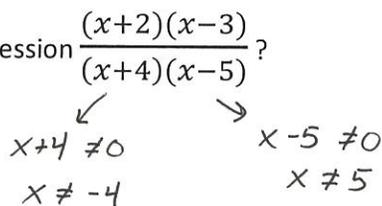


1.03 - EQ - 6.1 Rational Expressions

Q1: What are the non-permissible values for the rational expression $\frac{(x+2)(x-3)}{(x+4)(x-5)}$?

- a. $x \neq -2, 3$
- b. $x \neq 2, -3$
- c. $x \neq -4, 5$
- d. $x \neq 4, -5$



Q2: The rational expression $\frac{x^2+8x+15}{x^2-x-12}$ simplifies to $\frac{x+a}{x-b}$, where $x \neq c$, $x \neq -d$. The values of a , b , c , and d are __, __, __, and __.

(Record your four-digit answer in the Numerical Response boxes below)

5 4 4 3

$x^2+8x+15$
 $\begin{matrix} +3 & +5 \\ \square & + \square = 8 \\ \square & \times \square = 15 \end{matrix}$
 $\begin{matrix} 1, 15 \\ \hline 3, 5 \end{matrix}$
 $(x+3)(x+5)$

x^2-x-12
 $\begin{matrix} +3 & -4 \\ \square & + \square = -1 \\ \square & \times \square = -12 \end{matrix}$
 $\begin{matrix} 1, 12 \\ 2, 6 \\ \hline 3, 4 \end{matrix}$
 $(x+3)(x-4)$

$\frac{x^2+8x+15}{x^2-x-12} = \frac{(x+3)(x+5)}{(x+3)(x-4)} = \frac{x+5}{x-4}$, where $x \neq 4, -3$
 $\swarrow \searrow$
 $x+3 \neq 0$ $x-4 \neq 0$
 $x \neq -3$ $x \neq 4$
 $a=5$ $c=4$ $d=3$
 $b=4$

Q3: (Long Answer) Simplify the expression $\frac{2x^2+6x-20}{2x^2-x-6}$ and state any non-permissible values. (2 marks)

$2x^2+6x-20$
 $2(x^2+3x-10)$
 $\begin{matrix} -2 & +5 \\ \square & + \square = 3 \\ \square & \times \square = -10 \end{matrix}$
 $\begin{matrix} 1, 10 \\ \hline 2, 5 \end{matrix}$
 $2(x-2)(x+5)$

$2x^2-x-6$
 $\begin{matrix} +3 & -4 \\ \square & + \square = -1 \\ \square & \times \square = -12 \end{matrix}$
 $\begin{matrix} 1, 12 \\ 2, 6 \\ \hline 3, 4 \end{matrix}$
 \downarrow

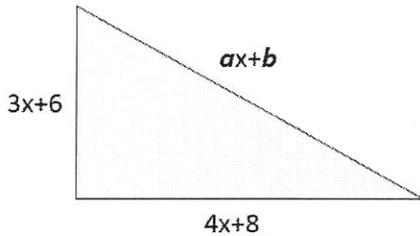
$2x^2+3x-4x-6$
 $(2x^2+3x) + (-4x-6)$
 $x(2x+3) - 2(2x+3)$
 $(2x+3)(x-2)$

$\frac{2x^2+6x-20}{2x^2-x-6} = \frac{2(x-2)(x+5)}{(2x+3)(x-2)} = \frac{2(x+5)}{2x+3}$ where $x \neq -\frac{3}{2}, 2$
 $\swarrow \searrow$
 $2x+3 \neq 0$ $x-2 \neq 0$
 $2x \neq -3$ $x \neq 2$
 $x \neq -\frac{3}{2}$

Q4: A triangle has a base of $4x+8$ and a height of $3x+6$. The hypotenuse is $ax+bc$, where a , b and c are ____, ____, and ____.

(Record your **three-digit** answer in the Numerical Response boxes below)

5	1	0	
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$$a^2 + b^2 = c^2$$

$$(3x+6)(3x+6) + (4x+8)(4x+8) = c^2$$

$$(9x^2 + 36x + 36) + (16x^2 + 64x + 64) = c^2$$

$$25x^2 + 100x + 100 = c^2$$

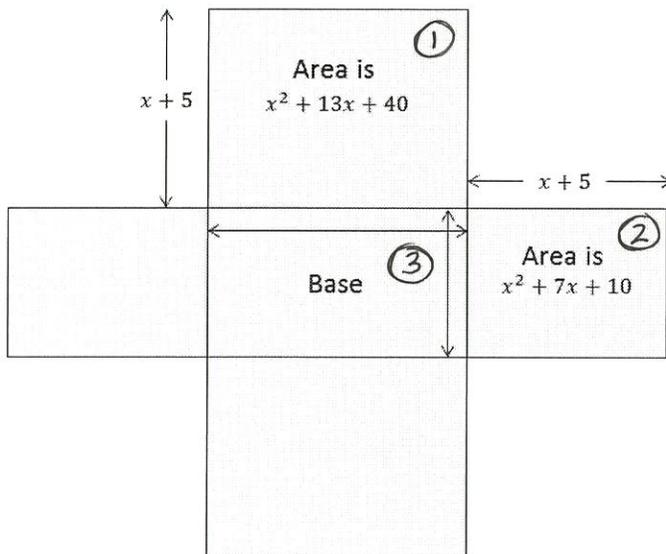
$$(5x+10)(5x+10) = c^2$$

$$c = 5x + 10$$

$$a = 5 \quad b = 1$$

$$c = 0$$

Q5: (Long Answer) A box has a height of $x + 5$ before being disassembled and laid flat as a net diagram. The area of one side is $x^2 + 13x + 40$ and the area of the other side is $x^2 + 7x + 10$. Determine the area of the base, and state any non-permissible values. (4 marks)



$$\textcircled{1} \text{ Length} = \frac{\text{Area}}{\text{Height}} = \frac{x^2 + 13x + 40}{x + 5}$$

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

$$= x+8, \text{ where } x \neq -5$$

$$\textcircled{2} \text{ Length} = \frac{\text{Area}}{\text{Height}} = \frac{x^2 + 7x + 10}{x + 5}$$

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

$$= x+2, \text{ where } x \neq -5$$

$$\textcircled{3} \text{ Area} = (L)(w)$$

$$= (x+8)(x+2)$$

$$= x^2 + 10x + 16$$

$$\textcircled{4} \text{ where } x \neq -5$$

MARKING:

Beginning	0.0 – 4.0
Progressing	4.5 – 6.5
Competent	7.0 – 8.5
Exemplary	9.0