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## Work, energy and power – A2 Further Mathematics Mechanics

1. June/2022/Paper\_7367/03M/No.2

A car of mass  $1200\,\mathrm{kg}$  is travelling at a constant speed of  $18\,\mathrm{m\,s^{-1}}$  on a straight horizontal road.

The car experiences a total resistive force of 240 newtons.

Calculate the power of the car's engine.

Circle your answer.

[1 mark]

900 W 4320 W 16 000 W 21 600 W

	2.	June/2022	/Paper	7367	/03M	/No.5
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A train of mass  $10\,000\,\mathrm{kg}$  is travelling at  $0.3\,\mathrm{m\,s^{-1}}$  when it collides with a buffer. The buffer brings the train to rest.

As the buffer brings the train to rest it compresses by 0.2 metres.

When the buffer is compressed by a distance of  $\boldsymbol{x}$  metres it exerts a force of magnitude  $\boldsymbol{F}$  newtons, where

$$F = Ax + 9000x^2$$

where A is a constant.

Find	, in terms of $A$ , the work done in compressing the buffer by 0.2 metres.	[2 marks
Find	the value of $\boldsymbol{A}$	[2 marks

3.	June/202	$^{22/Paper}_{-7367/03M/No.8}$ In this question use $g$ as $9.8\mathrm{ms^{-2}}$
		A rope is used to pull a crate, of mass 60 kg, along a rough horizontal surface.
		The coefficient of friction between the crate and the surface is 0.4
		The crate is at rest when the rope starts to pull on it.
		The tension in the rope is 240 N and the rope makes an angle of 30° to the horizontal.
		When the crate has moved 5 metres, the rope becomes detached from the crate.
	(a)	Use an energy method to find the maximum speed of the crate.  [4 marks]

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Use an	energy meth	od to find	the total o	distance tra	avelled by	ine crate.	[2 mai
	nt claims tha				to travel n	nore than 5	.3 metres i
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