
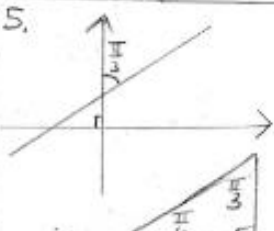


New Higher Unit 1 Test Practice

1. $M_{AB} = \frac{3+1}{8-2}$ $M_B = -\frac{3}{2}$ Midpoint $(\frac{2+8}{2}, \frac{-1+3}{2})$ $y-1 = \frac{-3}{2}(x-5)$
 $= \frac{4}{6}$ $= \frac{2}{3}$ $= (5, 1)$ $2y-2 = -3x+15$
 $2y = -3x+17$

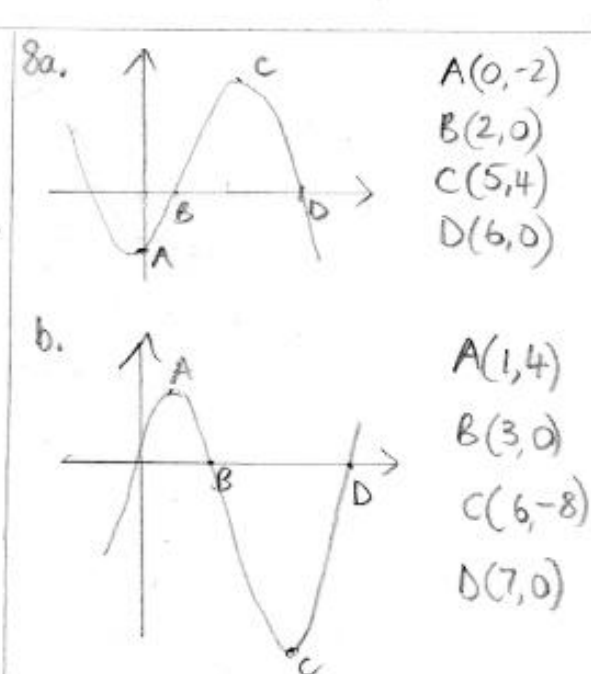
2. $3y = -2x+5$ $y+1 = \frac{-2}{3}(x-2)$ 3. $2y = -3x-5$ $y+5 = \frac{-3}{2}(x-3)$
 $y = \frac{-2}{3}x + \frac{5}{3}$ $3y+3 = -2x+4$ $y = \frac{-3}{2}x - \frac{5}{2}$ $2y+10 = -3x+9$
 $m = \frac{-2}{3}$ $3y = -2x+1$ $m = \frac{-3}{2}$ $2y = -3x-1$

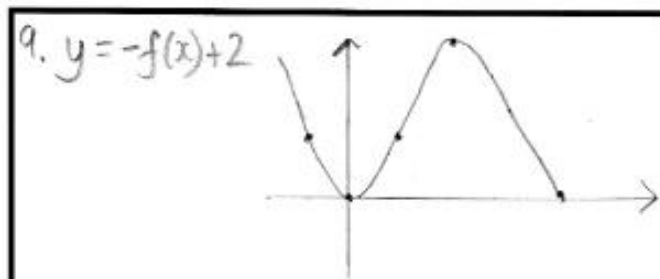
4. $m = \frac{2+1}{3\sqrt{3}-0}$ $m = \tan \theta$ 
 $= \frac{3}{3\sqrt{3}}$ $\tan \theta = \frac{1}{\sqrt{3}}$ $\theta = 30^\circ$
 $= \frac{1}{\sqrt{3}}$ $\alpha = 30^\circ$

5. 
 $m = \tan \theta$
 $= \tan \frac{\pi}{6}$
 $= \frac{1}{\sqrt{3}}$

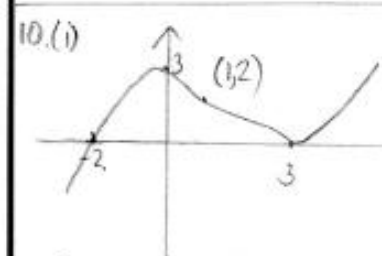
6a. $p(x) = f(g(x))$ b. $p(q(x)) = p(\frac{3}{3-x})$ $\therefore q(x)$ is the inverse of $p(x)$
 $= f(\frac{3}{x})$ $= 3(\frac{3}{3-x} - \frac{3-x}{3-x})$
 $= 3 - \frac{3}{x}$ $= \frac{3}{3-x}$
 $= \frac{3x-3}{x}$ $= 3(\frac{x}{3-x}) \div \frac{3}{3-x}$
 $= \frac{3x-3}{x}$ $= \frac{3x}{3-x} \times \frac{3-x}{3}$
 $= \frac{3(x-1)}{x}$ $= \frac{3x}{3}$
 $= \underline{\underline{x}}$

7a. $h(x) = g(f(x))$ b. $x^2-4=0$
 $= g(\frac{1}{x^2-4})$ $x^2=4$
 $= 2(\frac{1}{x^2-4})+1$ $x = \pm 2$
 $= \frac{2}{x^2-4} + \frac{x^2-4}{x^2-4}$ $x \in \mathbb{R}; x \neq \pm 2$
 $= \frac{x^2-2}{x^2-4}$



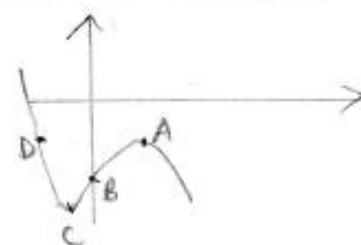


- $(-1, 2)$ $(3, 2)$
- $(0, 0)$ $(4, 0)$
- $(1, 2)$
- $(2, 3)$



- D(-2,0)
- C(0,3)
- B(1,2)
- A(3,0)

- (ii)
- D(-3,-2)
 - C(-1,-5)
 - B(0,-4)
 - A(2,-2)



11a. $f(g(x)) = f(2x-4)$
 $= (2x-4)^3$
 $= (2x-4)(4x^2-16x+16)$
 $= 8x^3 - 32x^2 + 64x - 16x^2 + 64x - 64$
 $= 8x^3 - 48x^2 + 128x - 64$

b. $k(h(x)) = k(5x)$
 $= \underline{\underline{\tan 5x}}$

12. $y = a^x$
 $3 = a^1$
 $\underline{\underline{a = 3}}$

13. $\underline{\underline{y = \log_2 x}}$

14. $y = \frac{x^5 - 3}{x^3 - x^3}$
 $y = x^2 - 3x^{-3}$

$\frac{dy}{dx} = 2x + 9x^{-4}$
 $= 2x + \frac{9}{x^4}$
 $\underline{\underline{\hspace{2cm}}}$

15. $y = x^2 - 5x + 6$ When $x = 5$, $\frac{dy}{dx} = 2x - 5$
 $\frac{dy}{dx} = 2x - 5$
 $\underline{\underline{m = 5}}$

16a. $y = 3\sin x$
 $\underline{\underline{\frac{dy}{dx} = 3\cos x}}$

b. $y = \frac{1}{3}\cos x$
 $\underline{\underline{\frac{dy}{dx} = -\frac{1}{3}\sin x}}$

c. $y = 3 - 4\cos x$
 $\underline{\underline{\frac{dy}{dx} = 4\sin x}}$

17a. $\underline{\underline{y = \sin x - 2}}$ b. $\underline{\underline{y = \frac{1}{2}\cos x}}$

18a. $V_{n+1} = 0.3V_n + 4$ has a limit because $-1 < 0.3 < 1$.

b. $L = \frac{4}{1-0.3}$
 $= \frac{4}{0.7}$
 $= \frac{40}{7}$

c. $U_{n+1} = 3U_n - 0.4$, $U_0 = 1$
 $U_1 = 2.6$
 $U_2 = 7.4$
 $U_3 = 21.8$ — $U_7 = 1749.8$
 $n = 7$

19a. $U_{n+1} = 0.75U_n + 1$, $U_0 = 0$
 $U_1 = 1$, $U_2 = 1.75$, $U_3 = 2.3125$
 After 3 weeks

b(i) See a. (ii) $L = \frac{1}{0.25}$
 $= 4$
 Yes it is safe as the level will