

Solve:

The height of a cake varies directly as the amount of batter available and inversely as the base area of its baking pan. Baking 2 cups of batter in a 24 square inch pan results in a 3 inch tall cake. How much batter is needed for a 3 inch tall cake in a 32 square inch pan?

SCORE: ____ / 15 PTS

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 OF CAKE

b = AMOUNT OF BATTER

a = AREA OF PAN

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

$$h = \frac{36b}{a}$$

$$3 = \frac{k(2)}{24}$$

$$3 = \frac{36b}{32}$$

$$k = 36$$

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

$2\frac{2}{3}$ CUPS OF BATTER
ARE NEEDED

Subtract and simplify:

$$\frac{x+5}{x^2+7x+12} - \frac{x+6}{x^2+6x+8}$$

$$x^2+7x+12 = (x+3)(x+4)$$

$$x^2+6x+8 = (x+2)(x+4)$$

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$$\text{LCD} = (x+2)(x+3)(x+4)$$

$$= \frac{x+5}{(x+3)(x+4)} \cdot \frac{x+2}{x+2} - \frac{x+6}{(x+2)(x+4)} \cdot \frac{x+3}{x+3}$$

$$= \frac{x^2+7x+10 - (x^2+9x+18)}{(x+2)(x+3)(x+4)}$$

$$= \frac{-2x-8}{(x+2)(x+3)(x+4)} = \frac{-2(x+4)}{(x+2)(x+3)(x+4)} = \frac{-2}{(x+2)(x+3)}$$

Solve for x:

$$\frac{5}{x^2+x-6} + \frac{1}{x^2+6x+9} = \frac{1}{x-2}$$

CHECK YOUR ANSWER(S).

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$$\begin{aligned} (x+3)^2(x-2) \left(\frac{5}{(x+3)(x-2)} + \frac{1}{(x+3)^2} \right) \\ = \left(\frac{1}{x-2} \right) (x+3)^2(x-2) \end{aligned}$$

$$5(x+3) + x-2 = (x+3)^2$$

$$5x+15+x-2 = x^2+6x+9$$

$$4 = x^2$$

$$x = \pm 2$$

$$\boxed{x = -2}$$

$$x^2+x-6 = (x+3)(x-2)$$

$$x^2+6x+9 = (x+3)^2$$

$$x-2 = (x-2)$$

$$LCD = (x+3)^2(x-2)$$

CHECK:

$$x=2 \quad \frac{5}{0} + \dots \text{ FAILS}$$

$$x=-2 \quad \frac{5}{-4} + \frac{1}{1} \stackrel{?}{=} \frac{1}{-4}$$

$$= -\frac{5}{4} + 1 = -\frac{1}{4} \checkmark$$

Solve:

Pat & Chris & Hunter each took a 63 km hike.

SCORE: ____ / 18 PTS

- [a] Hunter was hiking at 6 km per hour. How many hours did Hunter hike ?

$$\frac{63}{6} = 10.5 \text{ HOURS}$$

- [b] Pat was hiking 1 km per hour faster than Chris, and took 4 hours less time than Chris.
How fast was Pat hiking ?

FOR FULL CREDIT, YOU MUST WRITE AND SOLVE A RATIONAL EQUATION, AND SUMMARIZE YOUR FINAL ANSWER IN A SENTENCE USING THE CORRECT UNITS OF MEASUREMENT.

LET x = PAT'S SPEED

SO $x - 1$ = CHRIS' SPEED

$$\frac{63}{x} = \text{PAT'S TIME}$$

$$\frac{63}{x-1} = \text{CHRIS' TIME}$$

$$\frac{63}{x} = \frac{63}{x-1} - 4$$

$$x(x-1)\left(\frac{63}{x}\right) = \left(\frac{63}{x-1} - 4\right) \times (x-1)$$

$$63(x-1) = 63x - 4x(x-1)$$

$$\rightarrow 63x - 63 = 63x - 4x^2 + 4x$$

$$4x^2 - 4x - 63 = 0$$

$$(2x - 9)(2x + 7) = 0$$

$$x = \frac{9}{2}, -\frac{7}{2}$$

PAT WAS HIKING

4.5 km PER HOUR

Find the equation of the horizontal asymptote of $y = \frac{5-9x}{15x-10}$. Simplify your answer.

SCORE: ____ / 8 PTS

$$\text{As } x \rightarrow \pm\infty, y \approx \frac{-9x}{15x}$$

$$y = -\frac{3}{5}$$

Find the equation of the vertical asymptote of $y = \frac{5-9x}{15x-10}$. Simplify your answer.

$$15x - 10 = 0$$

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

Divide and simplify:

$$\frac{27x^2 - 48}{20x^2 - 30x^3} \div \frac{18x - 24}{15x^2 - 10x}$$

SCORE: ____ / 15 PTS

$$= \frac{3(9x^2 - 16)}{-10x^2(3x - 2)} \cdot \frac{5x(3x - 2)}{6(3x - 4)}$$

$$= \frac{3(3x - 4)(3x + 4)}{-10x^2(3x - 2)} \cdot \frac{5x(3x - 2)}{6(3x - 4)}$$

$\begin{matrix} -2 & & 2 \end{matrix}$

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

Simplify:

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

SCORE: ____ / 15 PTS

$$= \frac{(x-6)(x-2) - 8(x-2)}{4(x-2) - 6(x-6)}$$

$$= \frac{(x-2)(x-6-8)}{4x-8-6x+36}$$

$$= \frac{(x-2)(x-14)}{-2x+28}$$

$$= \frac{(x-2)(x-14)}{-2(x-14)}$$

$$= -\frac{x-2}{2} \text{ or } \frac{2-x}{2}$$

Subtract and simplify:

$$\frac{7x^2 - 9x - 8}{x^2 - 3x - 10} - \frac{5x^2 - 2x + 7}{x^2 - 3x - 10}$$

SCORE: ____ / 15 PTS

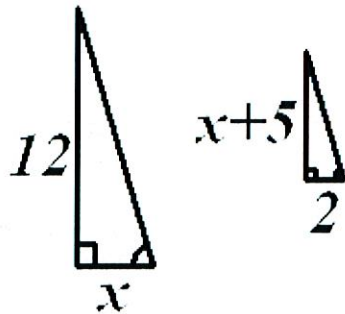
$$= \frac{2x^2 - 7x - 15}{x^2 - 3x - 10}$$

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

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

Solve for x in the following similar triangles:

SCORE: ____ / 12 PTS



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

$$x^2 + 5x = 24$$

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

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

$$x = -\cancel{8}, 3$$

Simplify:

$$\frac{6x^2 - 11x + 3}{9x^2 + 3x - 2}$$

SCORE: ____ / 12 PTS

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

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