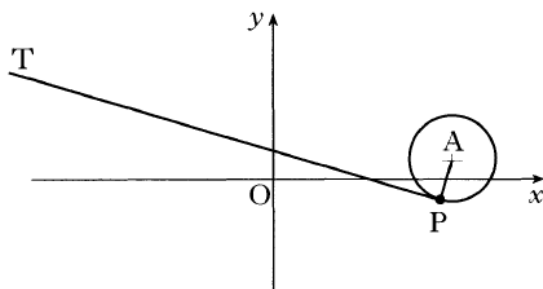


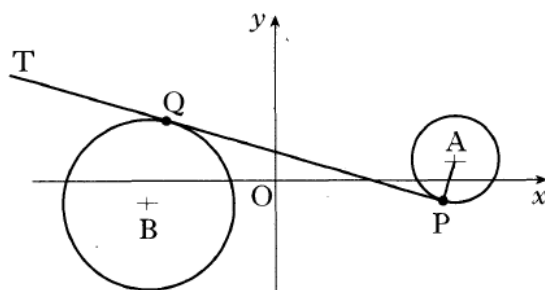
- 1 The circle with centre A has equation $x^2 + y^2 - 12x - 2y + 32 = 0$. The line PT is a tangent to this circle at the point P(5, -1).



- (a) Show that the equation of this tangent is $x + 2y = 3$.

4

The circle with centre B has equation $x^2 + y^2 + 10x + 2y + 6 = 0$.



- (b) Show that PT is also a tangent to this circle.
 (c) Q is the point of contact. Find the length of PQ.

5

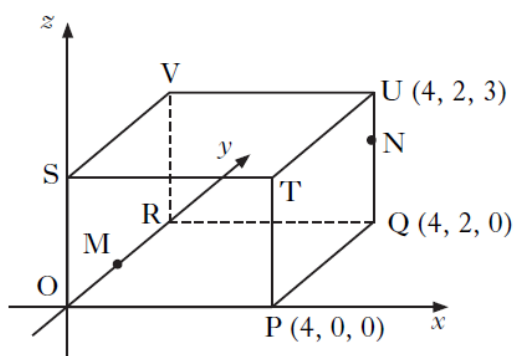
2

- 2 The diagram shows a cuboid OPQR,STUV relative to the coordinate axes.

P is the point (4, 0, 0),
 Q is (4, 2, 0) and U is (4, 2, 3).

M is the midpoint of OR.

N is the point on UQ such that $UN = \frac{1}{3}UQ$.



- (a) State the coordinates of M and N.
 (b) Express \vec{VM} and \vec{VN} in component form.
 (c) Calculate the size of angle MVN.

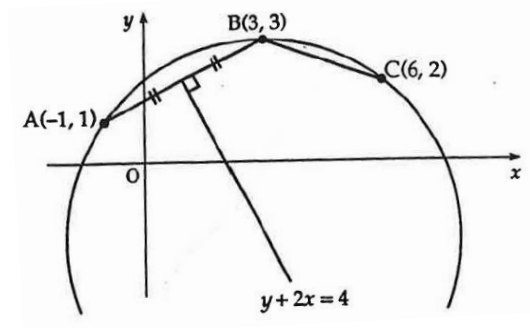
2

2

5

- 3 (a) Find the equation of ℓ_1 , the perpendicular bisector of the line joining $P(3, -3)$ to $Q(-1, 9)$. 4
- (b) Find the equation of ℓ_2 which is parallel to PQ and passes through $R(1, -2)$. 2
- (c) Find the point of intersection of ℓ_1 and ℓ_2 . 3
- (d) Hence find the shortest distance between PQ and ℓ_2 . 2

- 4 (a) In the diagram, A is the point $(-1, 1)$, B is $(3, 3)$ and C is $(6, 2)$. The perpendicular bisector of AB has equation $y = 2x - 4$. Find the equation of the perpendicular bisector of BC . 4



- (b) Find the centre and the equation of the circle which passes through A , B and C . 6