



Algebra & Functions (Maths 201–016)

(Marks)

Show your work—**justify** all your answers. Just having the correct answer is not sufficient.
Pace yourself—a rough guide is to spend not more than 2m minutes on a question worth m marks.

(3) 1. Solve the system by the method of substitution: $\begin{cases} 2x + 3y = 1 \\ 3x - y = 7 \end{cases}$

(3) 2. Solve the system by the method of elimination: $\begin{cases} -2x + 3y = 7 \\ -4x + 5y = 3 \end{cases}$

(2×1) 3. Given points $A(5, 2)$, $B(-2, 3)$, $C(3, -1)$:

(a) find the distance between A and B . (Give your answer as an exact square root, and simplify.)

(b) find the midpoint of the line joining B and C ;

(3×1) 4. Simplify each expression:

(a) $3\sqrt{45} - 2\sqrt{20}$ (b) $4\sqrt{\frac{72}{32}}$ (c) $\frac{\sqrt{63} - \sqrt{28}}{\sqrt{14}}$

(3×2) 5. Rationalize the denominator (give your answer simplified):

(a) $\frac{3\sqrt{28}}{10\sqrt{63}}$ (b) $\frac{3}{5 - \sqrt{7}}$ (c) $\frac{3}{\sqrt{12} - \sqrt{3}}$

(3 × 3) 6. Factor completely:

(a) $3ab - 6a + b - 2$ (b) $2x^5 - 50x^3y^4$ (c) $2r^6 + 54r^3$

For the following questions, write “DNE” if no real solution is possible.

(2 × 3) 7. Solve the following equations by completing the square:

(a) $x^2 - 6x = 16$ (b) $x^2 + 1 = 12x$

(3 × 3) 8. Solve the following equations with the quadratic formula:

(a) $x^2 + 4x + 5 = 0$ (b) $4x^2 + 9 = 12x$ (c) $2x^2 + 4x = 12$

(3 × 3) 9. Solve the following equations (any valid method):

(a) $\sqrt{2x + 11} = x - 2$ (b) $2(x^2 - 10) = x(x - 5)$ (c) $\frac{x + 1}{x - 1} = \frac{x - 1}{2x - 2}$

(Total: 50)