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Test 3
(version for practice)

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 elimination: $\begin{cases} 2x + y &= 6 \\ 5x - 2y &= 6 \end{cases}$

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

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

(1) (a) find the midpoint of the line joining A and B;

(1) (b) find the distance between A and C. (Give your answer as an exact square root, and simplify.)

(3×1) 4. Simplify each expression:

(a) $5\sqrt{12} - 2\sqrt{27}$ (b) $15\sqrt{\dfrac{49}{25}}$ (c) $\dfrac{\sqrt{50} - \sqrt{5}}{\sqrt{45}}$

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

(a) $\dfrac{5\sqrt{12}}{2\sqrt{27}}$ (b) $\dfrac{4}{\sqrt{6} - \sqrt{2}}$ (c) $\dfrac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$

(3 × 3) 6. Factor completely:

(a) $2a - 2 + ab - b$ (b) $2x^6 - 18x^4$ (c) $3a^3 - 24b^3$

(2 × 3) 7. Solve the following equations by completing the square: (Write "*DNE*" if no real solution is possible.)

(a) $x^2 + 10x + 16 = 0$ (b) $x^2 = 6x + 7$

(3 × 3) 8. Solve the following equations with the quadratic formula: ("*DNE*" if no real solution)

(a) $2x^2 + 3x + 4 = 0$ (b) $x^2 + 25 = 10x$ (c) $3x^2 + 2x - 4 = 0$

(3 × 3) 9. Solve the following equations (any method): ("*DNE*" if no real solution)

(a) $\dfrac{x}{4 - x} = \dfrac{2}{x}$ (b) $\sqrt{2x + 11} = x - 2$ (c) $\frac{1}{2}(2x + 3)^2 = 50$

(Total: 50)