

NAME : \_\_\_\_\_

# SOUTH SYDNEY HIGH SCHOOL



## YEAR 10 - MATHEMATICS (ADVANCED)

### TOPIC TEST: STRAIGHT LINE GRAPHS

#### INSTRUCTIONS:

- Place all answers in the spaces provided.
- Show all necessary working.
- Marks will be deducted for untidy work.
- All questions are NOT of equal value.

**Question 1 (10 marks)**

Plot the points  $A(-4, 8)$ ,  $B(8, 2)$  and  $C(6, 13)$  on a number plane to form a triangle  $ABC$ . (2 m)

If  $D$  is the mid point of  $AB$ .

(a) Find the co-ordinates of  $D$ . (2 m)

(b) Show that  $CD$  is perpendicular to  $AB$ . (3 m)

(c) Find the area of triangle  $ABC$ . (3 m)

**Question 2 (7 marks)**

The points  $A(0, 6)$ ,  $B(-6, 2)$ ,  $C(2, -10)$  and  $D(8, -6)$  are the vertices of a quadrilateral.  
Without graphing the points,

- (a) Show that the quadrilateral is a rectangle. (4 m)

- (b) Find the area of the rectangle. (3 m)

**Question 3 (8 marks)**

$ABCD$  is a rectangle.  $A$  has co-ordinates  $(4, 6)$ ,  $B$ ,  $(-2, 4)$  and  $C$ ,  $(-1, 1)$ .

(a) Find the equation of  $AD$ . (2 m)

(b) Find the equation of  $CD$ . (1 m)

(c) Hence, or otherwise, find the co-ordinates of  $D$ . (2 m)

(d) Find the area of the rectangle. (3 m)

**Question 4 (10 marks)**

Sketch the points  $A(-2, 1)$ ,  $B(4, 4)$  and  $C(1, -5)$  and join them to form  
a triangle. (2 m)

- (a) Calculate the gradients of  $AB$  and  $AC$ . Hence show the triangle is right angled, stating which angle is  $90^\circ$ . (2 m)

(b) Find the area of the triangle  $ABC$ . (3 m)

(c) If  $D$  and  $E$  are the mid points of  $AB$  and  $BC$  respectively, show algebraically  
that  $DE$  is parallel to  $AC$ . (3 m)

100%  
Excellent

NAME: Micah

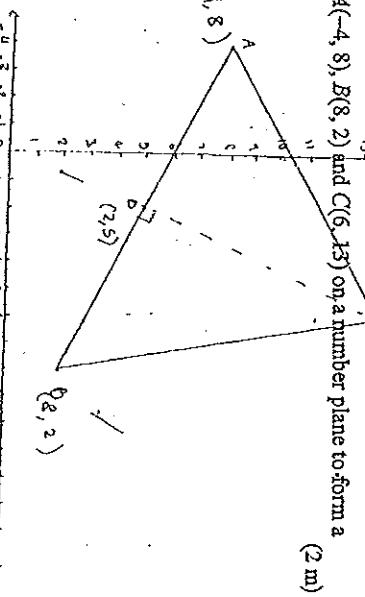
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# SOUTH SYDNEY HIGH SCHOOL



S.S.H.S - YEAR 10 ADVANCED - STRAIGHT LINE GRAPHS  
Question 1 (10 marks)

Plot the points  $A(-4, 8)$ ,  $B(8, 2)$  and  $C(6, 13)$  on a number plane to form a triangle  $ABC$ . (2 m)



## YEAR 10 - MATHEMATICS

### (ADVANCED)

#### TOPIC TEST: STRAIGHT LINE

#### GRAPHS

If  $D$  is the mid point of  $AB$ .

(a) Find the co-ordinates of  $D$ .  $m_{PD} = \left( \frac{-4+8}{2}, \frac{8+2}{2} \right) \checkmark \quad (2 \text{ m})$

$\therefore D = (2, 5) \checkmark$

(b) Show that  $CD$  is perpendicular to  $AB$ .

$$m_{AB} = \frac{8-2}{-4-8} = \frac{6}{-12} = -\frac{1}{2}$$

$$m_{CD} = \frac{13-5}{6-2} = \frac{8}{4} = 2 \checkmark$$

$$-\frac{1}{2} \times 2 = -1$$

$$\therefore CD \perp AB$$

(negative reciprocal gradients)

#### INSTRUCTIONS:

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- All questions are NOT of equal value.

(3 m)

(c) Find the area of triangle  $ABC$ .

$$\sqrt{(4-8)^2 + (8-2)^2} \checkmark = \sqrt{(2-6)^2 + (5-13)^2} \checkmark$$

$$\sqrt{(-12)^2 + 6^2} = \sqrt{(-4)^2 + (-8)^2} \checkmark$$

$$\sqrt{144 + 36} = \sqrt{16 + 64} \checkmark$$

$$= \sqrt{200} \checkmark$$

$$= 10\sqrt{5} \checkmark$$

$$= 4\sqrt{5} \checkmark$$

$$= 60 \text{ units}^2 \checkmark$$

(b)

Question 2 (7 marks)

The points  $A(0, 6)$ ,  $B(-6, 2)$ ,  $C(2, -10)$  and  $D(8, -6)$  are the vertices of a quadrilateral. Without graphing the points,

- (a) Show that the quadrilateral is a rectangle.

$$AB = \sqrt{(0+6)^2 + (6-2)^2} \quad (4 \text{ m})$$

$$= \sqrt{6^2 + 4^2} \\ = \sqrt{36 + 16} \\ = 2\sqrt{13}$$

$$CD = \sqrt{(2-8)^2 + (-10+6)^2} \\ = \sqrt{36 + 16} \\ = 2\sqrt{13}$$

$$\therefore AB = CD$$

$$AD = \sqrt{(0-8)^2 + (6+6)^2} \\ = \sqrt{64 + 144} \\ = 4\sqrt{13}$$

$$BC = \sqrt{(6-2)^2 + (2+10)^2} \\ = \sqrt{64 + 144} \\ = 4\sqrt{13}$$

$$m_{AB} = \frac{6-2}{0+6} \\ = \frac{4}{6} \\ = \frac{2}{3}$$

$$m_{BC} = \frac{2+10}{6-2} \\ = \frac{12}{4} \\ = 3$$

$$m_{AD} = \frac{-6-2}{8-0} \\ = \frac{-8}{8} \\ = -1$$

$\therefore AB \perp CD$  /  $\therefore ABCD$  is a rectangle (2 pairs of equal sides, right angles)

- (3 m)

Find the area of the rectangle.

$$AB \times AD = \text{area}$$

$$2\sqrt{13} \times 4\sqrt{13} = 104 \text{ units}^2$$

- (c)

$$\therefore (5, 3) /$$

- (d) Find the area of the rectangle.

$$AB = \sqrt{(4+2)^2 + (6-4)^2} \\ = \sqrt{6^2 + 2^2} \\ = \sqrt{36 + 4} \\ = 2\sqrt{10}$$

$$BC = \sqrt{(-2+1)^2 + (4-1)^2} \\ = \sqrt{1+9} \\ = \sqrt{10}$$

$$AB \times BC = 20 \text{ units}^2$$

Question 3 (8 marks)

- (a)  $ABCD$  is a rectangle.  $A$  has co-ordinates  $(4, 6)$ ,  $B$ ,  $(-2, 4)$  and  $C$ ,  $(-1, 1)$ . Find the equation of  $AD$ .

$$m_{AD} = \left(\frac{4-1}{2}, \frac{6+1}{2}\right)$$

$$= \left(\frac{3}{2}, \frac{7}{2}\right)$$

$$= \frac{x_0 - 2}{2} = \frac{3}{2}$$

$$x_0 = 3+2 \\ = 5$$

$$y_0 + 4 = 7$$

$$y_0 = 3$$

$$D : (5, 3) /$$

- (b) Find the equation of  $CD$ .

$$m_{CD} = \frac{3-1}{5+1} \\ = \frac{2}{6} \\ = \frac{1}{3}$$

$$y-1 = \frac{1}{3}(x+1)$$

$$y = \frac{x}{3} + \frac{4}{3} + 1$$

$$y = \frac{x}{3} + \frac{7}{3}$$

$$\therefore (5, 3) /$$

$$\therefore (5, 3) /$$

$$\therefore (5, 3) /$$

$$\therefore (5, 3) /$$

- (c) Hence, or otherwise, find the co-ordinates of  $D$ .

$$3x = 18-3 \\ x = 5$$

8

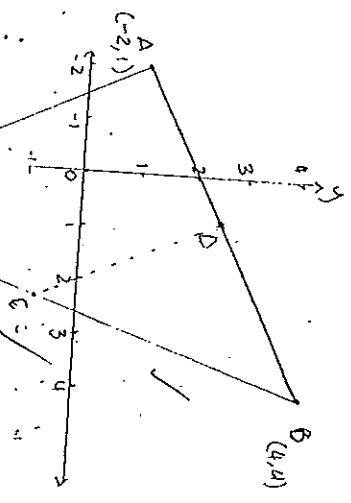
- (d) Find the area of the rectangle.

$$AB = \sqrt{(4+2)^2 + (6-4)^2} \\ = \sqrt{6^2 + 2^2} \\ = \sqrt{36 + 4} \\ = 2\sqrt{10}$$

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Sketch the points  $A(-2, 1)$ ,  $B(4, 4)$  and  $C(1, -5)$  and join them to form a triangle.

(2 m)



(b) Find the area of the triangle ABC.

$$\begin{aligned} AB &= \sqrt{(-2-4)^2 + (1-4)^2} \\ &= \sqrt{36+9} \\ &= 3\sqrt{5} \end{aligned}$$

$$\text{area} = \frac{3\sqrt{5} \times 3\sqrt{5}}{2} = 22.5 \text{ units}^2$$

(c) If  $D$  and  $E$  are the mid points of  $AB$  and  $BC$  respectively, show algebraically that  $DE$  is parallel to  $AC$ .

(3 m)

$\angle BAC = 90^\circ$

(a) Calculate the gradients of  $AB$  and  $AC$ . Hence show the triangle is right angled, stating which angle is  $90^\circ$ .

(2 m)

$$\begin{aligned} m_{AB} &= \frac{1-4}{-2-4} = \frac{-3}{-6} = \frac{1}{2} \\ m_{AC} &= \frac{1+5}{-2-1} = \frac{6}{-3} = -2 \end{aligned}$$

$$\frac{1}{2} \times -2 = -1$$

$\therefore \angle BAC$  is  $90^\circ$

since  $AB \perp AC$

$\therefore DE \parallel AC$  (corresponding  $\angle$  are equal)

(10)