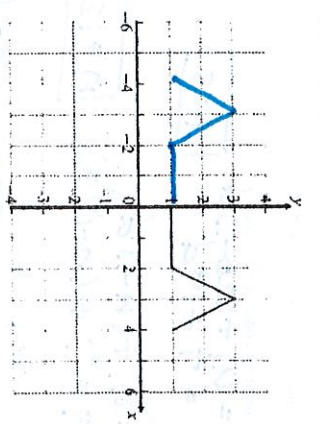


1. Consider the graph of  $f$  shown below.



a) Sketch  
 $y = f(-x)$

Key

The following four diagrams show images of  $f$  under different transformations.

Diagram A

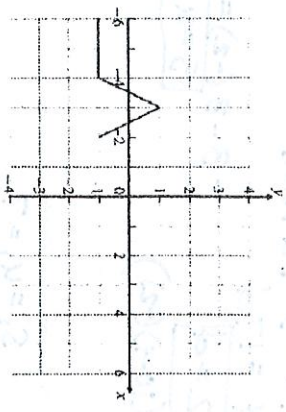


Diagram B

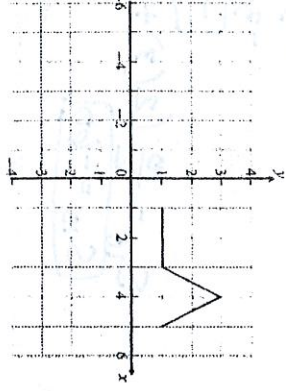


Diagram C

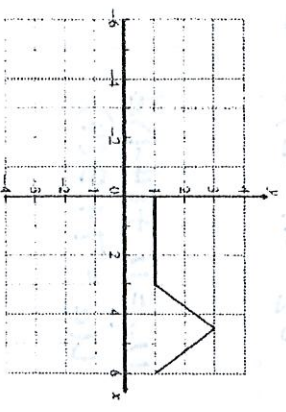
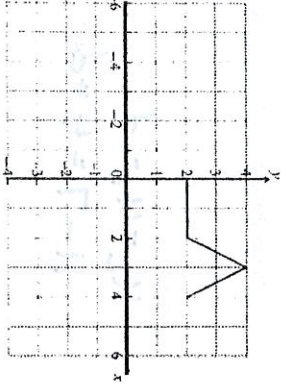


Diagram D



(b) Complete the following table.

Description of transformation	Diagram letter
Horizontal stretch with scale factor 1.5	C
Maps $f$ to $f(x) + 1$	D

(2)

(c) Give a full geometric description of the transformation that gives the image in Diagram A.

down 2  
left 6

$f(x+b)-2$

(Total 6 marks) (2)

2. An arithmetic series has five terms. The first term is 2 and the last term is 32. Find the sum of the series.

Working:

$$a_1 = 2 \quad a_5 = 32$$

$$a_5 = a_1 + (5-1)d$$

$$32 = 2 + 4d$$

$$\frac{30}{4} = d$$

$$\frac{15}{2} = d$$

Answer:

$$S_5 = 85$$

(Total 4 marks)

3. In an arithmetic sequence, the first term is -2, the fourth term is 16, and the  $n^{\text{th}}$  term is 11998.

- (a) Find the common difference  $d$ .  
 $a_1 = -2 \quad a_4 = 16$   
 $a_n = 11998$
- (b) Find the value of  $n$ .

Working:

$$a_4 = a_1 + (4-1)d$$

$$16 = -2 + 3d$$

$$18 = 3d$$

$$6 = d$$

$$a_n = a_1 + (n-1)d$$

$$11998 = -2 + (n-1)6$$

$$n = 2001$$

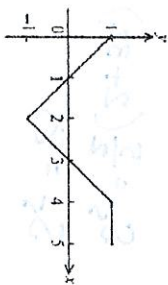
Answers:

(a)  $d = 6$

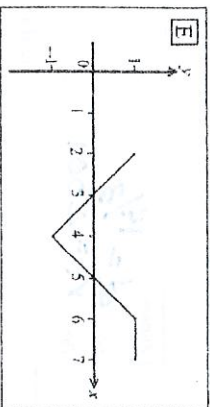
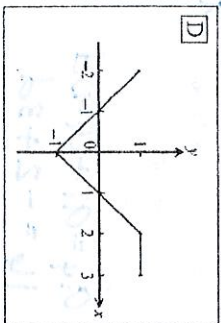
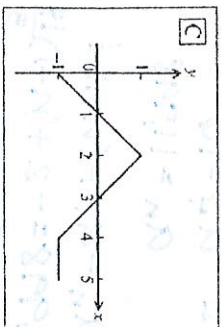
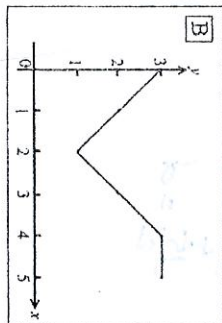
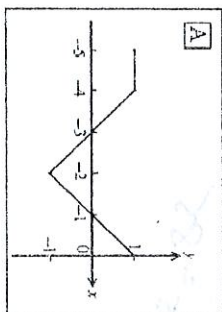
(b)  $n = 2001$

(Total 6 marks)

4. The following diagram shows part of the graph of  $f(x)$ .



Consider the five graphs in the diagrams labelled A, B, C, D, E below.



- (a) Which diagram is the graph of  $f(x+2)$ ? **D**
- (b) Which diagram is the graph of  $-f(x)$ ? **C**
- (c) Which diagram is the graph of  $f(-x)$ ? **A**

(Total 6 marks)

5. In an arithmetic sequence  $u_1 = 7$ ,  $u_{20} = 64$  and  $u_n = 3709$ .

(a) Find the value of the common difference. **(3)**

$$u_{20} = u_1 + (20-1)d$$

$$64 = 7 + 19d$$

$$\boxed{d=3}$$

(b) Find the value of  $n$ . **(2)**

$$u_n = u_1 + (n-1)d$$

$$3709 = 7 + (n-1)(3)$$

$$\boxed{n=1235}$$

(Total 5 marks)

6. In an arithmetic sequence  $u_2 = -37$  and  $u_4 = -3$ .

(a) Find **(1)**

- (i) the common difference,  $-37 = u_1 + 3d$   $-3 = u_1 + d$
- (ii) the first term.  $-37 = -3 - 3d + 20d$   $-34 = 17d$   $-2 = d$   $-3 - 3(-2) = u_1$   $3 = u_1$

(b) Find  $S_{10}$ . **(3)**

$$S_{10} = \frac{10}{2} (2(3) + (10-1)(-2))$$

$$\boxed{S_{10} = -60}$$

(Total 7 marks)

7. Let  $S_n$  be the sum of the first  $n$  terms of an arithmetic sequence, whose first three terms are  $u_1$ ,  $u_2$  and  $u_3$ . It is known that  $S_1 = 7$ , and  $S_2 = 18$ .

- (a) Write down  $u_1$ .  $S_1 = u_1 = 7$
- (b) Calculate the common difference of the sequence.  $S_2 = u_1 + u_2$ , so  $u_2 = 11$
- (c) Calculate  $u_4$ .

Workings:

$$u_2 - u_1 = d$$

$$11 - 7 = 4 = d$$

$$u_4 = u_1 + (4-1)d$$

$$u_4 = 7 + 3(4)$$

Answers:

- (a)  $u_1 = S_1 = 7$
- (b)  $d = 4$
- (c)  $u_4 = 19$

(Total 6 marks)