

The Mathematical Association of Victoria

Trial Exam 2014

SPECIALIST MATHEMATICS

Written Examination 1

STUDENT NAME _____

Reading time: 15 minutes

Writing time: 1 hour

QUESTION AND ANSWER BOOK

Structure of Book

<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
9	9	40

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers,
- Students are NOT permitted to bring into the examination room: notes of any kind, a calculator of any type, blank sheets of paper and/or white out liquid/tape.

Materials supplied

- Question and answer book of 13 pages with a detachable sheet of miscellaneous formulas in the centrefold.

Instructions

- Detach the formula sheet from the centre of this book during reading time.
- Write your **name** in the space provided above on this page.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

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Instructions

Answer **all** questions in the spaces provided.

Unless otherwise specified an **exact** answer is required to a question.

In questions where more than one mark is available, appropriate working **must** be shown.

Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Take the **acceleration due to gravity** to have magnitude $g \text{ m/s}^2$, where $g = 9.8$

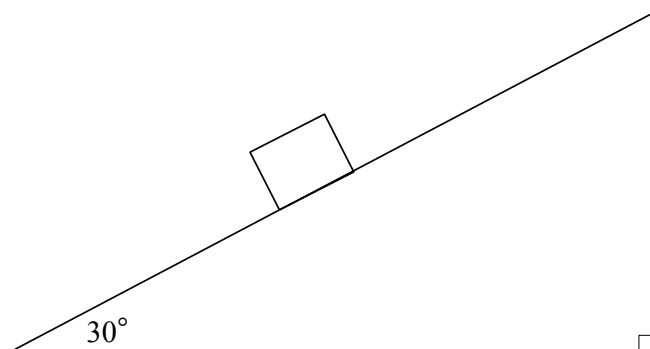
Question 1 (5 marks)

A body of mass 6 kg is projected at a speed of 3 m/s up a **rough** plane inclined at 30° to the horizontal.

The coefficient of friction between the body and the plane is $\frac{2\sqrt{3}}{3}$.

- a. On the diagram below, show all the forces acting on the body while it is moving up the plane and label them.

1 mark



Question 9 (5 marks)

Consider the function

$$f : [1, a) \cup (a, b) \rightarrow R, f(x) = 1 - 2\operatorname{cosec}\left(\frac{\pi x}{3}\right).$$

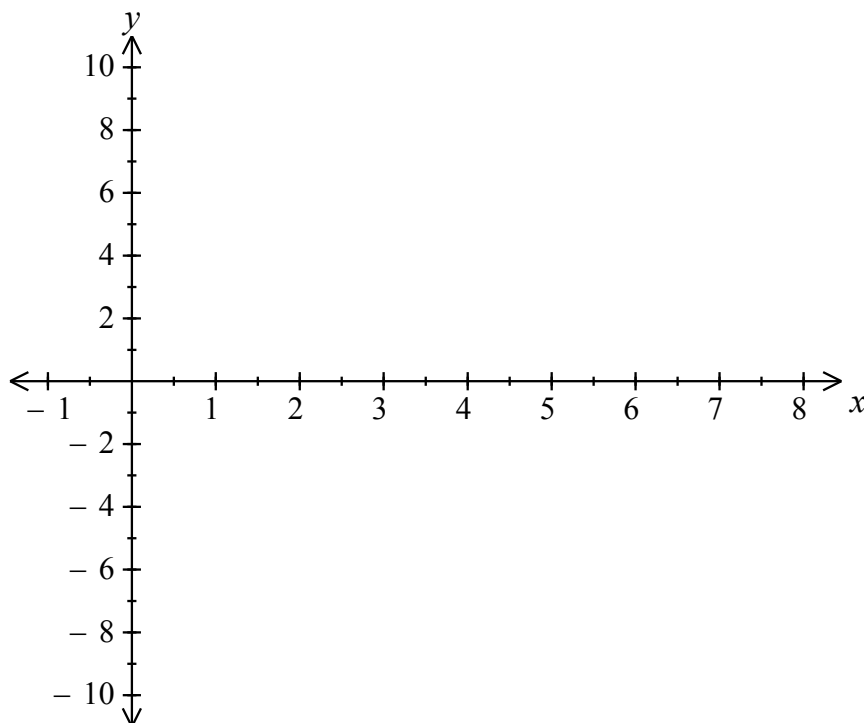
where the values of a and b are the largest for which f is defined.

- a. State the values of a and b .

1 mark

- b. Sketch the graph of $y = f(x)$. Label the turning points and any endpoints with their **coordinates** and the asymptotes with their equations.

4 marks

**END OF QUESTION AND ANSWER BOOK**