6.3 Answers

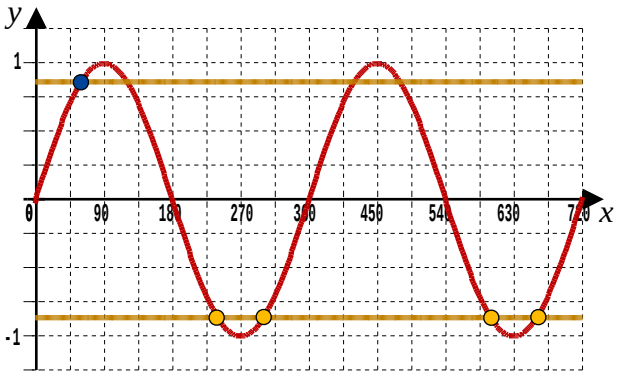
Additional Mathematics
A-Level Pure Mathematics : Year 1
Trigonometry IV

6.3.1 Solution to 6.1 Example (Teaching Video)

$$2\sin(2x) = -\sqrt{3} \qquad 0 \leqslant x \leqslant 360°$$

$$\sin(2x) = -\frac{\sqrt{3}}{2} \Rightarrow \text{Solve } \sin(2x) = +\frac{\sqrt{3}}{2} \text{ for the working angle}$$

$$(2x) = 60°$$



$(2x) = 240,\ 300,\ 600,\ 660$ from the sketch graph of $y = \sin x$

$x = 120°,\ 150°,\ 300°,\ 330°$

[6 marks]

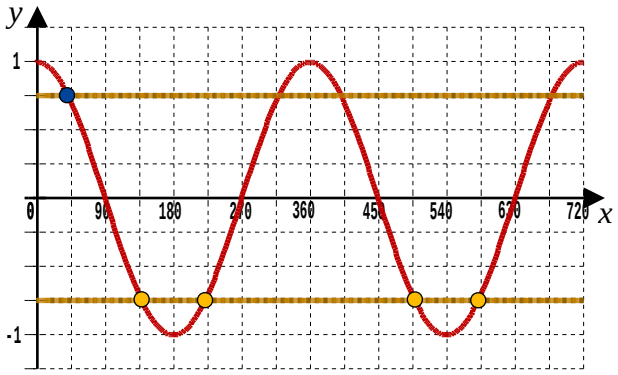
6.3.2 Solutions to 6.2 Exercise

Answer 1

$$4\cos(2x) = -3 \qquad 0 \leqslant x \leqslant 360°$$

$$\cos(2x) = -\frac{3}{4} \Rightarrow \text{Solve } \cos(2x) = +\frac{3}{4} \text{ for the working angle}$$

$$(2x) = 41.4°$$



$(2x) = 138.6,\ 221.4,\ 498.6,\ 581.4$ from the sketch graph of $y = \cos x$

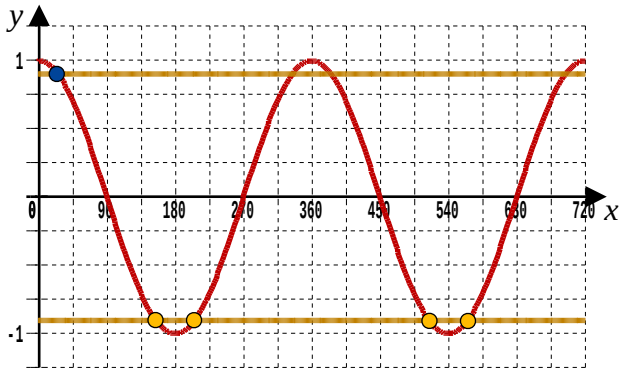
$x = 69.3°,\ 110.7°,\ 249.3°,\ 290.7°$

[6 marks]

Answer 2

$$\cos(2x) = -0.9 \Rightarrow \text{Solve } \cos(2x) = +0.9 \text{ for the working angle}$$

$$(2x) = 25.8°$$



$(2x) = 154.2,\ 205.8,\ 514.2,\ 565.8$ from the sketch graph of $y = \cos x$

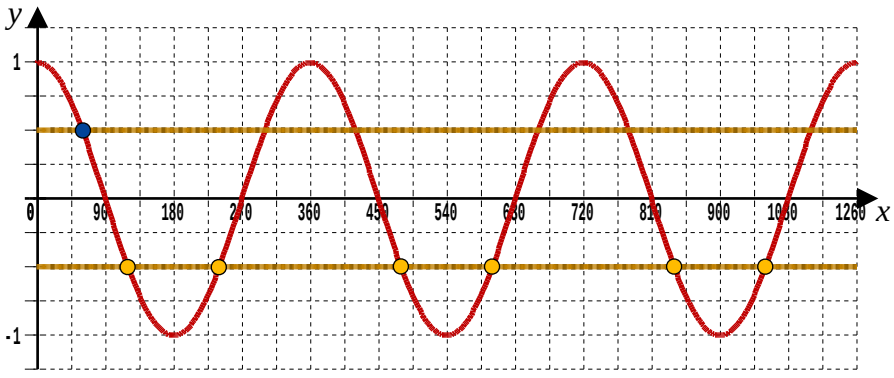
$x = 77.1°,\ 102.9°,\ 257.1°,\ 282.9°$

[4 marks]

Answer 3

$$\cos(3x) = -\frac{1}{2} \Rightarrow \text{Solve } \cos(3x) = +\frac{1}{2} \text{ for the working angle}$$

$$(3x) = 60°$$



$(3x) = 120,\ 240,\ 480,\ 600,\ 840,\ 960$ from the sketch graph of $y = \cos x$

$x = 40°,\ 80°,\ 160°,\ 200°,\ 280°,\ 320°$

[6 marks]

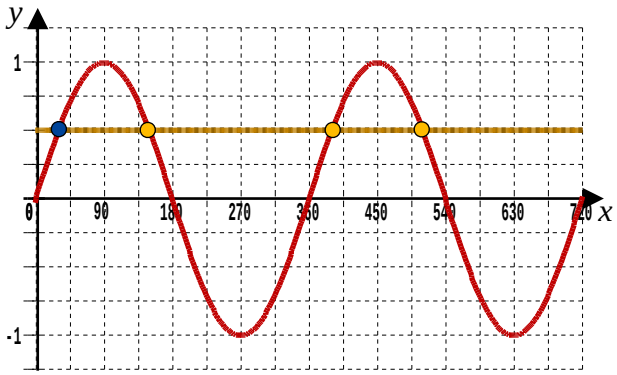
Answer 4

$$sin^3(2x) = \frac{1}{8}$$

Cube root both sides

$$sin(2x) = \frac{1}{2}$$

$$(2x) = 30° \text{ for the working angle}$$



$(2x) = 30,\ 150,\ 390,\ 510$ from the sketch graph of $y = sin\, x$

$x = 15°,\ 75°,\ 195°,\ 255°$

[6 marks]

Answer 5

$$\tan^2(3x) = 2\tan(3x) - 1$$

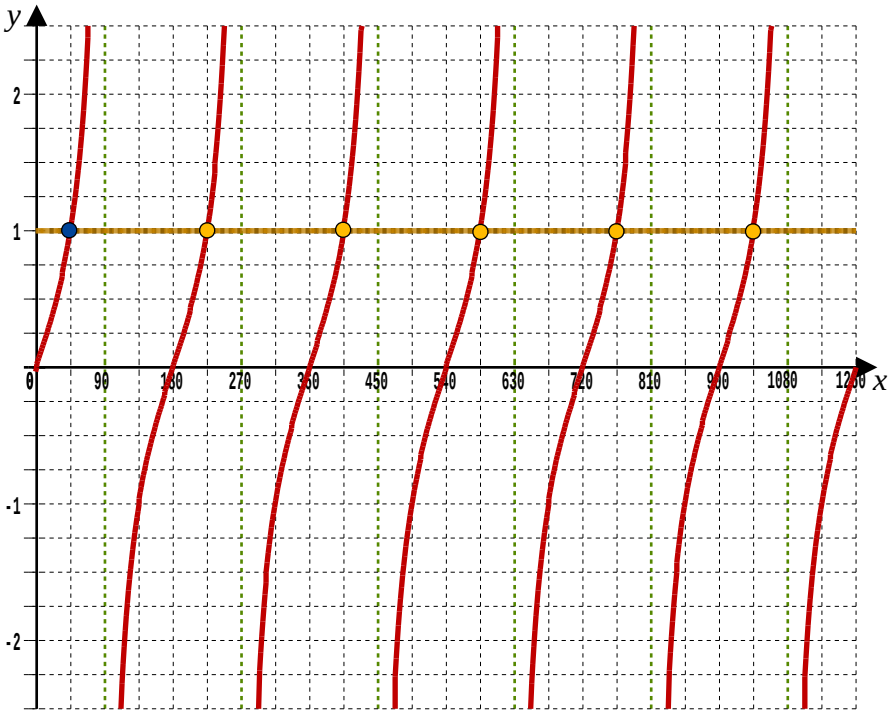
$$\tan^2(3x) - 2\tan(3x) + 1 = 0$$

$$(\tan(3x) - 1)(\tan(3x) - 1) = 0$$

$$\therefore\ (\tan(3x) - 1) = 0$$

$$\tan(3x) = 1$$

$$(3x) = 45°\ \text{for the working angle}$$



$(3x) = 45,\ 225,\ 405,\ 585,\ 765,\ 945$ from the sketch graph of $y = \tan x$

$x = 15°,\ 75°,\ 135°,\ 195°,\ 255°,\ 315°$

[8 marks]