

## Coordinate Geometry Conventional Questions

1. [13-14 St Test 2, 3]

In **Figure 3**,  $L_1 \perp L_2$  at  $A(6, 24)$ .  $B(18, 4)$  is a point on  $L_2$  and  $L_1$  cuts the  $x$ -axis at  $C$ .

- (a) Find the coordinates of  $C$ . (3 marks)
- (b) Find the area of  $\triangle ABC$ . (3 marks)
- (c) If point  $D$  lies on  $BC$  such that its  $x$ -coordinate is 3, find  $CD : DB$ . (2 marks)

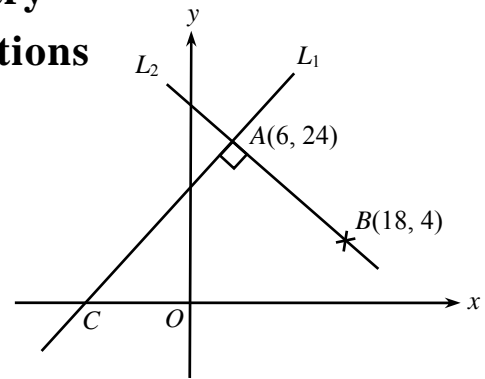


Figure 3

2. [13-14 St Test 2, 6]

In **Figure 6**,  $ABCD$  is a rhombus with vertices  $A(0, a)$ ,  $B(b, 0)$ ,  $C(0, -a)$  and  $D(-b, 0)$ .  $M$  is the mid-point of  $BC$  and  $AM = DM$ .

- (a) Find the coordinates of  $M$ . (1 mark)
- (b) Prove that  $ABCD$  is a square by the analytic approach. (3 marks)

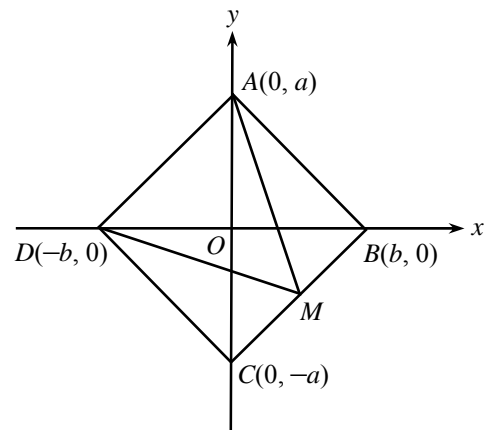


Figure 6

3. [13-14 Final Exam, 5]

In **Figure 3**,  $CD$  is the perpendicular bisector of  $AB$ .  $CD$  cuts  $AB$  at point  $D$ .

- (a) Find the coordinates of  $D$ . (1 mark)
- (b) If the  $y$ -coordinate of point  $C$  is 7, find the  $x$ -coordinate of  $C$ . (2 marks)

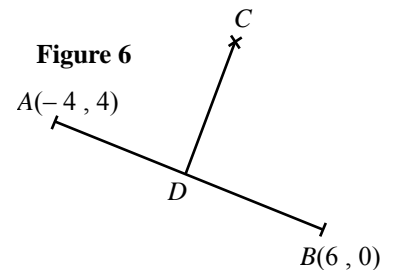


Figure 3

4. [13-14 Final Exam, 10]

In **Figure 5**,  $ABCD$  is a parallelogram.  $E, F, G,$  and  $H$  are the mid-points of  $AB, BC, CD$  and  $DA$  respectively.

- (a) Find the value of  $k$ . (2 marks)
- (b) Prove that  $EFGH$  is a parallelogram by the analytical approach. (3 marks)
- (c) Prove that  $HF \perp GF$  and hence find the area of  $\triangle FGH$ . (3 marks)

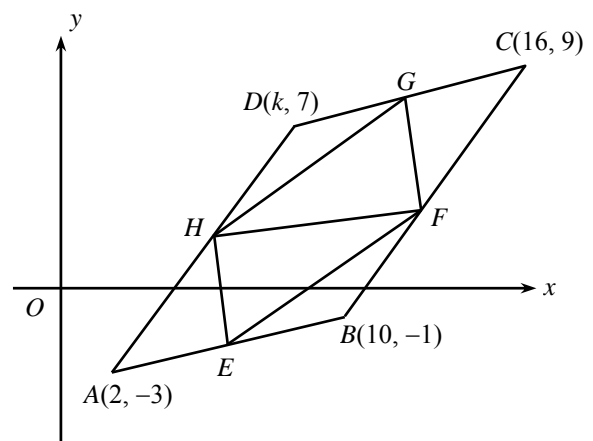


Figure 5

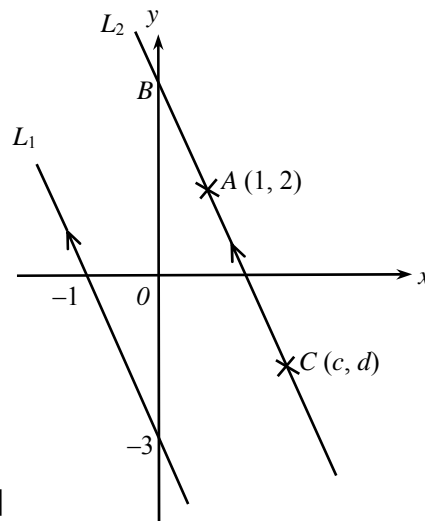
5. [14-15 Standardized Test, 1]

It is given that  $P(-1, 6)$ ,  $Q(-3, 0)$  and  $R(1, 2)$ . Prove that  $\triangle PQR$  is an isosceles right-angled triangle. (3 marks)

6. [14-15 Standardized Test, 7]

In Figure 3,  $L_1 \parallel L_2$ .  $L_1$  passes through  $(-1, 0)$  and  $(0, -3)$ .  $L_2$  passes through  $A(1, 2)$  and cuts  $y$ -axis at  $B$ .

- (a) Find the coordinates of  $B$ . (2 marks)
- (b) If  $C(c, d)$  is a point on  $L_2$  such that  $BC : BA = 5 : 2$ , find the coordinates of  $C$ . (2 marks)



7. [14-15 Final Exam, 9]

$A(-3, 4)$ ,  $B(9, 10)$  and  $C(0, 13)$  are the vertices of a triangle as shown in Figure 4.

- (a) Prove that  $\triangle ABC$  is an isosceles right-angled triangle. (3 marks)
- (b) A line  $L$  (not shown in the figure) passes through point  $C$  and parallel to  $AB$ ,
  - (i) find the slope of  $L$ . (1 mark)
  - (ii) Let  $D(x, y)$  be a point on  $L$  such that  $DA \perp AB$ . Find the coordinates of  $D$ . (3 marks)

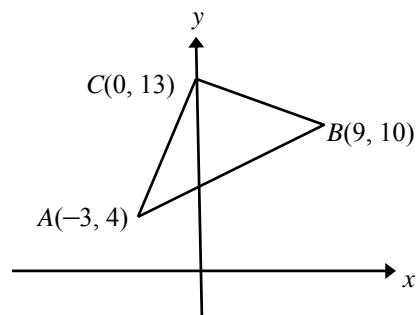


Figure 4

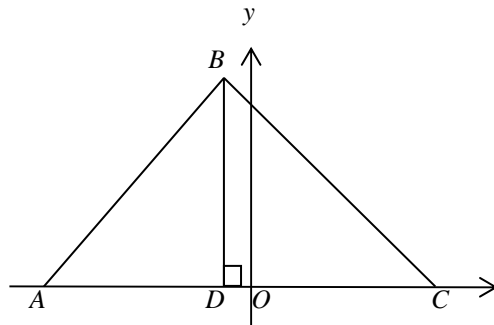
8. [14-15 Final Exam, 11]

If  $C(4, 2)$  is a point on  $AB$ , and the coordinates of  $A$  and  $B$  are  $(2, -6)$  and  $(7, y)$  respectively, find

- (a)  $AC : CB$ , (2marks)
- (b) the value of  $y$ . (1 mark)

**9. [15-16 Standardized Test, 6]**

In **Figure 4**,  $A(-6, 0)$ ,  $B(-1, 6)$  and  $C(6, 0)$  are the vertices of  $\triangle ABC$  on the rectangular coordinate plane.  $BD$  is the height of  $\triangle ABC$ .



**Figure 4**

- (a) It is given that  $E(-6 + 5a, 6a)$  is a point on  $AB$  such that  $ED \parallel BC$ , find the value of  $a$ . **(2 marks)**
- (b) It is given that  $F$  is a point on  $BC$  such that  $DF \perp BC$ . By considering the area of  $\triangle BCD$ , find  $DF$ . (Leave your answer in surd form.) **(3 marks)**
- (c)  $BA$  is produced to a point  $G$  such that  $GA : GB = 1 : 3$ . Write down the coordinates of  $G$ . **(1 mark)**
- (d) A point  $H$  lies on  $BD$  such that  $BH : HD = 151 : 149$ . Gary claims that  $E, H$  and  $F$  are collinear. Do you agree? Explain briefly. **(2 marks)**

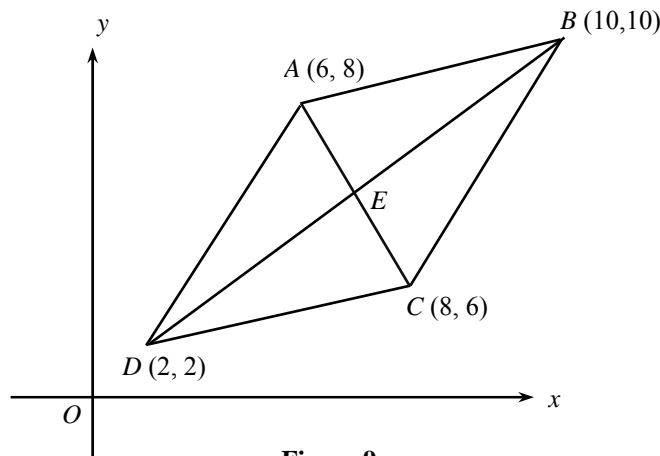
**10. [15-16 Final Exam, 8]**

The coordinates of  $A$  and  $B$  are  $(-1, 2)$  and  $(b, 8)$  respectively. It is given that  $C(2, 4)$  is a point on  $AB$  such that  $AC : CB = 1 : 2$ .

- (a) Find  $b$ . **(2 marks)**
- (b) If  $DB \perp AB$  and the coordinates of  $D$  are  $(2d, d)$ , find  $d$ . **(2 marks)**

**11. [15-16 Final Exam, 17]**

In **Figure 9**, the diagonals  $AC$  and  $BD$  of quadrilateral  $ABCD$  intersect at  $E$ . It is given that  $E$  is the mid-point of  $AC$ .



**Figure 9**

- (a) Write down the coordinates of  $E$ . **(1 mark)**
- (b) Find  $\angle ABD$  by analytical approach. **(3 marks)**

**12. [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)

**13. [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)

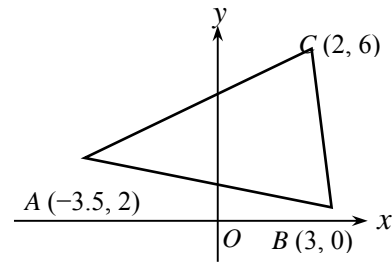


Figure 3

**14. [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)

**15. [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)

**16. [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)

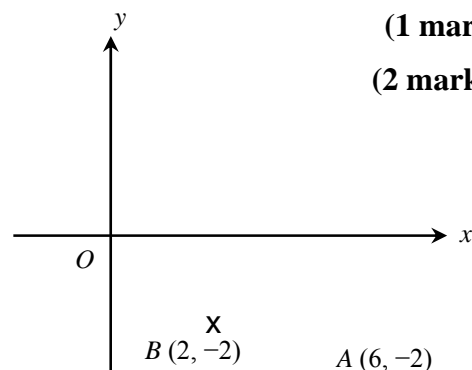


Figure 4

17. [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  $P$ .

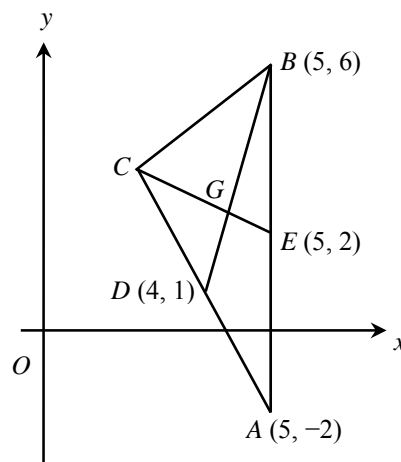


Figure 8