

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	



General Certificate of Education  
Advanced Subsidiary Examination  
June 2014

# Mathematics

# MM1B

## Unit Mechanics 1B

Monday 16 June 2014 9.00 am to 10.30 am

**For this paper you must have:**

- the blue AQA booklet of formulae and statistical tables.

You may use a graphics calculator.

### Time allowed

- 1 hour 30 minutes

### Instructions

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Write the question part reference (eg (a), (b)(i) etc) in the left-hand margin.
- You must answer each question in the space provided for that question. If you require extra space, use an AQA supplementary answer book; do **not** use the space provided for a different question.
- Do not write outside the box around each page.
- Show all necessary working; otherwise marks for method may be lost.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- The **final** answer to questions requiring the use of calculators should be given to three significant figures, unless stated otherwise.
- Take  $g = 9.8 \text{ m s}^{-2}$ , unless stated otherwise.

### Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 75.

### Advice

- Unless stated otherwise, you may quote formulae, without proof, from the booklet.
- You do not necessarily need to use all the space provided.



J U N 1 4 M M 1 B 0 1

Answer **all** questions.

Answer each question in the space provided for that question.

- 1** A car is travelling along a straight horizontal road. It is moving at  $14 \text{ m s}^{-1}$  when it starts to accelerate. It accelerates at  $0.8 \text{ m s}^{-2}$  for 12 seconds.
- (a)** Find the speed of the car at the end of the 12 seconds. **[3 marks]**
- (b)** Find the distance travelled during the 12 seconds. **[3 marks]**
- (c)** The mass of the car is 1400 kg. A horizontal forward driving force of 1600 N acts on the car during the 12 seconds. Find the magnitude of the resistance force that acts on the car. **[3 marks]**

QUESTION  
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QUESTION  
PART  
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### Answer space for question 1

Answer space for question 1

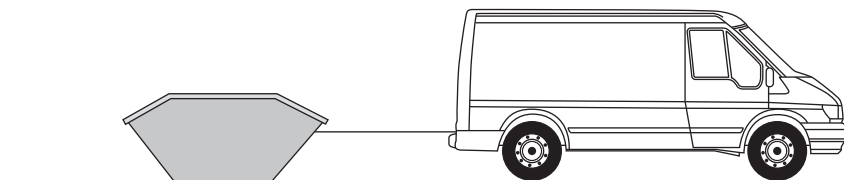
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**3** A skip, of mass 800 kg, is at rest on a rough horizontal surface. The coefficient of friction between the skip and the ground is 0.4. A rope is attached to the skip and then the rope is pulled by a van so that the rope is horizontal while it is taut, as shown in the diagram.



The mass of the van is 1700 kg. A constant horizontal forward driving force of magnitude  $P$  newtons acts on the van. The skip and the van accelerate at  $0.05 \text{ m s}^{-2}$ .

Model both the van and the skip as particles connected by a light inextensible rope. Assume that there is no air resistance acting on the skip or on the van.

- (a) Find the speed of the van and the skip when they have moved 6 metres. **[3 marks]**
- (b) Draw a diagram to show the forces acting on the skip while it is accelerating. **[1 mark]**
- (c) Draw a diagram to show the forces acting on the van while it is accelerating. State one advantage of modelling the van as a particle when considering the vertical forces. **[2 marks]**
- (d) Find the magnitude of the friction force acting on the skip. **[3 marks]**
- (e) Find the tension in the rope. **[3 marks]**
- (f) Find  $P$ . **[3 marks]**

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QUESTION  
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REFERENCE

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**END OF QUESTIONS**

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