L1 Algebra Trial #1

Q1. a) Simplify fully: $\frac{12x^3}{4x^2}$

b) Expand and simplify: $(2x + 5)(x - 6)$

c) Simplify fully: $\frac{5x - 15x^2}{10x^3}$

d) Simplify: $\sqrt{36x^2}$

e) Make k the subject of the equation: $2x = \frac{k}{k + k^2}$

f) The pattern 5, 11, 21, 35, … is given by the rule $t_n = 2n^2 + 3$.
Show that the difference between one term and the next is = 4n + 2

Q2. a) Solve: $x + 8 = 3 - x$

b) Expand and simplify: $4(x + 3) - 7(x - 2)$

c) Solve: $4x - 7 < 9x + 4$

d) Solve: $\frac{x+1}{x+3} = 5$

e) Solve the simultaneous equations: $y = 2x - 8$ and $y = 2 - 6x$

f) Find two numbers ten apart, so the one divided by the other is equal to one-fifth.

Q3. a) Factorise fully: $x^2 - 12x + 35$

b) Solve: $(x + 3)(x - 2) = 0$

c) Simplify fully: $\frac{x^2 + 3x - 10}{x^2 + 7x + 10}$

d) Solve: $x^2 = 5x + 50$

e) What is the lowest possible value of y if $y = x^2 + 4x - 32$?

f) A rectangle has one side 6 cm longer than the other.
If the area (in cm^2) is twice its perimeter (in cm), how long is the longer side?

L1 Algebra Trial #1 : Answers

In general terms: a) & b) are Achieved, c) & d) are Merit, e) & f) are Excellence

Q1. a) Simplify fully: $\frac{12x^3}{4x^2}$ $= \frac{\cancel{4}\times 3\times x\times \cancel{x\times x}}{\cancel{4\times x\times x}}$ **$= 3x$**

b) Expand and simplify: $(2x + 5)(x - 6)$ $= 2x^2 - 12x + 5x - 30$ **$= 2x^2 - 7x - 30$**

c) Simplify fully: $\frac{5x - 15x^2}{10x^3}$ $= \frac{\cancel{5x}\times(1-3x)}{\cancel{5x}\times 2x^2}$ $= \mathbf{\frac{1-3x}{2x^2}}$

d) Simplify: $\sqrt{36x^2}$ $= \sqrt{36}\times\sqrt{x^2}$ **$= \pm 6x$** (need ± for M)

e) Make k the subject of the equation: $2x = \frac{k}{k+k^2}$ **$k = \frac{1-2x}{2x}$ or $k = \frac{1}{2x} - 1$**

f) The pattern 5, 11, 21, 35, … is given by the rule $t_n = 2n^2 + 3$. Show that the difference between one term and the next is given by: difference = 4n + 2

diff = $t_{n+1} - t_n$ = $[2(n + 1)^2 + 3] - [2n^2 + 3] = (2n^2 + 4n + 2 + 3) - (2n^2 + 3)$

diff = $2n^2 + 4n + 2 + 3 - 2n^2 - 3$ **diff = 4n + 2**

Q2. a) Solve: $x + 8 = 3 - x$ $x + x = 3 - 8$ $2x = -5$ **$x = -2.5$**

b) Expand and simplify: $4(x + 3) - 7(x - 2)$ $= 4x + 12 - 7x + 14$ **$= -3x + 26$**

c) Solve: $4x - 7 < 9x + 4$ $-7 < 9x - 4x + 4$

$-7 - 4 < 5x$ $-11 < 5x$ **$x > -2.2$** or $-11/5$

d) Solve: $\frac{x+1}{x+3} = 5$ $x + 1 = 5(x + 3)$

$x + 1 = 5x + 15$ $-14 = 4x$ **$x = -3.5$** or $-7/2$

e) Solve the simultaneous equations: $y = 2x - 8$ and $y = 2 - 6x$

$2x - 8 = 2 - 6x$ $8x = 10$ $x = 1.25$ $y = 2 \times 1.25 - 8 = -5.5$

The solution is **$x = 1.25, y = -5.5$** or in the form (1.25, −5.5)

f) Find two numbers ten apart, so the one divided by the other is equal to one-fifth.

$\mathbf{\frac{x}{x+10} = \frac{1}{5}}$ $5x = x + 10$ $4x = 10$ $x = 2.5$

the numbers are **2.5 and 12.5** (must have equations and both numbers)

Q3. a) Factorise fully: $x^2 - 12x + 35$ **$= (x - 7)(x - 5)$**

b) Solve: $(x + 3)(x - 2) = 0$ **$x = -3$ or 2**

c) Simplify fully: $\frac{x^2+3x-10}{x^2+7x+10}$ $= \frac{(x-2)\cancel{(x+5)}}{(x+2)\cancel{(x+5)}}$ $= \mathbf{\frac{x-2}{x+2}}$

d) Solve: $x^2 = 5x + 50$ $x^2 - 5x - 50 = 0$ $(x - 10)(x + 5) = 0$ **$x = 10$ or -5**

e) What is the lowest possible value of y if $y = x^2 + 4x - 32$? $y = (x + 8)(x - 4)$

Parabola, so lowest point is midway at $x = -2$, which gives **$y = -36$**

f) A rectangle has one side 6 cm longer than the other. If the area (in cm^2) is twice its perimeter (in cm), how long is the longer side?

area $x(x - 6) = 2(x + x - 6 + x + x - 6)$ perimeter $x^2 - 6x = 8x - 24$

$x^2 - 14x + 24 = 0$ $x = 12$ or 2, but 2 not possible **long side = 12 cm**