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

**Level 1**

1. units

units

units

units

units

 *RS* = *ST*

∴ 

*k*2 – 6*k* + 34 = 64 – 16*k* + *k*2

10*k* = 30

*k* = 3

*x*

*y*

*Oy*

*P*(3, –1)

*Q*(5, 3)

*R*(1, 1)

*S*(–1, –3)

2. units

units

units

units

units

units

units

units

units

units

units

units

Since *PQ* = *QR* = *RS* = *SP*, *PQRS* is a rhombus.

3. units

units

units

units

units

units

units

units

units

 *AB* = *BC*

∴ △*ABC* is an isosceles triangle.

Slope of *AB* = 



Slope of *BC* = 



 Slope of *AB* × slope of *BC* =  = –1

∴ *AB* ⊥ *BC*

∴ △*ABC* is an isosceles right-angled triangle.

4. (a) Slope of *AB* =  = 

i.e. = 2

–2 = 2(*m* – 2)

2*m* = 2

*m* = 1

(b) Slope of *CD* = 

= 

= *n* – 3

i.e. 

5(*n* – 3) = –1

5*n* = 14



5. (a) Slope of *AP* =  = 

i.e. 



(b) Let the coordinates of point *B* be (0 , *y*).

Slope of *AB* =  = 

i.e. 

*y* = 2

∴ The coordinates of point *B* is (0 , 2).

∴ Distances between the points *A* and *B* = units

= units

= 3.61 units, *cor*. *to 3 sig*. *fig*.

6. (a) Slope of *L*1 =  = 

Slope of *L*2 =  = 

 *L*1 // *L*2

∴ Slope of *L*1 = slope of *L*2



1. Slope of *L*3 = = = 

Slope of *L*4 =  = 

 *L*3 ⊥ *L*4

∴ Slope of *L*3 × slope of *L*4 = –1



1. Slope of *BA* = 

Slope of *CD* = 

 Slope of *BA* = slope of *CD*

∴ *BA* // *CD*

units

units

units

units

units

units

∴ *BA* = *CD*

∴ *ABCD* is a parallelogram (*2 sides equal and* //).

8. Consider the *x*-coordinate of point *M*: 



Consider the *y*-coordinate of point *M*: 



9. Let (*a* , *b*) be the coordinates of point *Q*. We have *PN* : *NQ* = 2 : 1.

Consider the *x*-coordinate of point *N*: 



Consider the *y*-coordinate of point *N*: 



∴ The coordinates of point *Q* are (3 , –6).

10. Slope of *OB* =  = 1

Slope of *AC* =  =  = –1

Slope of *OB* × slope of *AC* = 1 × (–1) = –1

∴ *OB* ⊥ *AC*

**Level 2**

1. (a) Let the coordinates of point *C* be (*a* , 0).

units

units

units

units = (*a* + 4) units

 *AC* = *BC*

∴ = *a* + 4

*a*2 – 10*a* + 74 = *a*2 + 8*a* + 16

18*a* = 58



∴ The coordinates of point *C* are .

(b) *BC* = units =  units

When *BC* is the base, the height of △*ABC* = 7 units

∴ Area of △*ABC* = sq. units = 25.28 sq. units, *cor*. *to 2 d*.*p*.

(c) units

units

units



∴ *h* = 4.43, *cor*. *to 2 d*.*p*.

1. [Choosing a rectangular coordinate system with *C* as the origin and every unit

being 1 m, we can mark the coordinates of various points as shown.]

*x*

*y*

*B*(19, 0)

*A*(19, 15)

*P*(9, 8)

*C*(0, 0)









 Entrance *C* has the shortest distance from Jane.

∴ She should choose entrance *C*.

3. (a) Slope of *BC* = 

∴ 

3(*k* – 7) = –2(*k* – 2)

3*k* – 21 = –2*k* + 4

5*k* = 25

∴ *k* = 5

(b) The coordinates of point *C* are (5 , 5).

Slope of *AC* = 

The slopes of *AB*, *BC* and *AC* are 1,  and  respectively.

∴ *AB* is steeper.

4. (a) Slope of *PQ* 

Slope of *QR* 

Slope of *RS* 

Slope of *PS* 

(b) *PQ* 

*QR* 

*RS* 

*PS* 

(c) Slope of *PQ* × slope of *QR* 

∴ *PQ* ⊥ *QR*

Slope of *RS* × slope of *PS* 

∴ *RS* ⊥ *PS*

 *PQ* = *RS* and *QR* = *PS*

∴ *PQRS* is a rectangle.

5. Slope of *LM* = 



Slope of *MN* =  

∵ Slope of *LM* = slope of *MN*

∴ Three points *L*, *M* and *N* lie on the same straight line.

6. (a) Since point *C* is on the *x*-axis, the *y*-coordinate of point *C* = 0.

We have *AC* : *CB* = 1 : *r*.

If we consider the *y*-coordinate of point *C* with the section formula, then



(b) Let the coordinates of point *C* be (*a* , 0).

If we consider the *x*-coordinate of point *C* with the section formula, then



∴ The coordinates of point *C* are (3 , 0).

7. (a) Let *PO* : *OQ* = 1 : *r*.

If we consider the *x*-coordinate of point *O* with the section formula, then



∴ *PO* : *OQ* = 1 :

or *PO* : *OQ* = 2 : 3

(b) Let the coordinates of point *A* be (*m*, *n*).

We have *OA* : *AQ* = *PO* : *OQ* = 2 : 3.

If we consider the *x*-coordinate of point *A* with the section formula, then



If we consider the *y*-coordinate of point *A* with the section formula, then



∴ The coordinates of point *A* are ( , ).

8. (a) Consider the coordinate system as shown

in the figure.

According to the section formula,

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

*B*

*C* (*c*, 0)

*P*

*Q*

*y*

*x*

the coordinates of *P* are

, i.e. ;

the coordinates of *Q* are

, i.e. .

Since *P* and *Q* have the same *y*-coordinate

, *PQ* is a horizontal line.

i.e. *PQ* is parallel to the *x*-axis.

∴ *PQ* // *BC*

(b) 



*BC* = *c* – 0 = *c*

∴ 