MEMORANDUM

Name: ..... Class: .....

Date: .....

MARK ____ / 21

Answer all questions. Show all your working — marks are awarded for method as well as the final answer. **Teacher copy: accept any correct equivalent method.**

1 Write down the amplitude of $y = 2\sin x$. (1)

2 ✓ (1)

2 Write down the period of $y = \sin x$. (1)

360° ✓ (1)

3 Write down the range of $y = 2\sin x + 1$. (2)

$-1 \leq y \leq 3$ ✓✓ (2)

4 Describe the transformation from $y = \cos x$ to $y = \cos x + 1$. (2)

A shift of **1 unit upwards** ✓✓ (2)

5 Write down the equations of the asymptotes of $y = \tan x$ for $x \in [0° ; 360°]$. (2)

$x = 90°$ **and** $x = 270°$ ✓✓ (2)

6 Write down the maximum value of $y = 3\cos x - 1$. (2)

$3 - 1 = 2$ ✓✓ (2)

7 For what value of x in $[0° ; 360°]$ does $y = \sin x$ reach its minimum? (1)

$x = 270°$ ✓ (1)

8 What does a negative value of a do to $y = a\sin x$? (1)

It **reflects the graph in the x-axis.** ✓ (1)

9 The graph of $y = a\sin\theta + q$, where $a > 0$, has a maximum value of 7 and a minimum value of 1. Determine the values of a and q, and write down the equation of the graph. (3)

$q = \frac{7+1}{2} = 4$ ✓; $a = \frac{7-1}{2} = 3$ ✓; $y = 3\sin\theta + 4$ ✓ (3)

10 The graph of $y = a\cos\theta + q$, where $a > 0$, has a range of $[-5\ ;\ 3]$. Determine a and q. **(3)**

> $q = \frac{3 + (-5)}{2} = -1$ ✓; $a = \frac{3 - (-5)}{2} = 4$ ✓; so $y = 4\cos\theta - 1$ ✓ **(3)**

11 A cosine graph passes through a MINIMUM at $\theta = 0°$ and has amplitude 2 with no vertical shift. Write down its equation and explain the sign of a. **(3)**

> $y = -2\cos\theta$ ✓✓; a is negative because an ordinary cosine graph starts at a maximum — starting at a minimum means it has been reflected in the θ-axis ✓ **(3)**

TOTAL: 21 marks

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