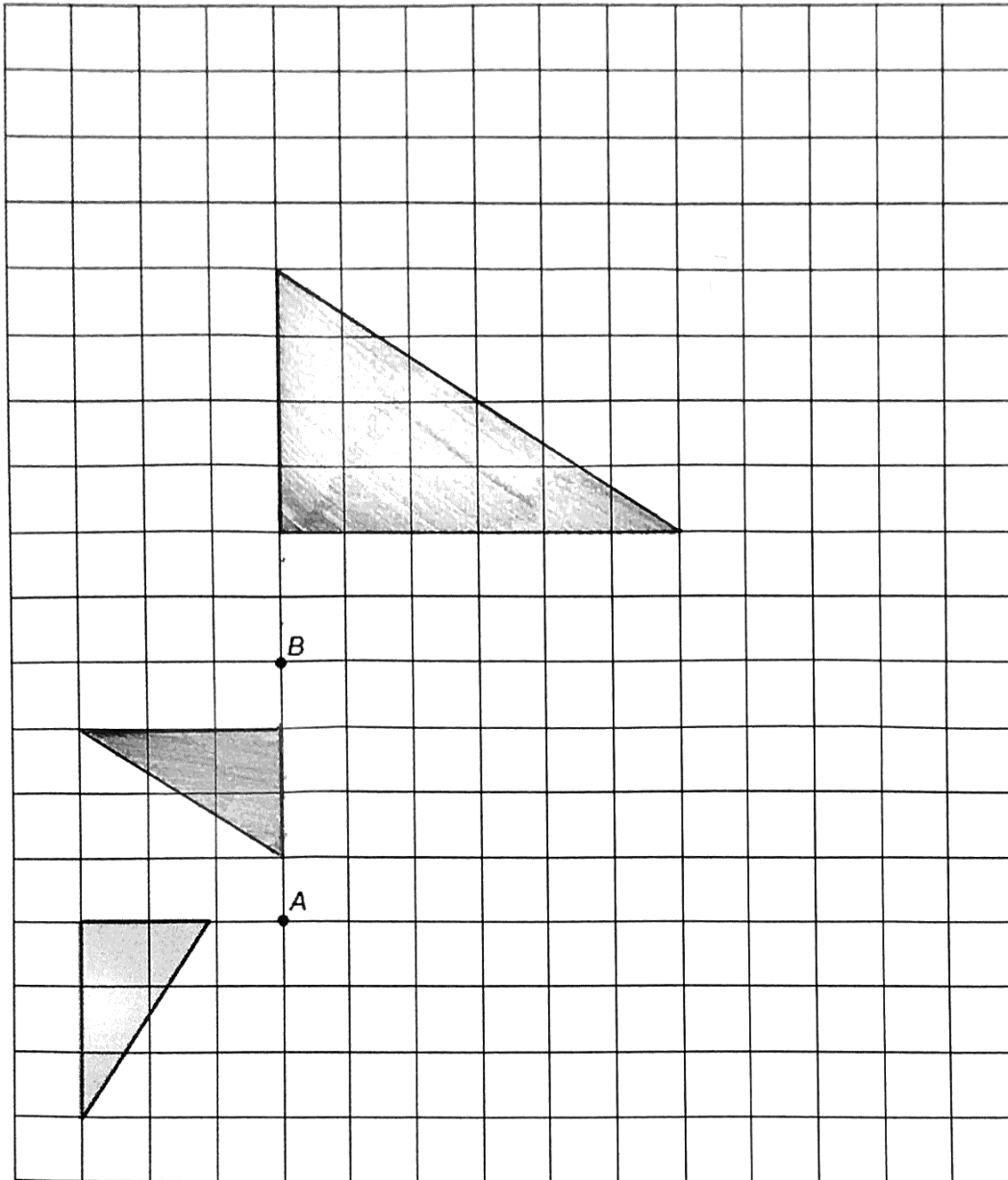


**End of Unit Test**  
**Transformations - HIGHER**

Name: Answers

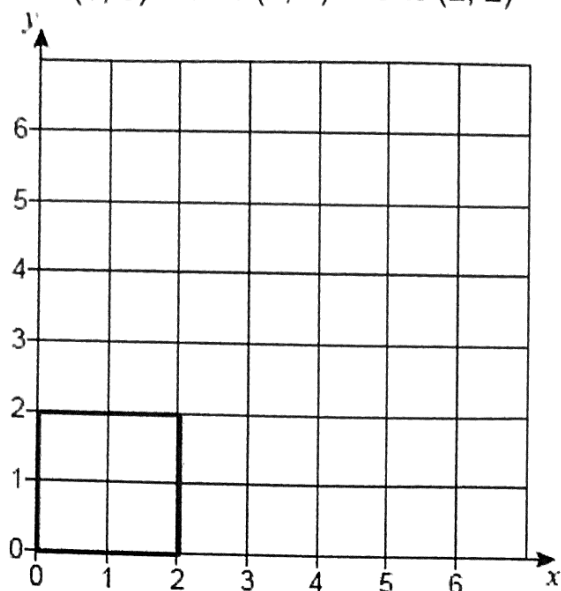


- 1) The shape is **rotated**  $90^\circ$  clockwise about point  $A$ .  
It is then **enlarged** by scale factor  $-2$ , centre  $B$ .  
Draw the final shape on the diagram.



(Total 3 marks)

- 2) Square  $OABC$  is drawn on a centimetre grid.  
 $O$  is  $(0, 0)$     $A$  is  $(2, 0)$     $B$  is  $(2, 2)$     $C$  is  $(0, 2)$



- (a)  $OABC$  is translated by the vector  $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$   
 Circle the number of invariant points on the perimeter of the square.

0                      1                      2                      4

(1)

- (b)  $OABC$  is enlarged, scale factor 2, centre  $(0, 0)$   
 Circle the number of invariant points on the perimeter of the square.

0                       1                      2                      4

(1)

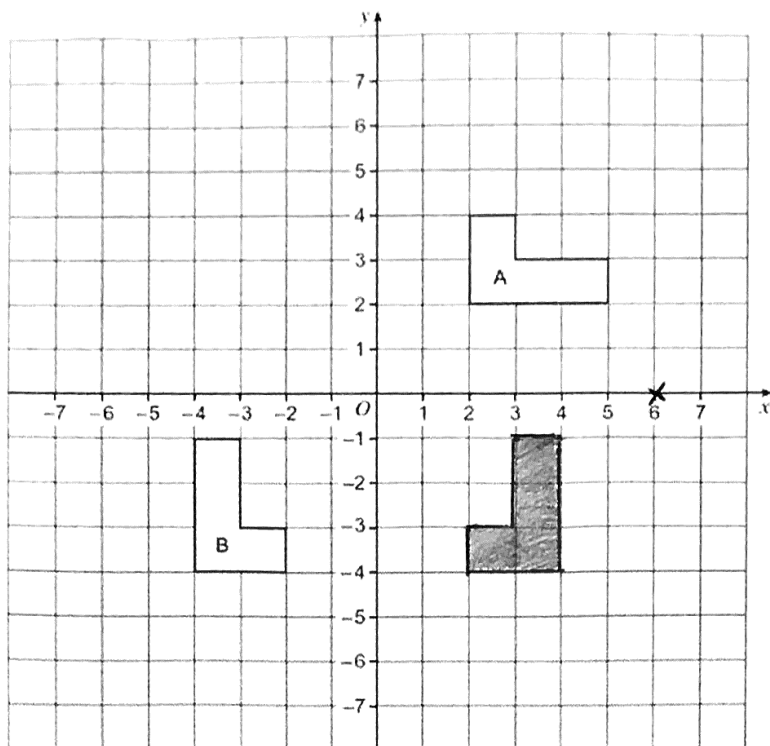
- (c)  $OABC$  is reflected in the line  $y = x$   
 Circle the number of invariant points on the perimeter of the square.

0                      1                      2                       4

(1)

(Total 3 marks)

- 3) The diagram shows shapes A and B.



Shape A is mapped onto shape B by a reflection in one of the axes followed by a rotation. Complete the sentence.

Shape A is mapped onto shape B by a reflection in  $x = 0$

followed by a rotation  $90^\circ$  clockwise about  $(6, 0)$

(Total 3 marks)

4)  $\mathbf{a} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$      $\mathbf{b} = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$

Circle the vector  $\mathbf{a} - \mathbf{b}$

$\begin{pmatrix} -3 \\ -5 \end{pmatrix}$

$\begin{pmatrix} 7 \\ 1 \end{pmatrix}$

$\begin{pmatrix} 3 \\ 1 \end{pmatrix}$

$\begin{pmatrix} 7 \\ -5 \end{pmatrix}$

(Total 1 mark)

- 5) Here are two column vectors.

$\mathbf{f} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$      $\mathbf{g} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$

Work out  $3\mathbf{f} - 2\mathbf{g}$

$\begin{pmatrix} 12 \\ 15 \end{pmatrix} - \begin{pmatrix} 10 \\ -4 \end{pmatrix}$

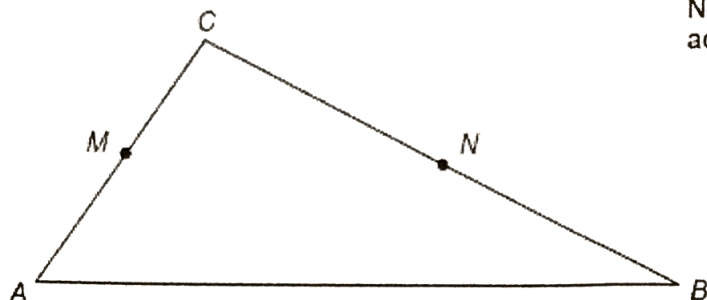
Answer  $\begin{pmatrix} 2 \\ 19 \end{pmatrix}$

(Total 2 marks)

- 6) In triangle  $ABC$   
 $M$  is the midpoint of  $AC$   
 $N$  is the point on  $BC$  where  $BN : NC = 2 : 3$

$$\vec{AC} = 2\mathbf{a}$$

$$\vec{AB} = 3\mathbf{b}$$



Not drawn accurately

- (a) Work out  $\vec{MN}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .  
 Give your answer in its simplest form.

$$\vec{AC} = 2\mathbf{a}$$

$$\vec{CB} = 3\mathbf{b} - 2\mathbf{a}$$

$$\vec{MN} = \frac{1}{2}\vec{AC} + \frac{3}{5}\vec{CB}$$

$$= \mathbf{a} + \frac{3}{5}(3\mathbf{b} - 2\mathbf{a})$$

$$= \mathbf{a} + \frac{9}{5}\mathbf{b} - \frac{6}{5}\mathbf{a}$$

Answer  $\frac{9}{5}\mathbf{b} - \frac{1}{5}\mathbf{a}$

(3)

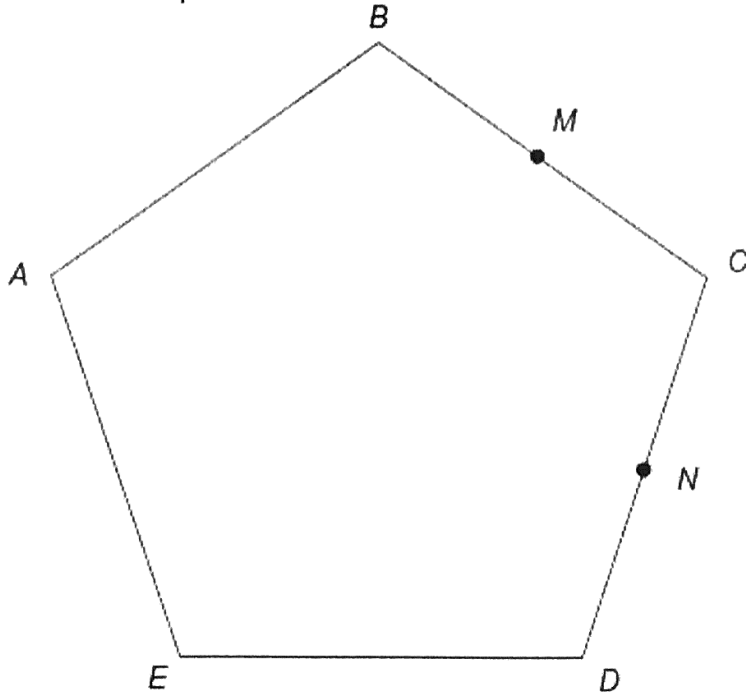
- (b) Use your answer to part (a) to explain why  $MN$  is **not** parallel to  $AB$ .

$$\left. \begin{array}{l} 3\mathbf{b} = 3(\mathbf{b}) \\ \frac{9}{5}\mathbf{b} - \frac{1}{5}\mathbf{a} = \frac{1}{5}(9\mathbf{b} - \mathbf{a}) \end{array} \right\} \text{No common factors.}$$

(1)

(Total 4 marks)

- 7)  $ABCDE$  is a pentagon.  
 $M$  is the midpoint of  $BC$ .  
 $N$  is the midpoint of  $CD$ .



$$\vec{BC} = x$$

$$\vec{CD} = y$$

- (a) Show that  $MN$  is parallel to  $BD$ .

$$\vec{BD} = x + y$$

$$\vec{MN} = \frac{1}{2}x + \frac{1}{2}y = \frac{1}{2}(x + y)$$

$x + y$  is a common factor  $\therefore$  parallel.

- (b) Write down the ratio  $BD : MN$  in its simplest form.

Answer  $2 : 1$

(1)

(Total 4 marks)

(Total for test = 20 marks)