

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. $\frac{PQ}{QR} = \frac{2}{7}$. If P is $(-1,3,0)$ and R is $(17,12,-18)$ find the coordinates of Q.
7. $\frac{MP}{PN} = \frac{2}{5}$. 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.

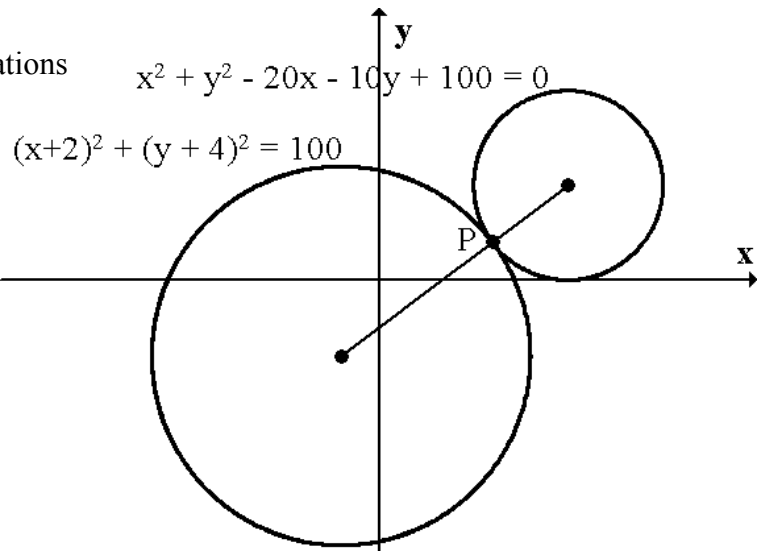
11. The diagram shows the circles with equations

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

and

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

Find the coordinates of the point P.



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.

