

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**  
**MATHEMATICS B (MEI)**  
Paper 4 Section B (Higher Tier)

**B294B**

Candidates answer on the Question Paper

**OCR Supplied Materials:**  
None

- Other Materials Required:**
- Geometrical instruments
  - Scientific or graphical calculator
  - Tracing paper (optional)

**Friday 11 June 2010**  
**Morning**

**Duration: 1 hour**



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**INSTRUCTIONS TO CANDIDATES**

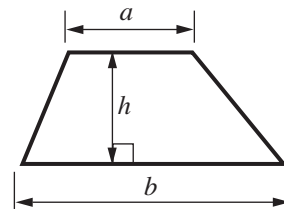
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Show all your working. Marks may be given for a correct method even if the answer is incorrect.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).

**INFORMATION FOR CANDIDATES**

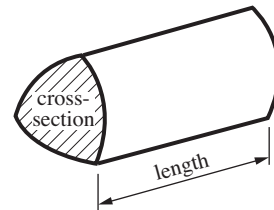
- The number of marks is given in brackets [ ] at the end of each question or part question.
- Section B starts with question 11.
- You are expected to use a calculator in Section B of this paper.
- Use the  $\pi$  button on your calculator or take  $\pi$  to be 3.142 unless the question says otherwise.
- The total number of marks for this Section is **50**.
- This document consists of **12** pages. Any blank pages are indicated.

## Formulae Sheet: Higher Tier

**Area of trapezium** =  $\frac{1}{2}(a + b)h$



**Volume of prism** = (area of cross-section)  $\times$  length

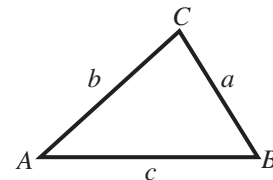


**In any triangle  $ABC$**

**Sine rule**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

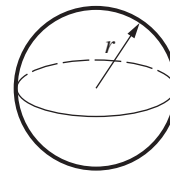
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

**Area of triangle** =  $\frac{1}{2}ab \sin C$



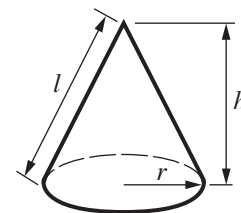
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

**Surface area of sphere** =  $4\pi r^2$



**Volume of cone** =  $\frac{1}{3}\pi r^2 h$

**Curved surface area of cone** =  $\pi r l$



**The Quadratic Equation**

The solutions of  $ax^2 + bx + c = 0$ , where  $a \neq 0$ , are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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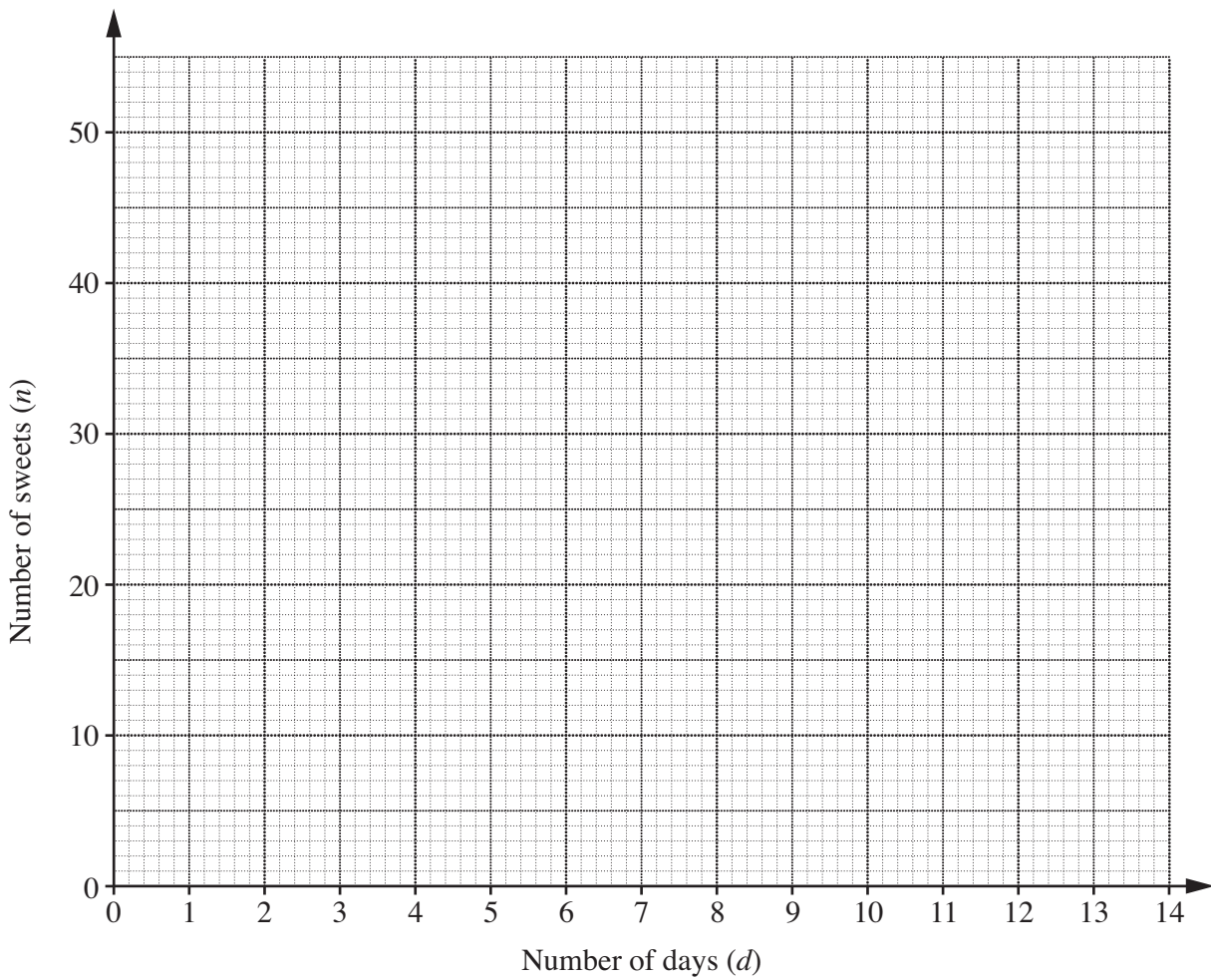
11 Sarah was given a bag containing 50 sweets. Each day she eats 4 sweets.

(a) Write down an equation connecting

- $n$ , the number of sweets left in the bag and
- $d$ , the number of days since she was given the bag of sweets.

(a) ..... [2]

(b) Draw the graph of  $n$  against  $d$ .



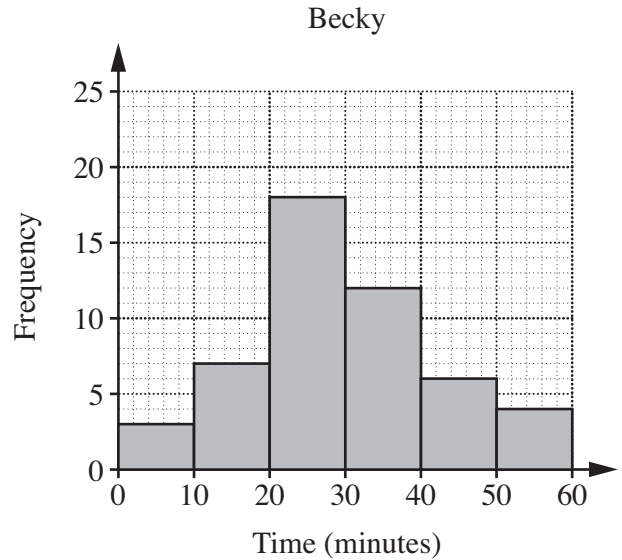
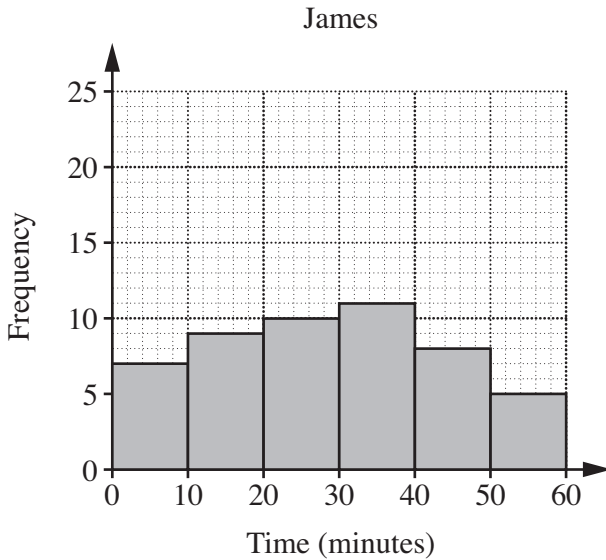
[2]

(c) Use your graph to find on what day the bag is empty.

(c) ..... [1]

- 12 James and Becky each carried out a survey about the length of time it takes for the students at their school to get to school. They each took a sample of 50 students.

Their results are shown in these frequency diagrams.



- (a) State the modal class of Becky's times.

(a) ..... minutes [1]

- (b) Make **two** comparisons between the two distributions.

1 .....

2 ..... [2]

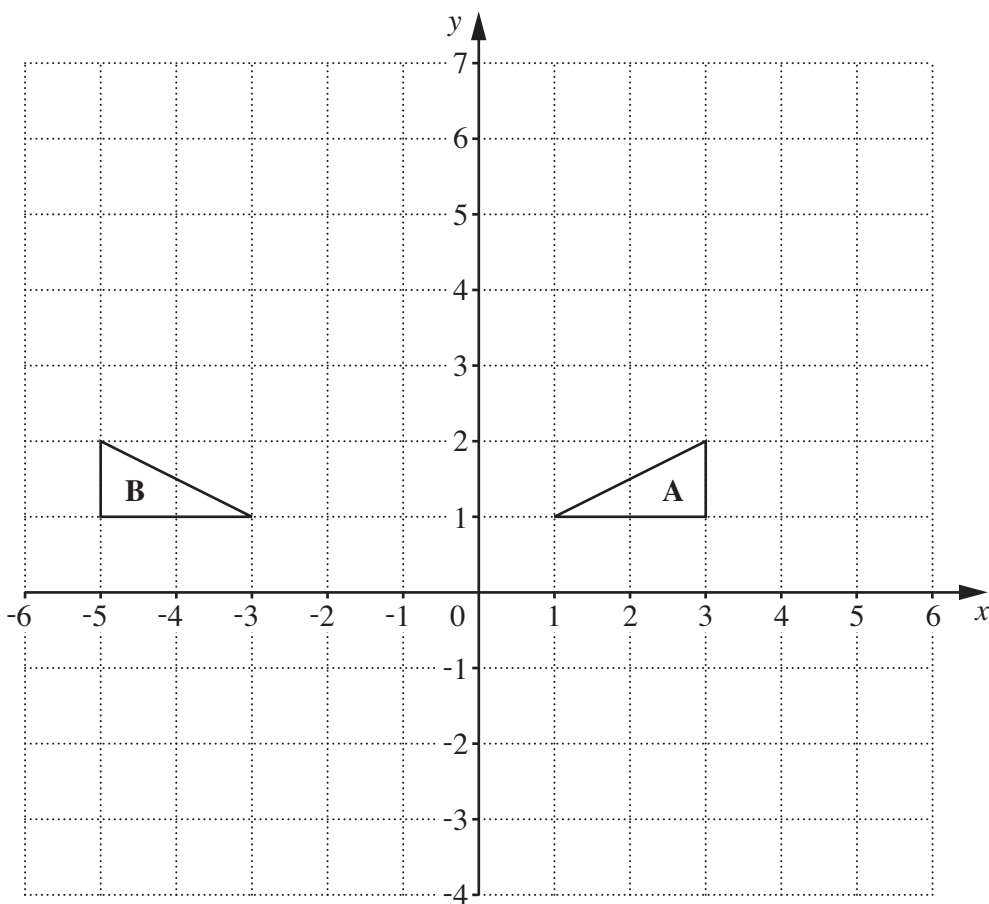
- (c) To obtain his sample, James went round the playground at break and asked a selection of 50 students.  
To obtain her sample, Becky stood outside the school gate before school and asked the first 50 students she saw arriving.

- (i) Give **one** reason why James' sample may not be representative.

..... [1]

- (ii) Give **one** reason why Becky's sample may not be representative.

..... [1]



(a) Describe fully the single transformation that maps triangle **A** onto triangle **B**.

..... [2]

(b) Draw an enlargement of triangle **A** with centre (4, 0) and scale factor 3.

[3]

14 On the 1st January 2009 Salim bought a car for £9460.  
Each year the car depreciates by 12% of its value at the beginning of the year.

- (a) What will be the value of the car on 1st January 2012?  
Give your answer to a suitable degree of accuracy.

(a) £ ..... [4]

- (b) The car was one year old when Salim bought it.

What was the value of the car, when new, on 1st January 2008?

(b) £ ..... [3]

15 (a) Factorise  $x^2 - 9x$ .

(a) ..... [1]

(b) Rearrange these equations to make  $x$  the subject.

(i)  $y = \frac{x + a}{5}$

(b)(i) ..... [2]

(ii)  $xy = a(x - b)$

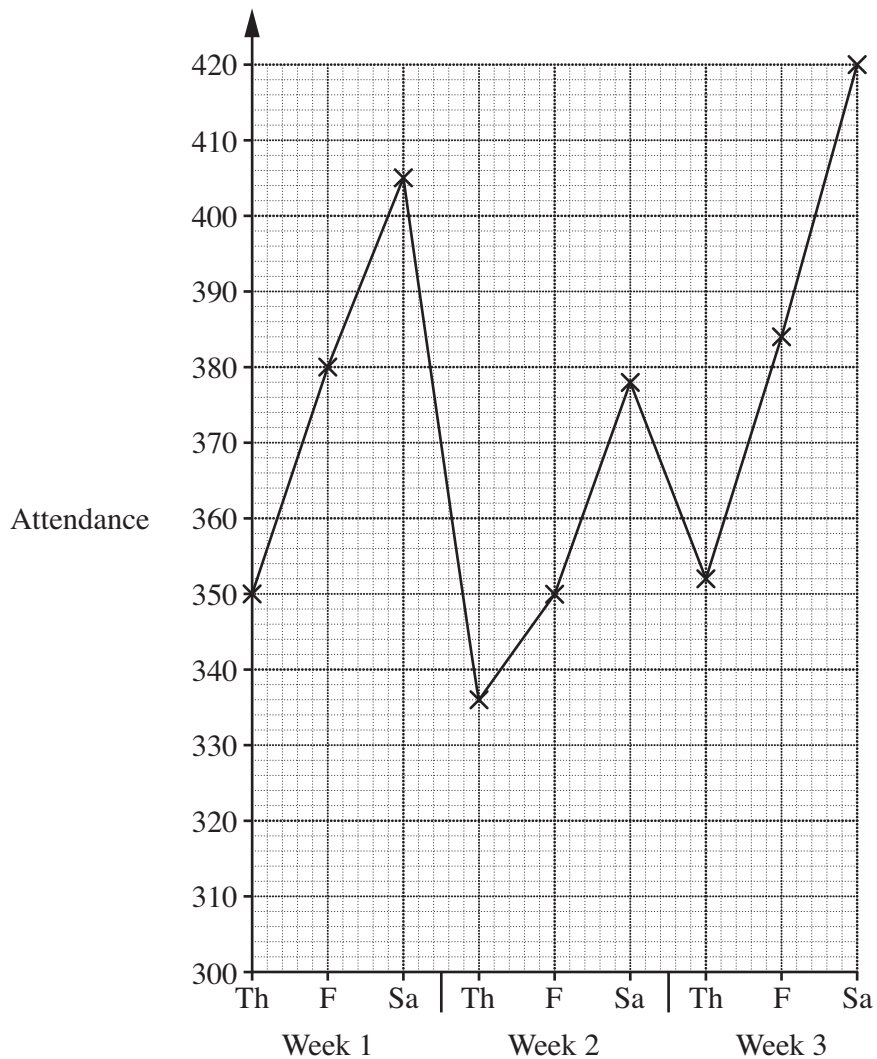
(ii) ..... [3]

16 An amateur theatre group performs a play on Thursday, Friday and Saturday for three weeks.

The attendances are shown in the table

	Thursday	Friday	Saturday
Week 1	350	380	405
Week 2	336	350	378
Week 3	352	384	420

The graph of these figures is plotted below.





The 3-point moving averages for the attendances are as follows.

$p$       373.7       $q$       354.7      360      371.3      385.3

(a) Calculate the values of  $p$  and  $q$ .

(a)  $p = \dots\dots\dots$  ,  $q = \dots\dots\dots$  [3]

(b) Plot all 7 moving averages on the graph. [3]

(c) Describe the overall trend in the attendances.

.....  
..... [1]

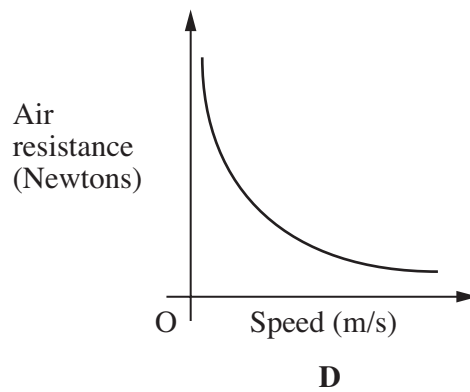
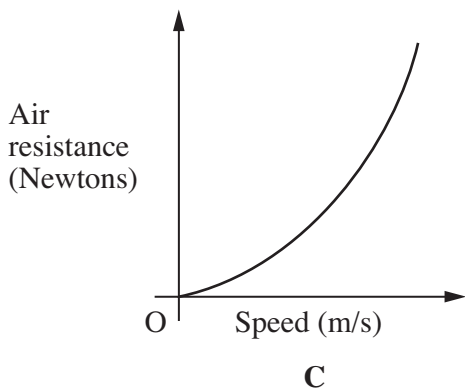
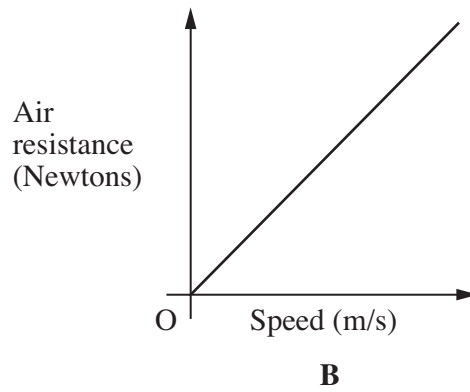
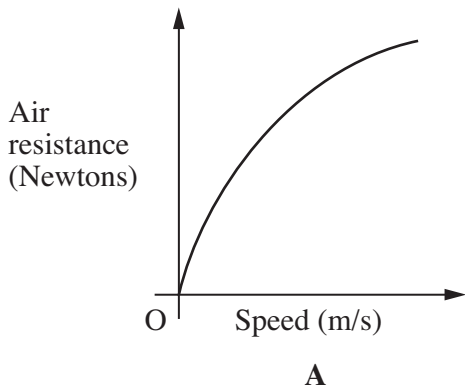
17 The air resistance to a moving ball is proportional to the square of its speed.

(a) At a certain speed the air resistance is 15 Newtons.

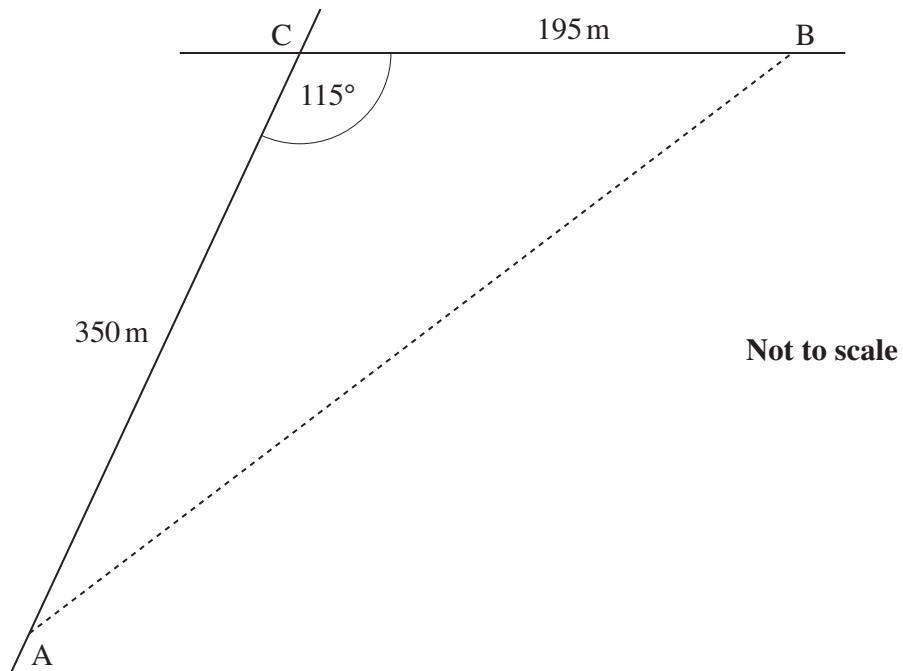
What is the air resistance when the speed is 3 times as great?

(a) ..... Newtons [2]

(b) Which of these graphs best represents the relationship between air resistance and speed?



(b) ..... [1]



On his way home Adam can go by road, A to C to B, or take a shortcut across the playing field from A to B.

$AC = 350\text{ m}$ ,  $CB = 195\text{ m}$  and  $\angle ACB = 115^\circ$ .

Adam walks at 1.2 metres per second.

Calculate the time that Adam saves by walking across the field.

..... s [5]

**TURN OVER FOR QUESTION 19**

- 19 Solve algebraically these simultaneous equations.  
Give your answers correct to 2 decimal places.

$$\begin{aligned}y &= x + 2 \\x^2 + y^2 &= 5\end{aligned}$$

$$x = \dots\dots\dots, y = \dots\dots\dots$$

$$\text{or } x = \dots\dots\dots, y = \dots\dots\dots \quad [7]$$



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