Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Simultaneous equations and quadratics

Time allowed: 1 hour 30 minutes

Subject code **0606**

Additional Mathematics

Questions from Paper 1 and Paper 2

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.
Questions 1-2, 5-6, 10 (Paper 1): no calculator.
Questions 3-4, 7-9 (Paper 2): calculator allowed.

Total marks

/ 60

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.
- Unless a question says otherwise, give answers that are not exact to 3 significant figures, and angles in degrees to 1 decimal place.

Information

- This paper has 10 questions worth 60 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 Given that the graph of $y = (2k + 5)x^2 + kx + 1$ does not meet the x-axis, find the possible values of k. [4]

The discriminant: nature of roots, line and curve Click for more variations

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2 Solve the inequality $(3-x)(5x+8) \geqslant 9-3x$. [4]

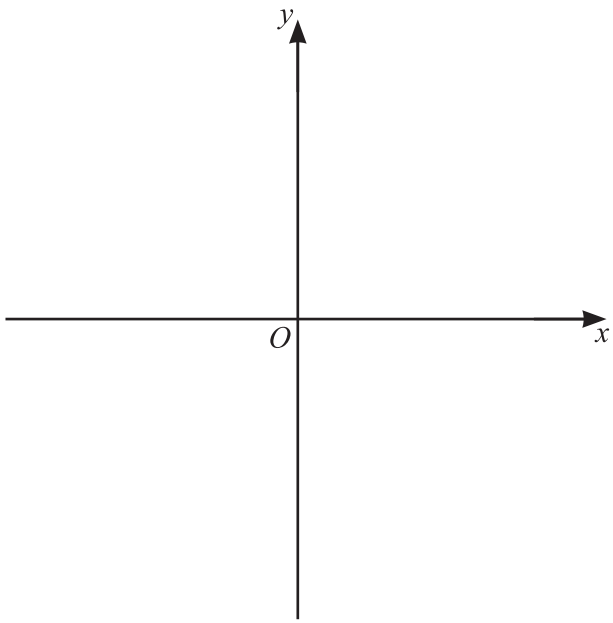
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3 A curve has equation $y = x^2 + 2x - 3$.

(a) Use the method of completing the square to find the coordinates of the stationary point on the curve. [3]

(b) On the axes, sketch the curve, stating the intercepts with the coordinate axes. [2]



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4 Solve the following simultaneous equations for x and y, giving each answer in its simplest surd form.

$$\sqrt{3}x + y = 4$$

$$x - 2y = 5\sqrt{3}$$ [5]

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5 Given that $7^x \times 49^y = 1$ and $5^{5x} \times 125^{\frac{2y}{3}} = \frac{1}{25}$, calculate the value of x and of y. [5]

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6 DO NOT USE A CALCULATOR IN THIS QUESTION.

Solve the equation $\left(\sqrt{5}-1\right)x^2-2x-\left(\sqrt{5}+1\right)=0$, giving your answers in the form $a+b\sqrt{5}$, where a and b are constants. [6]

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7 Find the exact values of the constant k for which the line $y = 2x + 1$ is a tangent to the curve $y = 4x^2 + kx + k - 2$. [6]

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The discriminant: nature of roots, line and curve Click for more variations

8 Given that $f(x) = 3x^2 + 12x + 2$,

(i) find values of a, b and c such that $f(x) = a(x + b)^2 + c$, [3]

(ii) state the minimum value of $f(x)$ and the value of x at which it occurs, [2]

(iii) solve $f\left(\frac{1}{y}\right) = 0$, giving each answer for y correct to 2 decimal places. [3]

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9 The line $y = 2x - 8$ cuts the curve $2x^2 + y^2 - 5xy + 32 = 0$ at the points A and B. Find the length of the line AB. [7]

Simultaneous equations Click for more variations

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10 The line $x - y + 2 = 0$ intersects the curve $2x^2 - y^2 + 2x + 1 = 0$ at the points A and B. The perpendicular bisector of the line AB intersects the curve at the points C and D. Find the length of the line CD in the form $a\sqrt{5}$, where a is an integer. [10]

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