For Supervisor's use only

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90639

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Level 3 Calculus, 2005

90639 Sketch graphs and find equations of conic sections

Credits: Three
9.30 am Wednesday 16 November 2005

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

Make sure that you have a copy of the Formulae and Tables booklet L3-CALCF.

You should answer ALL the questions in this booklet.

Show ALL working for ALL questions.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–15 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

For Assessor's use only	**Achievement Criteria**	
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Sketch graphs of conic sections. ☐	Solve problems involving conic sections. ☐	Solve more difficult conic section problems. ☐
Find equations of conic sections from given information. ☐		
Overall Level of Performance (all criteria within a column are met) ☐		

You are advised to spend 40 minutes answering the questions in this booklet.

Assessor's use only

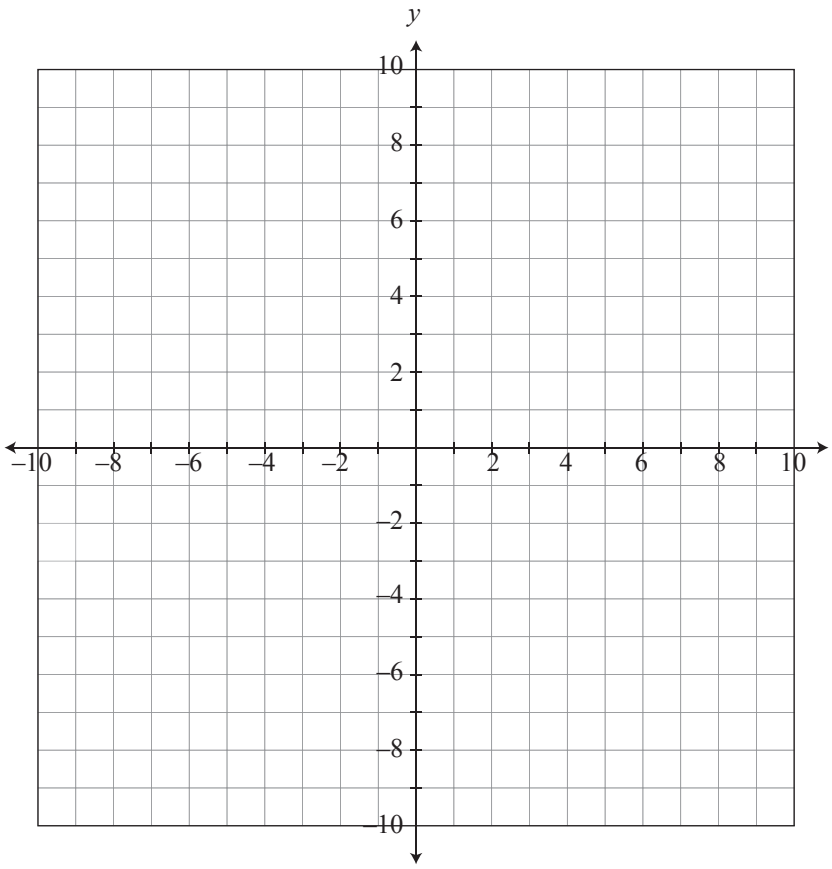
Show **ALL** working.

QUESTION ONE

Sketch the graph of $\frac{(x-3)^2}{9} + \frac{y^2}{4} = 1$.

If you need to redraw this graph, use page 12 or 13.

Label any intercepts and any asymptotes.



QUESTION TWO

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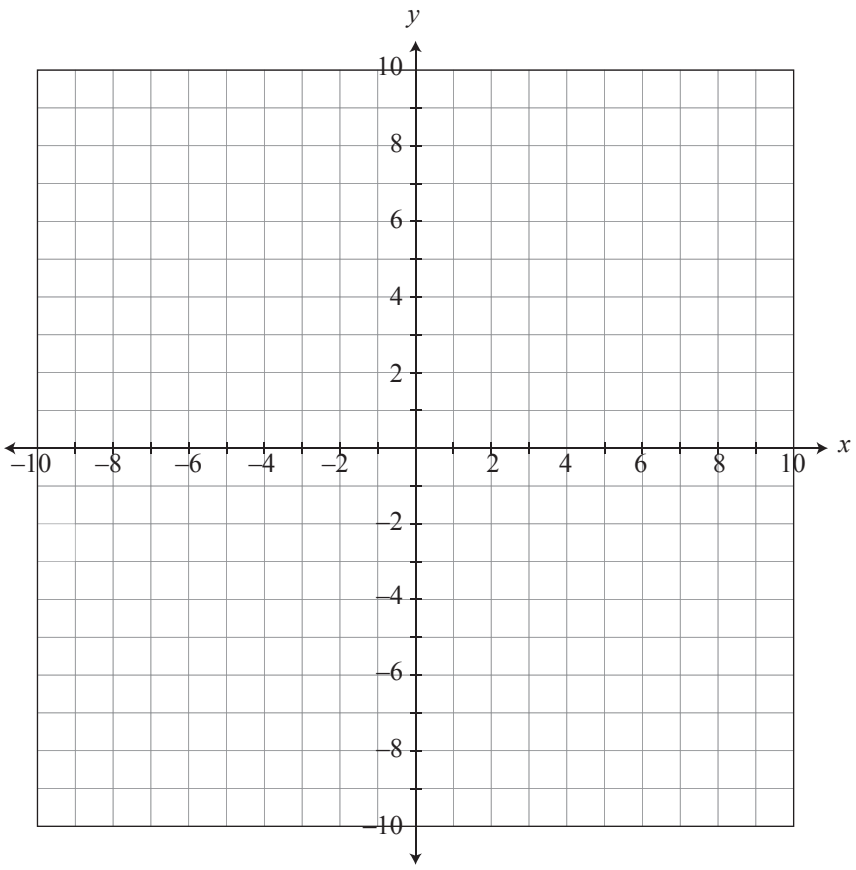
Sketch the graph of $x^2 + y^2 + 8y + 7 = 0$.

If you need to redraw this graph, use page 12 or 13.

Label any intercepts and any asymptotes.



QUESTION THREE

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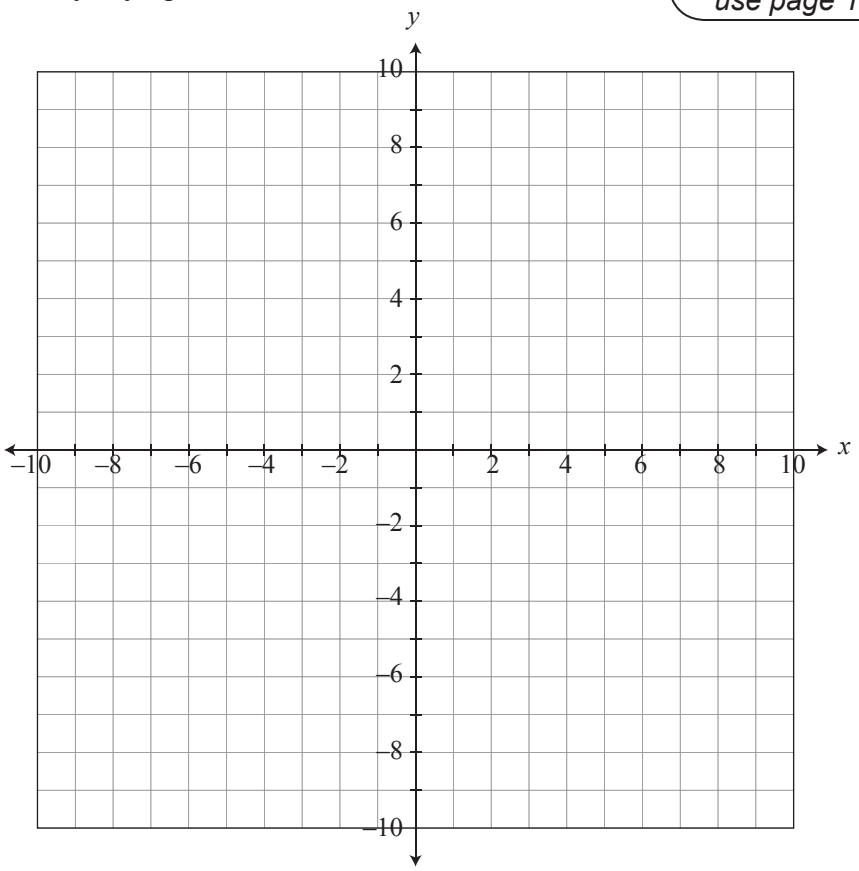
Sketch the graph of the curve defined by $x = 2\sec t, y = 3\tan t$.

If you need to redraw this graph, use page 12 or 13.

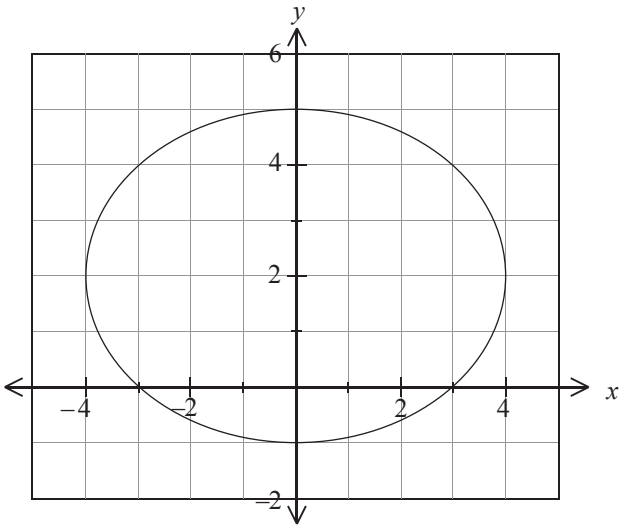
Label any intercepts and any asymptotes.



QUESTION FOUR

Assessor's use only

(a) Find the equation of the conic section shown:



(b) Find the equation of the conic section described below.

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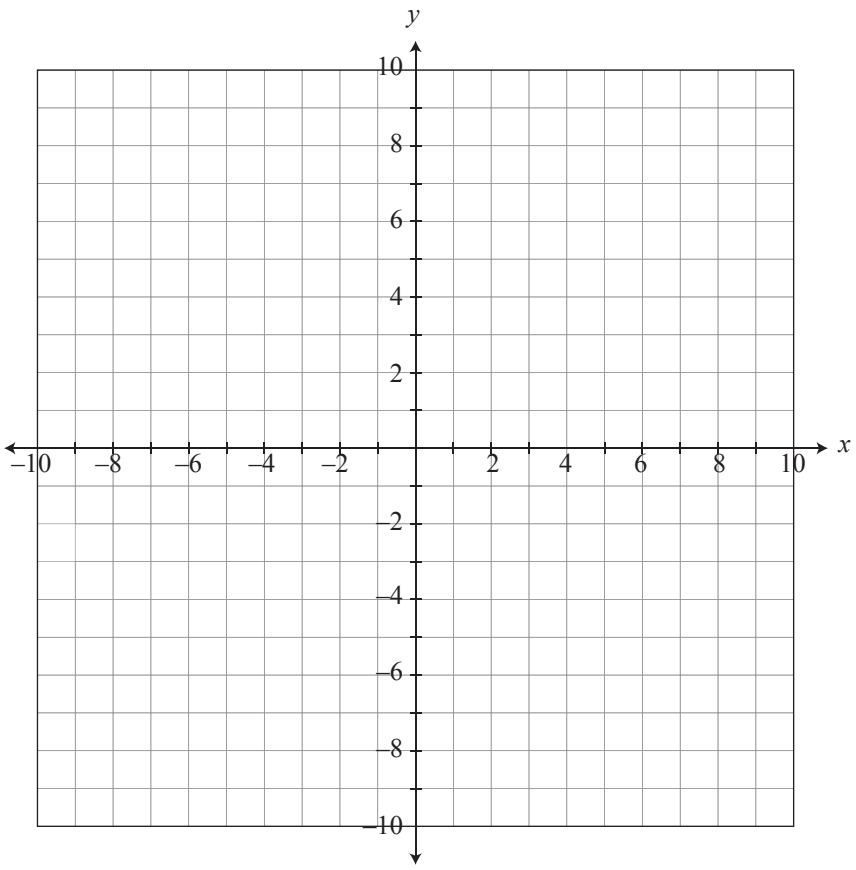
A hyperbola:

- centre at (0,0),
- distance between the vertices is 6
- the equation of one of its asymptotes is $y = 2x$.



(c) Find the equation of the conic section shown:

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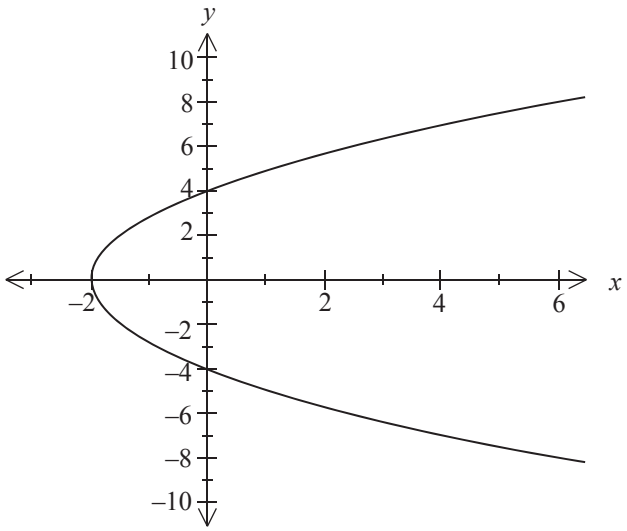
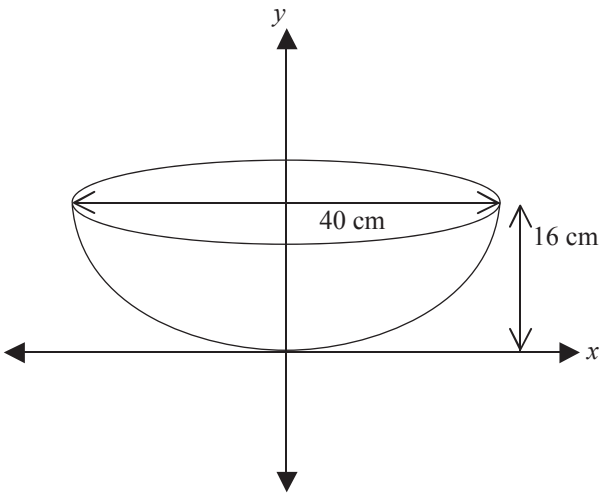


QUESTION FIVE

Assessor's use only

A wok has a vertical cross section which is parabolic.

It also has a horizontal cross section which is circular.



The wok is 40 cm wide and has a depth of 16 cm.

The wok is filled with water to a depth of 8 cm.

What is the surface area in cm^2 of the water in the wok?

QUESTION SIX

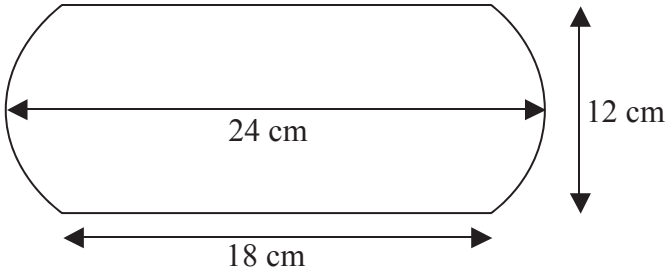
Assessor's use only

The Fibonacci Chocolate Company makes Easter eggs with an elliptical cross section.

These eggs are very difficult to stack, so the company cuts the bottom and the top off the egg leaving a symmetrical shape as shown.

The cut-down egg has a width of 24 cm and a height of 12 cm.

The cut surface is 18 cm wide.



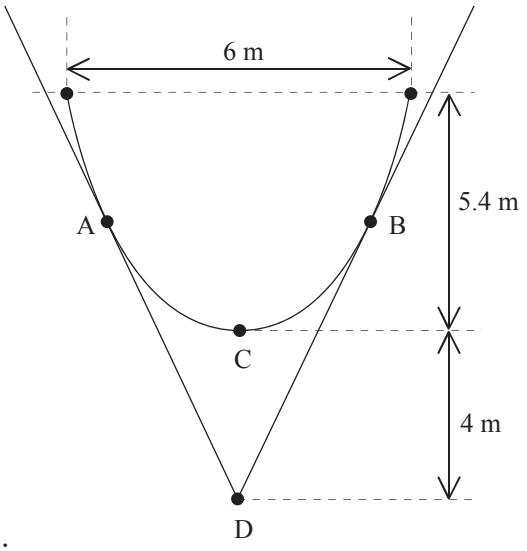
Calculate the original height in cm of an uncut egg.

QUESTION SEVEN

Assessor's use only

Find the equation of the tangent to the curve $\frac{(x-5)^2}{16} + \frac{y^2}{12} = 1$ at the point (7,3).

QUESTION EIGHT



The sketch shows part of a parabola and two tangents.

Points A and B are where the tangents touch the parabola.

The parabola has a width of 6 m at the top of the sketch.

Point C is the vertex of the parabola.

The height of this parabolic section is 5.4 m.

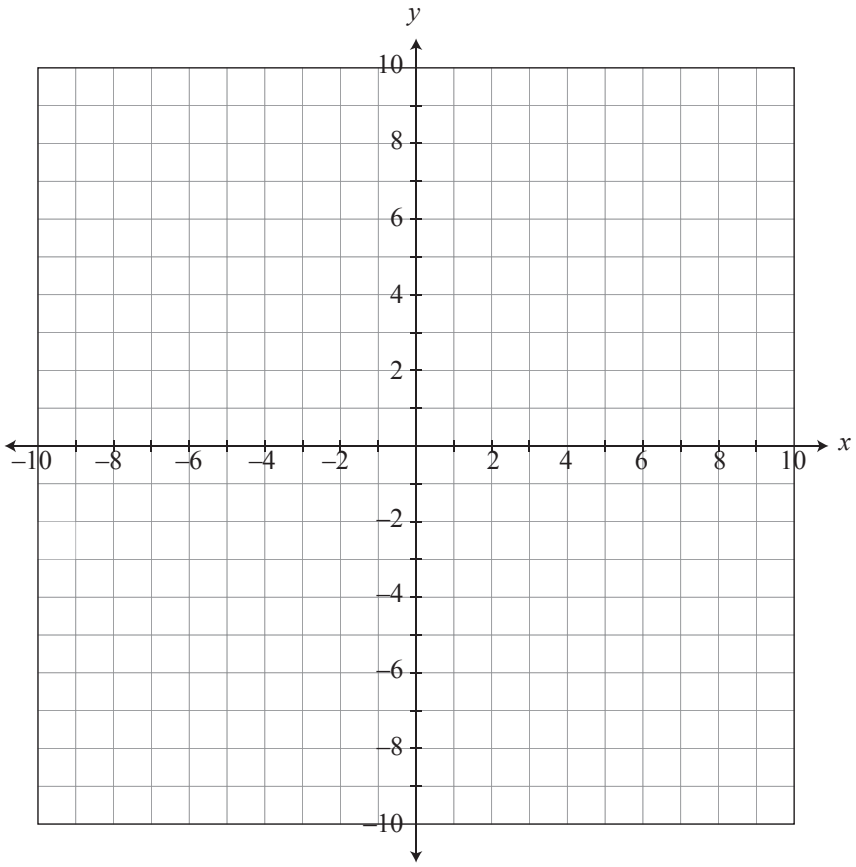
The distance between points C and D is 4 m.

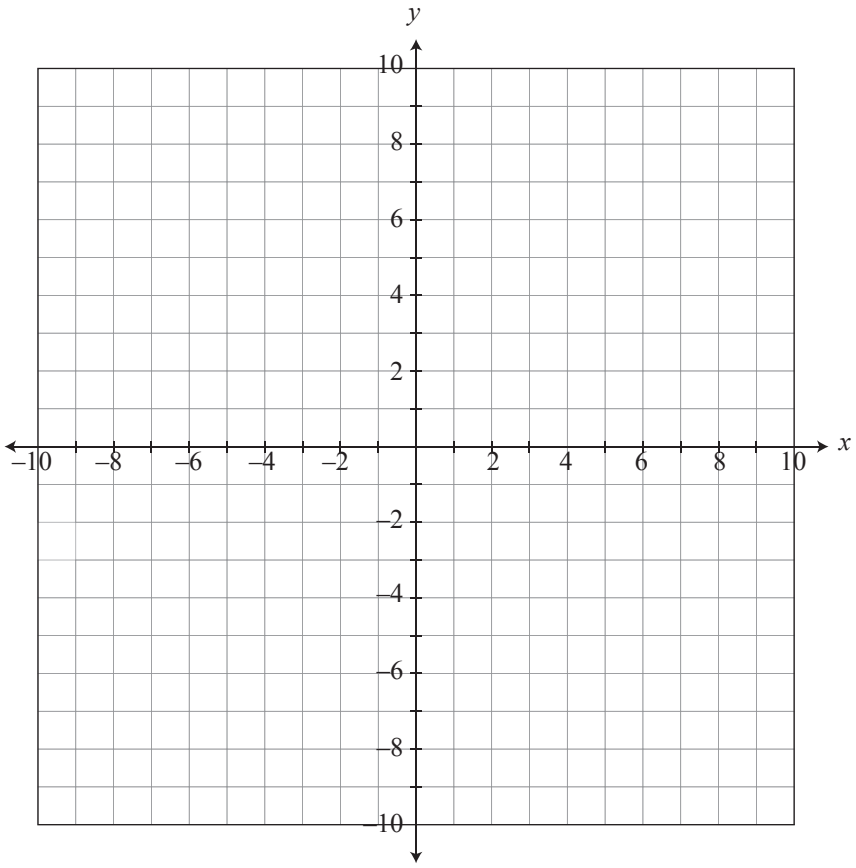
Calculate the distance in metres between points A and B.

Assessor's use only

If you have made a mistake and need to redraw a graph, use the appropriate copy printed here and clearly number the question.

Assessor's use only





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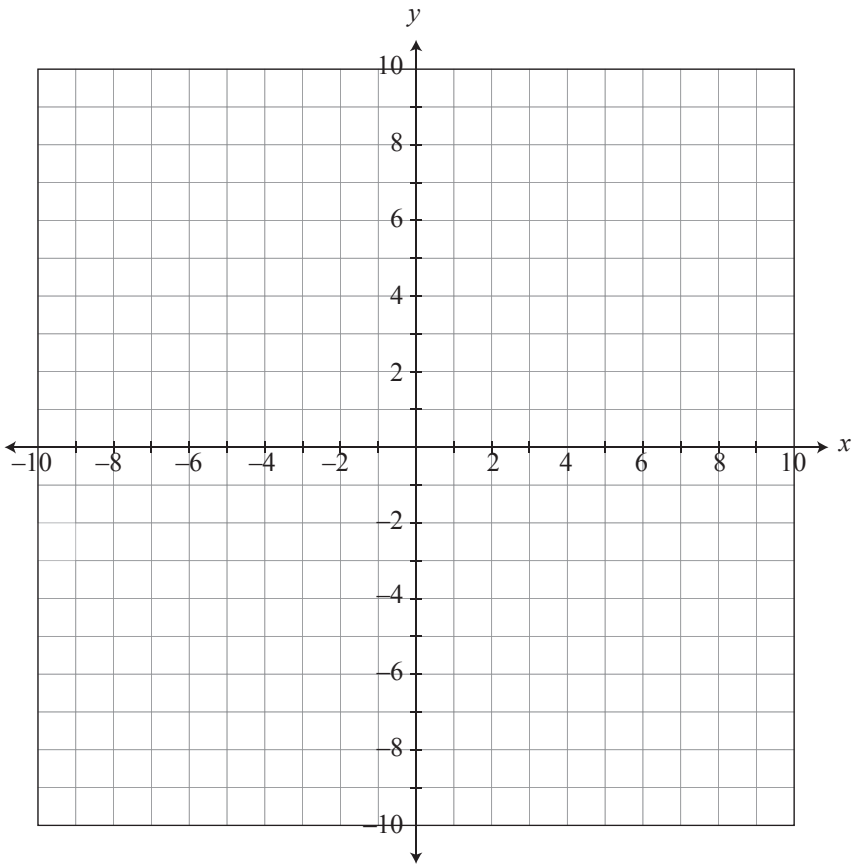

Extra paper for continuation of answers if required.
Clearly number the question.

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