

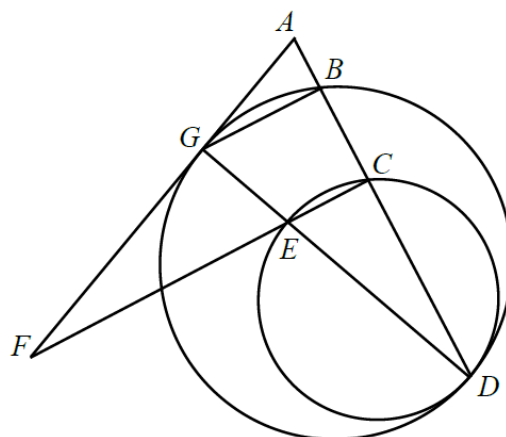
1. Two points A and B are on a straight line where $AB = 6$ m. A particle P moves along the line so that its velocity, $v \text{ ms}^{-1}$, is given by $v = 2t^2 - 7t - 4$, where t is the time in seconds after leaving B . Initially P is at B , moving towards A .
 - a) Find an expression, in terms of t for the acceleration of P . [1]
 - b) Find the minimum velocity of P . [3]
 - c) Find an expression, in terms of t for the distance of P from A . [2]
 - d) Find the distance from A of the point where P comes instantaneously to rest [3]
 - e) Find the total distance travelled by P in the first 6 seconds. [3]

2. The velocity, $v \text{ ms}^{-1}$, of a particle travelling in a straight line at time t seconds after leaving a fixed point O is given by $v = 2t^2 + (2 - 3k)t + 4k - 5$, where k is a constant.
 - a) Given that the minimum velocity occurs at $t = \frac{13}{4}$, show that the value of $k = 5$. [3]
 - b) Find the time(s) the particle comes to instantaneous rest. [2]
 - c) Find the distance travelled in the first 7 seconds after passing through O . [4]
 - d) Given that R is the point when the particle has zero acceleration, and P is the point where the particle first comes to rest, determine, with full working whether R is nearer to O or nearer to P . [3]

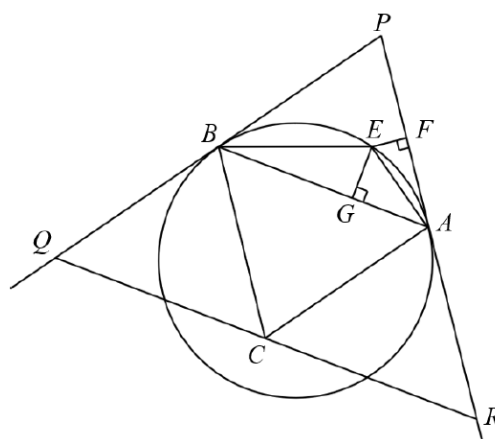
3. In the diagram, GED is the diameter of circle GBD , and ED is the diameter of circle ECD . AGF is a tangent to circle GBD at G .

$ABCD$ and CEF are straight lines and $GE = EC$.

- Prove that triangle DBG is similar to triangle DCE . [2]
- Prove that $GF = CD$. [3]
- Prove that the triangle ABG is similar to triangle EGF . [2]



4. In the diagram, A, B and C are the midpoints of PR, PQ and QR respectively. PR and PQ are tangents to the circle at A and B respectively. EF and EG are perpendiculars from E to PR and AB respectively.



- Prove that PACB is a parallelogram. [2]
- Prove that $EF \times BE = EG \times AE$. [1]

Answer Key

1(a)	$a = 4t - 7$
1(b)	$v = -10\frac{1}{8} \text{ m/s}$
1(c)	$s = \frac{2}{3}t^3 - \frac{7}{2}t^2 - 4t + 6$
1(d)	$23\frac{1}{3} \text{ m}$
1(e)	$52\frac{2}{3} \text{ m}$
2(a)	-
2(b)	1.5s or 5s
2(c)	43.75 m
2(d)	$OR = 2.98 \text{ m}$, $PR = 7.15 \text{ m}$, nearer to O