

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

Find the equation of the horizontal asymptote of $y = \frac{5+13x}{17x-12}$.

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$$y \approx \frac{13x}{17x} \text{ for large values of } x$$

$$\boxed{y = \frac{13}{17}}$$

Find the equation of the vertical asymptote of $y = \frac{5+13x}{17x-12}$.

$$17x - 12 = 0$$

$$\boxed{x = \frac{12}{17}}$$

Simplify: $\frac{3x^2 + 5x - 2}{6x^2 + 5x - 14}$

SPECIFY ANY RESTRICTIONS.

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$$= \frac{(3x-1)(x+2)}{(6x-7)(x+2)}$$

$$= \boxed{\frac{3x-1}{6x-7}}$$

$$x + 2 \neq 0$$

$$x \neq -2$$

Solve: A number divided by two is equal to twelve divided by five less than that number.
Find the number. CHECK YOUR ANSWER(S).

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$$\frac{x}{2} = \frac{12}{x-5}$$

CHECK:

$$x = 8$$

$$x = -3$$

$$x^2 - 5x = 24$$

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

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

$$x^2 - 5x - 24 = 0$$

$$\frac{12}{3} = 4$$

$$\frac{12}{-8} = -\frac{3}{2}$$

$$(x-8)(x+3) = 0$$

$$\boxed{x = 8 \text{ or } x = -3}$$

Subtract and simplify:

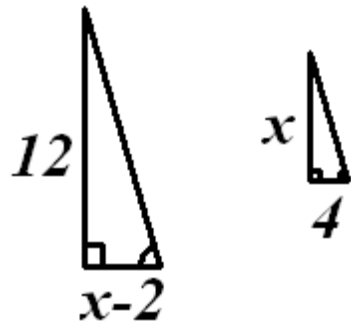
$$\frac{7x^2 - 7x - 4}{x^2 - x - 2} - \frac{5x^2 - 6x + 2}{x^2 - x - 2}$$

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

Solve for x in the following similar triangles:

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$$\begin{aligned} \frac{12}{x-2} &= \frac{x}{4} \\ 48 &= x^2 - 2x \\ 0 &= x^2 - 2x - 48 \\ 0 &= (x+6)(x-8) \\ x &= -6 \text{ or } \boxed{x=8} \end{aligned}$$

Divide and simplify:

$$\frac{50x^2 - 8}{36x^2 - 27x^3} \div \frac{20x + 8}{9x^2 - 12x}$$

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$$\begin{aligned} &= \frac{2(25x^2 - 4)}{-9x^2(3x-4)} \div \frac{4(5x+2)}{3x(3x-4)} \\ &= \frac{2(5x+2)(5x-2)}{-9x^2(3x-4)} \times \frac{3x(3x-4)}{4(5x+2)} \\ &= \frac{5x-2}{-3x} \times \frac{1}{2} \\ &= \frac{5x-2}{-6x} \\ &= \boxed{-\frac{5x-2}{6x} \text{ or } \frac{2-5x}{6x}} \end{aligned}$$

Simplify:

$$\frac{1 - \frac{2}{x-4}}{\frac{2}{x-4} - \frac{9}{x+3}}$$

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$$\begin{aligned} &= \frac{1 - \frac{2}{x-4}}{\frac{2}{x-4} - \frac{9}{x+3}} \frac{(x-4)(x+3)}{(x-4)(x+3)} \\ &= \frac{(x-4)(x+3) - 2(x+3)}{2(x+3) - 9(x-4)} \\ &= \frac{x^2 - x - 12 - 2x - 6}{2x + 6 - 9x + 36} \\ &= \frac{x^2 - 3x - 18}{-7x + 42} \\ &= \frac{(x-6)(x+3)}{-7(x-6)} \\ &= \frac{x+3}{-7} \\ &= \boxed{-\frac{x+3}{7}} \end{aligned}$$

Solve for x:

$$\frac{2}{x^2 - 4x + 3} - \frac{1}{x^2 - 1} = \frac{1}{x-3} \quad \text{CHECK YOUR ANSWER(S)}$$

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$$\begin{aligned} (x-1)(x-3)(x+1) \left[\frac{2}{(x-1)(x-3)} - \frac{1}{(x-1)(x+1)} \right] &= \frac{1}{x-3} (x-1)(x-3)(x+1) \\ 2(x+1) - (x-3) &= (x-1)(x+1) \\ 2x + 2 - x + 3 &= x^2 - 1 \\ x + 5 &= x^2 - 1 \\ 0 &= x^2 - x - 6 \\ 0 &= (x+2)(x-3) \\ \boxed{x = -2} &\text{ or } x = 3 \end{aligned}$$

CHECK:

$$\begin{aligned} x = -2 \quad \frac{2}{15} - \frac{1}{3} &= \frac{2}{15} - \frac{5}{15} = -\frac{3}{15} = -\frac{1}{5} \\ \frac{1}{-5} &= -\frac{1}{5} \end{aligned}$$

$$\begin{aligned} x = 3 \quad \frac{2}{0} &\text{ IS UNDEFINED} \end{aligned}$$

Subtract and simplify: $\frac{x+3}{x^2-1} - \frac{x+5}{x^2-2x-3}$

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$$\begin{aligned}
 &= \frac{x+3}{(x-1)(x+1)} - \frac{x+5}{(x-3)(x+1)} \\
 &= \frac{x+3}{(x-1)(x+1)} \frac{x-3}{x-3} - \frac{x+5}{(x-3)(x+1)} \frac{x-1}{x-1} \\
 &= \frac{x^2-9-(x^2+4x-5)}{(x-1)(x+1)(x-3)} \\
 &= \frac{-4x-4}{(x-1)(x+1)(x-3)} \\
 &= \frac{-4(x+1)}{(x-1)(x+1)(x-3)} \\
 &= \boxed{\frac{-4}{(x-1)(x-3)}}
 \end{aligned}$$

Solve: The cost of paper needed to wrap a cylinder varies directly as the weight of the cylinder and inversely as the radius. A cylinder weighing 21 ounces with a radius of 4 inches requires 35 cents of paper to wrap. Find the cost of paper needed to wrap a cylinder with a radius of 2 inches that weighs 12 ounces. **SCORE: ____ / 15 POINTS**

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.

C = cost of paper (cents)
 w = weight of cylinder (ounces)
 r = radius (inches)

$$\begin{aligned}
 C &= \frac{kw}{r} & C &= \frac{20w}{3r} \\
 35 &= \frac{k(21)}{4} & C &= \frac{20(12)}{3(2)} \\
 140 &= 21k & C &= 40 \\
 \frac{20}{3} &= k
 \end{aligned}$$

It costs 40 cents to wrap the cylinder.