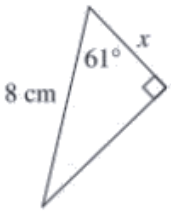
Week Three – Trigonometry Equations

Warm-Up

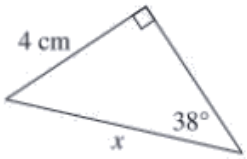
Section A

Find the side labelled x in each of these triangles.

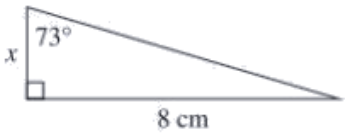
a



b



c



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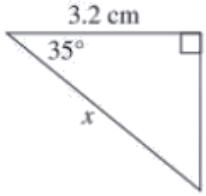
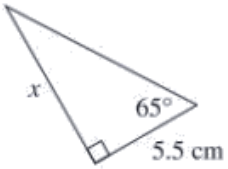
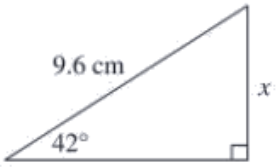


e



f



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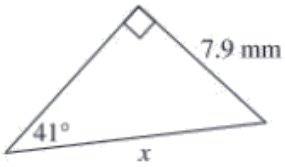

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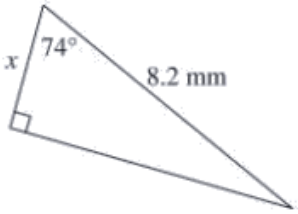
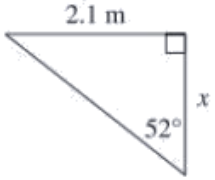


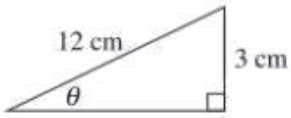
i



Section B

Find the angle labelled θ in each of these triangles.

a



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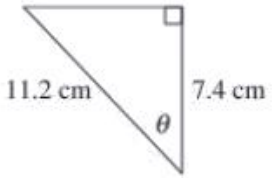

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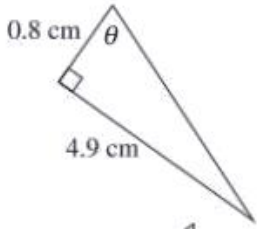

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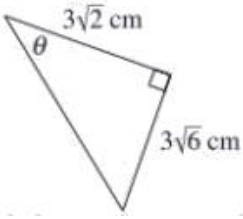

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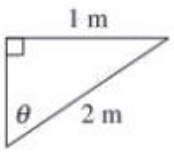

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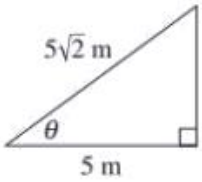
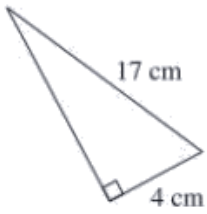


Section C

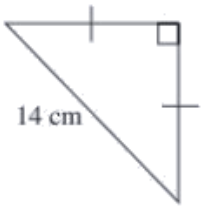
Find the missing side lengths in each of these triangles.

a



b

c



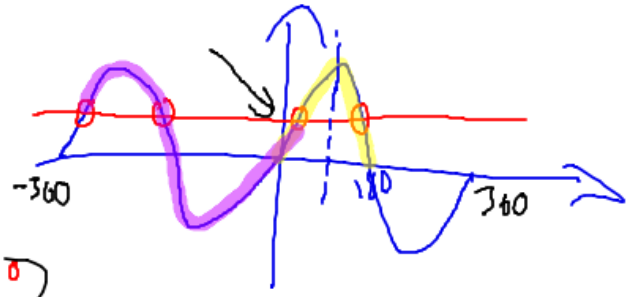
Trigonometry Equations

Example 1 LINK

Find all the solutions to the equation $\sin x = 0.8$ in the range $-360° \leq x \leq 360°$

$x = \sin^{-1}(0.8)$

$= 53.1°$



$180 - 53.1 = 126.9°$

$53.1 - 360 = -306.9$

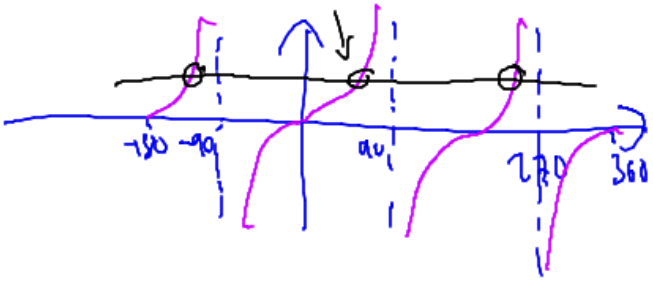
$126.9 - 360 = -233.1$

Example 2 LINK

Find all the solutions to the equation $\tan x = 0.5$ in the range $-180° \leq x \leq 360°$

$x = \tan^{-1}(0.5)$

$= 26.6°$



$26.6 - 180 = -153.4$

$26.6 + 180 = 206.6$

Example 3 LINK

Find all the solutions to these equations in the range $0° \leq \theta \leq 360°$

a $2\sin\theta = -\sqrt{2}$ **b** $5\cos\theta - 1 = 3$

a) $2\sin\theta = -\sqrt{2}$

$(\div 2)$

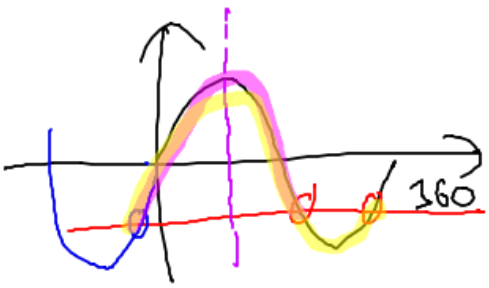
$\sin\theta = -\frac{\sqrt{2}}{2}$

$\theta = \sin^{-1}\left(\frac{\sqrt{2}}{2}\right)$

$= -45$

$180 - -45 = 225°$

$360 + -45 = 315°$



b) $5\cos\theta - 1 = 3$

$(+1)$

$5\cos\theta = 4$

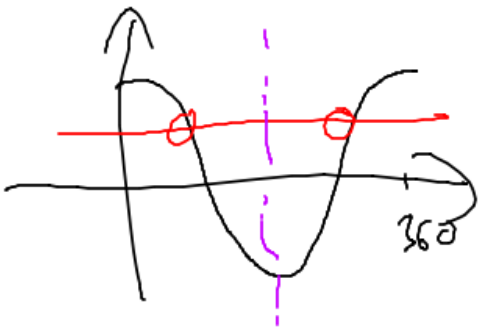
$(\div 5)$

$\cos\theta = \frac{4}{5}$

$\theta = \cos^{-1}\left(\frac{4}{5}\right)$

$= 36.9°$

$360 - 36.9 = 323.1$



Exercise 1

Solve each of these equations for $0° \leq x \leq 360°$

a $\cos x = 0.3$ **b** $\cos x = 1$ **c** $\cos x = -0.9$ **d** $\cos x = -\frac{1}{4}$

Exercise 2

Solve each of these equations for $-360° \leq x \leq 360°$

a $\sin x = 0.5$ **b** $\sin x = -\frac{3}{4}$ **c** $\sin x = \frac{\sqrt{2}}{2}$ **d** $\sin x = -\frac{1}{3}$

Exercise 3

Solve each of these equations for $-360° \leq \theta \leq 360°$

a $\cos\theta = \frac{1}{2}$ **b** $\cos\theta = -\frac{1}{3}$ **c** $\cos\theta = 0.15$ **d** $\cos\theta = -0.18$

Exercise 4

Solve each of these equations for $0° \leq \theta \leq 360°$

a $3\cos\theta + 5 = 7$ **b** $2 + 5\sin\theta = 4$ **c** $5 - 3\tan\theta = 1$ **d** $6\cos\theta + 5 = 2$