AQA – Kinematics – AS Mathematics P1
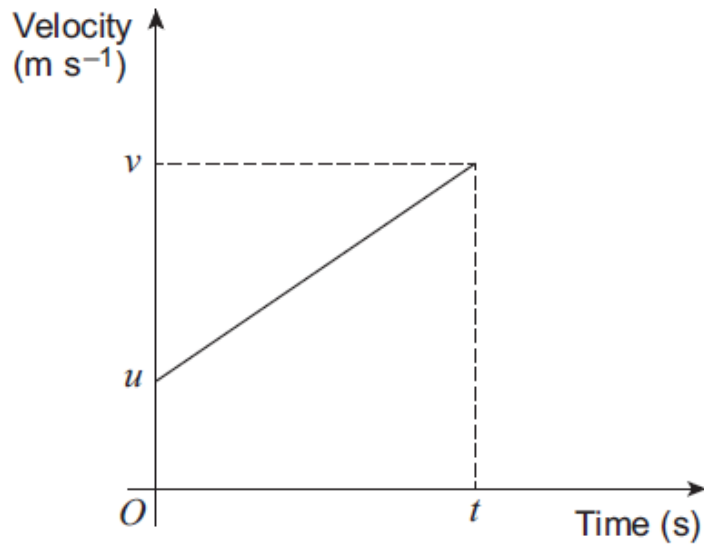
1. June/2020/Paper_1/No.13

An object is moving in a straight line, with constant acceleration $a \, \text{ms}^{-2}$, over a time period of t seconds.

It has an initial velocity u and final velocity v as shown in the graph below.

Use the graph to show that

$$v = u + at$$

[3 marks]

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2. June/2020/Paper_1/No.15

A particle, P, is moving in a straight line with acceleration $a\,\mathrm{m\,s^{-2}}$ at time t seconds, where

$$a = 4 - 3t^2$$

(a) Initially P is stationary.

Find an expression for the velocity of P in terms of t.

[2 marks]

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2. June/2020/Paper_1/No.15

A particle, P, is moving in a straight line with acceleration $a\,\mathrm{m\,s^{-2}}$ at time t seconds, where

(b) When $t = 2$, the displacement of P from a fixed point, O, is 39 metres.

Find the time at which P passes through O, giving your answer to three significant figures.

Fully justify your answer.

[5 marks]

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3. June/2019/Paper_1/No.11

A ball moves in a straight line and passes through two fixed points, A and B, which are 0.5 m apart.

The ball is moving with a constant acceleration of $0.39 \, \text{m s}^{-2}$ in the direction AB.

The speed of the ball at A is $1.9 \, \text{m s}^{-1}$

Find the speed of the ball at B.

Circle your answer.

[1 mark]

$2 \, \text{m s}^{-1}$ $3.2 \, \text{m s}^{-1}$ $3.8 \, \text{m s}^{-1}$ $4 \, \text{m s}^{-1}$

4. June/2019/Paper_1/No.13

A car, starting from rest, is driven along a horizontal track.

The velocity of the car, $v\,\mathrm{m\,s^{-1}}$, at time t seconds, is modelled by the equation

$$v = 0.48t^2 - 0.024t^3 \text{ for } 0 \leq t \leq 15$$

(a)   Find the distance the car travels during the first 10 seconds of its journey.

[3 marks]

(b)   Find the maximum speed of the car.

Give your answer to three significant figures.

[4 marks]

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(c)   Deduce the range of values of t for which the car is modelled as decelerating.

[2 marks]

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