**F.3 Mathematics – Supplementary Worksheet for NCM 3B Chapter 12**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Class: 3\_\_\_\_\_\_ ( )**

**Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Level 1**

1. *R*(3 , 5), *S*(*k* , 0) and *T*(8 , 0) are the three vertices of △*RST*. If *RS* = *ST*, find the value of *k*. (10 marks)

2. *P*(3 , –1), *Q*(5 , 3), *R*(1 , 1) and *S*(–1 , –3) are the four vertices of a quadrilateral *PQRS*. Prove that *PQRS* is a rhombus. (10 marks)

3. *A*(4 , 2), *B*(6 , –2) and *C*(2 , –4) are the vertices of △*ABC*. By using Pythagoras’ theorem, prove that △*ABC* is an isosceles right-angled triangle.

*x*

*y*

*O*

*B* (6, –2)

*C* (2, –4)

*A* (4, 2)

(14 marks)

4. Find the unknown in each of the following.

 (a) *A*(2 , –1), *B*(*m* , –3); slope of *AB* = 2.

 (b) *C*(4 , *n*), *D*(3 , 3); slope of *CD* =. (12 marks)

5. A line *L* cuts the *x*-axis at point *A*(–3 , 0) and its slope is . If it passes through a point *P*(1 , *k*) and cuts the *y*-axis at point *B*, find

 (a) the value of *k*,

 (b) the distance between the points *A* and *B*, correct to 3 significant figures.

(12 marks)

6. Find the unknown in each of the following figures.

 (a) (b)

*x*

*y*

0

(3, *k*)

(–2, –2)

4

–5

*L*1

*L*2

*x*

*y*

0

(4, 7)

(–3, *k*)

7

–3

*L*3

*L*4

(10 marks)

7. The figure shows a quadrilateral *ABCD*. Prove that *ABCD* is a parallelogram.

*x*

*y*

*O*

*B* (–5, 3)

*A* (4, 5)

*D* (6, 0)

*C* (–3, –2)

(10 marks)

8. If *M*(–1 , –2) is the mid-point of the line segment joining *A*(*x* , 2) and *B*(–7 , *y*), find the values of *x* and *y*.

(8 marks)

9. If *N*(0 , –3) divides the line segment joining *P*(–6 , 3) and *Q* internally, and *PN* : *NQ* = 2 : 1, find the coordinates of point *Q*.

(8 marks)

10. The figure shows a quadrilateral *OABC*.

*x*

*y*

*O*

*A* (*a*, *b*)

*B* (*a*, *a*)

*C* (*b*, *a*)

 Prove that *OB* ⊥ *AC*.

(6 marks)

**Level 2**

1. In the figure, *C* is a point on the *x*-axis such that *AC* = *BC*. Find the

 (a) coordinates of *C*,

 (b) area of △*ABC*, correct to 2 decimal places,

 (c) distance *h* from *C* to *AB*, correct to

 2 decimal places.

 (14 marks)

*A*

*B*

*C*

*P*

8 m

10 m

19 m

15 m

2. In the figure, *A*, *B* and *C* represent the three entrances of a theater, and *AB* ⊥ *CB*. The lengths of the walls *AB* and *CB* are 15 m and 19 m respectively. Jane stands at point *P*, which is 10 m from the wall *AB* and 8 m from the wall *CB*. By using coordinate geometry, help Jane to choose an entrance with the shortest distance from her.

(12 marks)

3. *A*(–3 , 2), *B*(2 , 7) and *C*(*k* , *k*) are the vertices of a triangle. The slope of *BC* is  and the inclination of *AB* is 45°. Find

 (a) the value of *k*,

 (b) the slope of *AC*. Hence state which side of △*ABC* is steeper.

(12 marks)

4. Four points *P*(2 , 6), *Q*(–4 , 2), *R*(–2 , –1) and *S*(4 , 3) of a quadrilateral are given.

 (a) Find the slopes of *PQ*, *QR*, *RS* and *PS*.

 (b) Find the distances of *PQ*, *QR*, *RS* and *PS*.

 (*Leave the* ‘√’ *sign in the answers*.)

 (c) State what kind of quadrilateral *PQRS* is.

(14 marks)

5. Determine whether the three points *L*(4 , 3), *M*(–6 , –1) and *N*(–1 , 1) lie on the

 same straight line.

(10 marks)

6. A line segment *AB* cuts the *x*-axis at point *C*. If the coordinates of *A* and *B* are (1 , –3) and (9 , 9) respectively, and *AC* : *CB* = 1 : *r*, find

 (a) the value of *r*,

 (b) the coordinates of point *C*.

(12 marks)

7. A line segment *PQ* passes through the origin *O*. The coordinates of *P* and *Q* are (–6 , –4) and (9 , 6) respectively.

 (a) Find *PO* : *OQ*.

 (b) If the point *A* lies on the line segment *OQ* such that *OA* : *AQ* = *PO* : *OQ*, find the coordinates of point *A*.

(12 marks)

1. The figure shows a triangle *ABC*. *P* and *Q* are points on *AB* and *AC* respectively such that *AP* : *PB* = *AQ* : *QC* = 2 : 3. Prove, using analytic method, that

 (a) *PQ* // *BC*,

*A*

*B*

*C*

*P*

*Q*

(b) .

(14 marks)