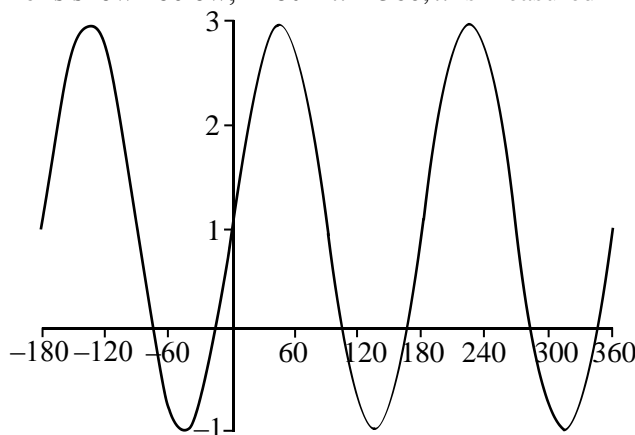


## Math Studies Function Review

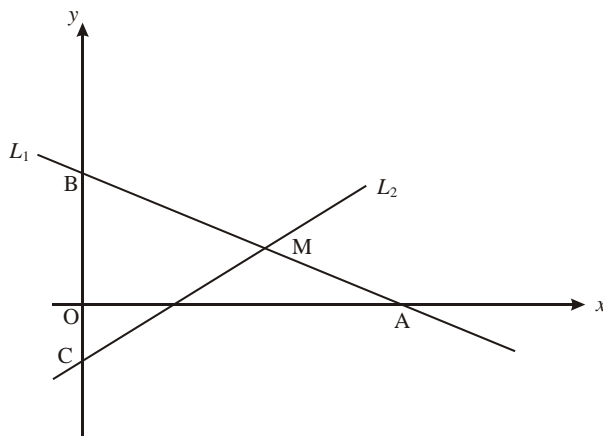
1. The graph of  $y = a \sin 2x + c$  is shown below,  $-180 \leq x \leq 360$ ,  $x$  is measured in degrees.



- (a) State:
- the period of the function;
  - the amplitude of the function.
- (b) Determine the values of  $a$  and  $c$ .
- (c) Calculate the value of the first **negative**  $x$ -intercept.
2. (a) Sketch the graph of the function  $f: x \mapsto 1 + 2 \sin x$ , where  $x \in \mathbb{R}, -360^\circ \leq x \leq 360^\circ$ .
- (b) Write down the range of this function for the given domain.
- (c) Write down the amplitude of this function.
- (d) On the same diagram sketch the graph of the function  $g: x \mapsto \sin 2x$ , where  $x \in \mathbb{R}, -360^\circ \leq x \leq 360^\circ$ .
- (e) Write down the period of this function.
- (f) Use the sketch graphs drawn to find the number of solutions to the equation  $f(x) = g(x)$  in the given domain.
- (g) Hence solve the equation  $1 + 2 \sin x = \sin 2x$  for  $0^\circ \leq x \leq 360^\circ$ .

3. The line  $L_1$  shown on the set of axes below has equation  $3x + 4y = 24$ .  $L_1$  cuts the  $x$ -axis at A and cuts the  $y$ -axis at B.

Diagram not drawn to scale



- (a) Write down the coordinates of A and B.  
M is the midpoint of the line segment [AB].
- (b) Write down the coordinates of M.  
The line  $L_2$  passes through the point M and the point C  $(0, -2)$ .
- (c) Write down the equation of  $L_2$ .
- (d) Find the length of
- MC;
  - AC.
- (e) The length of AM is 5. Find
- the size of angle CMA;
  - the area of the triangle with vertices C, M and A.

4. The cost  $c$ , in Australian dollars (AUD), of renting a bungalow for  $n$  weeks is given by the linear relationship  $c = nr + s$ , where  $s$  is the security deposit and  $r$  is the amount of rent per week. Ana rented the bungalow for 12 weeks and paid a total of 2925 AUD. Raquel rented the same bungalow for 20 weeks and paid a total of 4525 AUD. Find the value of
- $r$ , the rent per week;
  - $s$ , the security deposit.

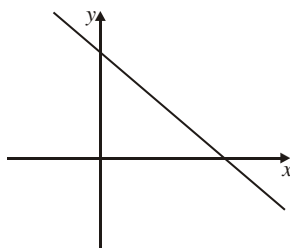
5. The diagrams below are sketches of some of the following functions.

- $y = a^x$
- $y = x^2 - a$
- $y = a - x^2$
- $y = a - x$
- $y = x - a$

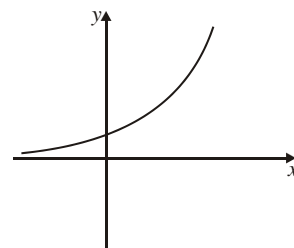
Complete the table to match each sketch to the correct function.

Sketch	Function
(a)	
(b)	
(c)	
(d)	

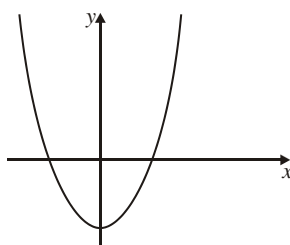
(a)



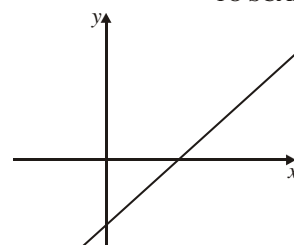
(b)



(c)



(d)



DIAGRAMS NOT TO SCALE

6. The following diagram shows the graph of  $y = 3^{-x} + 2$ . The curve passes through the points  $(0, a)$  and  $(1, b)$ .

(a) Find the value of

- $a$ ;
- $b$ .

b) Write down the equation of the asymptote to this curve.

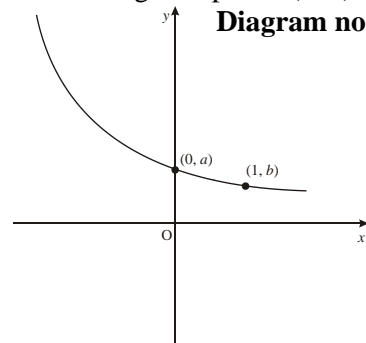
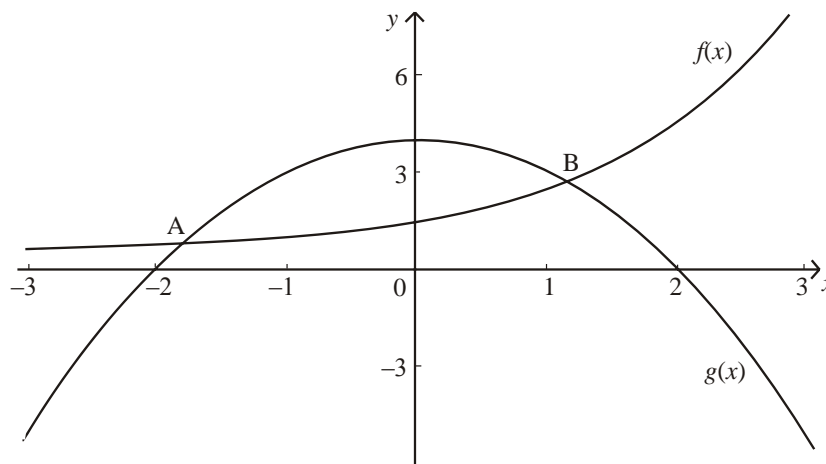


Diagram not to scale

7. The figure below shows the graphs of the functions  $f(x) = 2^x + 0.5$  and  $g(x) = 4 - x^2$  for values of  $x$  between  $-3$  and  $3$ .



- Write down the coordinates of the points A and B.
- Write down the set of values of  $x$  for which  $f(x) < g(x)$ .