

Group Quiz 4 Solutions

① a) $12x^2 - x - 6$
(5 pt)

$$12x^2 - 9x + 8x - 6$$

$$3x(4x-3) + 2(4x-3)$$

$$(3x+2)(4x-3)$$

$$\begin{array}{r} ac \\ -9 \quad -72 \\ \quad -1 \quad +8 \\ b \end{array}$$

← these two numbers add to -1 & multiply to -72

rewrite the quadratic using the -9 & +8 found above.

Factor completely by grouping.

b) $10x^2 - 10x - 120$
(5 pt)

$$10[x^2 - x - 12]$$

$$10[(x-4)(x+3)]$$

$$10(x-4)(x+3)$$

d) $\frac{42(x+3)^7 \cancel{(x-6)^5} - 50(x-6) \cancel{(x+3)^6}}{\cancel{(x-6)^5}}$
(9 pt)

$$42(x+3)^7 - 50(x-6)(x+3)^6$$

$$(x+3)^6 [42(x+3) - 50(x-6)]$$

$$(x+3)^6 [42x + 126 - 50x + 300]$$

$$(x+3)^6 [-8x + 426]$$

c) $\frac{2^3 \cdot 3^3 - 2^4 \cdot 3^4}{6^2}$
(5 pt)

$$\frac{2^3 \cdot 3^3 - 2^4 \cdot 3^4}{(2 \cdot 3)^2}$$

$$\frac{2^3 \cdot 3^3 - 2^4 \cdot 3^4}{2^2 \cdot 3^2}$$

$$\frac{2^3 \cdot 3^3 (1 - 2 \cdot 3)}{2^2 \cdot 3^2}$$

$$2 \cdot 3 (1 - 2 \cdot 3)$$

$$6(1-6)$$

$$6(-5)$$

$$-30$$

$$\textcircled{2} \text{ a) } \frac{3x^3 - 16x^2 - 35x}{3x^2 - 26x + 35}$$

$$\frac{x(3x+5)(\cancel{x-7})}{(3x-5)(\cancel{x-7})}$$

$$\boxed{\frac{x(3x+5)}{3x-5}}$$

side work

$$\begin{aligned} & 3x^3 - 16x^2 - 35x \\ & \times [3x^2 - 16x - 35] \\ & \times [3x^2 - 21x + 5x - 35] \\ & \times [3x(x-7) + 5(x-7)] \\ & \times [(3x+5)(x-7)] \end{aligned}$$

$$\begin{aligned} & 3x^2 - 26x + 35 \\ & 3x^2 - 21x - 5x + 35 \\ & 3x(x-7) - 5(x-7) \\ & (3x-5)(x-7) \end{aligned}$$

$$\begin{array}{r} -105 \\ -21 \quad +5 \\ \hline -16 \end{array}$$

$$\begin{array}{r} 105 \\ -21 \quad -5 \\ \hline -26 \end{array}$$

$$\text{b) } \frac{x^2 - x - 42}{x^2 + 6x} \cdot \frac{x^3 + x^2}{x^2 - 6x - 7}$$

$$\frac{(x-7)(x+6)}{x(x+6)} \cdot \frac{x^2(x+1)}{(x-7)(x+1)}$$

$$\frac{\cancel{(x-7)}\cancel{(x+6)} \cdot x^2 \cdot \cancel{(x+1)}}{\cancel{x}\cancel{(x+6)}\cancel{(x-7)}\cancel{(x+1)}}$$

$$\boxed{x}$$

$$\begin{aligned} & \frac{x^2 - x - 42}{(x-7)(x+6)} \\ & \frac{x^2 + 6x}{x(x+6)} \\ & \frac{x^3 + x^2}{x^2(x+1)} \\ & \frac{x^2 - 6x - 7}{(x-7)(x+1)} \end{aligned}$$

$$\text{c) } \frac{\frac{x^3}{x+4}}{x}$$

$$\frac{x^3}{x(x+4)}$$

$$x^2 + 8x + 16$$

$$\begin{aligned} & x^2 + 8x + 16 \\ & (x+4)(x+4) \end{aligned}$$

$$\frac{x^3}{(x+4)} \cdot \frac{(x+4)(x+4)}{x}$$

← here I multiply by the reciprocal and change to factored form at the same time.

$$\boxed{x^2(x+4)}$$

$$\textcircled{2d)} \frac{x}{x-6} - \frac{1}{x+5}$$

$$\frac{x(x+5)}{(x-6)(x+5)} - \frac{(x-6) \cdot 1}{(x-6)(x+5)}$$

$$\frac{x^2+5x - (x-6)}{(x-6)(x+5)}$$

$$\boxed{\frac{x^2+4x+6}{(x-6)(x+5)}}$$

$$\text{LCD: } (x-6)(x+5)$$

Side work

$$x^2+4x+6$$

Does it factor nicely?
are there 2 numbers that
multiply to 6 $\frac{1}{x}$
add to 4? No.

So we are done.

$$e) \frac{2}{x^2} + \frac{3}{x^2+7x}$$

$$\text{LCD: } x^2(x+7)$$

$$\frac{2}{x^2} + \frac{3}{x(x+7)}$$

$$\frac{2(x+7)}{x^2(x+7)} + \frac{3x}{x \cdot x \cdot (x+7)}$$

$$\frac{2(x+7) + 3x}{x^2(x+7)}$$

$$\frac{2x+14+3x}{x^2(x+7)}$$

$$\boxed{\frac{5x+14}{x^2(x+7)}}$$

$$\textcircled{2} f) \frac{\cancel{x+4}}{\cancel{x-1}} - \frac{x-3}{\cancel{x-4}} \frac{(x-1)(x-4)}{(x-1)(x-4)}$$

$$x+4 \quad (x-1)(x-4)$$

LCD of all fractions: $(x-1)(x-4)$

not including $(x+4)$ b/c $x+4$ is not a fraction

$$\frac{(x-4)(x+4) - (x-3)(x-1)}{(x+4)(x-1)(x-4)}$$

$$\frac{x^2 - 16 - [x^2 - 4x + 3]}{(x+4)(x-1)(x-4)}$$

$$\frac{\cancel{x^2} - 16 - \cancel{x^2} + 4x - 3}{(x+4)(x-1)(x-4)}$$

$$\frac{4x - 19}{(x+4)(x-1)(x-4)}$$

$$g) \frac{1 \cdot \cancel{(8+x+h)(8+x)}}{8+x+h} - \frac{1 \cdot \cancel{(8+x+h)(8+x)}}{8+x}$$

$$h \quad (8+x+h)(8+x)$$

LCD of all fractions: $(8+x+h)(8+x)$

$$\frac{8+x - (8+x+h)}{h(8+x+h)(8+x)}$$

$$\frac{\cancel{8} + \cancel{x} - \cancel{8} - \cancel{x} - h}{h(8+x+h)(8+x)}$$

$$\frac{-h}{h(8+x+h)(8+x)}$$

$$\frac{-1}{(8+x+h)(8+x)}$$

③ a) $\frac{1}{3-t} + \frac{5}{3+t} + \frac{18}{9-t^2} = 0$
 (10 pt)

$$\frac{1}{3-t} + \frac{5}{9} + \frac{18}{(3-t)(3+t)} = 0$$

[note
 $t \neq 3, -3$]

[1]

LCD: $(3-t) \cdot 9(3+t)$ [2 pt]

$$\frac{1 \cdot 9 \cdot (3+t)}{(3-t) \cdot 9(3+t)} + \frac{5(3-t)(3+t)}{9(3-t)(3+t)} + \frac{18(9)}{9(3-t)(3+t)} = 0$$

$$9(3+t) + 5(9-t^2) + 162 = 0$$

[in order for the fraction to be zero, the numerator must be zero.]

$$27 + 9t + 45 - 5t^2 + 162 = 0$$

$$-5t^2 + 9t + 234 = 0$$

$$\begin{array}{r} -1170 \\ 39 \times -30 \\ 9 \end{array}$$

$$-5t^2 + 39t - 30t + 234 = 0$$

$$-t(5t-39) - 6(5t-39) = 0$$

$$(-t-6)(5t-39) = 0$$

[5]

$$-t-6=0$$

$$-t=6$$

$$t = -6$$

[1]

$$5t-39=0$$

$$5t=39$$

$$t = \frac{39}{5}$$

[1]

check:

$$\frac{1}{3-(-6)} + \frac{5}{9} + \frac{18}{(9-36)} = 0$$

$$\frac{1}{9} + \frac{5}{9} + \frac{18}{-27} = 0$$

$$\frac{6}{9} - \frac{6}{9} = 0 \checkmark$$

$$\frac{1}{3-\frac{39}{5}} + \frac{5}{9} + \frac{18}{9-\frac{1521}{25}} = 0$$

$$-\frac{1}{\frac{24}{5}} + \frac{5}{9} + \frac{-25}{72} = 0$$

$$-\frac{5}{24} + \frac{5}{9} - \frac{25}{72} = 0$$

$$-\frac{15}{72} + \frac{40}{72} - \frac{25}{72} = 0 \checkmark$$

③ b) $\frac{x}{8x-64} - 8 = \frac{1}{x-8}$

LCD of all fractions: $8(x-8)$ [2]

$\frac{\cancel{8}(x-8)}{\cancel{8}(x-8)} \frac{x}{\cancel{8}(x-8)} - \frac{8(x-8)\cancel{8}}{\cancel{8}(x-8)} = \frac{1 \cdot \cancel{8}(x-8)}{\cancel{8}(x-8)}$ [1]

$$x - 64(x-8) = 8$$

$$x - 64x + 512 = 8$$

$$-63x + 504 = 0$$

$$\frac{63x}{63} = \frac{504}{63}$$

$$x = 8$$
 [5]

remember the note at the beginning says $x \neq 8$ because then we would be dividing by zero (illegal)

Thus this equation has no solution.

[2]

note: we call $x=8$ an "extraneous solution"