Edexcel GCSE
Mathematics (Linear) – 1MA0

SIMULTANEOUS EQUATIONS WITH A QUADRATIC

Materials required for examination
Ruler graduated in centimetres and
millimetres, protractor, compasses,
pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers
Nil

Instructions

Use black ink or ball-point pen.
Fill in the boxes at the top of this page with your name, centre number and candidate number.
Answer all questions.
Answer the questions in the spaces provided – there may be more space than you need.
Calculators may be used.

Information

The marks for each question are shown in brackets – use this as a guide as to how much time to
spend on **each** question.
Questions labelled with an **asterisk** (*) are ones where the quality of your written communication
will be assessed – you should take particular care on these questions with your spelling, punctuation
and grammar, as well as the clarity of expression.

Advice

Read each question carefully before you start to answer it.
Keep an eye on the time.
Try to answer every question.
Check your answers if you have time at the end.

1. Solve the simultaneous equations

$$x^2 + y^2 = 29$$

$$y - x = 3$$

$$y = x + 3$$

$$x^2 + (x+3)^2 = 29$$

$$x^2 + x^2 + 6x + 9 = 29$$

$$2x^2 + 6x - 20 = 0$$

$$x^2 + 3x - 10 = 0$$

$$(x+5)(x-2) = 0$$

$$x = -5 \text{ or } 2$$

$$y = -2 \text{ or } 5$$

$$y - 5 = 3$$

$$y - 2 = 3$$

....

(Total 7 marks)

2. Bill said that the line $y = 6$ cuts the curve $x^2 + y^2 = 25$ at two points.

(a) By eliminating y show that Bill is incorrect.

$$x^2 + 6^2 = 25$$
$$x^2 = 25 - 36$$
$$x^2 = -11 \quad \text{no square root}$$

(2)

(b) By eliminating y, find the solutions to the simultaneous equations

$$x^2 + y^2 = 25$$

$$y = 2x - 2$$

$$x^2 + (2x - 2)^2 = 25$$
$$x^2 + 4x^2 - 8x + 4 = 25$$
$$5x^2 - 8x - 21 = 0$$
$$(5x + 7)(x - 3) = 0$$
$$x = 3 \text{ or } -\frac{7}{5}$$

$5 \quad +7$
$1 \quad -3$

$$y = 4 \text{ or } \quad -4^4/5$$

$$-\frac{7}{5} \times 2 = -\frac{14}{5}$$

$$-2\frac{4}{5} - 2 =$$
$$-4\frac{4}{5}$$

$x = \underline{\quad 3 \quad}$ $y = \underline{\quad 4 \quad}$

or $x = \underline{\quad -7/5 \quad}$ $y = \underline{\quad -4^4/5 \quad}$

(6)

(Total 8 marks)

3. By eliminating y, find the solutions to the simultaneous equations

$$x^2 + y^2 = 25$$
$$y = x - 7$$

$$x^2 + (x-7)^2 = 25$$

$$x^2 + x^2 - 14x + 49 = 25$$

$$2x^2 - 14x + 24 = 0$$

$$x^2 - 7x + 12 = 0$$

$$(x-3)(x-4) = 0$$

$1 \rightarrow 3$
$1 \rightarrow 4$

$$x = 3 \text{ or } 4$$

$$y = -4 \text{ or } -3$$

$x = $ ......3...... $y = $ ......-4......

or $x = $ ......4...... $y = $ ......-3......

(Total 6 marks)

4. By eliminating y, find the solutions to the simultaneous equations

$$y - 2x = 3$$

$$x^2 + y^2 = 18$$

$$y = 3 + 2x$$

$$x^2 + (3 + 2x)^2 = 18$$

$$x^2 + 4x^2 + 12x + 9 = 18$$

$$5x^2 + 12x - 9 = 0$$

$$(5x - 3)(x + 3) = 0$$

$$x = -3 \text{ or } \frac{3}{5}$$

$$y = -3 \text{ or } 3 \frac{4}{5} \cdot \frac{1}{5}$$

$x - 3$
$1 + 3$

$3 - 6$

$\frac{6}{5} + 3$

$x = \dots\dots -3 \dots\dots$ $y = \dots\dots -3 \dots\dots$

or $x = \dots\dots \frac{3}{5} \dots\dots$ $y = \dots\dots 4\frac{1}{5} \dots\dots$

(Total 7 marks)

5. Solve the simultaneous equations

$$x^2 + y^2 = 5$$

$$y = 3x + 1$$

$$x^2 + (3x+1)^2 = 5$$

$$x^2 + 9x^2 + 6x + 1 = 5$$

$$10x^2 + 6x - 4 = 0$$

$$5x^2 + 3x - 2 = 0$$

$$(5x-2)(x+1) = 0$$

$$5 \quad -2$$
$$1 \quad +1$$

$$x = \frac{2}{5} \text{ or } -1$$

$$y =$$

$$y = 2\tfrac{1}{5} \text{ or } -2$$

$$x = \ldots\frac{2}{3}\ldots \quad y = \ldots-1\ldots$$

$$\text{or } x = \ldots2\tfrac{1}{5}\ldots \quad y = \ldots-2\ldots$$

(Total 6 marks)

6. Solve the simultaneous equations

$$x + y = 4$$

$$x^2 + y^2 = 40$$

$$y = 4 - x$$

$$x^2 + (4-x)^2 = 40$$

$$x^2 + 16 - 8x + x^2 = 40$$

$$2x^2 - 8x - 24 = 0$$

$$x^2 - 4x - 12 = 0$$

$$(x - 6)(x + 2) = 0$$

$$x = 6 \quad \text{or} \quad -2$$

$$y = -2 \quad \text{or} \quad 6$$

$x = $ ......6......, $y = $ ......-2......

or

$x = $ ......-2......, $y = $ ......6......

(Total 7 marks)

7. By eliminating x, find the solutions to the simultaneous equations

$$x - 2y = 1$$
$$x^2 + y^2 = 13$$

$$x = 1 + 2y$$

$$(1 + 2y)^2 + y^2 = 13$$

$$1 + 4y + 4y^2 + y^2 = 13$$
$$5y^2 + 4y - 12 = 0$$
$$(y + 2)(5y - 6) = 0$$

$$y = -2 \text{ or } \frac{6}{5}$$

$$-3$$
$$x = \text{ or } 3\frac{2}{5}$$

$$5 \quad -6$$
$$1 \quad +2$$

$$x = 2 + \frac{6}{5} = 1$$
$$x = 1 + \frac{12}{5}$$
$$3\frac{2}{5}$$

$x = \underset{-3}{\dots\dots}$, $y = \underset{-2}{\dots\dots}$

or $x = \underset{3^2/5}{\dots\dots}$, $y = \underset{6/5}{\dots\dots}$

(Total 7 marks)