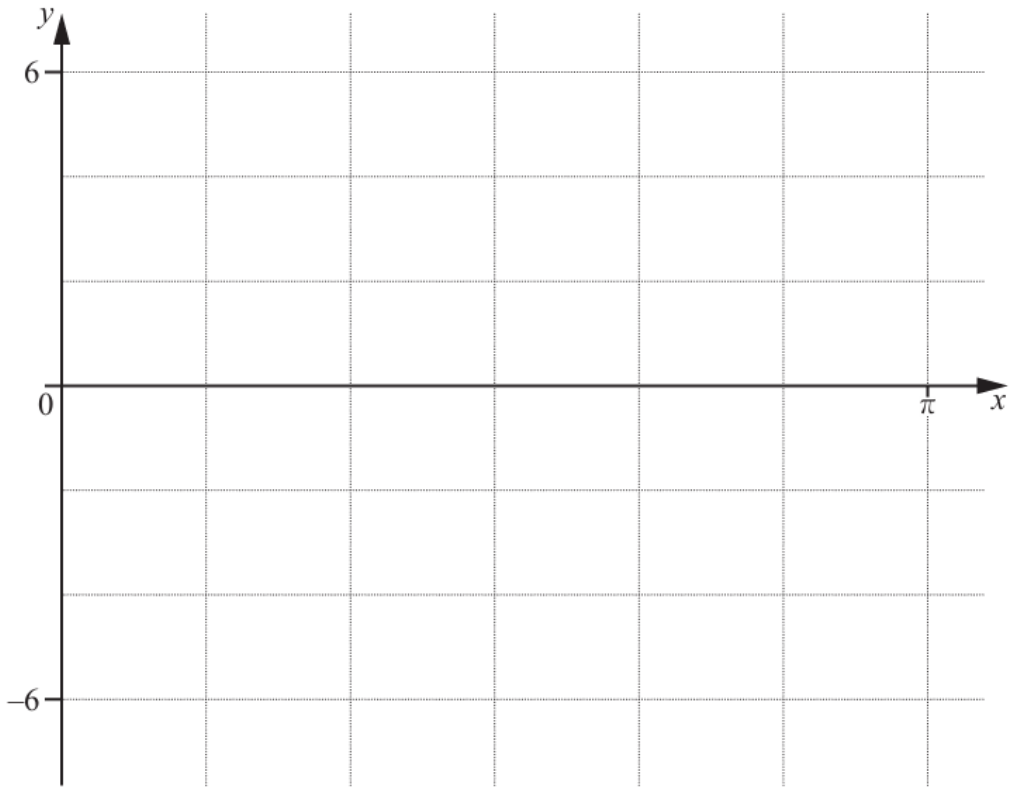
16. 4037/11/M/J/18 Q4

(i) The curve $y = a + b\sin cx$ has an amplitude of 4 and a period of $\frac{\pi}{3}$. Given that the curve passes through the point $\left(\frac{\pi}{12}, 2\right)$, find the value of each of the constants a, b and c. [4]

(ii) Using your values of a, b and c, sketch the graph of $y = a + b\sin cx$ for $0 \leqslant x \leqslant \pi$ radians. [3]



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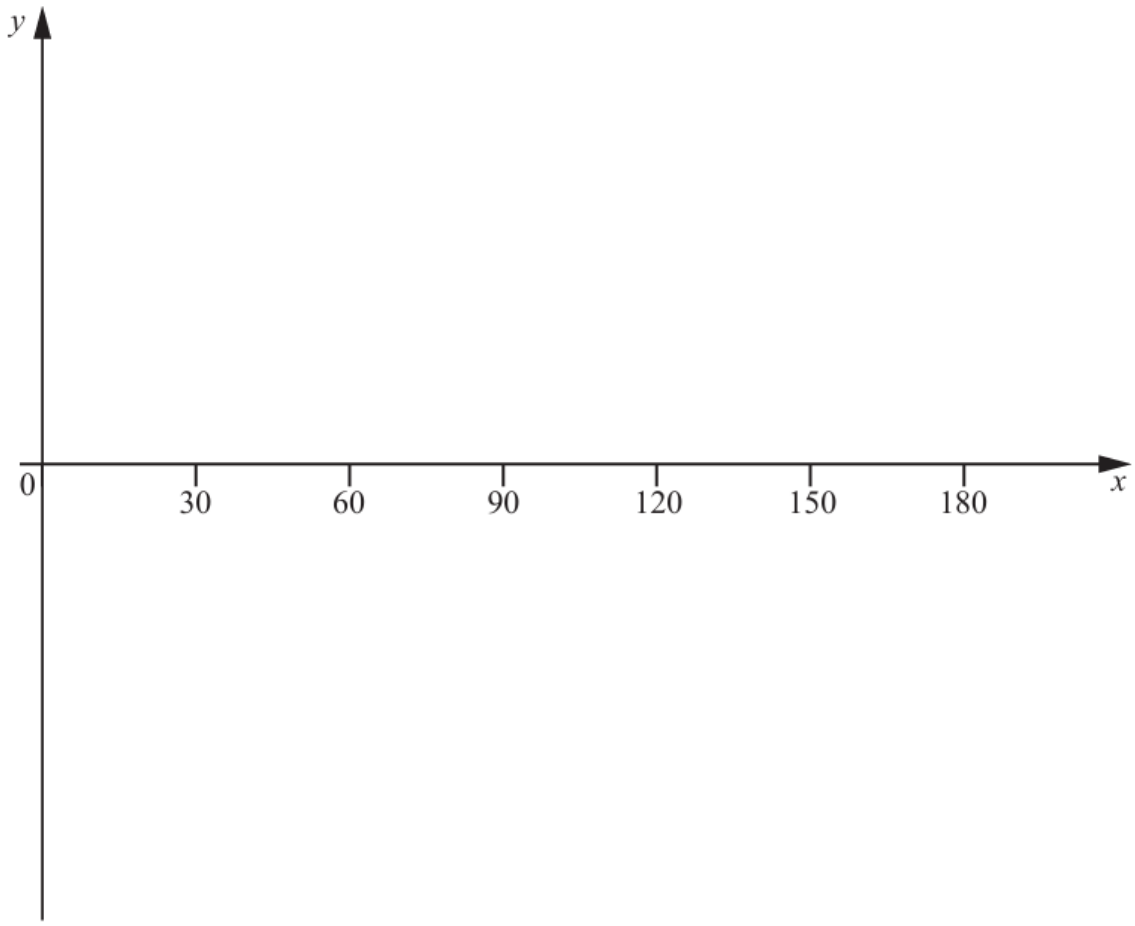
17. 4037/12/M/J/18 Q1

It is given that $y = 1 + \tan 3x$.

(i) State the period of y. [1]

(ii) On the axes below, sketch the graph of $y = 1 + \tan 3x$ for $0° \leqslant x° \leqslant 180°$. [3]



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18. 4037/12/M/J/18 Q8

(a) Solve $3\cos^2\theta + 4\sin\theta = 4$ for $0° \leqslant \theta \leqslant 180°$. [4]

(b) Solve $\sin 2\phi = \sqrt{3}\cos 2\phi$ for $-\frac{\pi}{2} \leqslant \phi \leqslant \frac{\pi}{2}$ radians. [4]

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19. 4037/21/M/J/18 Q11

(a) Solve $10\cos^2 x + 3\sin x = 9$ for $0° < x < 360°$. [5]

(b) Solve $3\tan 2y = 4\sin 2y$ for $0 < y < \pi$ radians. [5]

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20. 4037/22/M/J/18 Q1

(i) Show that $\cos\theta\cot\theta + \sin\theta = \operatorname{cosec}\theta$. [3]

(ii) Hence solve $\cos\theta\cot\theta + \sin\theta = 4$ for $0° \leqslant \theta \leqslant 90°$. [2]

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21. 4037/12/O/N/18 Q1

Solve $1+\sqrt{2}\sin(x+50°)=0$ for $-180° \leqslant x \leqslant 180°$. [4]

22. 4037/22/O/N/18 Q8

(i) Show that $\frac{1}{1-\sin x}-\frac{1}{1+\sin x}=2\tan x\sec x$. [4]

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(ii) Hence solve the equation $\frac{1}{1-\sin x} - \frac{1}{1+\sin x} = \operatorname{cosec} x$ for $0° \leqslant x \leqslant 360°$. [4]

23. 4037/23/O/N/18 Q9

(a) Solve $2\sin\left(x+\frac{\pi}{4}\right) = \sqrt{3}$ for $0 < x < \pi$ radians. [3]

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(b) Solve $3\sec y = 4\operatorname{cosec} y$ for $0° < y < 360°$. [3]

(c) Solve $7\cot z - \tan z = 2\operatorname{cosec} z$ for $0° < z < 360°$. [6]

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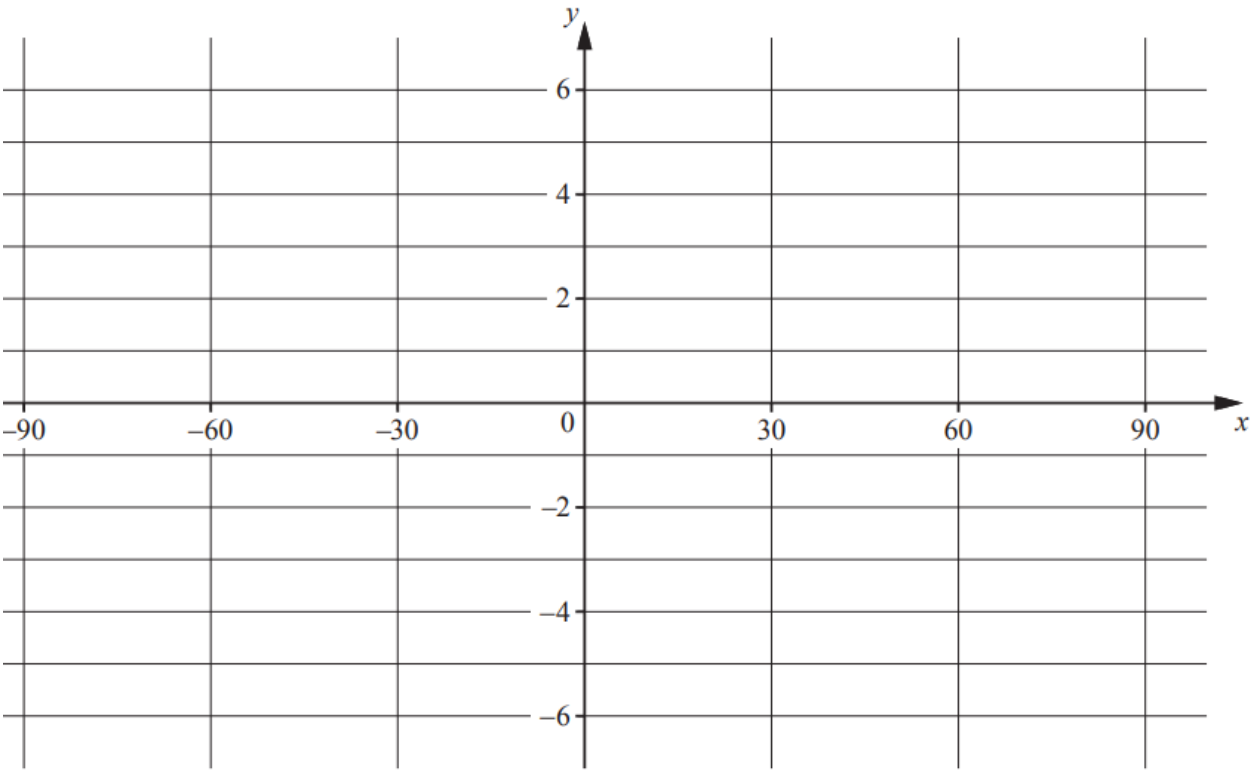
24. 4037/11/M/J/19 Q2

(i) Write down the amplitude of $4\sin 3x - 1$. [1]

(ii) Write down the period of $4\sin 3x - 1$. [1]

(iii) On the axes below, sketch the graph of $y = 4\sin 3x - 1$ for $-90° \leqslant x° \leqslant 90°$.



[3]

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25. 4037/21/M/J/19 Q11

(a) (i) Show that $\dfrac{\operatorname{cosec}\theta - \cot\theta}{\sin\theta} = \dfrac{1}{1+\cos\theta}$. [4]

(ii) Hence solve $\dfrac{\operatorname{cosec}\theta - \cot\theta}{\sin\theta} = \dfrac{5}{2}$ for $180° < \theta < 360°$. [2]

(b) Solve $\tan(3\phi - 4) = -\dfrac{1}{2}$ for $0 \leqslant \phi \leqslant \dfrac{\pi}{2}$ radians. [3]

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26. 4037/22/M/J/19 Q9

(a) Solve $6\sin^2 x - 13\cos x = 1$ for $0° \leqslant x \leqslant 360°$. [4]

(b) **(i)** Show that, for $-\frac{\pi}{2} < y < \frac{\pi}{2}$, $\frac{4\tan y}{\sqrt{1+\tan^2 y}}$ can be written in the form $a\sin y$, where a is an integer. [3]

(ii) Hence solve $\frac{4\tan y}{\sqrt{1+\tan^2 y}} + 3 = 0$ for $-\frac{\pi}{2} < y < \frac{\pi}{2}$ radians. [1]

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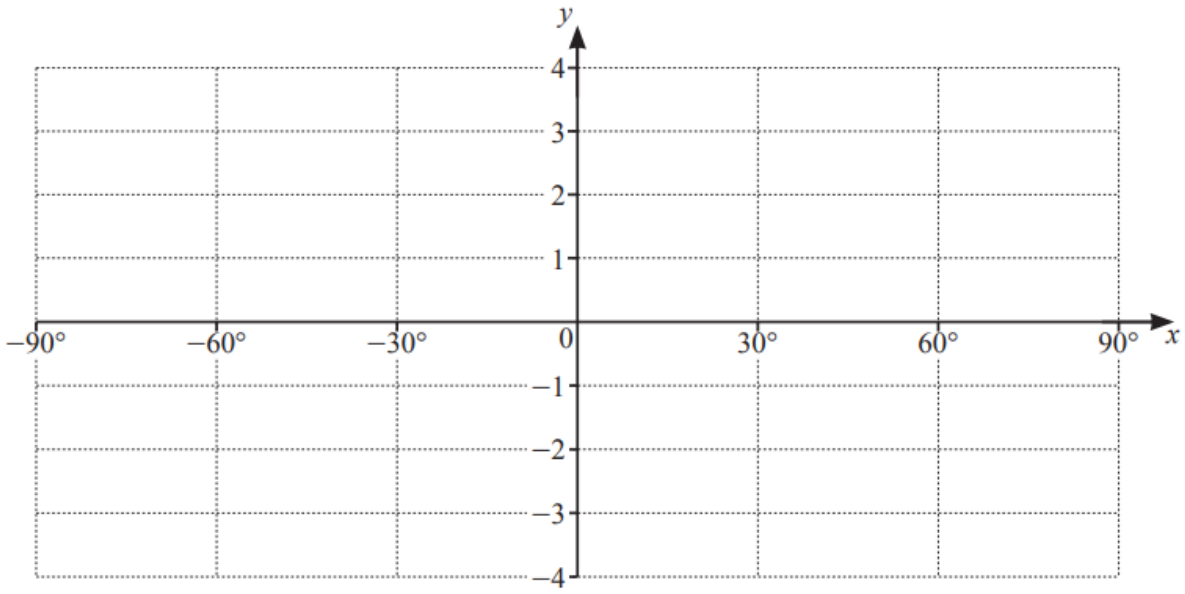
(i) On the axes below, sketch the graph of $y = 2\cos 3x - 1$ for $-90° \leqslant x \leqslant 90°$.



[3]

(ii) Write down the amplitude of $2\cos 3x - 1$. [1]

(iii) Write down the period of $2\cos 3x - 1$. [1]

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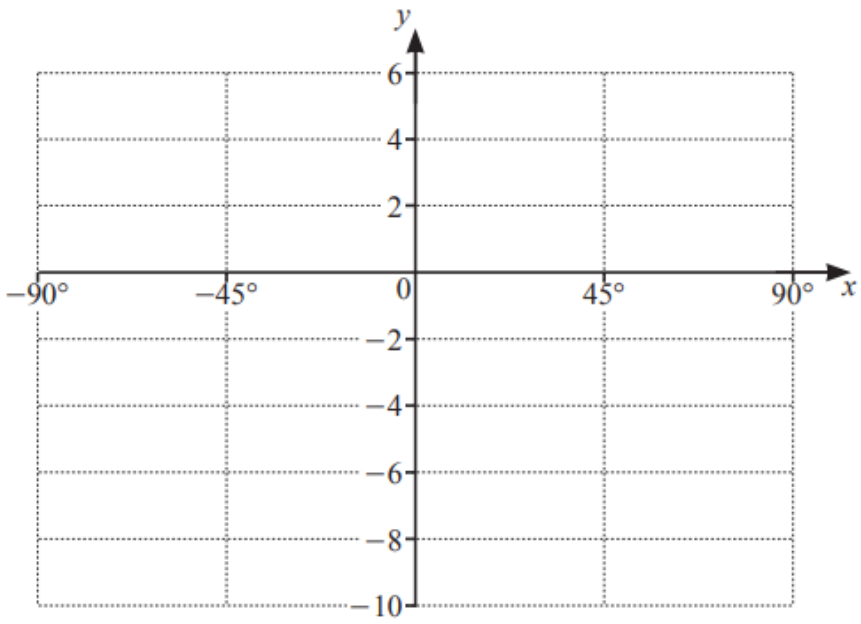
(i) On the axes below, sketch the graph of $y = 5\cos 4x - 3$ for $-90° \leqslant x \leqslant 90°$.



[4]

(ii) Write down the amplitude of y. [1]

(iii) Write down the period of y. [1]

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29. 4037/22/O/N/19 Q6

(i) Show that $\frac{\tan x}{1+\sec x}+\frac{1+\sec x}{\tan x}=\frac{2}{\sin x}$. [5]

(ii) Hence solve the equation $\frac{\tan x}{1+\sec x}+\frac{1+\sec x}{\tan x}=1+3\sin x$ for $0° \leqslant x \leqslant 180°$. [4]

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30. 4037/23/O/N/19 Q2

(i) Show that $\frac{\text{cosec}x - \cot x}{1 - \cos x} = \text{cosec}x$. [3]

(ii) Hence solve $\frac{\text{cosec}x - \cot x}{1 - \cos x} = 2$ for $0° < x < 180°$. [2]

31. 4037/23/O/N/19 Q5

(a) Solve $3\cot^2\left(y - \frac{\pi}{4}\right) = 1$ for $0 < y < \pi$ radians. [4]

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(b) Solve $7\cot z + \tan z = 7\operatorname{cosec} z$ for $0° \leqslant z \leqslant 360°$. [6]

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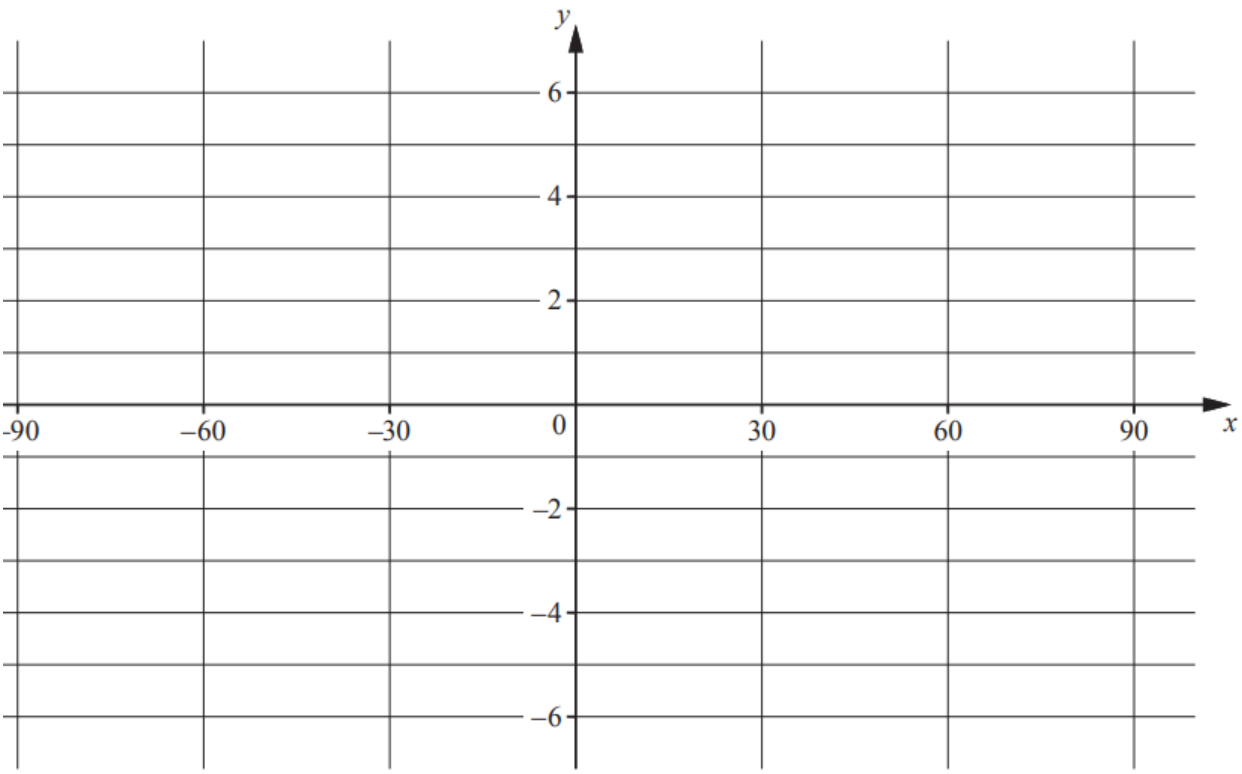
32. 4037/11/M/J/19 Q2

(i) Write down the amplitude of $4\sin 3x - 1$. [1]

(ii) Write down the period of $4\sin 3x - 1$. [1]

(iii) On the axes below, sketch the graph of $y = 4\sin 3x - 1$ for $-90° \leqslant x° \leqslant 90°$.



[3]

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33. 4037/21/M/J/19 Q11

(a) (i) Show that $\dfrac{\operatorname{cosec}\theta - \cot\theta}{\sin\theta} = \dfrac{1}{1+\cos\theta}$. [4]

(ii) Hence solve $\dfrac{\operatorname{cosec}\theta - \cot\theta}{\sin\theta} = \dfrac{5}{2}$ for $180° < \theta < 360°$. [2]

(b) Solve $\tan(3\phi - 4) = -\dfrac{1}{2}$ for $0 \leqslant \phi \leqslant \dfrac{\pi}{2}$ radians. [3]

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34. 4037/22/M/J/19 Q9

(a) Solve $6\sin^2 x - 13\cos x = 1$ for $0° \leqslant x \leqslant 360°$. [4]

(b) **(i)** Show that, for $-\frac{\pi}{2} < y < \frac{\pi}{2}$, $\frac{4\tan y}{\sqrt{1+\tan^2 y}}$ can be written in the form $a\sin y$, where a is an integer. [3]

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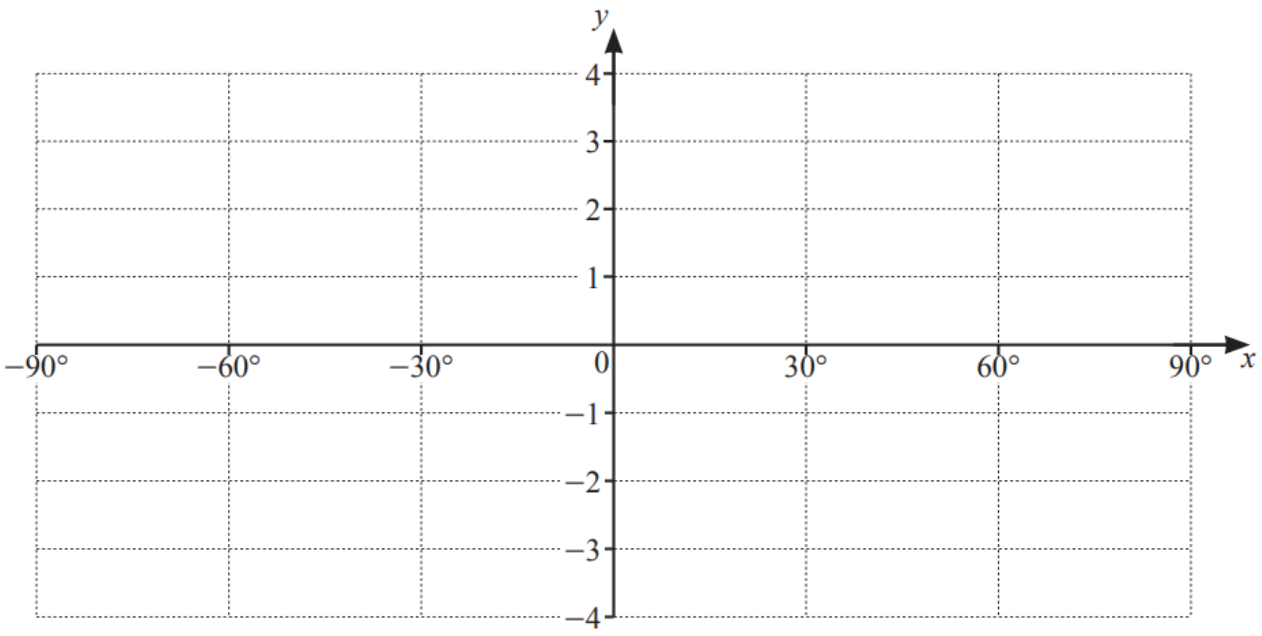
(ii) Hence solve $\dfrac{4\tan y}{\sqrt{1+\tan^2 y}}+3=0$ for $-\dfrac{\pi}{2}<y<\dfrac{\pi}{2}$ radians. [1]

35. 4037/12/O/N/19 Q1

(i) On the axes below, sketch the graph of $y=2\cos 3x-1$ for $-90°\leqslant x\leqslant 90°$.



[3]

(ii) Write down the amplitude of $2\cos 3x-1$. [1]

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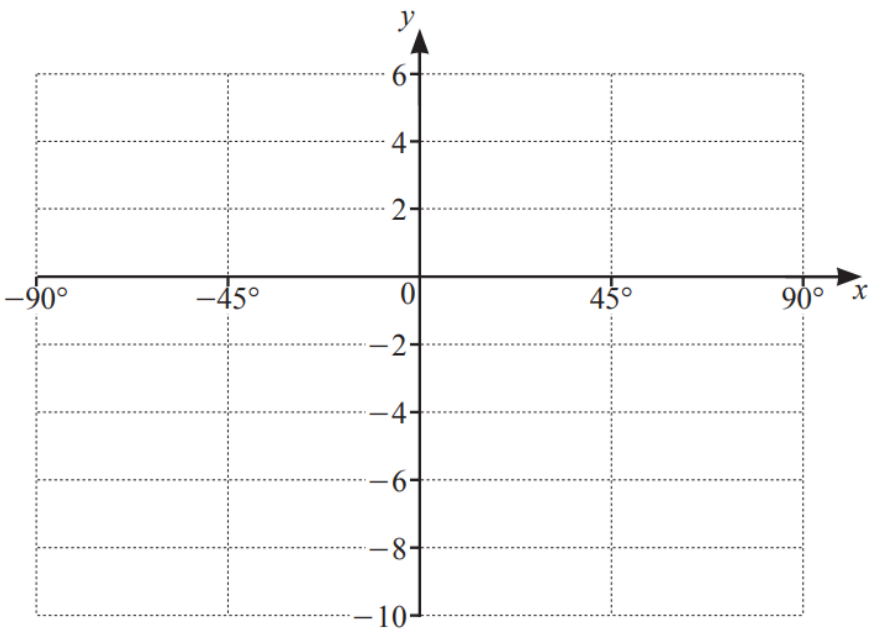
(iii) Write down the period of $2\cos 3x - 1$. [1]

36. 4037/13/O/N/19 Q2

(i) On the axes below, sketch the graph of $y = 5\cos 4x - 3$ for $-90° \leqslant x \leqslant 90°$.



[4]

(ii) Write down the amplitude of y. [1]

(iii) Write down the period of y. [1]

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37. 4037/22/O/N/19 Q6

(i) Show that $\dfrac{\tan x}{1+\sec x}+\dfrac{1+\sec x}{\tan x}=\dfrac{2}{\sin x}$. [5]

(ii) Hence solve the equation $\dfrac{\tan x}{1+\sec x}+\dfrac{1+\sec x}{\tan x}=1+3\sin x$ for $0° \leqslant x \leqslant 180°$. [4]

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38. 4037/23/O/N/19 Q2

(i) Show that $\frac{\text{cosec}x - \cot x}{1 - \cos x} = \text{cosec}x$. [3]

(ii) Hence solve $\frac{\text{cosec}x - \cot x}{1 - \cos x} = 2$ for $0° < x < 180°$. [2]

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39. 4037/23/O/N/19 Q5

(a) Solve $3\cot^2\left(y-\frac{\pi}{4}\right)=1$ for $0<y<\pi$ radians. [4]

(b) Solve $7\cot z+\tan z=7\operatorname{cosec} z$ for $0°\leqslant z\leqslant 360°$. [6]

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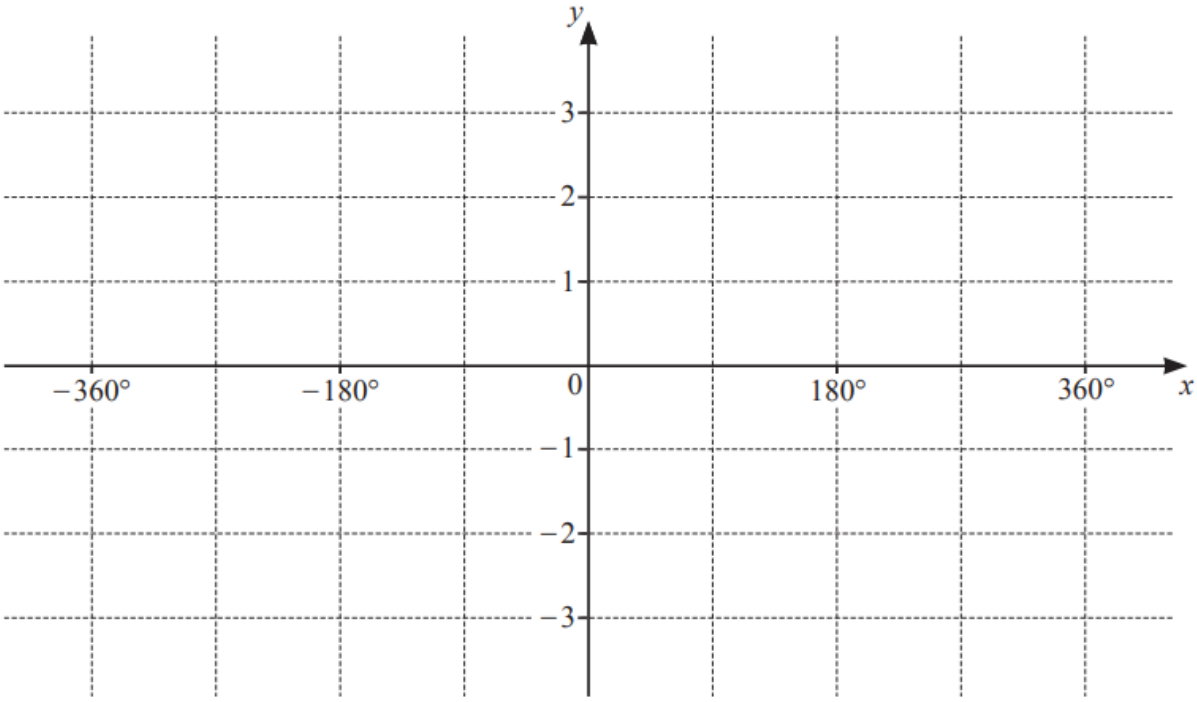
40. 4037/11/M/J/20 Q2

(a) Write down the period of $2\cos\frac{x}{3}-1$. [1]

(b) On the axes below, sketch the graph of $y=2\cos\frac{x}{3}-1$ for $-360° \leqslant x \leqslant 360°$. [3]



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41. 4037/11/M/J/20 Q10

(a) (i) Show that $\frac{1}{\sec\theta - 1} - \frac{1}{\sec\theta + 1} = 2\cot^2\theta$. [3]

(ii) Hence solve $\frac{1}{\sec 2x - 1} - \frac{1}{\sec 2x + 1} = 6$ for $-90° < x < 90°$. [5]

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(b) Solve $\operatorname{cosec}\left(y+\frac{\pi}{3}\right)=2$ for $0 \leqslant y \leqslant 2\pi$ radians, giving your answers in terms of π. [4]

42. 4037/12/M/J/20 Q10

(a) Solve $\tan 3x = -1$ for $-\frac{\pi}{2} \leqslant x \leqslant \frac{\pi}{2}$ radians, giving your answers in terms of π. [4]

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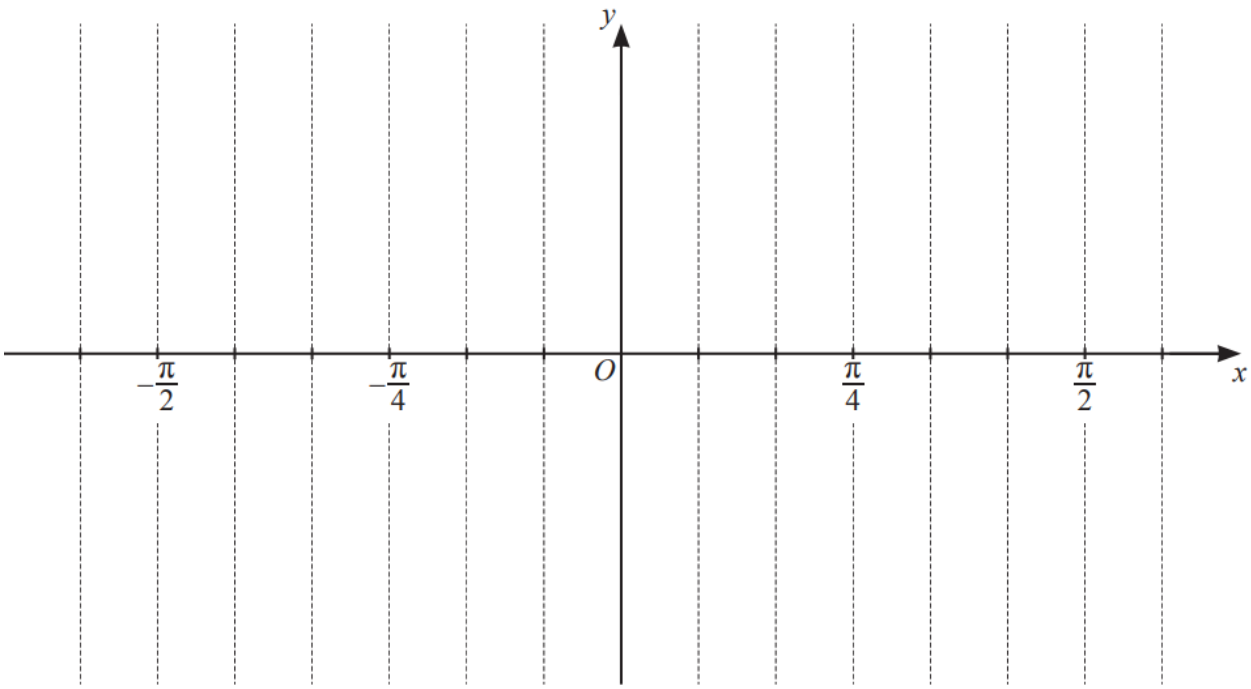
(b) Use your answers to **part (a)** to sketch the graph of $y = 4\tan 3x + 4$ for $-\frac{\pi}{2} \leqslant x \leqslant \frac{\pi}{2}$ radians on the axes below. Show the coordinates of the points where the curve meets the axes.



[3]

43. 4037/22/M/J/20 Q8

(a) Solve $3\cot^2 x - 14\operatorname{cosec} x - 2 = 0$ for $0° < x < 360°$. [5]

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(b) Show that $\dfrac{\sin^4 y - \cos^4 y}{\cot y} = \tan y - 2\cos y \sin y.$ [4]

44. 4037/12/O/N/20 Q3

(a) Write down the amplitude of $2\cos\frac{x}{3} - 1.$ [1]

(b) Write down the period of $2\cos\frac{x}{3} - 1.$ [1]

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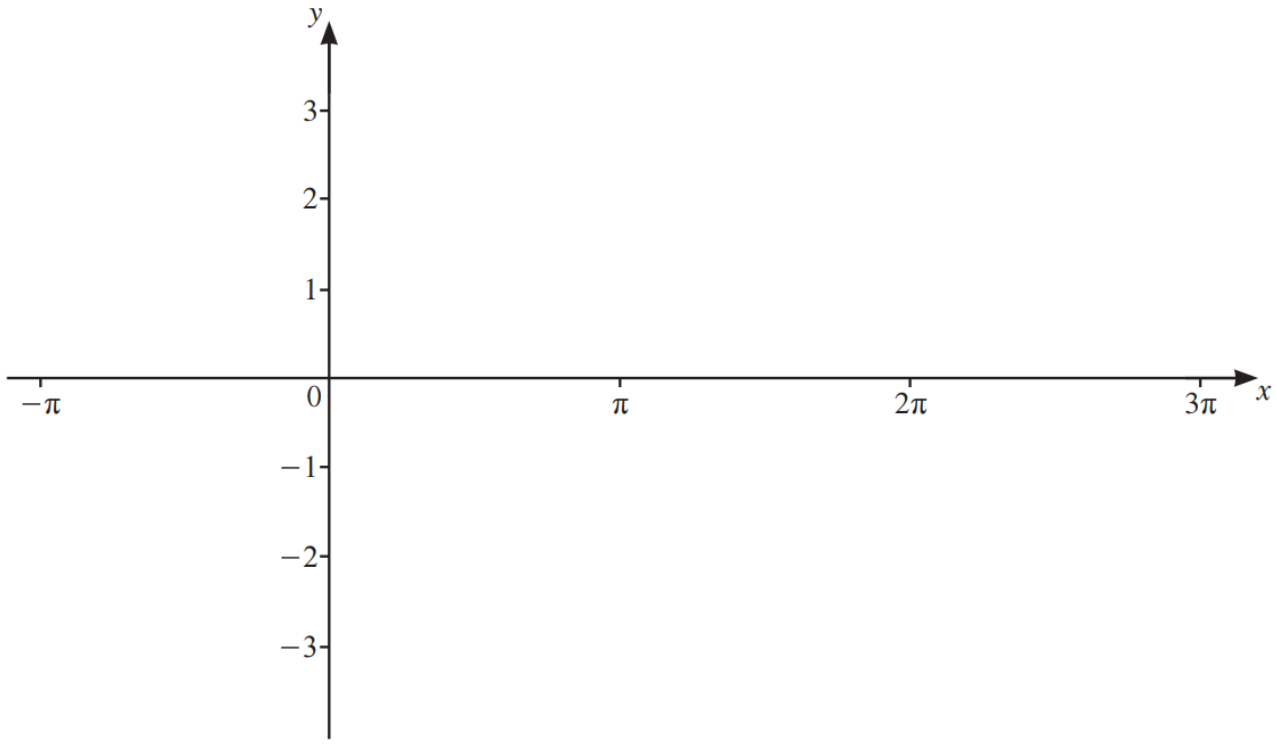
(c) On the axes below, sketch the graph of $y = 2\cos\frac{x}{3} - 1$ for $-\pi \leqslant x \leqslant 3\pi$ radians.



[3]

45. 4037/13/O/N/20 Q11

(a) Given that $2\cos x = 3\tan x$, show that $2\sin^2 x + 3\sin x - 2 = 0$. [3]

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(b) Hence solve $2\cos\left(2\alpha+\frac{\pi}{4}\right)=3\tan\left(2\alpha+\frac{\pi}{4}\right)$ for $0<\alpha<\pi$ radians, giving your answers in terms of π. [4]

46. 4037/22/O/N/20 Q11

(a) Show that $\frac{\sin x\tan x}{1-\cos x}=1+\sec x$. [4]

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(b) Solve the equation $5\tan x - 3\cot x = 2\sec x$ for $0° \leqslant x \leqslant 360°$. [6]

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(a) (i) Write $6xy+3y+4x+2$ in the form $(ax+b)(cy+d)$, where a, b, c and d are positive integers. [1]

(ii) Hence solve the equation $6\sin\theta\cos\theta+3\cos\theta+4\sin\theta+2=0$ for $0° < \theta < 360°$. [4]

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(b) Solve the equation $\frac{1}{2}\sec\left(2\phi+\frac{\pi}{4}\right)=\frac{1}{\sqrt{3}}$ for $-\pi<\phi<\pi$, where ϕ is in radians. Give your answers in terms of π. [5]

48. 4037/12/M/J/21 Q10

(a) Solve the equation $\sin\alpha\,\text{cosec}^2\alpha+\cos\alpha\sec^2\alpha=0$ for $-\pi<\alpha<\pi$, where α is in radians. [4]

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(b) (i) Show that $\frac{\cos\theta}{1-\sin\theta}+\frac{1-\sin\theta}{\cos\theta}=2\sec\theta$. [4]

(ii) Hence solve the equation $\frac{\cos 3\phi}{1-\sin 3\phi}+\frac{1-\sin 3\phi}{\cos 3\phi}=4$ for $0°\leqslant\phi\leqslant 180°$. [4]

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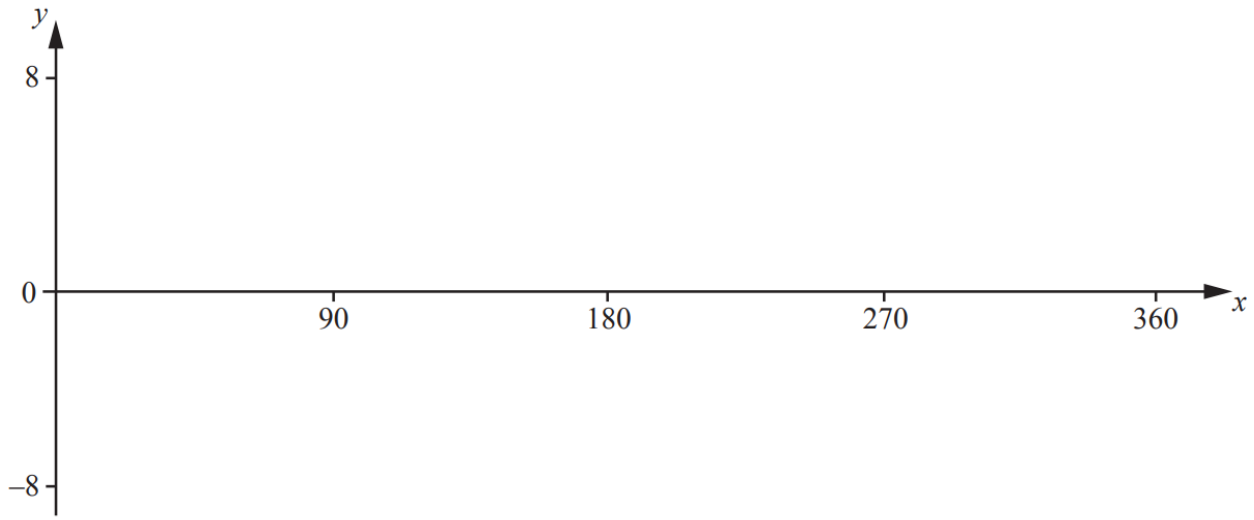
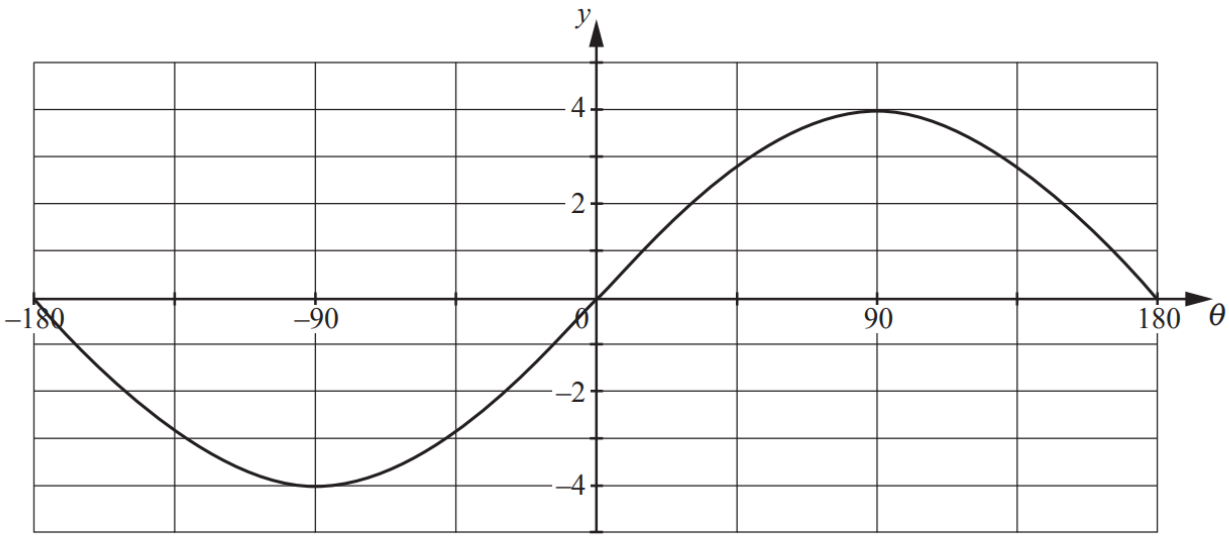
49. 4037/14/M/J/21 Q1

(a) On the axes below, sketch the graph of $y = 6\cos 2x - 1$ for $0° \leqslant x \leqslant 360°$.



[3]

(b) The graph of $y = a + b\sin c\theta$ for $-180° \leqslant \theta \leqslant 180°$ is shown below.



Write down the value of each of the constants a, b and c. [2]

$a =$ ..... $b =$ ..... $c =$ .....

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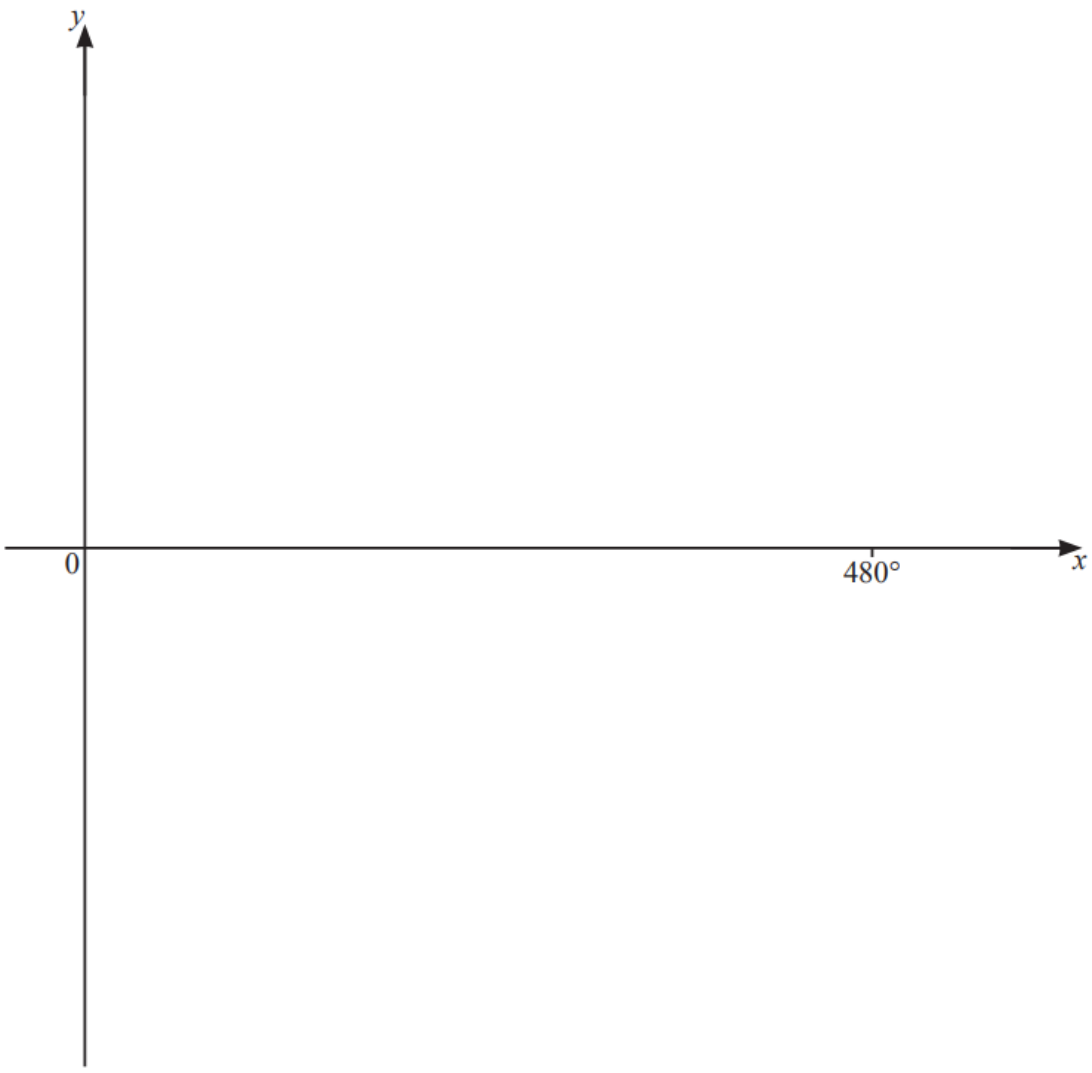
50. 4037/21/M/J/21 Q4

The graph of $y = a + 2\tan bx$, where a and b are constants, passes through the point $(0, -4)$ and has period 480°.

(a) Find the value of a and of b. [3]

(b) On the axes, sketch the graph of y for values of x between 0° and 480°. [2]



Exambuddy

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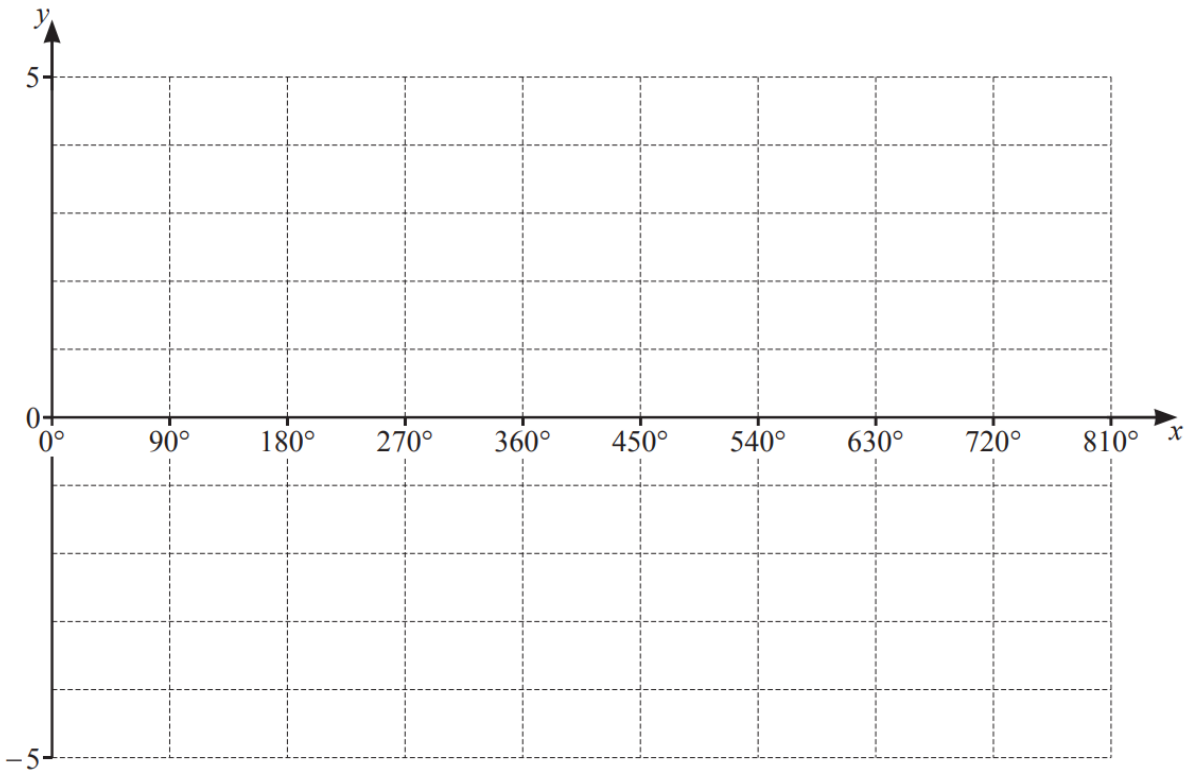
51. 4037/22/M/J/21 Q5

The function f is defined, for $0° \leqslant x \leqslant 810°$, by $f(x) = -2 + \cos\frac{2x}{3}$.

(a) Write down the amplitude of f. [1]

(b) Find the period of f. [2]

(c) On the axes, sketch the graph of $y = f(x)$. [2]



Exambuddy

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52. 4037/24/M/J/21 Q8

(a) (i) Show that $\dfrac{\cos^2 2x}{1+\sin 2x} = 1-\sin 2x$. [2]

(ii) Hence solve $\dfrac{3\cos^2 2x}{1+\sin 2x} = 1$ for $0° \leqslant x \leqslant 90°$. [4]

(b) Solve $\cot\left(y-\dfrac{\pi}{2}\right) = \sqrt{3}$ for $0 \leqslant y \leqslant \pi$ radians. [3]

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53. 4037/12/O/N/21 Q4

Solve the equation $\cot\left(2x+\frac{\pi}{3}\right)-\sqrt{3}=0$, where $-\pi < x < \pi$ radians. Give your answers in terms of π. [4]

54. 4037/13/O/N/21 Q3

Solve the equation $\cot^2\left(2x-\frac{\pi}{3}\right)=\frac{1}{3}$, where x is in radians and $0 \leqslant x < \pi$. [5]

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55. 4037/22/O/N/21 Q3

(a) Show that $\frac{1}{\sec x - 1} + \frac{1}{\sec x + 1} = 2 \cot x \operatorname{cosec} x$. [4]

(b) Hence solve the equation $\frac{1}{\sec x - 1} + \frac{1}{\sec x + 1} = 3 \sec x$ for $0° < x < 360°$. [4]

Exambuddy

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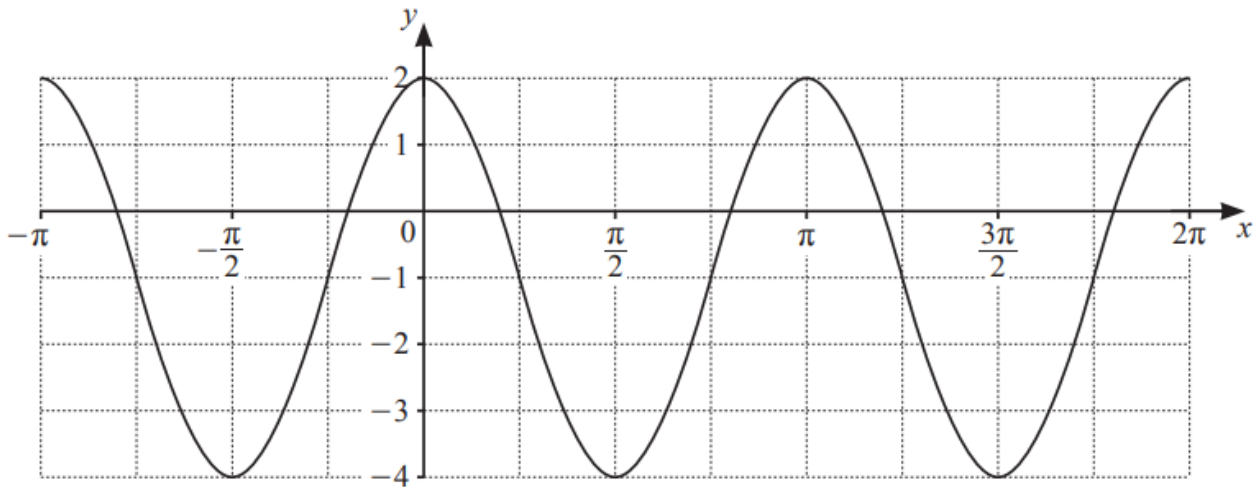
56. 4037/23/O/N/21 Q3



(a) The curve has equation $y = a\cos bx + c$ where a, b and c are integers. Find the values of a, b and c. [3]

(b) Another curve has equation $y = 2\sin 3x + 4$. Write down

(i) the amplitude, [1]

(ii) the period in radians. [1]

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57. 4037/23/O/N/21 Q5

(a) Show that $\frac{1}{\text{cosec}\,x-1}+\frac{1}{\text{cosec}\,x+1}=2\tan x\sec x.$ [4]

(b) Hence solve the equation $\frac{1}{\text{cosec}\,x-1}+\frac{1}{\text{cosec}\,x+1}=5\,\text{cosec}\,x$ for $0° < x < 360°.$ [4]

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58. 4037/11/M/J/22 Q6

(a) Write down the values of k for which the line $y = k$ is a tangent to the curve $y = 4\sin\left(x + \frac{\pi}{4}\right) + 10$. [2]

(b) **(i)** Show that $\frac{1+\tan\theta}{1-\cos\theta} + \frac{1-\tan\theta}{1+\cos\theta} = \frac{2(1+\sin\theta)}{\sin^2\theta}$. [4]

(ii) Hence solve the equation $\frac{1+\tan\theta}{1-\cos\theta} + \frac{1-\tan\theta}{1+\cos\theta} = 3$, for $0° \leqslant \theta \leqslant 360°$. [4]

Exambuddy

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59. 4037/11/M/J/22 Q8

DO NOT USE A CALCULATOR IN THIS QUESTION.

(a) Find the exact coordinates of the points of intersection of the curve $y = x^2 + 2\sqrt{5}x - 20$ and the line $y = 3\sqrt{5}x + 10$. [4]

(b) It is given that $\tan\theta = \dfrac{\sqrt{3}-1}{2+\sqrt{3}}$, for $0 < \theta < \dfrac{\pi}{2}$. Find $\text{cosec}^2\theta$ in the form $a + b\sqrt{3}$, where a and b are constants. [5]

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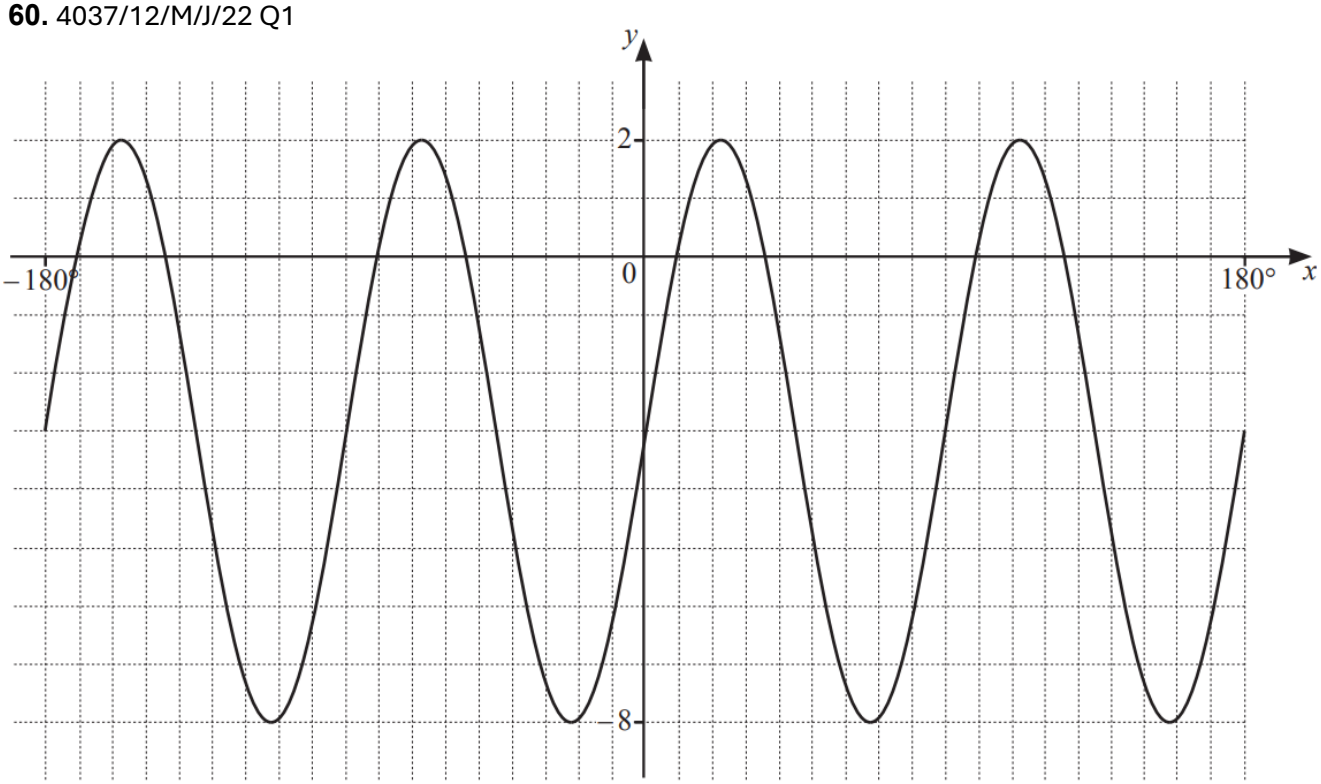
60. 4037/12/M/J/22 Q1



The diagram shows the graph of $y = a\sin bx + c$, where a, b and c are integers, for $-180° \leqslant x \leqslant 180°$. Find the values of a, b and c. [3]

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61. 4037/12/M/J/22 Q2

Given that $x = \sec^2\theta$ and $y + 2 = \cot^2\theta$, find y in terms of x. [4]

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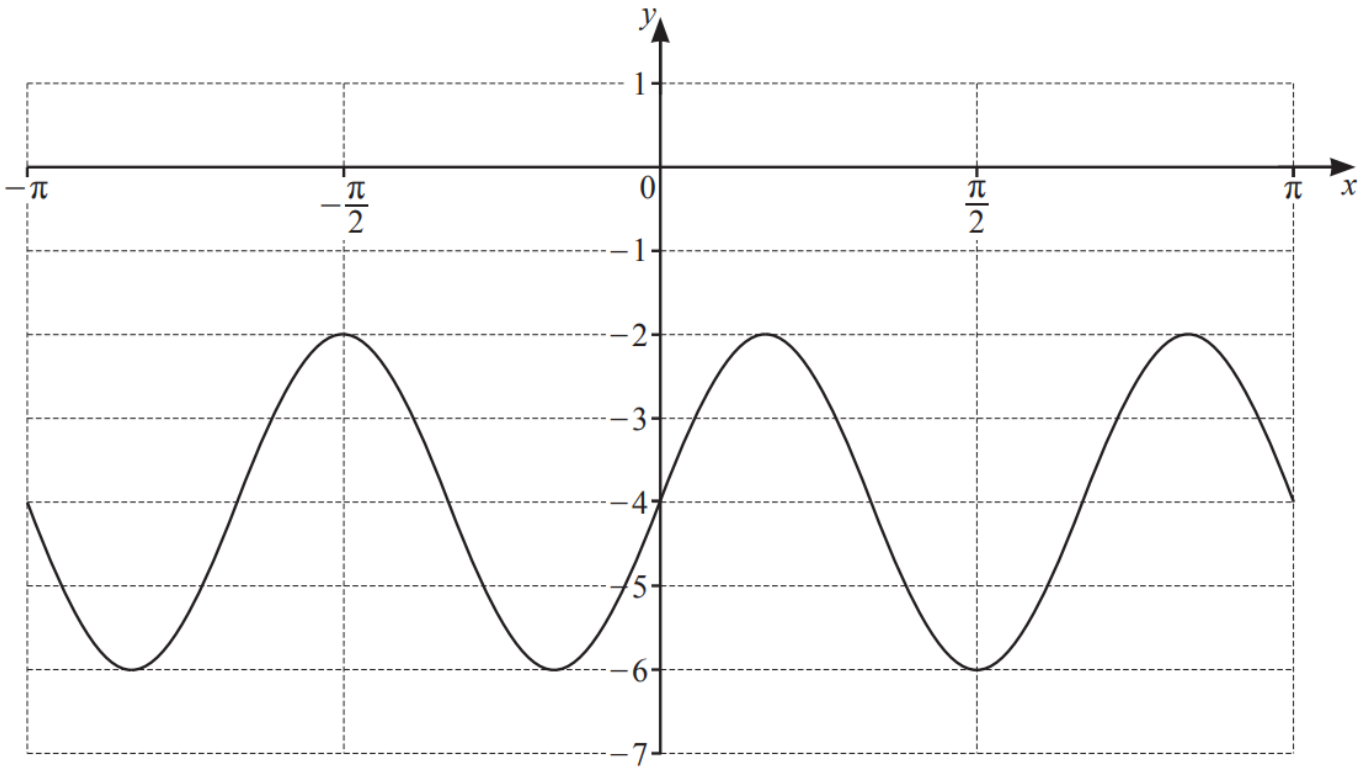
62. 4037/12/O/N/22 Q1



The diagram shows the graph of $y = a\sin bx + c$, where a, b and c are integers. Find the values of a, b and c. [3]

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63. 4037/12/O/N/22 Q4

Solve the equation $3\sin\left(2x+\frac{\pi}{4}\right)=\sqrt{3}\cos\left(2x+\frac{\pi}{4}\right)$, for $0 \leqslant x \leqslant \pi$. [5]

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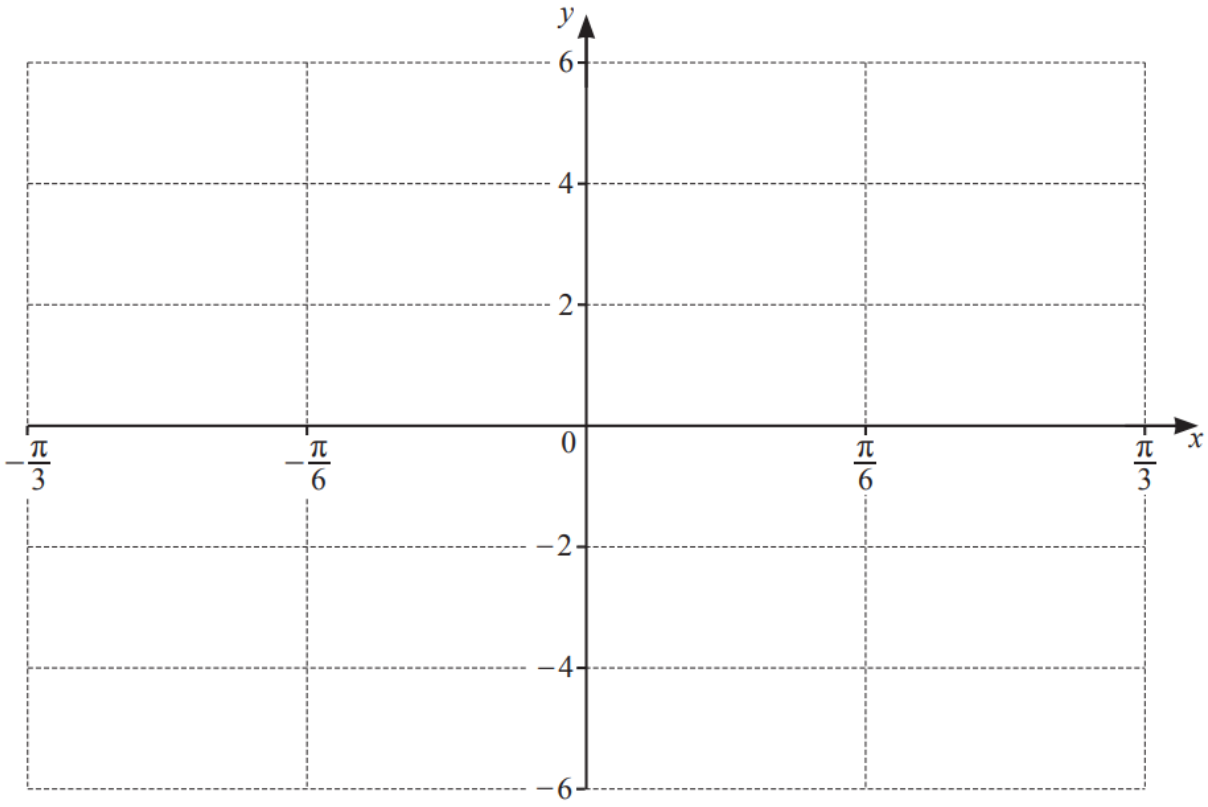
64. 4037/13/O/N/22 Q1

On the axes, sketch the graph of $y = 4\sin 3x - 2$ for $-\frac{\pi}{3} \leqslant x \leqslant \frac{\pi}{3}$. [3]



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65. 4037/13/O/N/22 Q10

Solve the equation $\sqrt{2}\cos(3x+1.2) = 2\sin(3x+1.2)$, where x is in radians, for $-1.5 \leqslant x \leqslant 1.5$. [5]

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66. 4037/22/O/N/22 Q7

(a) Show that $\frac{\sin x}{1-\cos x}+\frac{1-\cos x}{\sin x}=2\operatorname{cosec} x$. [4]

(b) Hence solve the equation $\frac{\sin x}{1-\cos x}+\frac{1-\cos x}{\sin x}=3\sin x-1$ for $0° < x < 360°$. [4]

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67. 4037/23/O/N/22 Q5

(a) Show that $\frac{\cos x}{1-\sin x}+\frac{1-\sin x}{\cos x}=2\sec x$. [4]

(b) Hence solve the equation $\frac{\cos\frac{\theta}{2}}{1-\sin\frac{\theta}{2}}+\frac{1-\sin\frac{\theta}{2}}{\cos\frac{\theta}{2}}=8\cos^2\frac{\theta}{2}$ for $-360° < \theta < 360°$. [4]

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68. 4037/11/M/J/23 Q6

(a) Show that $\frac{\cot\theta + \tan\theta}{\sec\theta} = \operatorname{cosec}\theta$. [4]

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(b) Hence solve the equation $\left(\dfrac{\cot\frac{\phi}{3}+\tan\frac{\phi}{3}}{\sec\frac{\phi}{3}}\right)^2 = 2, \quad \text{for } -540° < \phi < 540°.$ [6]

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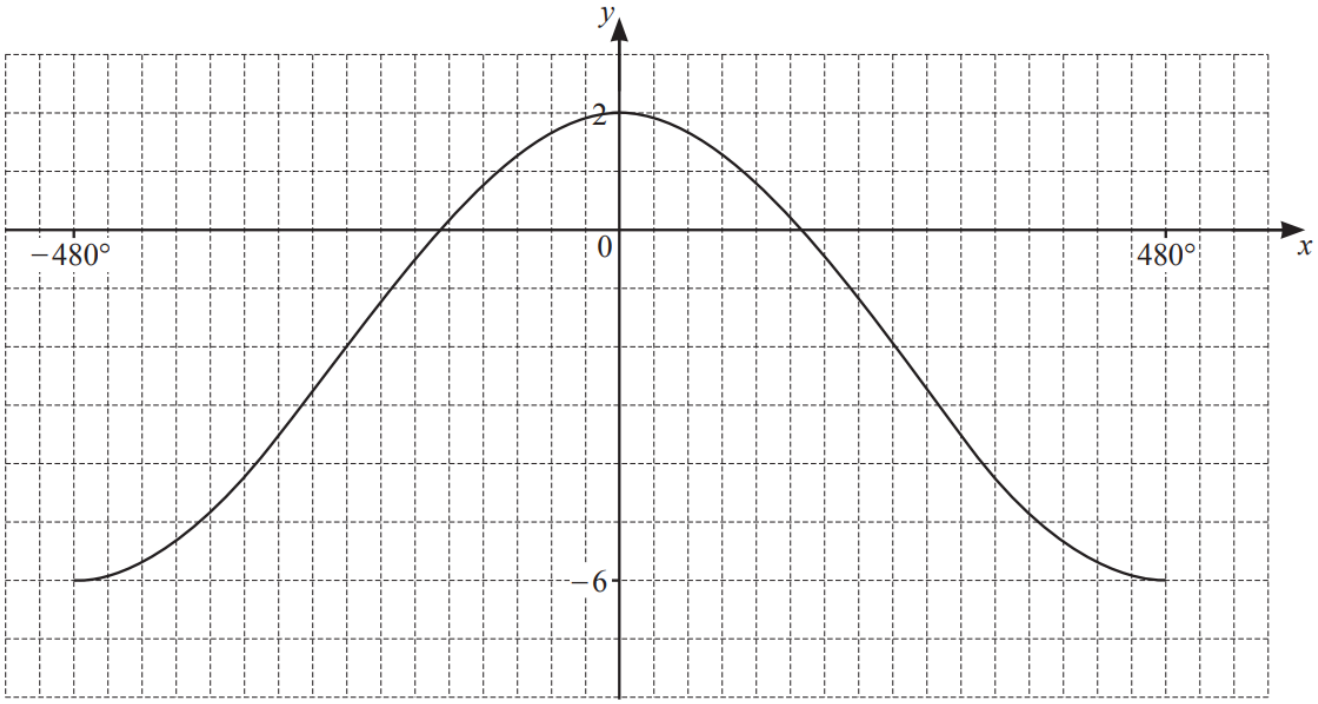
69. 4037/11/M/J/23 Q1

The diagram shows the graph of $y = a\cos bx + c$. Find the values of the constants a, b and c. [3]



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70. 4037/12/M/J/23 Q6

(a) Given that $\cot^2\theta = \frac{1}{y+2}$ and $\sec\theta = x-4$, find y in terms of x. [2]

(b) Solve the equation $\sqrt{3}\,\text{cosec}\left(2\phi + \frac{3\pi}{4}\right) = 2$, for $-\pi < \phi < \pi$, giving your answers in terms of π. [5]

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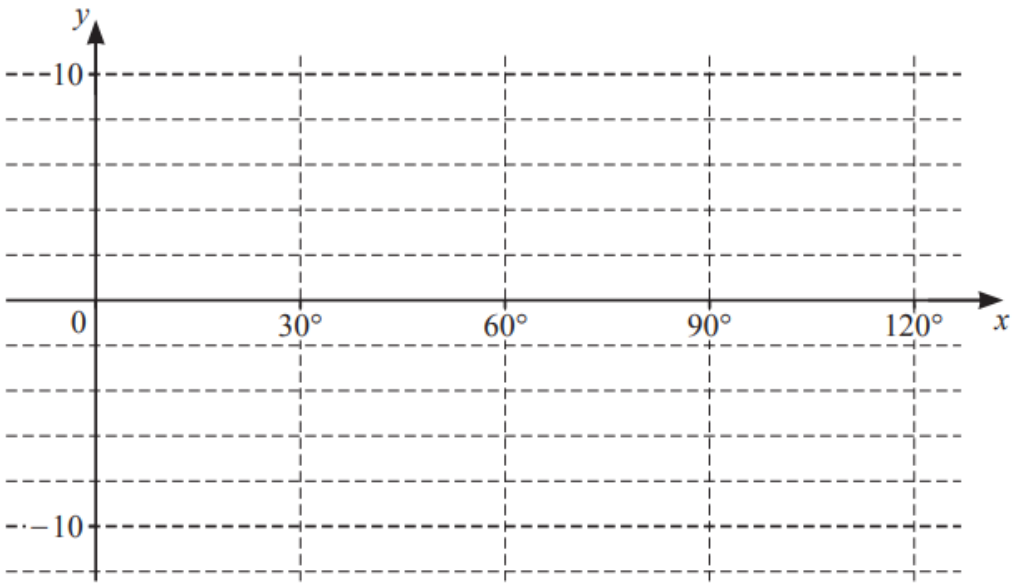
The function g is defined for $0° \leqslant x \leqslant 120°$ by $g(x) = 2 + 4\cos 6x$.

(a) On the axes, sketch the graph of $y = g(x)$. [3]



(b) State the amplitude of g. [1]

(c) State the period of g. [1]

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72. 4037/12/O/N/23 Q5

Solve the equation $3\sec^2\left(2\theta+\frac{\pi}{6}\right)=4$ for $-\frac{\pi}{2}<\theta<\frac{\pi}{2}$, giving your answers in terms of π. [5]

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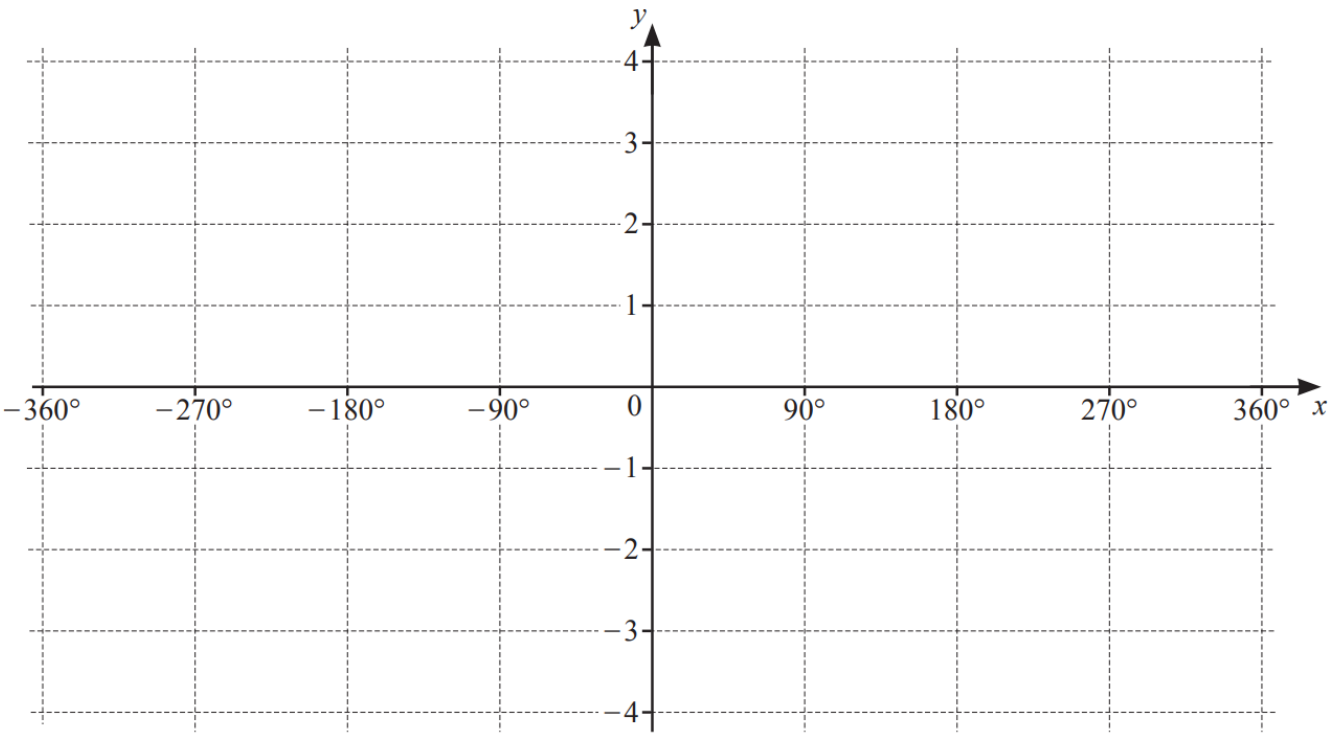
73. 4037/13/O/N/23 Q3

On the axes, draw the graph of $y = 2\sin\frac{x}{3} - 1$ for $-360° \leqslant x \leqslant 360°$. [4]



74. 4037/13/O/N/23 Q12

Solve the equation $3\,\text{cosec}^2\left(\frac{2x}{3} - \frac{\pi}{3}\right) = 4$, for $0 < x \leqslant 3\pi$. Give your answers in terms of π. [5]

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75. 4037/22/O/N/23 Q10

(a) By writing $\cot x$ and $\tan x$ in terms of $\cos x$ and $\sin x$, show that

$$\frac{\sin x}{1-\cot x}+\frac{\cos x}{1-\tan x}=\sin x+\cos x.$$ [5]

(b) Solve the equation $9\cot x+3\operatorname{cosec} x=\tan x$, for $0° < x < 360°$. [5]