

SCORE: _____ / 140 POINTS

- ALL PROBLEMS MUST BE SOLVED ALGEBRAICALLY TO EARN CREDIT (NO GUESS & CHECK)
- PUT A BOX AROUND EACH FINAL ANSWER
- SHOW COMPLETE AND PROPER WORK TO EARN FULL CREDIT

Divide and simplify: $\frac{4x^2 - 1}{6x + 18} \div \frac{6x^2 + 3x}{4x + 12}$

SCORE: ____ / 10 POINTS

$$= \frac{4x^2 - 1}{6x + 18} \cdot \frac{4x + 12}{6x^2 + 3x}$$

$$= \frac{(2x+1)(2x-1)}{\underset{3}{6}(x+3)} \cdot \frac{\overset{2}{4}(x+3)}{3x(2x+1)} = \boxed{\frac{2(2x-1)}{9x}}$$

Subtract and simplify: $\frac{5x^2 - 3x + 8}{x^2 - 3x - 10} - \frac{4x^2 + 5x - 7}{x^2 - 3x - 10}$

SCORE: ____ / 10 POINTS

$$= \frac{x^2 - 8x + 15}{x^2 - 3x - 10}$$

$$= \frac{(x-3)(x-5)}{(x+2)(x-5)} = \boxed{\frac{x-3}{x+2}}$$

Simplify: $\frac{\frac{5}{x+2} - 4}{7 + \frac{3}{x+2}} \cdot \frac{x+2}{x+2}$

SCORE: ____ / 10 POINTS

$$= \frac{5 - 4(x+2)}{7(x+2) + 3}$$

$$= \frac{5 - 4x - 8}{7x + 14 + 3}$$

$$= \boxed{\frac{-4x - 3}{7x + 17}}$$

Subtract and simplify:

$$\frac{x+1}{x^2+5x+6} - \frac{x-2}{x^2+8x+12}$$

SCORE: ___ / 12 POINTS

$$= \frac{x+1}{(x+2)(x+3)} \cdot \frac{x+6}{x+6} - \frac{x-2}{(x+2)(x+6)} \cdot \frac{x+3}{x+3}$$

$$= \frac{x^2+7x+6 - (x^2+x-6)}{(x+2)(x+3)(x+6)}$$

$$= \frac{6x+12}{(x+2)(x+3)(x+6)}$$

$$= \frac{6(x+2)}{(x+2)(x+3)(x+6)}$$

$$= \boxed{\frac{6}{(x+3)(x+6)}}$$

Solve for x:

$$\frac{2}{x^2+4x+3} - \frac{3}{x^2+3x} = \frac{3}{x^2+x}$$

CHECK YOUR ANSWER(S)

SCORE: ___ / 12 POINTS

$$x(x+1)(x+3) \left[\frac{2}{(x+1)(x+3)} - \frac{3}{x(x+3)} \right] = \left[\frac{3}{x(x+1)} \right] x(x+1)(x+3)$$

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

$$2x - 3x - 3 = 3x + 9$$

$$-x - 3 = 3x + 9$$

$$-4x = 12$$

$$x = -3$$

CHECK:

$$\frac{2}{0} - \frac{3}{0} = \frac{3}{6}$$

↑ ↑
UNDEFINED

NO SOLUTION

Solve:

A number divided by eight is equal to five divided by six less than that number.
Find the number. CHECK YOUR ANSWER(S).

SCORE: ___ / 10 POINTS

$$\frac{x}{8} = \frac{5}{x-6}$$

$$x(x-6) = 40$$

$$x^2 - 6x - 40 = 0$$

$$(x-10)(x+4) = 0$$

$$\boxed{x = 10, -4}$$

CHECK:

$$x = 10$$

$$\frac{10}{8} = \frac{5}{4} \checkmark$$

$$x = -4$$

$$\frac{-4}{8} = -\frac{1}{2}$$

$$\frac{5}{-10} = -\frac{1}{2} \checkmark$$

Simplify:

$$\frac{3x^2 + x - 10}{2x^2 + 9x + 10}$$

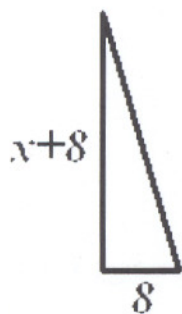
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$$= \frac{(3x-5)(x+2)}{(2x+5)(x+2)}$$

$$= \boxed{\frac{3x-5}{2x+5}}$$

Solve for x in the following similar triangles:

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$$\frac{x+8}{6} = \frac{8}{x}$$

$$x(x+8) = 48$$

$$x^2 + 8x - 48 = 0$$

$$(x+12)(x-4) = 0$$

$$x = -12, \boxed{4}$$

Add and simplify:

$$\frac{4}{x+3} + \frac{x-1}{x-6}$$

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$$= \frac{4(x-6) + (x-1)(x+3)}{(x+3)(x-6)}$$

$$= \frac{4x - 24 + x^2 + 2x - 3}{(x+3)(x-6)}$$

$$= \frac{x^2 + 6x - 27}{(x+3)(x-6)}$$

$$= \boxed{\frac{(x+9)(x-3)}{(x+3)(x-6)}}$$

Multiply and simplify:

$$\frac{2x^2 - 8}{x^2 + 9x + 8} \cdot \frac{x^2 - 5x - 6}{x^2 - 4x - 12}$$

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$$= \frac{2(x^2 - 4)}{(x+1)(x+8)} \cdot \frac{(x-6)(x+1)}{(x-6)(x+2)}$$

$$= \frac{2(x+2)(x-2)}{(x+1)(x+8)} \cdot \frac{(x-6)(x+1)}{(x-6)(x+2)}$$

$$= \boxed{\frac{2(x-2)}{x+8}}$$

Solve:

The height of a rental storage unit varies directly as its monthly rent and inversely as its area. SCORE: ___ / 12 POINTS
A 42 square foot storage unit that is 8 feet tall rents for \$120 per month. What is the height of a 30 square foot storage unit that rents for \$75 per month? **FOR FULL CREDIT, YOU MUST IDENTIFY WHAT ALL YOUR VARIABLES REPRESENT, FIND THE SPECIFIC EQUATION CONNECTING THEM, AND SUMMARIZE YOUR FINAL ANSWER IN A SENTENCE USING THE CORRECT UNITS OF MEASUREMENT.**

$h =$ HEIGHT

$r =$ RENT

$a =$ AREA

$$h = \frac{kr}{a}$$

$$8 = \frac{k(120)}{42}$$

$$k = \frac{14}{5} \text{ or } 2.8$$

$$h = \frac{2.8r}{a}$$

$$h = \frac{2.8(75)}{30}$$

$$= 7$$

THE STORAGE UNIT IS 7 FEET TALL

Write a proportion for, but **DO NOT SOLVE**:

SCORE: ___ / 4 POINTS

If 117 US dollars is equivalent to 781 Swedish kronor, 362 Swedish kronor is equivalent to how many US dollars?

$$\frac{117}{781} = \frac{x}{362}$$

Simplify:

$$\frac{\frac{5}{x-3} - \frac{2}{x}}{\frac{8}{x} + \frac{1}{x-3}}$$

$$\frac{x(x-3)}{x(x-3)}$$

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$$= \frac{5x - 2(x-3)}{8(x-3) + x}$$

$$= \frac{5x - 2x + 6}{8x - 24 + x}$$

$$= \frac{3x + 6}{9x - 24}$$

$$= \frac{3(x+2)}{3(3x-8)}$$

$$= \frac{x+2}{3x-8}$$

Fill in the blanks: The equation of the horizontal asymptote for $y = \frac{7-5x}{10x+6}$ is $y = -\frac{1}{2}$.

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$$y \approx -\frac{5x}{10x}$$

The equation of the vertical asymptote for $y = \frac{7-5x}{10x+6}$ is $x = -\frac{3}{5}$.

$$10x + 6 = 0$$