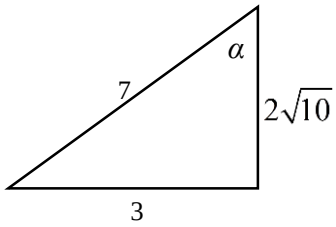
Section 1: Trigonometric functions and identities

Solutions to Exercise level 3

1. (i) The third side of the triangle is $\sqrt{40} = 2\sqrt{10}$

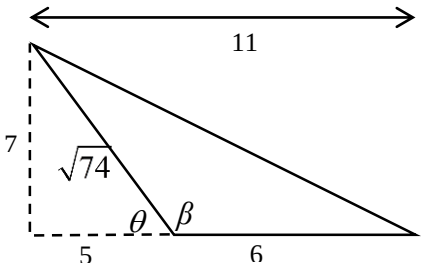


So $\sin\alpha = \frac{3}{7}$

$\cos\alpha = \frac{2\sqrt{10}}{7}$

$\tan\alpha = \frac{3}{2\sqrt{10}}$

(ii)

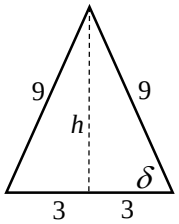


$\sin\beta = \sin(180-\theta) = \sin\theta = \frac{7}{\sqrt{74}}$

$\cos\beta = \cos(180-\theta) = -\cos\theta = -\frac{5}{\sqrt{74}}$

$\tan\beta = \tan(180-\theta) = -\tan\theta = -\frac{7}{5}$

(iii) The triangle is isosceles and $h = \sqrt{81-9} = \sqrt{72} = 6\sqrt{2}$



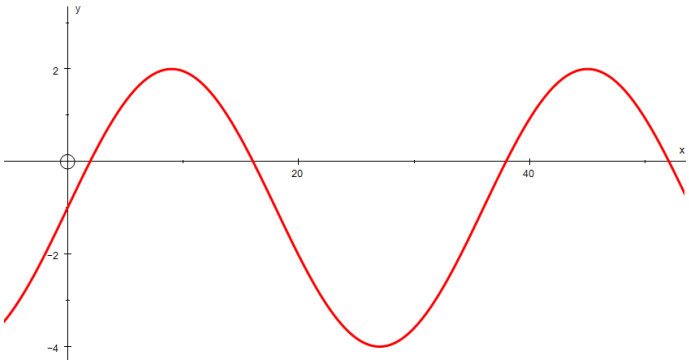
$\sin\delta = \frac{6\sqrt{2}}{9} = \frac{2}{3}\sqrt{2}$

$\cos\delta = \frac{3}{9} = \frac{1}{3}$

$\tan\delta = \frac{6\sqrt{2}}{3} = 2\sqrt{2}$

Edexcel AS Maths Trigonometry 1 Exercise solutions

2. (i)



(ii) $3\sin(10\theta) - 1 = 1$

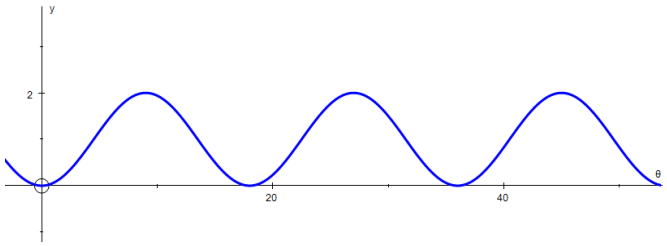
$\Rightarrow \sin(10\theta) = \frac{2}{3} \approx \sin 41.8°$

$\Rightarrow 10\theta \approx 41.8°,\ 138.2°,\ 401.8°$

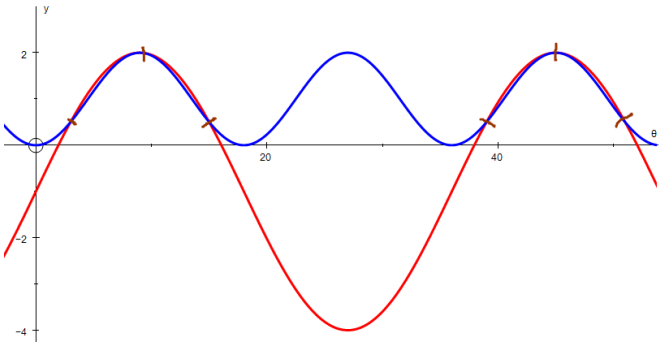
$\Rightarrow \theta \approx 4.18°,\ 13.82°,\ 40.18°$

so end A is 1 mm from the origin after 4.1 sec, 13.8 sec, 40.2 sec.

(iii)



(iv)



Edexcel AS Maths Trigonometry 1 Exercise solutions

$3\sin 10\theta - 1 = 2\sin^2 10\theta$

$\Rightarrow 2\sin^2 10\theta - 3\sin 10\theta + 1 = 0$

$\Rightarrow (2\sin 10\theta - 1)(\sin 10\theta - 1) = 0$

$\Rightarrow \sin 10\theta = \frac{1}{2}$ or $\sin 10\theta = 1$

$= \sin 30^\circ$ $= \sin 90^\circ$

$\Rightarrow 10\theta = 30^\circ, 150^\circ, 390^\circ, 510^\circ, \ldots\ldots$ or $90^\circ, 450^\circ, \ldots\ldots$

$\Rightarrow \theta = 3^\circ, 9^\circ, 15^\circ, 35^\circ, 39^\circ, 45^\circ$

so the positions are identical after 3, 9, 15, 35, 39, and 45 seconds.