

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 $y = \frac{5+12x}{17x-13}$.

SCORE: ____ / 8 POINTS

$y \approx \frac{12x}{17x}$ for large values of x

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

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

$$17x - 13 = 0$$

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

Simplify: $\frac{3x^2 + 5x - 2}{6x^2 + 7x - 10}$

SPECIFY ANY RESTRICTIONS.

SCORE: ____ / 15 POINTS

$$= \frac{(3x-1)(x+2)}{(6x-5)(x+2)}$$

$$= \boxed{\frac{3x-1}{6x-5}}$$

$$x + 2 \neq 0$$

$$x \neq -2$$

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

SCORE: ____ / 15 POINTS

$$\frac{x}{3} = \frac{12}{x-5}$$

CHECK:

$$x = 9$$

$$x = -4$$

$$x^2 - 5x = 36$$

$$\frac{9}{3} = 3$$

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

$$x^2 - 5x - 36 = 0$$

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

$$\frac{12}{-9} = -\frac{4}{3}$$

$$(x-9)(x+4) = 0$$

$$\boxed{x = 9 \text{ or } x = -4}$$

Subtract and simplify:

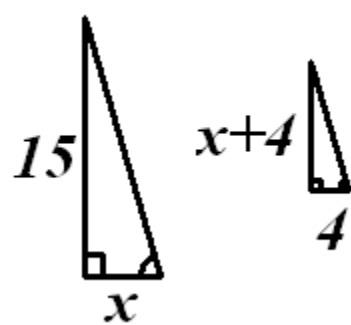
$$\frac{7x^2 - 11x - 5}{x^2 - x - 12} - \frac{5x^2 - 6x + 7}{x^2 - x - 12}$$

SCORE: ____ / 15 POINTS

$$\begin{aligned} &= \frac{2x^2 - 5x - 12}{x^2 - x - 12} \\ &= \frac{(x-4)(2x+3)}{(x-4)(x+3)} \\ &= \boxed{\frac{2x+3}{x+3}} \end{aligned}$$

Solve for x in the following similar triangles:

SCORE: ____ / 12 POINTS



$$\begin{aligned} \frac{15}{x} &= \frac{x+4}{4} \\ 60 &= x^2 + 4x \\ 0 &= x^2 + 4x - 60 \\ 0 &= (x+10)(x-6) \\ x &= -10 \text{ or } \boxed{x=6} \end{aligned}$$

Divide and simplify:

$$\frac{12x^2 - 75}{20x^2 - 30x^3} \div \frac{12x - 30}{15x^2 - 10x}$$

SCORE: ____ / 15 POINTS

$$\begin{aligned} &= \frac{3(4x^2 - 25)}{-10x^2(3x-2)} \div \frac{6(2x-5)}{5x(3x-2)} \\ &= \frac{3(2x+5)(2x-5)}{-10x^2(3x-2)} \times \frac{5x(3x-2)}{6(2x-5)} \\ &= \frac{2x+5}{-2x} \times \frac{1}{2} \\ &= \frac{2x+5}{-4x} \\ &= \boxed{-\frac{2x+5}{4x}} \end{aligned}$$

Simplify:

$$\frac{1 - \frac{6}{x-5}}{\frac{2}{x-5} - \frac{3}{x-2}}$$

SCORE: ____ / 15 POINTS

$$\begin{aligned} &= \frac{1 - \frac{6}{x-5}}{\frac{2}{x-5} - \frac{3}{x-2}} \cdot \frac{(x-5)(x-2)}{(x-5)(x-2)} \\ &= \frac{(x-5)(x-2) - 6(x-2)}{2(x-2) - 3(x-5)} \\ &= \frac{x^2 - 7x + 10 - 6x + 12}{2x - 4 - 3x + 15} \\ &= \frac{x^2 - 13x + 22}{-x + 11} \\ &= \frac{(x-11)(x-2)}{-(x-11)} \\ &= \boxed{-(x-2) \text{ or } 2-x} \end{aligned}$$

Solve for x:

$$\frac{5}{x^2 + x - 6} - \frac{4}{x^2 - 4} = \frac{1}{x+3}$$

CHECK YOUR ANSWER(S)

SCORE: ____ / 15 POINTS

$$\begin{aligned} (x-2)(x+3)(x+2) \left[\frac{5}{(x-2)(x+3)} - \frac{4}{(x-2)(x+2)} \right] &= \frac{1}{x+3} (x-2)(x+3)(x+2) \\ 5(x+2) - 4(x+3) &= (x-2)(x+2) \\ 5x + 10 - 4x - 12 &= x^2 - 4 \\ x - 2 &= x^2 - 4 \\ 0 &= x^2 - x - 2 \\ 0 &= (x+1)(x-2) \\ \boxed{x = -1} &\text{ or } x = 2 \end{aligned}$$

CHECK:

$$\begin{aligned} x = -1 \\ \frac{5}{-6} - \frac{4}{-3} &= -\frac{5}{6} + \frac{8}{6} = \frac{3}{6} = \frac{1}{2} \end{aligned}$$

$$\begin{aligned} x = 2 \\ \frac{5}{0} &\text{ IS UNDEFINED} \end{aligned}$$

Subtract and simplify:

$$\frac{x+7}{x^2-4x+3} - \frac{x+3}{x^2-3x+2}$$

SCORE: ____ / 15 POINTS

$$\begin{aligned} &= \frac{x+7}{(x-1)(x-3)} - \frac{x+3}{(x-1)(x-2)} \\ &= \frac{x+7}{(x-1)(x-3)} \frac{x-2}{x-2} - \frac{x+3}{(x-1)(x-2)} \frac{x-3}{x-3} \\ &= \frac{x^2+5x-14-(x^2-9)}{(x-1)(x-2)(x-3)} \\ &= \frac{5x-5}{(x-1)(x-2)(x-3)} \\ &= \frac{5(x-1)}{(x-1)(x-2)(x-3)} \\ &= \frac{5}{(x-2)(x-3)} \end{aligned}$$

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 8 ounces with a radius of 3 inches requires 12 cents of paper to wrap.

SCORE: ____ / 15 POINTS

Find the cost of paper needed to wrap a cylinder with a radius of 1.5 inches that weighs 11 ounces.

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)

$$C = \frac{kw}{r}$$

$$C = \frac{9w}{2r}$$

$$12 = \frac{k(8)}{3}$$

$$C = \frac{9(11)}{2(1.5)}$$

$$36 = 8k$$

$$C = 33$$

$$\frac{9}{2} = k$$

It costs 33 cents to wrap the cylinder.