Test - Kinematics

Year: Year 12 · Duration: 60 minutes · /20

Name:	Date:	**Mark: /20**

Question	1	2	3	4	5	Total
marks	4	4	4	4	4	**20**
Mark						

Show your working.

Question 1 (4 marks)

Question 1 – Constant acceleration

A car accelerates uniformly from 8 m/s to 20 m/s over a distance of 140 m.

a. Find the acceleration. (2 marks)
b. Find the time taken. (2 marks)

Question 2 (4 marks)

Question 2 – Vertical motion

A stone is thrown upwards at 21 m/s from a point 2 m above the ground. Take $g = 9.8$.

a. Find the maximum height above the ground. (2 marks)
b. Find the time when it hits the ground. (2 marks)

Question 3 (4 marks)

Question 3 – Velocity-time graph

A train accelerates uniformly from rest to 30 m/s in 60 s, travels at 30 m/s for 120 s and then decelerates uniformly to rest in 40 s.

a. Find the total distance. (3 marks)
b. Find the average speed. (1 mark)

Question 4 (4 marks)

Question 4 – Calculus

A particle has velocity $v = 3t^2 - 12t + 9$. At $t = 0$ its displacement is 4 m.

a. Find the times when the particle is at rest. (2 marks)
b. Find the displacement at $t = 4$. (2 marks)

Question 5 (4 marks)

Question 5 – Problem: overtaking

A police car starts from rest at a junction with acceleration 2 m/s^2 just as a van passes at a constant 20 m/s.

a. Show that the police car catches the van after 20 s. (2 marks)
b. Find the police car\'s speed then. (1 mark)
c. How far from the junction does this happen? (1 mark)