

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

Solve:

The height of a chocolate pyramid varies directly as the volume of chocolate used, and inversely as the area of the base of the pyramid. 2 liters of chocolate can be molded into a 0.4 meter tall pyramid with a base of area 150 cm^2 . How tall is a pyramid with a base of area 180 cm^2 molded from 3 liters of chocolate?

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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.

1 [H = HEIGHT
 V = VOLUME
 A = AREA OF BASE

4 [$H = \frac{kV}{A}$

2 [$0.4 = \frac{k(2)}{150}$

2 [$k = 30$

$H = \frac{30V}{A}$ 2

$H = \frac{30(3)}{180}$ 1

$H = 0.5$ 1

3L OF CHOCOLATE WILL MAKE A PYRAMID 0.5 m TALL WITH A BASE OF AREA 180 cm^2 1

Subtract and simplify:

$$\frac{x+5}{x^2+4x+3} - \frac{x+9}{x^2-9}$$

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$= \frac{x+5}{(x+1)(x+3)} \cdot \frac{x-3}{x-3} - \frac{x+9}{(x+3)(x-3)} \cdot \frac{x+1}{x+1}$ 1

$= \frac{(x^2+2x-15) - (x^2+10x+9)}{(x+1)(x+3)(x-3)}$ 2

$= \frac{-8x-24}{(x+1)(x+3)(x-3)}$ 3

$= \frac{-8(x+3)}{(x+1)(x+3)(x-3)}$ 1/2

$= \frac{-8}{(x+1)(x-3)}$ 1 1/2

Solve:

A number divided by four is equal to fifteen divided by seven less than that number.
Find the number. CHECK YOUR ANSWER(S).

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$$\frac{x}{4} = \frac{15}{x-7}$$

$$x^2 - 7x = 60$$

$$x^2 - 7x - 60 = 0$$

$$(x-12)(x+5) = 0$$

$$x = 12, -5$$

CHECK: $\frac{12}{4} = 3$
 $\frac{15}{12-7} = \frac{15}{5} = 3$ ✓

 $-\frac{5}{4}$
 $\frac{15}{-5-7} = \frac{15}{-12} = -\frac{5}{4}$ ✓

+1 FOR IDENTIFYING BOTH SOLUTIONS AS CORRECT AFTER CHECK

Find the equation of the vertical asymptote of $y = \frac{5+8x}{24x-9}$.

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$$24x - 9 = 0$$

$$x = \frac{9}{24} = \frac{3}{8}$$

$$x = \frac{3}{8}$$

Find the equation of the horizontal asymptote of $y = \frac{5+8x}{24x-9}$.

AS $x \rightarrow \pm\infty$, $y \approx \frac{8x}{24x} = \frac{1}{3}$

$$y = \frac{1}{3}$$

Simplify:

SPECIFY ANY RESTRICTIONS.

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$$\frac{5x^2 - 14x - 3}{6x^2 - 23x + 15}$$

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

$$= \frac{5x+1}{6x-5} \quad \text{IF } x \neq 3$$

(3 IF COEFFICIENTS OK BUT SIGNS WRONG)
 (3 n)

Solve for x:

$$\frac{3}{x^2+5x+4} + \frac{2}{x^2+8x+16} = \frac{1}{x+1}$$

CHECK YOUR ANSWER(S)

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$$(x+1)(x+4)^2 \left[\frac{3}{(x+1)(x+4)} + \frac{2}{(x+4)^2} \right] = \left[\frac{1}{x+1} \right] (x+1)(x+4)^2$$

$$\frac{1}{2} \frac{3(x+4) + 2(x+1)}{(x+4)^2} = \frac{(x+4)^2}{(x+4)^2}$$

$$\frac{1}{2} \frac{3x+12+2x+2}{(x+4)^2} = \frac{x^2+8x+16}{(x+4)^2}$$

$$\frac{1}{2} \frac{5x+14}{(x+4)^2} = \frac{x^2+8x+16}{(x+4)^2}$$

$$0 = x^2+3x+2$$

$$0 = (x+1)(x+2)$$

$$x = -1, -2$$

$$\text{CHECK: } x = -1$$

$$x = -2$$

$$\frac{3}{-2} + \frac{2}{2^2} = -1$$

$$\frac{1}{-1} = -1 \checkmark$$

+1 FOR IDENTIFYING -2 AS THE ONLY CORRECT SOLUTION

Simplify:

$$\frac{1 - \frac{4}{x-7}}{\frac{2}{x-7} - \frac{3}{x-5}}$$

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$$= \frac{1 - \frac{4}{x-7}}{\frac{2}{x-7} - \frac{3}{x-5}} \cdot \frac{(x-7)(x-5)}{(x-7)(x-5)}$$

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

$$= \frac{(x-5)(x-7-4)}{2x-10-3x+21}$$

$$= \frac{(x-5)(x-11)}{-x+11}$$

$$= \frac{(x-5)(x-11)}{-(x-11)}$$

$$= \frac{(x-5)(x-11)}{-(x-11)}$$

$$= \frac{(x-5)(x-11)}{-(x-11)}$$

$$= \frac{(x-5)(x-11)}{-(x-11)}$$

OR

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

$$= \frac{x-11}{x-7} \cdot \frac{(x-7)(x-5)}{2x-10-3x+21}$$

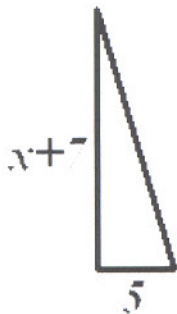
$$= \frac{x-11}{x-7} \cdot \frac{(x-7)(x-5)}{-x+11}$$

$$= \frac{x-11}{x-7} \cdot \frac{(x-7)(x-5)}{-x+11}$$

$$= \frac{(x-11)(x-5)}{-(x-11)} = -(x-5)$$

Solve for x in the following similar triangles:

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$$\frac{x+7}{6} = \frac{5}{x} \quad 5$$

$$x^2 + 7x = 30 \quad 2$$

$$x^2 + 7x - 30 = 0 \quad 1$$

$$(x+10)(x-3) = 0 \quad 2$$

$$x = -10, \boxed{3} \quad 1\frac{1}{2}$$

+ $1\frac{1}{2}$ FOR IDENTIFYING 3 AS THE ONLY CORRECT SOLUTION

Divide and simplify:

$$\frac{8x^2 - 50}{5 - 20x} \div \frac{8x^2 - 20x}{12x^2 - 3x}$$

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$$= \frac{8x^2 - 50}{5 - 20x} \cdot \frac{12x^2 - 3x}{8x^2 - 20x} \quad 4$$

$$= \frac{2(4x^2 - 25)}{-5(4x - 1)} \cdot \frac{3x(4x - 1)}{4x(2x - 5)} \quad 1$$

$$= \frac{3(2x+5)(2x-5)}{-10(2x-5)} = \boxed{-\frac{3(2x+5)}{10}} \quad 2$$

Subtract and simplify:

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

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$$= \frac{2x^2 - 3x - 5}{(x-6)(x+1)} \quad 9$$

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

$$= \boxed{\frac{2x-5}{x-6}} \quad 2$$