Instructor: Dr. R.A.G. Seely
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Test 2
(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.*
You may use the following equations, where useful:
$SP = C + M,\ M = MR \cdot C,\ SP = OP - D,\ D = DR \cdot OP,\ I = Prt$

(3 × 3) 1. Solve the following equations:

(a) $2(3x - 2) = 3(5 - 2x) + 2x - 5$

(b) $\frac{x}{4} + \frac{x}{6} = \frac{15}{4}$

(c) $3(x - 1)(x + 2) = 3x^2 + 2(x + 1) - 1$

(4 × 4) 2. Solve each of the following problems; make it clear what equations you are using, and solving.

(a) At my favourite shoes cost \$174, but I know that the shop actually paid \$150 for them. What was the shop's markup rate for those shoes?

(b) A \$150 pair of shoes (*i.e.* the usual price the store charges is \$150) was on sale for \$99; what was the discount rate for those shoes?

(c) I invested some cash in an account with an annual simple interest rate of 7%. In 60 months I earned \$105 in (simple) interest; how much did I initially invest?

(d) If a town's population increased by 20% over a year, ending up with a new population of 3600, then what was its original population (before the increase)?

(2) 3. Find an equation for the line through the points $(1, 6)$ and $(0, 5)$.

(3) 4. Find an equation for the line through $(-2, 8)$ that is parallel to $x + 2y - 6 = 0$.

(5) 5. For the line $3x + 2y = 4$, find: the slope; the x and y intercepts; and draw a sketch (graph) of the line.

(3×2) 6. Determine if each of the following pairs of lines is parallel, perpendicular, or neither. If not parallel, find the point of intersection, either by substitution or by elimination. Say which method you are using. *(For a bonus (2 marks), use both methods, and check you get the same answer either way.)*

(a) $\begin{cases} x + 2y &= 5 \\ 3x + 6y &= 21 \end{cases}$

(b) $\begin{cases} x + 2y &= 6 \\ 2x - y &= 12 \end{cases}$

(3×3) 7. Simplify the following expressions: your answers should have no negative exponents.

(a) $(2x^{-4}y^5z^2)^{-3}(4x^{-1}y^3z^3)^2$

(b) $\left(\frac{25a^3b^6c^{-7}}{5a^{-4}b^{-2}c^7}\right)^4$

(c) $\frac{x^8}{y^2} \cdot \frac{(2x^2y^3)^2}{(xy^4)^3}$

(Total: 50)