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Centre Number						Candidate Number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

B294B

MATHEMATICS B (MEI)

Paper 4 Section B (Higher Tier)

FRIDAY 11 JUNE 2010: Morning

DURATION: 1 hour

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the Question Paper

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Geometrical instruments

Scientific or graphical calculator

Tracing paper (optional)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

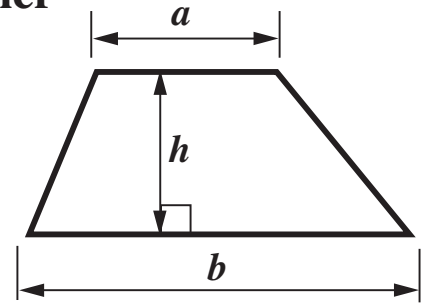
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Show your working. Marks may be given for a correct method even if the answer is incorrect.
- Answer ALL the questions.
- 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

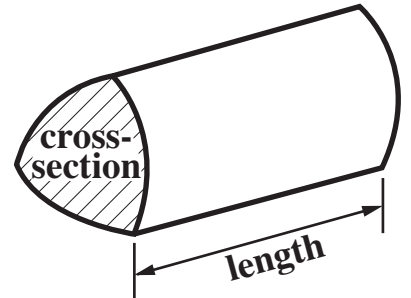
- The number of marks is given in brackets [] at the end of each question or part question.
- Section B starts with question 11.
- You are expected to use a calculator in Section B of this paper.
- Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
- The total number of marks for this Section is 50.

Formulae Sheet: Higher Tier

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



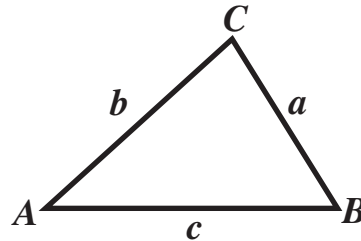
$$\text{Volume of prism} = (\text{area of cross-section}) \times \text{length}$$



In any triangle ABC

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

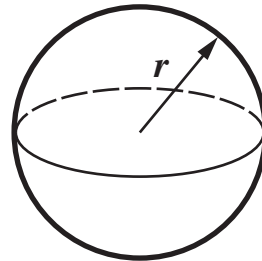
$$\text{Cosine rule} \quad a^2 = b^2 + c^2 - 2bc \cos A$$



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

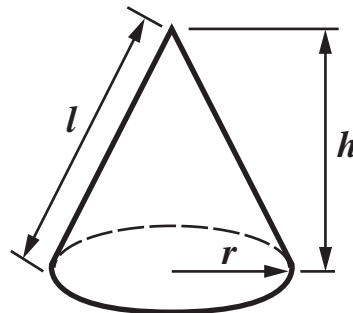
$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$

$$\text{Surface area of sphere} = 4\pi r^2$$



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

$$\text{Curved surface area of cone} = \pi r l$$



The Quadratic Equation

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

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

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

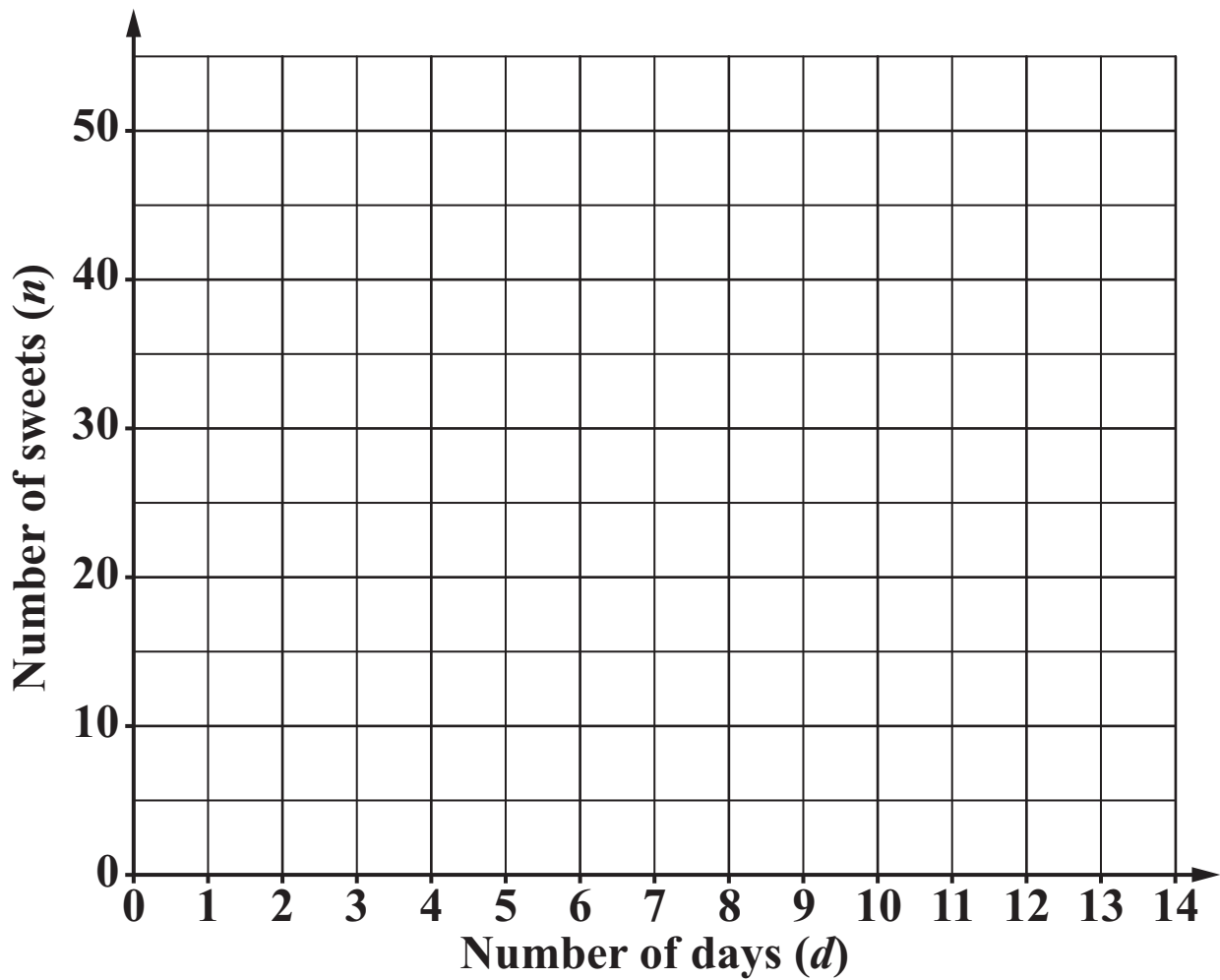
(a) Write down an equation connecting

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

[2 marks]

(a) _____

(b) Draw the graph of n against d .
[2 marks]



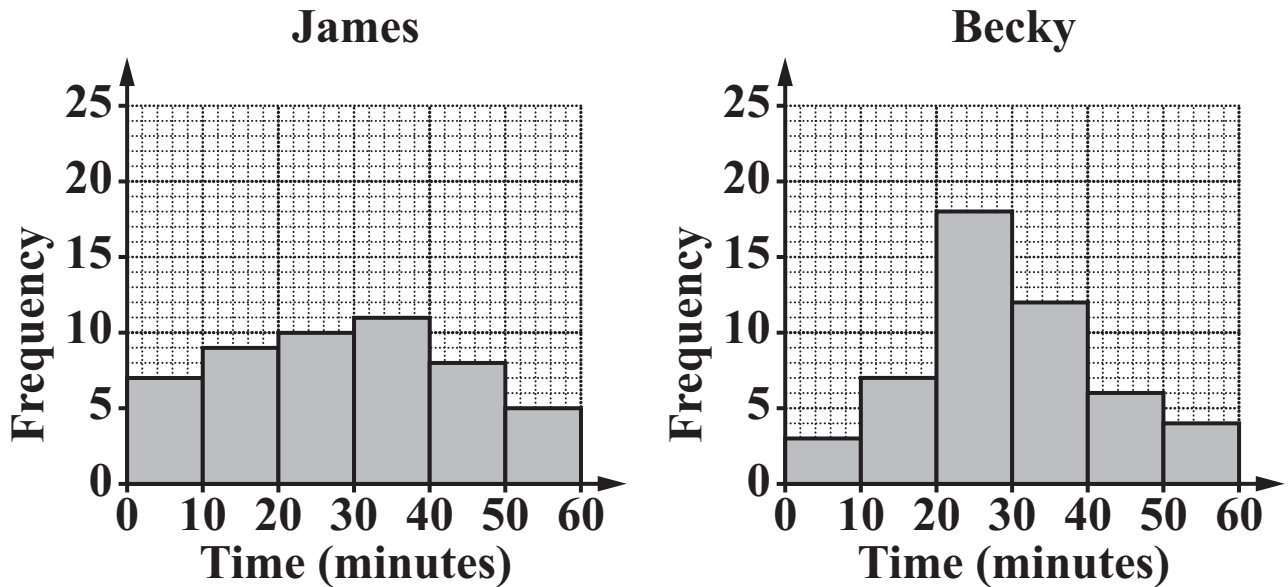
(c) Use your graph to find on what day the bag is empty.
[1 mark]

(c) _____

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.
[1 mark]

(a) _____ minutes

(b) Make TWO comparisons between the two distributions.
[2 marks]

1 _____

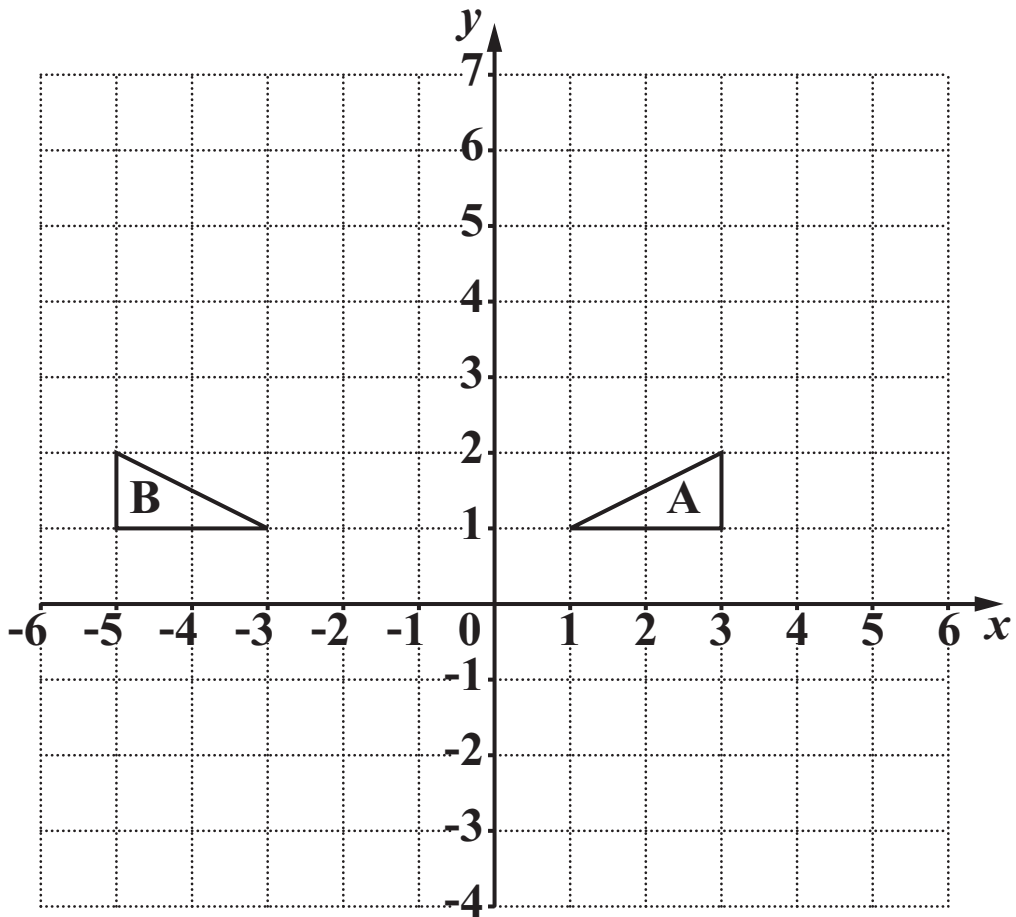
2 _____

(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 mark]

(ii) Give ONE reason why Becky's sample may not be representative.
[1 mark]

13 Triangles A and B are drawn on the grid below.



- (a)** Describe fully the single transformation that maps triangle A onto triangle B.
[2 marks]
-

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

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.
[4 marks]**

(a) £ _____

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

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

[3 marks]

(b) £ _____

15 (a) Factorise $x^2 - 9x$.
[1 mark]

(a) _____

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

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

[2 marks]

(b)(i) _____

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

[3 marks]

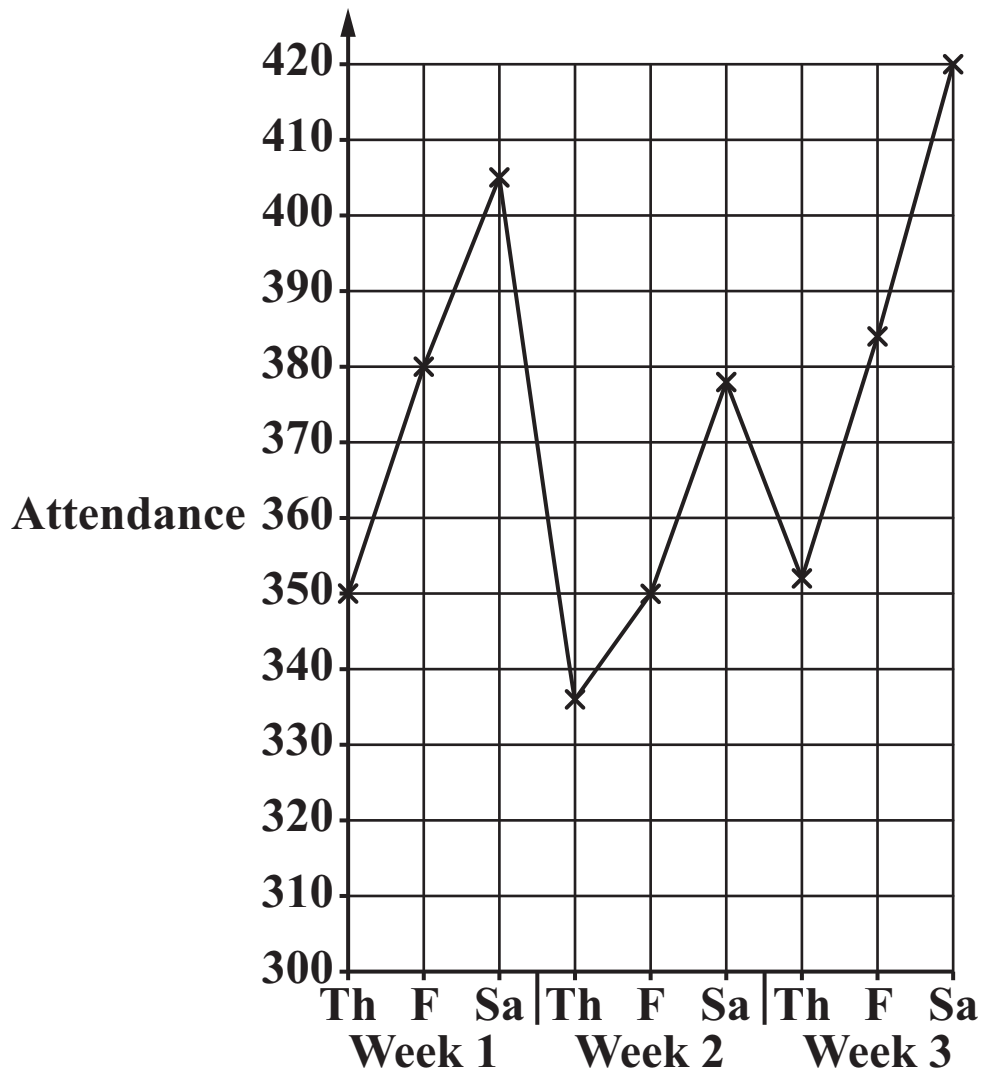
(ii) _____

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 .
[3 marks]

(a) $p =$ _____ , $q =$ _____

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

- (c) Describe the overall trend in the attendances.
[1 mark]

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

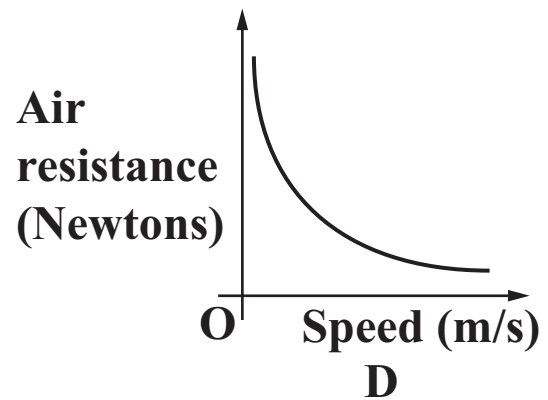
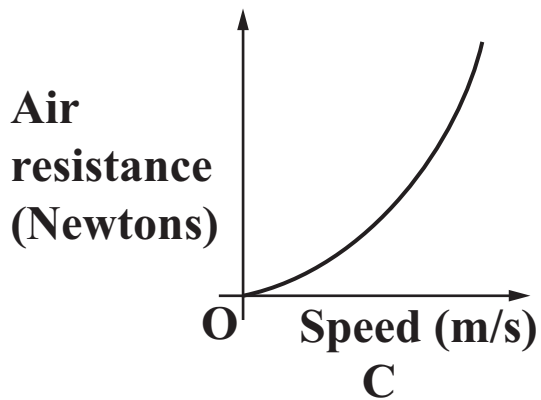
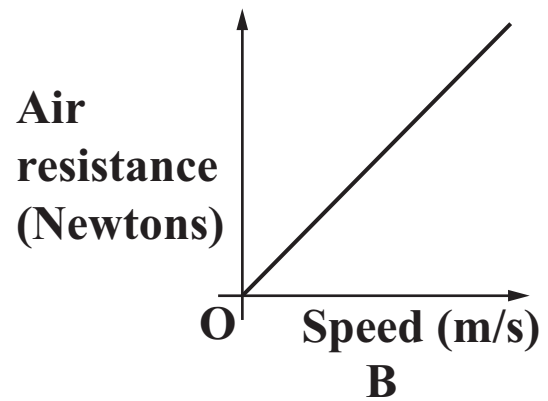
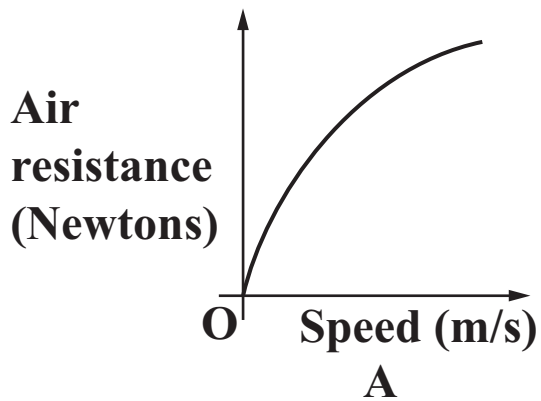
(a) At a certain speed the air resistance is 15 Newtons.

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

[2 marks]

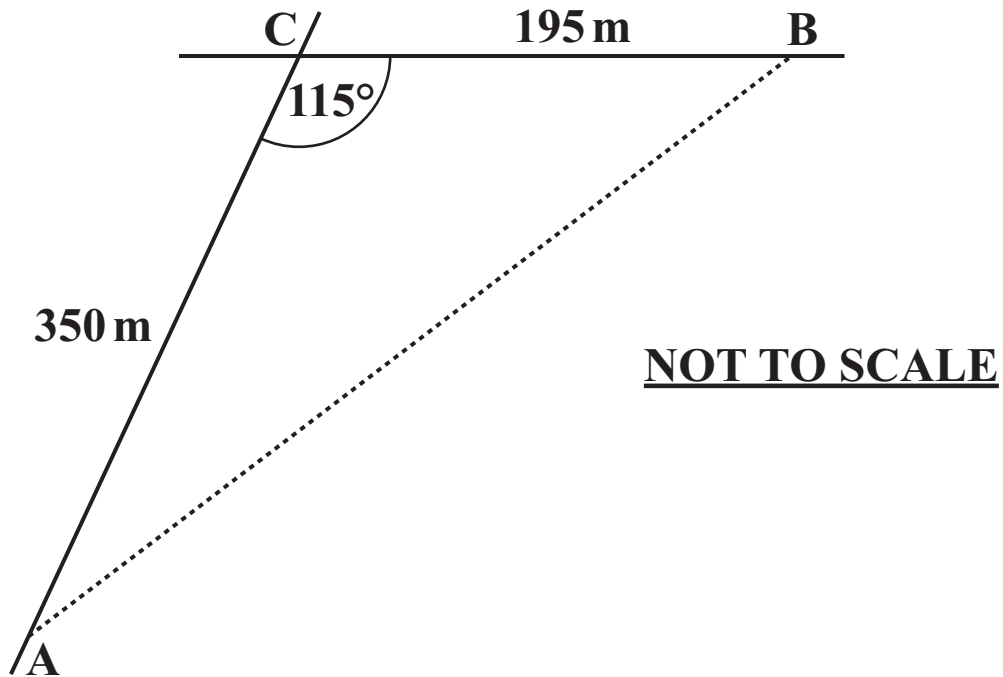
(a) _____ Newtons

**(b) Which of these graphs best represents the relationship between air resistance and speed?
[1 mark]**



(b) _____

- 18 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 as shown below.



$AC = 350 \text{ m}$, $CB = 195 \text{ m}$ and $\angle ACB = 115^\circ$.
Adam walks at 1.2 metres per second.

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

[5 marks]

S

TURN OVER FOR QUESTION 19

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

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

[7 marks]

$$x = \underline{\hspace{2cm}}, y = \underline{\hspace{2cm}}$$

$$\text{or } x = \underline{\hspace{2cm}}, y = \underline{\hspace{2cm}}$$

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