TASK 1 – REVIEW TEST SCORE: ___/30

NAME:_____

1. What are the solutions of $\sqrt{3}\tan x = -1$ for $0 \le x \le 2\pi$? (1)

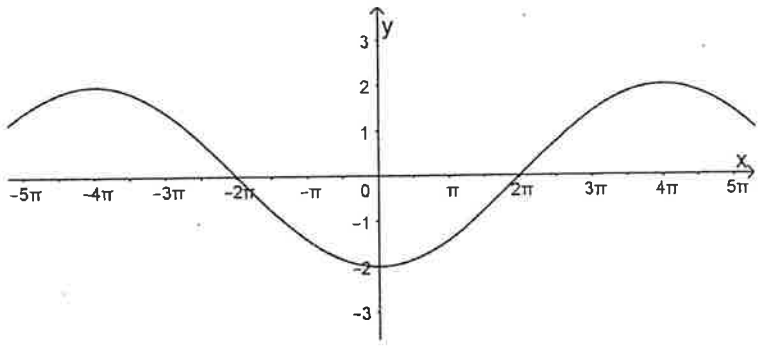
A $x = \frac{\pi}{3}$ or $x = \frac{2\pi}{3}$

B $x = \frac{\pi}{6}$ or $x = \frac{11\pi}{6}$

C $x = \frac{2\pi}{3}$ or $x = \frac{5\pi}{3}$

D $x = \frac{5\pi}{6}$ or $x = \frac{11\pi}{6}$

2. Which of the following is the correct equation for the graph shown? (1)



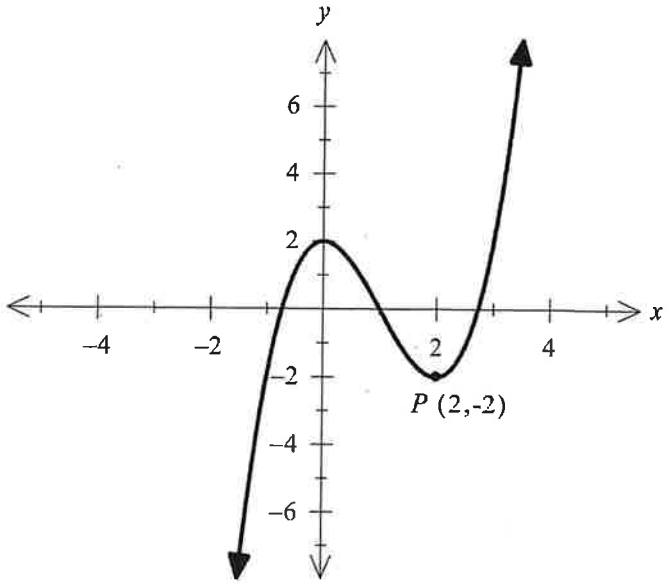
A. $y = -2\sin\left(\frac{x}{4} + \frac{\pi}{2}\right)$

B. $y = 2\sin\left(\frac{x}{4} - \frac{\pi}{4}\right)$

C. $y = -2\sin\left(\frac{x}{2} + \frac{\pi}{2}\right)$

D. $y = 2\sin\left(\frac{x}{4} + \frac{\pi}{4}\right)$

3. P lies on the graph of $y = f(x)$ as shown on the diagram below. A transformation maps the graph of $f(x)$ to $g(x)$ such that $g(x) = 2f(1-2x)$. The same transformation maps the point P to P'. (1)



What are the coordinates of P'?

A. $(2,-6)$

B. $\left(\frac{-1}{2},-4\right)$

C. $\left(\frac{1}{2},-4\right)$

D. $(-2,-4)$

4. What is the derivative of e^{x^6}? (1)

(A) $6x^5e^{x^6}$

(B) $6xe^{x^6}$

(C) $6x^5e^{6x^5}$

(D) $x^6e^{x^6-1}$

5. (3)

Find the gradient of the normal to the curve $y = \frac{(4 - x^2)}{e^{3x}}$ at the point $(0, 4)$.

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6. A bottle of vintage wine cost \$375 when first released. After t years its value, $\$V$, is given by $V = 375e^{0.05t}$.

(a) Find the value of the bottle of wine after 7 years, correct to the nearest dollar. (1)

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(b) Find how many years it takes for the value of the wine to increase to \$1200 per bottle. Round your answer to 1 decimal place. (2)

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(c) What is the rate of increase in the value of the wine 7 years after it was first released? Round your answer to 1 decimal place. (2)

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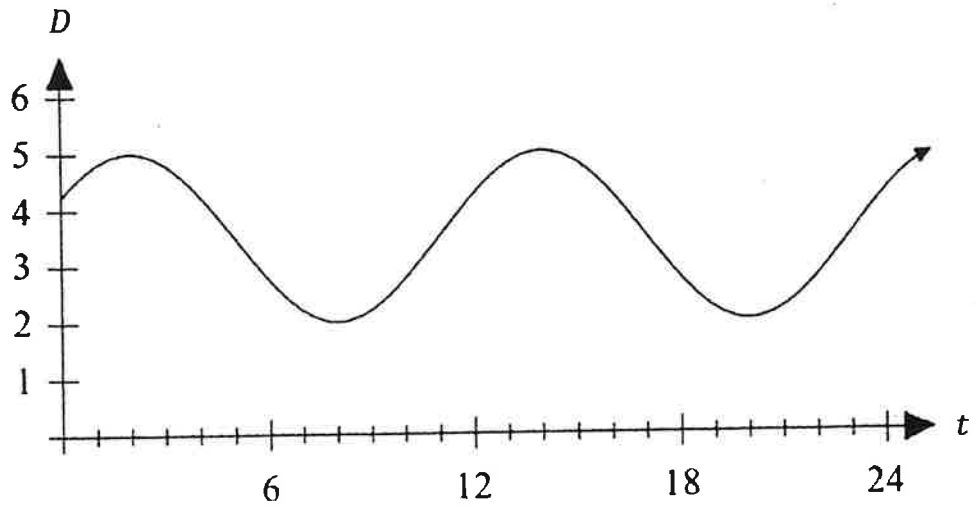
7.

The water level in an estuary is cyclical, with a maximum depth of 5 metres, a minimum depth of 2 metres, and the cycle repeats every 12 hours.

The last high tide was at 2:00 am.

The function of the form $D = k\cos\frac{\pi}{6}(t + b) + c$ models the water depth, where D is the water depth (in metres), t is the hours since 12:00 am (midnight) and k, b and c are constants.



(a) Determine the values of k, b and c. (3)

(b) Using the graph or otherwise, when is the water level less than 3m in the 24 hour period? (2)

8. The graph of $y = x^2$ is transformed into the graph of $y = 3x^2 + 24x + 33$ by the transformations: (3)

- A vertical stretch with scale factor k followed by
- A horizontal translation of p units followed by
- A vertical translation of q units

Write down the values of k, p and q.

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9. The velocity of a particle moving along the $x-$axis is given by:

$$\dot{x} = 8 - 8e^{-2t}$$

where t is the time in seconds and x is the displacement in metres.

(a) Show that the particle is initially at rest. (1)

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(b) Show that the acceleration of the particle is always positive. (1)

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(c) Sketch the graph of the particle's velocity as a function of time. (2)

10. Solve $\log_e x - \frac{3}{\log_e x} = 2$ giving your answers in exact form. (3)

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11. Sketch $f(x) = \frac{1-x}{x-2}$. Clearly label asymptotes, x and y intercepts. (2)

Hence or otherwise, solve for x, where $\frac{1-x}{x-2} > 0$ (1)