The Section Formula

1. M is the point (-1,4) and N is (-7,-10). Find the coordinates of R, the midpoint of MN.

2. A is the point (2,-1,6) and C is (5,-4,0). The point B divides AC in the ratio 2:1. Find the coordinates of B.

3. R divides PQ in the ratio 3:4. If P has coordinates (0,-1,4) and Q has coordinates (7,-8,4) find the coordinates of R.

4. K is (-1,-1,2) and M is (-6,9,22). Find L given KL:LM is 2:3.

5. H is the point (1,3,-4) and K is (11,13,6). The point J divides the line HK in the ratio 4:1. Find the coordinates of J.

6. $\dfrac{PQ}{QR} = \dfrac{2}{7}$. If P is (-1,3,0) and R is (17,12,-18) find the coordinates f Q.

7. $\dfrac{MP}{PN} = \dfrac{2}{5}$. Given M is the point (-1,3,-2) and N is (6,10,5), find the coordinates of P.

8. P is the point (3,4,0), Q is (3,2,2) and R is (1,4,2).

    (a) M is the midpoint of QR. Find the coordinates of M
    (b) T divides PM in the ratio 2:1. Find the coordinates of T.

9. M is the point (3,4,7), N is (1,-2,-15), P is (5,-4,8) and Q is (5,6,-17).

    (a) A is the midpoint of MN. Find the coordinates of A.
    (b) B divides PQ in the ratio 2:3. Find the coordinates of B.
    (c) If C has coordinates (11,-2,2) show that A,B and C are collinear.
    Remember: Find $\overrightarrow{AB} = (\mathbf{b} - \mathbf{a})$ and $\overrightarrow{BC} = (\mathbf{c} - \mathbf{b})$ and show they are multiples of the same vector.

10. A is the point (-1,-1,10), B is (-1,7,-6), C is (-6,11,-4) and D is (-2,7,8).

    (a) P divides AB in the ratio 5:3. Find the coordinates of P.
    (b) Q is the midpoint of CD. Find the coordinates of Q.
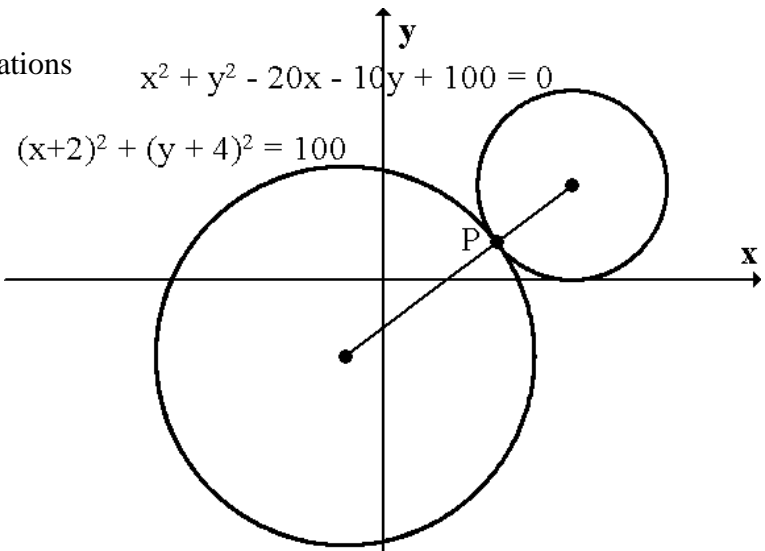   (c) Given R is (-13,24,8), show that P, Q and R are collinear and state the ratio in which Q divides PR.

11. The diagram shows the circles with equations

$(x + 2)^2 + (y + 4)^2 = 100$

and

$x^2 + y^2 - 20x - 10y + 100 = 0$

Find the coordinates of the point P.

$x^2 + y^2 - 20x - 10y + 100 = 0$

$(x+2)^2 + (y + 4)^2 = 100$

P

12. The diagram shows the circles with equations

$(x + 6)^2 + (y + 5)^2 = 225$

and

$x^2 + y^2 - 18x - 30y + 206 = 0$

Find the coordinates of the point T.

$x^2 + y^2 - 18x - 30y + 206 = 0$

T

$(x+6)^2 + (y + 5)^2 = 225$