MATHSAURUS

AS Mathematics Exam Questions by Topic
Chapter 19: Constant Acceleration Formulae (suvat equations)

These questions are taken from the Specimen Exam materials and the real 2018 papers for the new syllabus AS and A-level mathematics courses and arranged by chapter of the textbooks by Goldie et al (available here: `https://amzn.to/39umfr5` and `https://amzn.to/3hE8kBL`). There are a mixture of questions from OCR A, OCR B (MEI), Edexcel and AQA. Although the style of questions varies a little across the exam boards the content of the syllabus is almost identical so these are suitable for students preparing for any exam board.

Free problem sets for all other chapters, as well as video solutions, full past papers and other content for GCSE and A-level maths can be found at:

`https://mathsaurus.com/`

Edexcel AS Sample Paper 2 Question 6:

6.

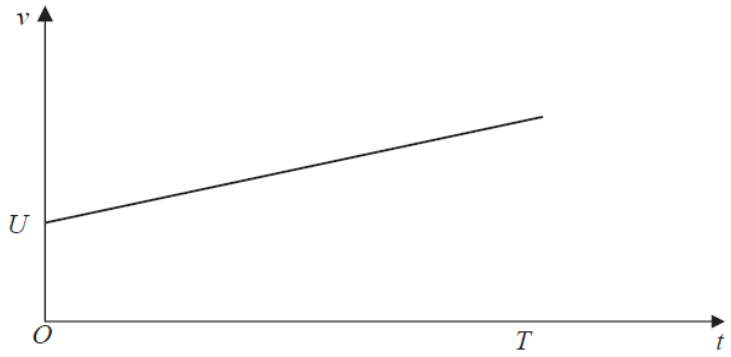


Figure 1

A car moves along a straight horizontal road. At time $t = 0$, the velocity of the car is U m s^{-1}. The car then accelerates with constant acceleration a m s^{-2} for T seconds. The car travels a distance D metres during these T seconds.

Figure 1 shows the velocity-time graph for the motion of the car for $0 \leqslant t \leqslant T$.

Using the graph, show that $D = UT + \frac{1}{2} aT^2$.

(No credit will be given for answers which use any of the kinematics (*suvat*) formulae listed under Mechanics in the AS Mathematics section of the formulae booklet.)

(4)

Edexcel AS Sample Paper 2 Question 7:

7. A car is moving along a straight horizontal road with constant acceleration. There are three points A, B and C, in that order, on the road, where $AB = 22$ m and $BC = 104$ m. The car takes 2 s to travel from A to B and 4 s to travel from B to C.

Find

(i) the acceleration of the car,

(ii) the speed of the car at the instant it passes A.

(7)

AQA 2018 Paper 2 Question 10:

10 A garden snail moves in a straight line from rest to $1.28\,\text{cm}\,\text{s}^{-1}$, with a constant acceleration in 1.8 seconds.

Find the acceleration of the snail.

Circle your answer.

[1 mark]

$2.30\,\text{m}\,\text{s}^{-2}$ $0.71\,\text{m}\,\text{s}^{-2}$ $0.0071\,\text{m}\,\text{s}^{-2}$ $0.023\,\text{m}\,\text{s}^{-2}$

AQA AS 2018 Paper 1 Question 11:

11 **In this question use $g = 9.8\,\text{m}\,\text{s}^{-2}$**

A ball, initially at rest, is dropped from a height of 40 m above the ground.

Calculate the speed of the ball when it reaches the ground.

Circle your answer.

[1 mark]

$-28\,\text{m}\,\text{s}^{-1}$ $28\,\text{m}\,\text{s}^{-1}$ $-780\,\text{m}\,\text{s}^{-1}$ $780\,\text{m}\,\text{s}^{-1}$

Edexcel AS 2018 Paper 2 Question 6:

6. A man throws a tennis ball into the air so that, at the instant when the ball leaves his hand, the ball is 2 m above the ground and is moving vertically upwards with speed $9\,\text{m}\,\text{s}^{-1}$

The motion of the ball is modelled as that of a particle moving freely under gravity and the acceleration due to gravity is modelled as being of constant magnitude $10\,\text{m}\,\text{s}^{-2}$

The ball hits the ground T seconds after leaving the man's hand.

Using the model, find the value of T.

(4)

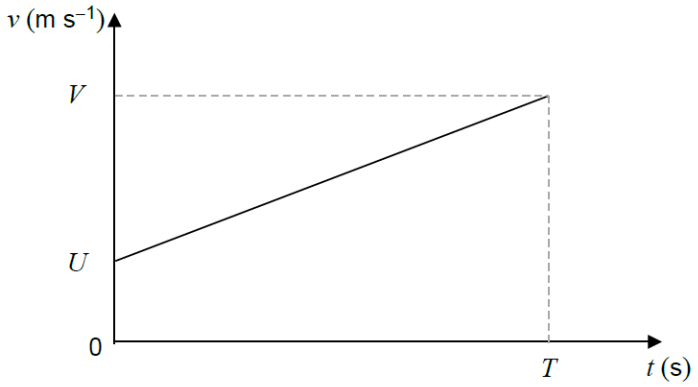
AQA Sample Paper 2 Question 12:

12 A particle moves on a straight line with a constant acceleration, a m s^{-2}.

The initial velocity of the particle is U m s^{-1}.

After T seconds the particle has velocity V m s^{-1}.

This information is shown on the velocity-time graph.



The displacement, S metres, of the particle from its initial position at time T seconds is given by the formula

$$S = \frac{1}{2}(U+V)T$$

12 (a) By considering the gradient of the graph, or otherwise, write down a formula for a in terms of U, V and T.

[1 mark]

12 (b) Hence show that $V^2 = U^2 + 2aS$

[3 marks]