

Introduction To Trigonometric Equations Exam Questions

Q1, (OCR 4752, Jan 2005, Q3)

At least 1 period of sine curve
Sine curve from 0 to 360

191.537 rot to 3 or more sf
348.463 rot to 3 or more sf

G1		
G1	± 1 indicated	
B1	After B1 B1, -1 for extras in the range	4
B1	SC1 for 192.8 and 347.2 (grads) SC1 for 180.2 and 359.8 (radians)	

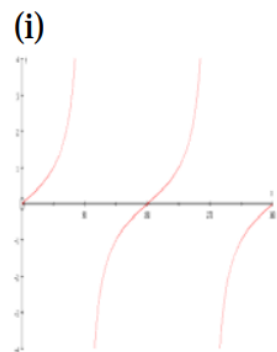
Q2, (OCR 4752, Jun 2005, Q8)

(i) 66° or 66.4 or 66.5....
293.58 to 3 or more sf cao

(ii) stretch (one way)
parallel to the x -axis
sf 0.5

B1	Allow 1.16 or 73.8	
B1	Lost for extras in range. Ignore extras outside the range	
1		5
1	Horizontal, from y axis, in x axis, oe	
1		

Q3, (OCR 4752, Jan 2006, Q5)



(ii) 36.8 to 36.9 and 216.8 to 216.9

2	no numbers required on axes unless more branches shown. G1 for a correct first sweep	5
M1		
A1A1	Allow 37, 217	

Q4, (OCR 4752, Jun 2006, Q7)

(i) sketch of correct shape
correct period and amplitude

period halved for $y = \cos 2x$;
amplitude unchanged

(ii) 30, 150, 210, 330

G1	Not ruled lines	
G1	need 1 and -1 indicated; nos. on horiz axis not needed if one period shown	
G1		
B2	B1 for 2 of these, ignore extras outside range.	5

Q5, (OCR 4722, Jun 2013, Q2)

(i)		$\frac{1}{2}x = 53.1^\circ, 126.9^\circ$ $x = 106^\circ, 254^\circ$	<p>B1 Obtain 106°, or better</p> <p>M1 Attempt correct solution method to find second angle</p> <p>A1 Obtain 254°, or better</p> <p>[3]</p>	<p>Allow answers in the range $[106.2, 106.3]$ Ignore any other solutions for this mark Must be in degrees, so 1.85 rad is B0</p> <p>Could be $2(180^\circ - \text{their } 53.1^\circ)$ or $(360^\circ - \text{their } 106^\circ)$ Allow valid method in radians, but M0 for eg $(360 - 1.85)$</p> <p>Allow answers in the range $[253.7^\circ, 254^\circ]$ A0 if in radians (4.43) A0 if extra incorrect solutions in range</p> <p>SR If no working shown then allow B1 for 106° and B2 for 254° (max B2 if additional incorrect angles)</p>
(ii)		$\tan x = 3$ $x = 71.6^\circ, 252^\circ$	<p>B1 State $\tan x = 3$</p> <p>M1 Attempt to solve $\tan x = k$</p> <p>A1 Obtain 71.6° and 252°, or better</p> <p>[3]</p>	<p>Allow B1 for correct equation even if no, or an incorrect, attempt to solve Give BOD on notation eg $\frac{\sin}{\cos}(x)$ as long as correct equation is seen or implied at some stage</p> <p>Not dep on B1, so could gain M1 for solving eg $\tan x = \frac{1}{3}$ Could be implied by a correct solution</p> <p>A0 if extra incorrect solutions in range</p> <p>Alt method: B1 Obtain $10\sin^2 x = 9$ or $10\cos^2 x = 1$ M1 Attempt to solve $\sin^2 x = k$ or $\cos^2 x = k$ (allow M1 if just the positive square root used) A1 Obtain 71.6° and 252°, with no extra incorrect solutions in range</p> <p>SR If no working shown at all then allow B1 for each correct angle (max B1 if additional incorrect angles), but allow full credit if $\tan x = 3$ seen first</p>

Q6, (OCR 4722, Jun 2016, Q9i,ii)

(i)	$\frac{2\pi}{a}$	B1	State $\frac{2\pi}{a}$	Any exact equiv Allow in degrees ie $\frac{360}{a}$ B0 if given as a range eg $0 \leq x \leq \frac{2\pi}{a}$
(ii)	$\frac{1}{5}\pi a = \pi - \frac{2}{5}\pi a$ hence $a = \frac{5\pi}{3}$ $k = \frac{1}{2}\sqrt{3}$ Alternative solution $\sin(\frac{1}{5}\pi a) = \sin(\frac{2}{5}\pi a)$ $\sin(\frac{1}{5}\pi a) = 2\sin(\frac{1}{5}\pi a)\cos(\frac{1}{5}\pi a)$ $2\cos(\frac{1}{5}\pi a) = 1$, hence $\frac{1}{5}\pi a = \frac{\pi}{3}$ $a = \frac{5\pi}{3}$ $k = \frac{1}{2}\sqrt{3}$	M1 A1 A1 [3] M1 A1 A1	Attempt to use symmetry of sine curve, or equiv Obtain $a = \frac{5\pi}{3}$ Obtain $k = \frac{1}{2}\sqrt{3}$ Attempt to use correct $\sin 2A$ identity Obtain $a = \frac{5\pi}{3}$ Obtain $k = \frac{1}{2}\sqrt{3}$	Allow any correct relationship between the two solutions, in radians or degrees Could also identify that the period must be $\frac{6}{5}\pi$ Any exact equiv CWO, but allow working in degrees Any exact equiv, but not involving sin CWO, but allow working in degrees A0 if from incorrect a As far as $2\cos(\frac{1}{5}\pi a) = 1$