

## TB(3B) Ch.8 Coordinate Geometry of Straight Lines Conventional Questions

1. [16-17 Standardized Test, 6]

Consider the points  $A(-6, 0)$ ,  $B(2, 0)$  and  $C(4, -5)$ .  $AC$  cuts the  $y$ -axis at  $M(0, y)$ .

(a) Show that  $AM : MC = 3 : 2$ .

(2 marks)

(b) Hence, find the area of  $\triangle BCM$ .

(4 marks)

2. [16-17 Final Exam, 13]

In **Figure 3**,  $A(-3.5, 2)$ ,  $B(3, 0)$  and  $C(2, 6)$  are three points on the rectangular coordinate plane.

(a) Find the length of  $AB$ . (2 marks)

(b) If  $D$  is the mid-point of  $BC$ , determine whether  $AD$  is perpendicular to  $BC$ ? Explain your answer. (2 marks)

(c)  $E$  is a point on  $AB$  such that  $AE : EB = 3 : 2$ . Jason claims that  $ED \parallel AC$ . Do you agree? Explain your answer. (2 marks)

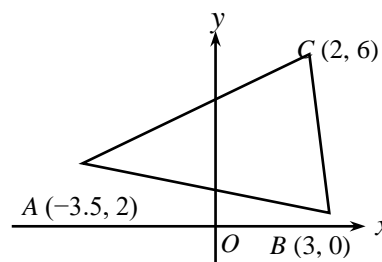


Figure 3

3. [17-18 Standardized Test, 4]

$A(8, 12)$ ,  $B(4, 2)$  and  $C(c, 0)$  are the vertices of a triangle. The mid-point  $K$  of  $AC$  lies on the  $y$ -axis.

(a) (i) Find the value of  $c$ . (2 marks)

(ii) Write down the coordinates of  $K$ . (1 mark)

(b)  $D$  is a point such that  $ABCD$  is a quadrilateral with  $AK : AC = BK : BD$ , where  $B$ ,  $K$  and  $D$  are collinear. Kitty claims that  $ABCD$  must be a parallelogram. Do you agree? Explain briefly. (2 marks)

4. [17-18 Standardized Test, 5]

$A(15, -5)$ ,  $B(b, -1)$  and  $O(0, 0)$  are the vertices of  $\triangle AOB$ . A straight line  $L$  which passes through  $P(1, 3\sqrt{2})$  and  $Q(-\sqrt{2}, -3)$  is parallel to  $BO$ .

(a) Find the inclination of  $PQ$ . (3 marks)

(b) Find the value of  $b$ . (1 mark)

(c) Show that  $\triangle AOB$  is a right-angled triangle. (2 marks)

5. [17-18 Final Exam, 11]

In **Figure 4**, the coordinates of the points  $A$  and  $B$  are  $(6, -2)$  and  $(2, -2)$  respectively.  $A'$  is the reflection image of  $A$  with respect to the  $x$ -axis.

- (a) Write down the coordinates of  $A'$ . (1 mark)
- (b) Prove that  $BA'$  is perpendicular to  $OB$ . (2 marks)

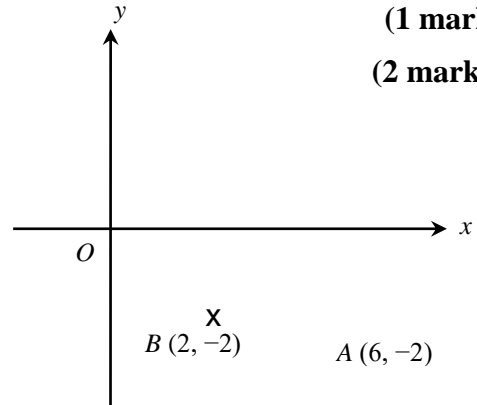


Figure 4

6. [17-18 Final Exam, 17]

In **Figure 8**,  $A(5, -2)$ ,  $B(5, 6)$  and  $C$  are the vertices of a triangle. It is given that  $D(4, 1)$  is the mid-point of  $AC$  and the coordinates of  $E$  are  $(5, 2)$ .  $BD$  and  $CE$  intersect at  $G$ .

- (a) Find the coordinates of  $C$ .
- (b) (i) Show that  $CG : GE = 2 : 1$ .
- (ii) Find the coordinates of  $G$ .
- (c) It is given that  $P$  is the circumcentre of  $\triangle ABC$ . Find the coordinates of  $P$ .

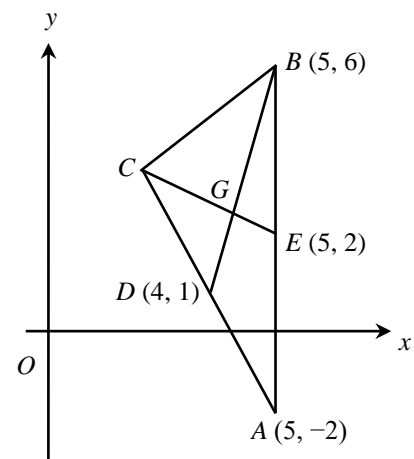


Figure 8

7. [18-19 Standardized Test 2, 6]

$A(5, 10)$ ,  $B$  and  $C(13, 2)$  are three points on the rectangular coordinate plane. It is given that  $D(3, 0)$  is the mid-point of  $AB$ .

- (a) Write down the coordinates of  $B$ . (1 mark)
- (b) Determine whether  $\triangle ACB$  is a right-angled triangle. (2 marks)
- (c)  $E$  is a point on the line segment joining  $A$  and  $C$  such that  $AE = EC$ . Prove that  $DE \parallel BC$ . (2 marks)

8. [18-19 Final Exam, 9]

The vertices of  $\triangle ABC$  are  $A(-5, k)$ ,  $B(1, 4)$  and  $C(-1, 6)$ , where  $k$  is a constant.  $BC$  cuts the  $y$ -axis at  $D$ .

(a) Find the slope of  $BC$  and the coordinates of  $D$ . (3 marks)

(b) If  $AD \perp BC$ ,

(i) find the value of  $k$ , (2 marks)

(ii) prove that  $\triangle ADB \cong \triangle ADC$ . (2 marks)

9. [18-19 Final Exam, 15]

In **Figure 8**,  $O$  is the origin. If the coordinates of points  $A$  and  $B$  are  $(6, 0)$  and  $(10, 4)$  respectively, find the coordinates of the circumcentre  $C$  of  $\triangle OAB$ . (2 marks)

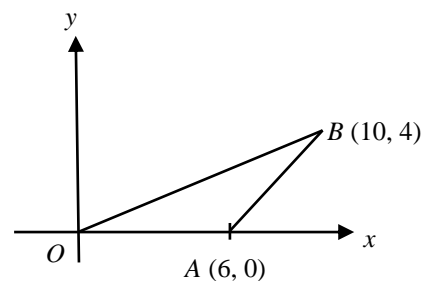


Figure 8

10. [20-21 Standardized Test #3]

In **Figure 3**,  $A(4, 8)$ ,  $B(-2, 2)$  and  $C(6, -6)$  are the vertices of  $\triangle ABC$ .

(a) Show that  $\triangle ABC$  is a right-angled triangle. (3 marks)

(b) Find the area of  $\triangle ABC$ . (2 marks)

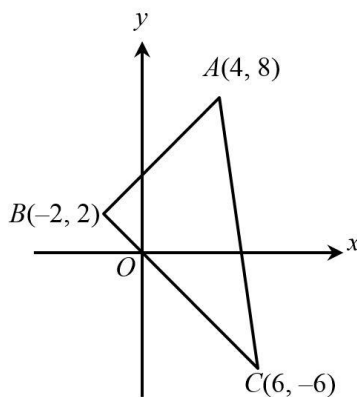


Figure 3

11. [20-21 Standardized Test #5]

$M(5, b)$  is a point on the line segment joining  $A(a, 12)$  and  $B(2, 5)$ . It is given that  $AM : MB = 4 : 3$ .

- (a) Find the values of  $a$  and  $b$ . (3 marks)
- (b)  $C(12, c)$  and  $N(9, -\frac{2c}{3})$  are two points on the same coordinate plane such that  $AC \parallel MN$ .

Someone claims that the  $y$ -coordinate of  $N$  is an integer. Do you agree? Explain your answer. (3 marks)

12. [20-21 Final Exam #9]

The coordinates of the points  $A$  and  $B$  are  $(-6, 1)$  and  $(4, 7)$  respectively.  $C$  is a point on  $AB$  and  $D$  is a point on the  $x$ -axis such that  $DC$  is the perpendicular bisector of  $AB$ . Find the coordinates of  $D$ . (3 marks)

13. [20-21 Final Exam #15]

In **Figure 8**,  $ABCD$  is a parallelogram with base  $a$  units and height  $h$  units.  $E$  is the mid-point of  $AC$ .  $R$  and  $S$  are points lying on  $AB$  and  $CD$  respectively such that  $AR : RB = CS : SD = 3 : 1$ . Prove that  $R, E$  and  $S$  are collinear by the analytic approach. (4 marks)

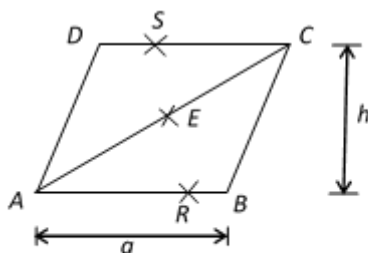


Figure 8

14. [20-21 Final Exam #16]

In **Figure 9**, the coordinates of the points  $A$  and  $B$  are  $(5, a)$  and  $(8, 0)$  respectively. It is given that  $\angle AOB = 45^\circ$  and  $E$  is the mid-point of  $AB$ .

- (a) Find  $a$ . (1 mark)
- (b) Let  $G$  be the circumcentre of  $\triangle OAB$ . Find the coordinates of  $G$ . (3 marks) Lv 3
- (c) Let  $H(h, -h)$  be a point on the rectangular coordinate plane such that  $GEBH$  is a trapezium and  $GE \parallel HB$ . Find the ratio of the area of  $\triangle GEB$  to the area of  $\triangle GBH$ . (3 marks) Lv 3

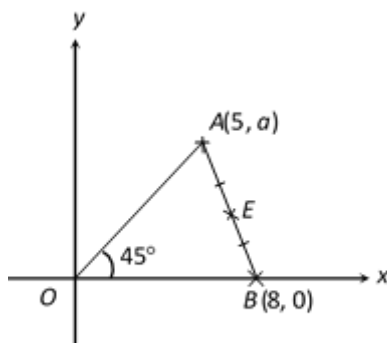


Figure 9