WARM-UP QUESTIONS: MECHANICS

1.

A cyclist starts from rest and accelerates uniformly to a speed of 12 ms^{-1} in 10 seconds. After travelling at this speed for 15 seconds, the cyclist then decelerates uniformly to rest over the next 6 seconds.

Sketch a velocity-time graph for the motion
Calculate the distance travelled by the cyclist.

2.

The force acting on a particle of mass 2.5 kg is given by the vector (8**i** + 18**j**) N

Give the acceleration of the particle as a vector
Calculate the angle that the acceleration makes with the direction (2**i** +**j**)

3.

A particle is moving along a straight line. At time $t = 0$ the particle is at point A, which is 6m from a fixed point, O

After t seconds, the velocity of the particle, v ms^{-1}, is given by

$v = 2 + 24t - 2t^2$
.
Calculate the distance of the particle from O when its acceleration is zero