Coordinate Geometry
Conventional Questions

1. [14-15 Standardized Test, 1]

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

2. [14-15 Standardized Test, 7]

In **Figure 3**, $L_1 // L_2$. 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)**

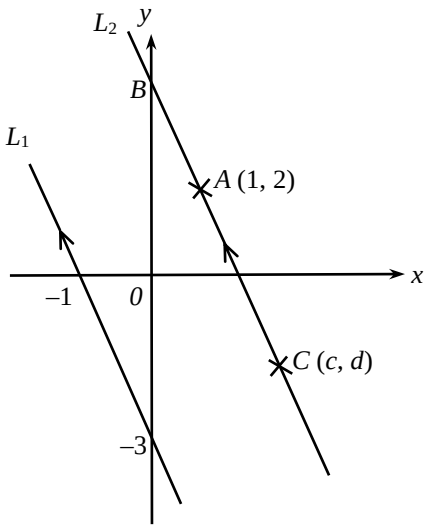

Figure 3

3. [14-15 Final Exam, 9]

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

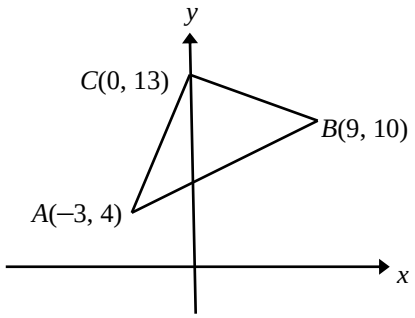

Figure 4

(a) Prove that ΔABC 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)**

4. [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)**

5. [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 $\triangle ABC$.

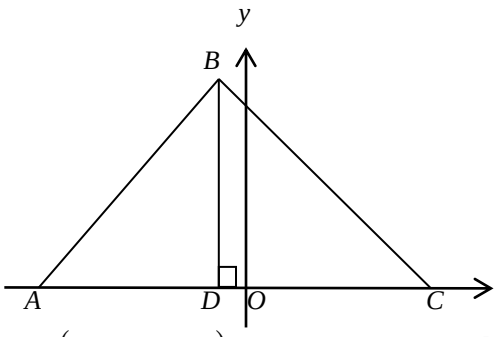

Figure 4

(a) It is given that $E(-6+5a, 6a)$ is a point on AB such that ED // 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 ΔBCD, 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)**

6. [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)**

7. [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.

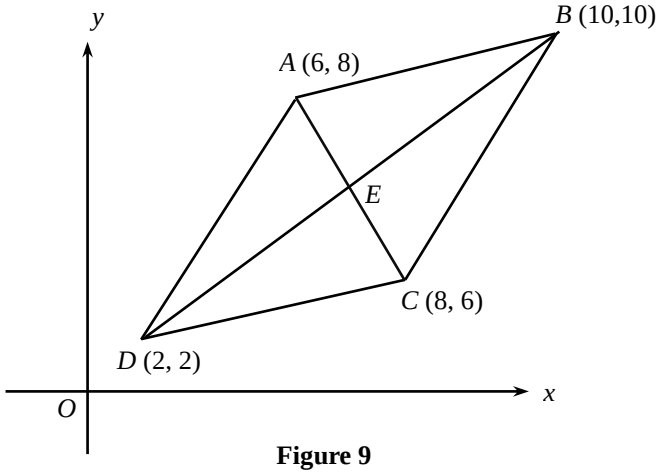

Figure 9

(a) Write down the coordinates of E. **(1 mark)**

(b) Find $\angle ABD$ by analytical approach. **(3 marks)**

8. [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 ΔBCM. **(4 marks)**

9. [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 $ED \,//\, AC$. Do you agree? Explain your answer. **(2 marks)**

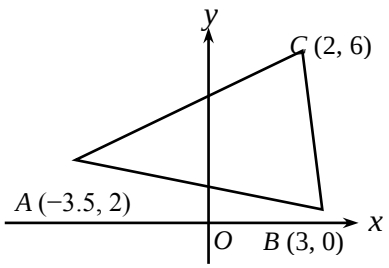

Figure 3

10. [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)

11. [17-18 Standardized Test, 5]

$A(15, -5)$, $B(b, -1)$ and $O(0, 0)$ are the vertices of ΔAOB. 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 ΔAOB is a right-angled triangle. **(2 marks)**

12. [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 respective to the x-axis.

(a) Write down the coordinates of A'. **(1 mark)**

(b) Prove that BA' is perpendicular to OB. **(2 marks)**

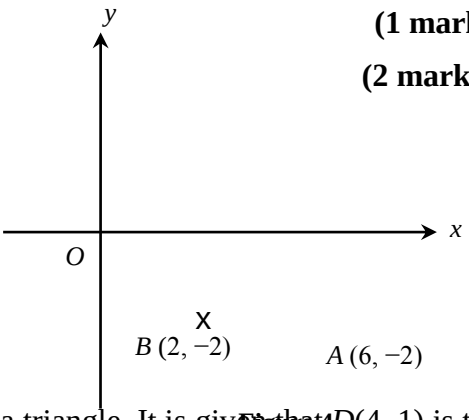

Figure 4

13. [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 ΔABC. Find the coordinates of P.

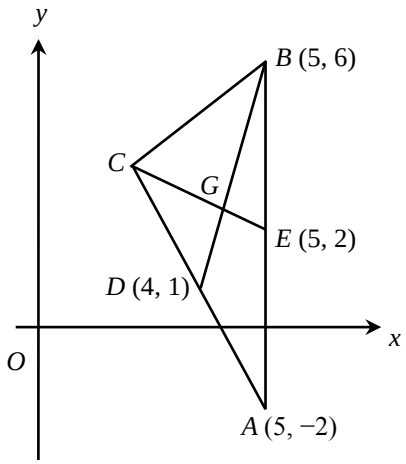

Figure 8

14. [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 ΔACB 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 // BC. **(2 marks)**

15. [18-19 Final Exam, 9]

The vertices of ΔABC 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 $\Delta ADB \cong \Delta ADC$. **(2 marks)**

16. [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 ΔOAB. **(2 marks)**

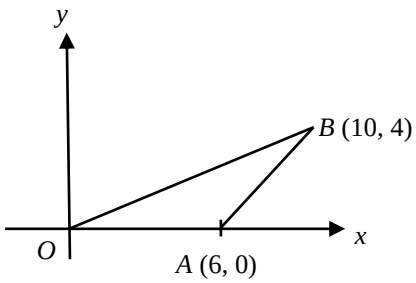

Figure 8