Name:
Result:

1. Calculate the exact value of the following expression: [3 *points*]

$$\frac{\cos(\frac{14\pi}{3}) \times \sin(\frac{21\pi}{2})}{\tan(\frac{19\pi}{4}) \times \cos(-\frac{2\pi}{3})}$$

NO GDC

2. Angle α and β are such that $0 < \alpha < \frac{\pi}{2}$ and $\frac{\pi}{2} < \beta < \frac{3\pi}{2}$. Furthermore $\tan\alpha = 2$ and $\sin\beta = \frac{1}{3}$. Calculate the exact value of $\cos\alpha \times \tan\beta$. [4 *points*]

NO GDC

3. Solve the following equations for $0 \leqslant \theta \leqslant 2\pi$ [7 *points*]

(a) $3\tan^2 x - 1 = 0$

(b) $4\cos(2x) - 1 = 1$

(c) $2\cos^2 x = 7\sin x + 5$

NO GDC

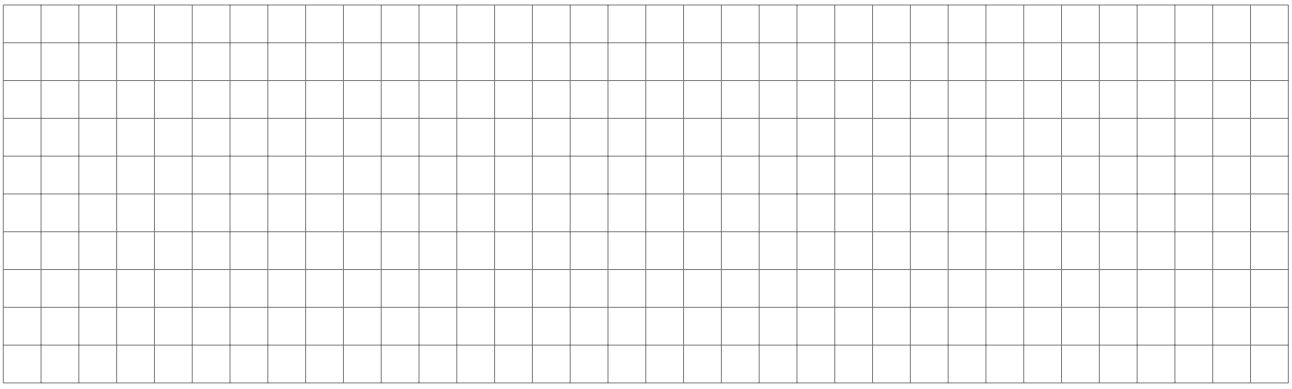
4. The depth of water (in metres) in an harbour can be modelled by the function:

$$d(t) = 1.2 \sin\left(\frac{\pi}{6}(t-1)\right) + 6$$

where t is time in hours past 6 a.m. [6 *points*]

(a) State the greatest depth of the water according to the model and the first time past 6 a.m. at which it occurs.

(b) Sketch the graph of $d(t)$ for $0 \leqslant t \leqslant 24$.



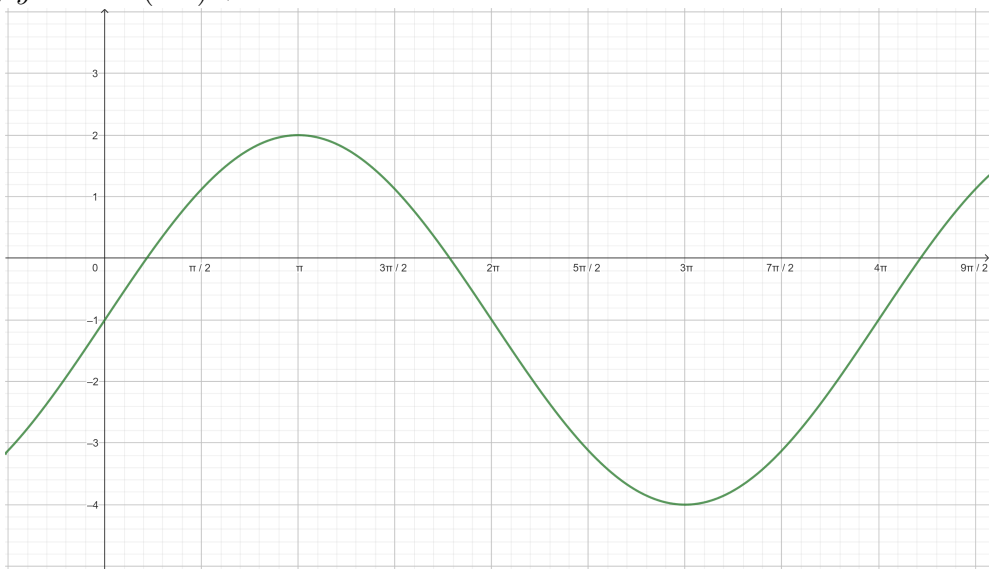
(c) Solve the equation $d(t) = 6.6$ for $0 \leqslant t \leqslant 24$.

(d) The ship can enter the harbour if the depth is greater than 6.6 metres. Calculate for how long during a 24 hour window can the ship enter the harbour.

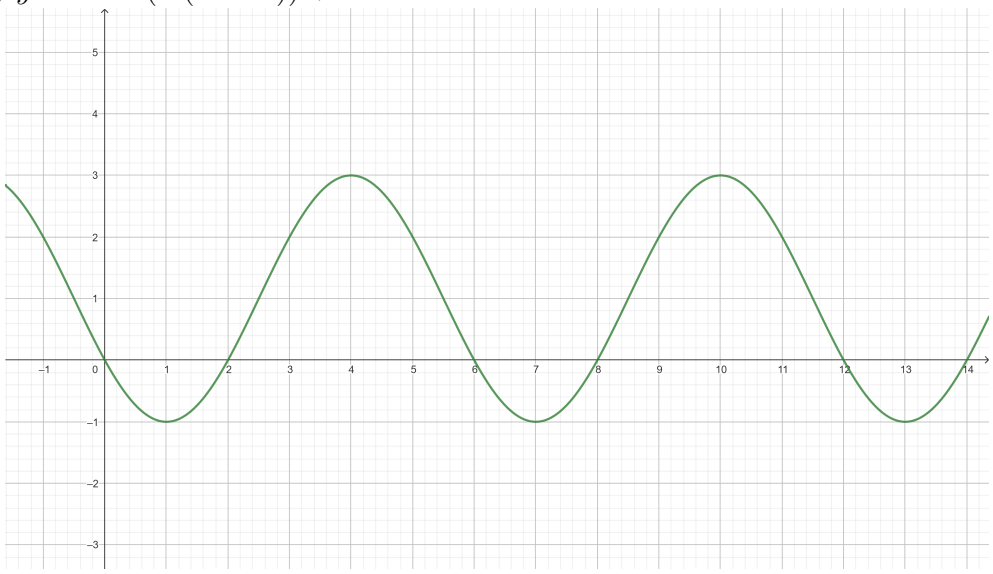
NO GDC

5. Find the constants A, B, C and D. Where $A, B, D \in \mathbb{R}$ and C is the least possible positive integer. [5 *points*]

(a) $y = A\sin(Bx) + D$



(a) $y = A\cos(B(x - C)) + D$



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