L1 Algebra Trial #4

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

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

c) Simplify fully: $\frac{5x(x-2)}{10x^2 + 20x}$

d) Simplify: $\sqrt{81x^8}$

e) Make k the subject of the equation: $x = \frac{7}{\sqrt{k+5}}$

f) The pattern 5, 10, 17, 26, ... is given by the rule $t_n = (n + 1)^2 + 1$. Show that the difference between one term and the next is given by: difference $= 2n + 3$

Q2. a) Factorise fully: $x^2 - 2x - 15$

b) Solve: $(x - 4)(x + 5) = 0$

c) Simplify fully: $\frac{x^2 - 36}{x + 6}$

d) Solve: $\frac{x + 11}{x + 5} = x + 1$

e) $x^2 - 50x + 625 = 0$ has only one solution, at $x = 25$. Explain what that means in terms of graphing the relationship of $y = x^2 - 50x + 625$.

f) If $ab^2 = 90$ and $ab = 15$, what is a?

Q3. a) Solve: $10x - 5 = 2x - 21$

b) Expand and simplify: $5(x + 3) - x(x - 2)$

c) Solve: $2x - 3 < 6x + 5$

d) Solve: $\frac{x + 4}{3} > x + 2$

e) Define k so that both these following statements are true:
k plus 3 is greater than 8 **and** 9 minus k is greater than zero.

f) Find a number such that a third of it added to a fifth of it equals 8.

L1 Algebra Trial #4 : Answers

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

Q1. a) Simplify fully: $\frac{2x^2}{4x^3}$ $= \frac{\cancel{2\times}1\times\cancel{x\times x}}{\cancel{2\times}2\times x\times\cancel{x\times x}}$ $= \mathbf{\frac{1}{2x}}$

b) Expand and simplify: $(x - 5)(x - 6)$ $= x^2 - 6x - 5x + 30$ $= \mathbf{x^2 - 11x + 30}$

c) Simplify fully: $\frac{5x(x-2)}{10x^2+20x}$ $= \frac{\cancel{5x}(x-2)}{\cancel{5x}(2x+4)}$ $= \mathbf{\frac{x-2}{2x+4}}$ **or** $\mathbf{\frac{x-2}{2(x+2)}}$

d) Simplify: $\sqrt{81x^8}$ $= \sqrt{81} \times \sqrt{x^8}$ $= \mathbf{\pm 9x^4}$ (need ± for M)

e) Make k the subject of the equation: $x = \frac{7}{\sqrt{k+5}}$ $\mathbf{k = \frac{49-5x^2}{x^2} = \frac{49}{x^2} - 5}$

f) The pattern 5, 10, 17, 26, ... is given by the rule $t_n = (n + 1)^2 + 1$. Show that the difference between one term and the next is given by: difference = 2n + 3

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

$= (n^2 + 4n + 4 + 1) - (n^2 + 2n + 1 + 1)$ **diff = 2n + 3**

Q2. a) Factorise fully: $x^2 - 2x - 15$ $= \mathbf{(x - 5)(x + 3)}$

b) Solve: $(x - 4)(x + 5) = 0$ $\mathbf{x = 4}$ **or** $\mathbf{{}^-5}$

c) Simplify fully: $\frac{x^2-36}{x+6}$ $= \frac{(x-6)\cancel{(x+6)}}{\cancel{(x+6)}}$ $= \mathbf{x - 6}$

d) Solve: $\frac{x+11}{x+5} = x + 1$ $x + 11 = (x + 5)(x + 1)$

$x + 11 = x^2 + 6x + 5$ $0 = x^2 + 5x - 6 = (x + 6)(x - 1)$ $\mathbf{x = 1}$ **or** $\mathbf{{}^-6}$

e) $x^2 - 50x + 625 = 0$ has only one solution, at $x = 25$. Explain what that means in terms of graphing the relationship of $y = x^2 - 50x + 625$.

The graph is a parabola, which only touches the x-axis at (25, 0) *or similar*

f) If $ab^2 = 90$ and $ab = 15$, what is a?

$b = \frac{ab^2}{ab} = \frac{90}{15} = 6$. As $ab = 15$, $a \times 6 = 15$, so $a = \frac{15}{6}$ $\mathbf{a = 2.5}$

Q3. a) Solve: $10x - 5 = 2x - 21$ $10x - 2x = {}^-21 + 5$ $8x = {}^-16$ $\mathbf{x = {}^-2}$

b) Expand and simplify: $5(x + 3) - x(x - 2)$ $= 5x + 15 - x^2 + 2x$ $= \mathbf{{}^-x^2 + 7x + 15}$

c) Solve: $2x - 3 < 6x + 5$ ${}^-3 < 6x - 2x + 5$

${}^-3 - 5 < 4x$ ${}^-8 < 4x$ $\mathbf{x > {}^-2}$

d) Solve: $\frac{x+4}{3} > x + 2$ $x + 4 > 3(x + 2)$

$x + 4 > 3x + 6$ ${}^-2 > 2x$ $\mathbf{x < {}^-1}$

e) Find what k can be so that both these following equations are true:
k plus 3 is greater than 8 **and** 9 minus k is greater than zero.

$k + 3 > 8$ so $k > 5$ $9 - k > 0$ ${}^-k > {}^-9$ so $k < 9$

$\mathbf{5 < k < 9}$ or in words, such as "k is more than 5 but less than 9"

f) Find a number such that a third of it added to a fifth of it equals 8.

$\frac{x}{3} + \frac{x}{5} = 8$ $\frac{5x}{15} + \frac{3x}{15} = 8$ $8x = 15 \times 8$ $x = 15$

the number is **15** (must solve using equations)