

## Level 2 Mathematics, 2009

### 90292 Solve straightforward trigonometric equations

#### Question One

Solve the following trigonometric equations

a)  $\cos x - 0.5 = 0.2, 0 \leq x \leq 360^\circ$

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b)  $2\tan x = 0.5, 0 \leq x \leq 2\pi$

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c)  $2\tan^2 x = 0.125, 0 \leq x \leq 2\pi$

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d)  $\sin^2 x + \sin x = 0, 0 \leq x \leq 2\pi$

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Question 2

a) Solve the equation

i)  $\sin x + 1.3 = 2, \quad 0 \leq x \leq 2\pi.$

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ii)  $\tan x/3 = 1.75, \quad 0 \leq x \leq 2\pi.$

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b) The temperature in a heated hot house has an average temperature of  $24^\circ \text{C}$ . The gardener records the temperature,  $T$ , over an hour and  $t$  is the time in minutes since the timing began. She finds the model

$$T = \sin \pi t/30 + 24$$

provides a good approximation.

For how long was the temperature above  $24.5^\circ$  during the hour.

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- c) The temperature  $T$  in a glass house, that is not heated, ranged from  $6^{\circ}$  to  $32^{\circ}$  over a 24 hour period on the 5<sup>th</sup> November.

The temperature can be modelled by a trigonometrical function of the form

$$T = A \sin Bt + C.$$

where  $t$  is the time in hours since midnight on the 5<sup>th</sup> November

Give the equation of the model and find the temperature at 8 am.

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Achievement Standard 90292

Question No.	Achievement	Achievement with Merit	Achievement with Excellence	Judgement
	Solve straight-forward trigonometric equations	Solve trigonometric equations	Solve multi-step trigonometric problems.	<b>A single judgement grade is to be awarded for each question</b>
1a	45.6, 314.4 <sup>0</sup> ,			A - 1 of 1a, 1b, and 1c achievement evidence
1b	0.24, 3.39	0.24, 3.39, 2.9, 6.03		M - A plus 1c or 1d merit evidence
1c	0.24, 3.39			E - 1d
1d		Consistent solution for x from a numerical or algebraic error	$\sin x(\sin x + 1) = 0$ $\sin x = 0$ or $-1$ $0, \pi, 3\pi/2$	
2ai	0.78, 2.34			A - 1 of 2ai, 2a ii, and 2b achievement evidence
2a ii	3.154			M - A plus 2b or 2c merit evidence
2b	t = 5 or 25	20 min		E - 2c
2c		2 pronumerals correct	$T = 13 \sin \pi t/12 + 19$ At 8 am 30.26°	
Sufficiency	Achievement 2A	Achievement with Merit 1M and 1A or higher	Achievement with Excellence 1 E and 1 M or higher	