Student Name	
Teacher	Mr Trufitt Mr Woodlock

MATHEMATICAL METHODS UNIT 3

SAC 1: Application Task

PART 1 – "INITIAL INVESTIGATION"

Thursday 9 May / Friday 10 May 2019

Reading time: nil
Writing time: 45 minutes

Structure of Task

Section	Number of questions	Number of questions to be answered
Application Task	6	6

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers, one CAS calculator and/or one scientific calculator, and one approved bound reference.
- Students are not permitted to use: blank sheets of paper and/or white out liquid/tape.

Materials supplied
- Question and answer book of 6 pages.
- Working space is provided throughout the book.

Instructions
- Write your name in the space provided above on this page.
- All responses must be written in English.

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

Students must not disclose the contents of the task; to do so will be a breach of School guidelines.
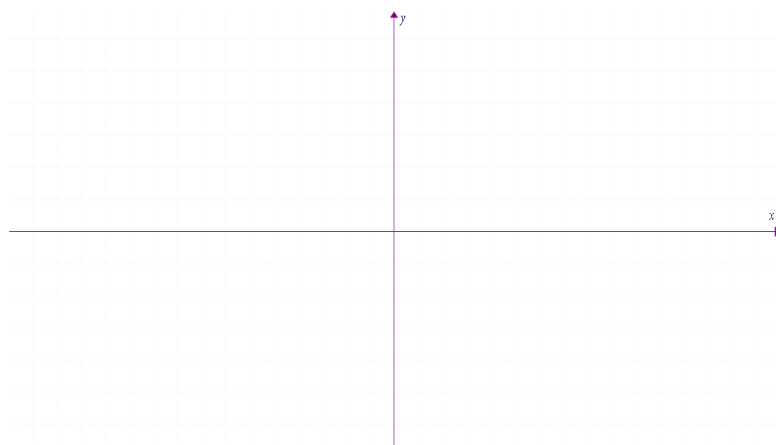
MATHEMATICAL METHODS UNIT 3

2019 SAC 1: Application Task

PART 1: "INITIAL INVESTIGATION"

1. A function, f, is defined for $f: D \rightarrow R, f(x) = \log_e(x^2)$.

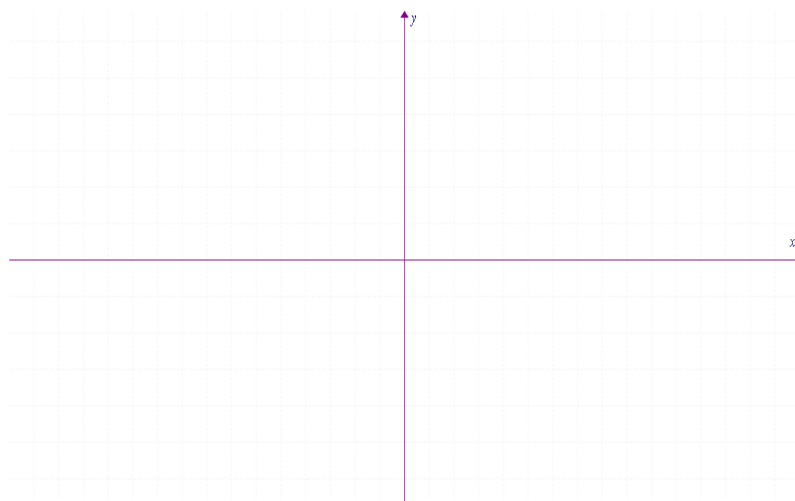   a. Write down the domain D of the function $f(x)$.

    b. Sketch the graph of the function $f(x)$, labelling any asymptotes and axial intercepts.

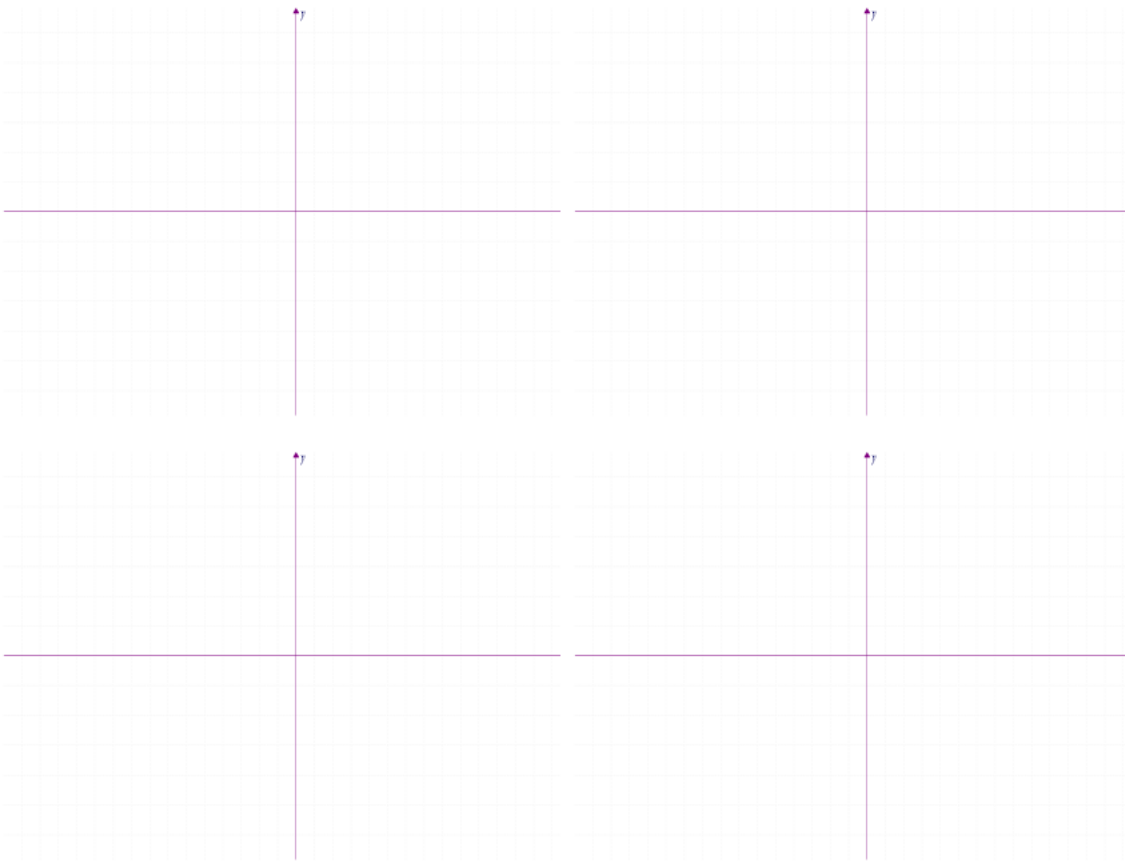2. A function, g, is defined for $g: D \rightarrow R, g(x) = \log_e((x-1)^2)$.

    a. State the maximal domain D over which $g(x)$ is defined.

    b. Sketch the graph of the function $g(x)$, labelling any asymptotes and axial intercepts.

3. Consider the function $h(x) = \log_e((x-p)^2)$, where $p > 0$.

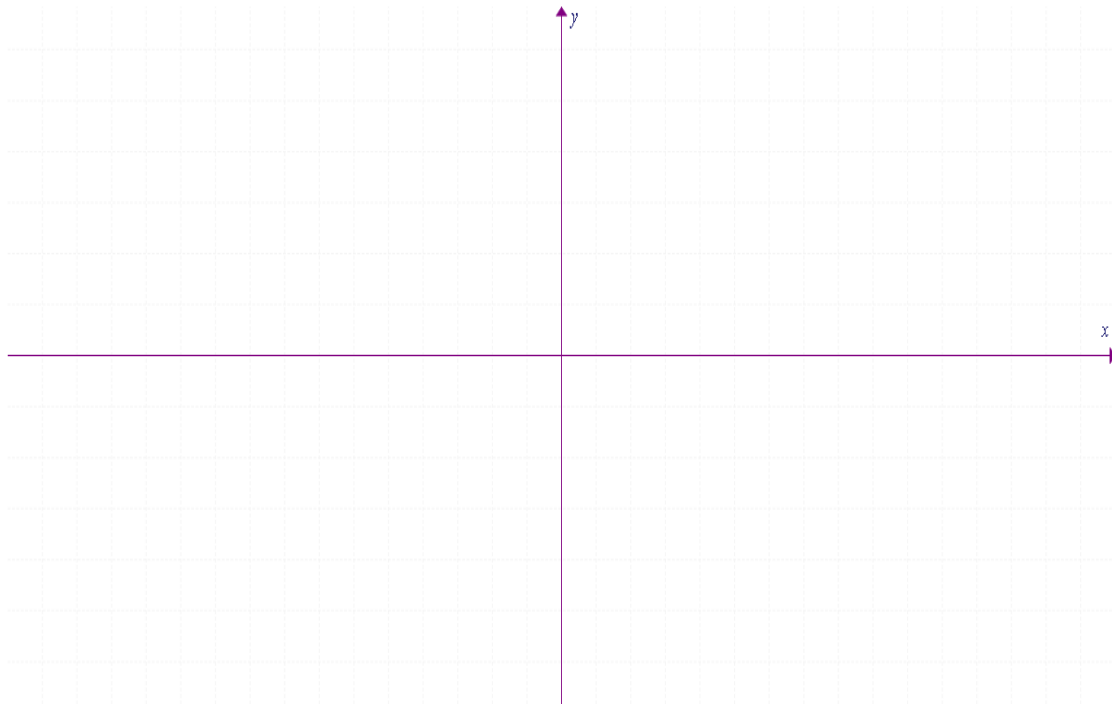   a. Sketch the graph of $h(x)$ for a range of suitable values of p.

   b. Comment on the effect that p has on the shape of the graph

4. A function, j, is defined for $j: D \to R, j(x) = \log_e(x^2 - 4)$.

    a. State the maximal domain D over which $j(x)$ is defined.

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    b. Sketch the graph of the function $j(x)$, labelling any asymptotes and axial intercepts.

WORKING SPACE

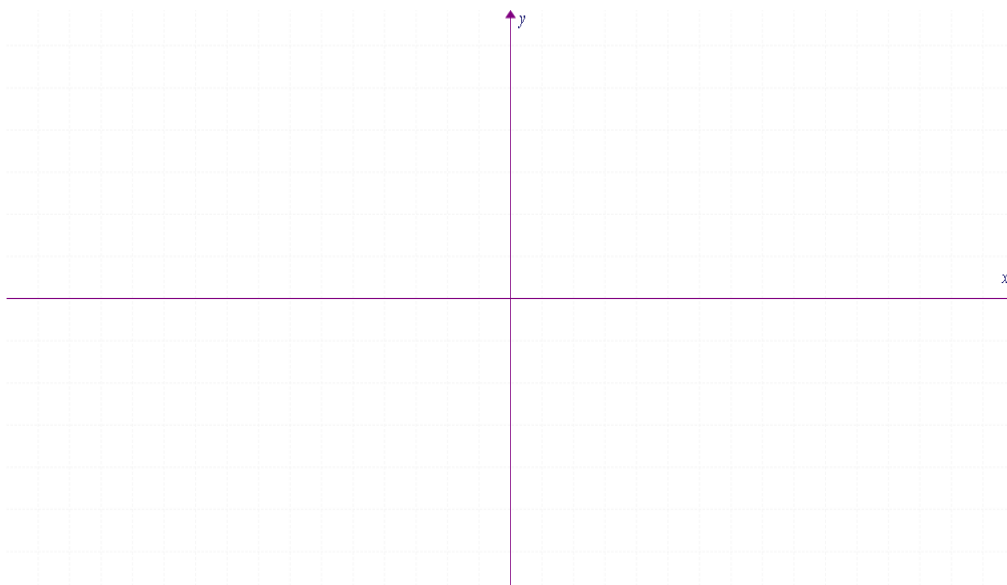5. Consider the function $k(x) = \log_e(x^2 - m)$, where $m > 0$.

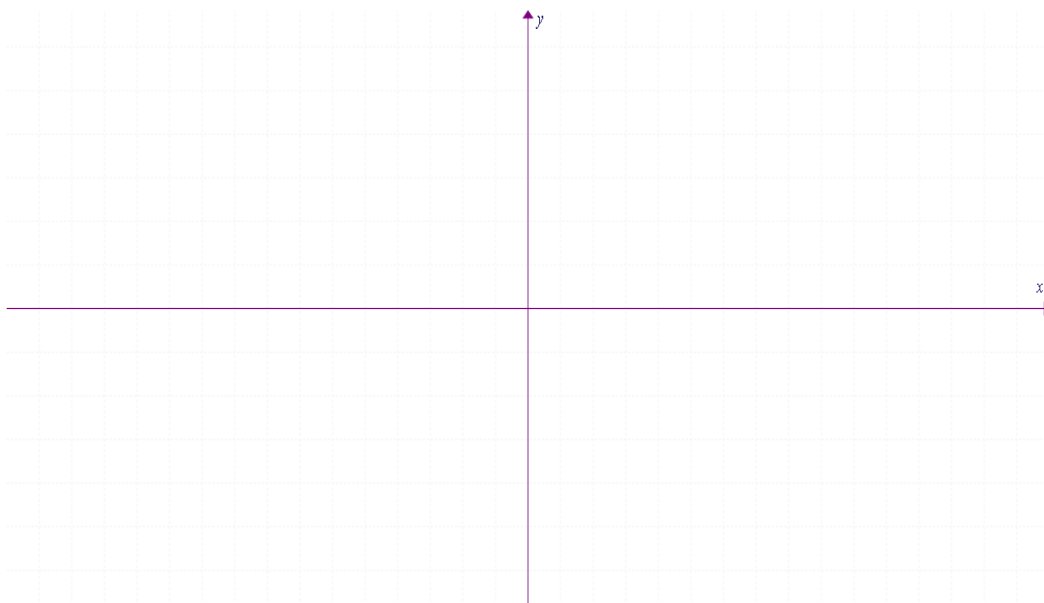c. Sketch the graph of $k(x)$ for a range of suitable values of m.

d. Comment on the effect that m has on the shape of the graph

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WORKING SPACE

6. a. Sketch the graph of the function $q(x) = (x-1)^2 - 4$. Label the turning point and axial intercepts.

b. Sketch the graph of the function $p(x) = \log_e(q(x))$. Label the asymptotes and axial intercepts.

c. State the domain and range of $p(x)$.

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END OF PART 1