

# New Higher Unit 1 Test Practice

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

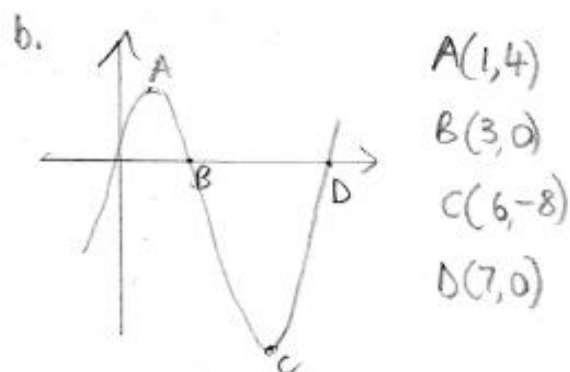
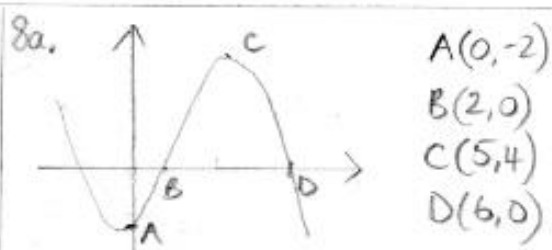
2.  $3y = -2x+5$     $y+1 = \frac{-2}{3}(x-2)$    3.  $2y = -3x-5$     $y+5 = \frac{-3}{2}(x-3)$   
 $y = \frac{-2}{3}x + \frac{5}{3}$     $3y+3 = -2x+4$     $y = \frac{-3}{2}x - \frac{5}{2}$     $2y+10 = -3x+9$   
 $m = \frac{-2}{3}$     $3y = -2x+1$     $m = \frac{-3}{2}$     $2y = -3x-1$

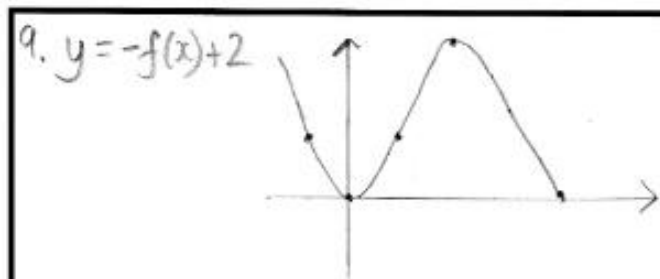
4.  $m = \frac{2+1}{3\sqrt{3}-0}$     $m = \tan \theta$     $\tan \theta = \frac{1}{\sqrt{3}}$     $\theta = 30^\circ$   
 $= \frac{3}{3\sqrt{3}}$     $= \frac{1}{\sqrt{3}}$     $\alpha = 30^\circ$

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

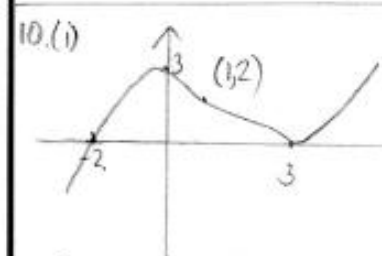
6a.  $p(x) = f(g(x))$    b.  $p(q(x)) = p(\frac{3}{3-x})$     $\therefore q(x)$  is the inverse of  $p(x)$   
 $= f(\frac{3}{x})$     $= 3(\frac{3}{3-x} - \frac{3-x}{3-x})$   
 $= 3 - \frac{3}{x}$     $= \frac{3}{3-x} \div \frac{3}{3-x}$   
 $= \frac{3x-3}{x}$     $= \frac{3x}{3-x} \times \frac{3-x}{3}$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

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



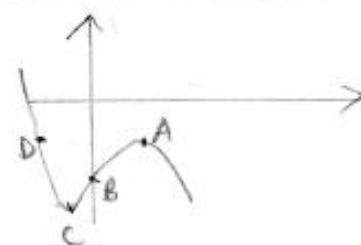


- $(-1, 2)$
- $(0, 0)$
- $(1, 2)$
- $(2, 3)$
- $(3, 2)$
- $(4, 0)$



- 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