

<p>C PATTERNS AND RELATIONS (Variables and Equations)</p>	<p>C8 determine equivalent forms of simple rational expressions with polynomial numerators, and denominators that are monomials, binomials or trinomials that can be factored</p>
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Knowledge

Prescribed Learning Outcomes – C8

70. Simplify:  $\frac{(x+1)(x+2)}{(x+3)(x+1)}$ ;  $x \neq -1, -3$

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

\* B.  $\frac{x+2}{x+3}$

C.  $\frac{x^2+2}{x^2+3}$

D.  $\frac{x^2+3x+2}{x^2+4x+3}$

Understanding

Prescribed Learning Outcomes – C8

71. Simplify:  $\frac{x^2-6x+8}{x^2-4}$ ;  $x^2 \neq 4$

\* A.  $\frac{x-4}{x+2} = \frac{(x-4)(x-2)}{(x+2)(x-2)}$

B.  $\frac{x+4}{x-2}$

C.  $\frac{x-4}{x-2}$

D.  $\frac{x+4}{x+2}$

C PATTERNS AND RELATIONS (Variables and Equations)	C9 determine the non-permissible values for the variable in rational expressions
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Knowledge

Prescribed Learning Outcomes – C9

73. For which values of  $x$  is the following expression undefined?

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

*Denominator only!*

$$x \neq 4, x \neq 3$$

- A. -4, 0  
 B. -4, 0, 3  
 \* C. 3, 4  
 D. 4

Understanding

Prescribed Learning Outcomes – C9

Match each Rational Expression on the left with the correct Non-Permissible Value(s) on the right. Each set of Non-Permissible Value(s) may be used once, more than once or not at all.	
Rational Expression	Non-Permissible Value(s)
74. $\frac{b^2 + 3b - 10}{b^2 - 25}$ $b^2 - 25 \neq 0 \quad b = \pm 5$	A. -5, 5 B. -2, 4
75. $\frac{x + 6}{x^2 - 4x}$ $x(x-4) \neq 0 \quad x \neq 0, 4$	C. 0, 4 D. -1, 5
76. $\frac{m^2 - 2m - 8}{2m^2 - 8m - 10}$ $2(m^2 - 4m - 5) \neq 0$ $2(m-5)(m+1) \neq 0$	E. -5, 2 F. -6

$$m \neq 5, -1$$

Answers

74. A  
 75. C  
 76. D

77. In the expression  $\frac{y^2-1}{(y^2+y+k)(y+k)}$  the non-permissible values of  $y$  are 2, -3, and 6.

What is the value of  $k$ ?

- \* A. -6  
B. -2  
C. 3  
D. 1

If  $y \neq 2, y \neq -3, y \neq 6$   
then  $y-2 \neq 0$   
 $y+3 \neq 0$   
 $y-6 \neq 0$

$$\begin{aligned} \therefore \frac{y^2-1}{(y-2)(y+3)(y-6)} \\ = \frac{y^2-1}{(y^2+y-6)(y-6)} \\ \therefore k = -6 \end{aligned}$$

<p>C PATTERNS AND RELATIONS (Variables and Equations)</p>	<p>C10 perform the operations of addition, subtraction, multiplication, and division on rational expressions <i>Clarification: Polynomials used in the rational expressions will be of types consistent with the other PLOs in this sub-organizer.</i></p>
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Knowledge

Prescribed Learning Outcomes – C10

78. Simplify:  $\frac{x}{x+3} + \frac{1}{x+3}$ ;  $x \neq -3$

- \* A.  $\frac{x+1}{x+3}$        $= \frac{x+1}{x+3}$
- B.  $\frac{x+1}{2x+6}$
- C.  $\frac{x+1}{x^2+9}$
- D.  $\frac{x+1}{x^2+6x+9}$

Match each Defined Expression on the left with the correct Simplified Expression on the right. Each Simplified Expression may be used once, more than once or not at all.	
Defined Expression	Simplified Expression
79. $\frac{3a+1}{2a} - \frac{2a-3}{a}$	A. $\frac{7}{2a}$
80. $\frac{5a}{a+1} - \frac{2}{a}$	B. $\frac{2a^2+16a-1}{(a-2)(a+1)}$
81. $\frac{6}{a+1} - \frac{2a-3}{a+1} + \frac{4a+5}{a-2}$	C. $\frac{5a^2-2a-2}{a(a+1)}$
	D. $\frac{2a^2+22a-13}{(a-2)(a+1)}$
	E. $\frac{5a^2-2a+2}{a(a+1)}$
	F. $\frac{-a+7}{2a}$

Answers

79. F  
80. C  
81. D

$$79. \quad \frac{3a+1}{2a} - \frac{2(2a-3)}{2a}$$

$$= \frac{3a+1-4a+6}{2a}$$

$$= \frac{-a+7}{2a} \text{ or } -\frac{(a-7)}{2a}$$

$$80. \quad \frac{5a(a)-2(a+1)}{a(a+1)}$$

$$= \frac{5a^2-2a-2}{a(a+1)}$$

$$81. \quad \frac{9-2a}{a+1} + \frac{4a+5}{a-2}$$

$$= \frac{(9-2a)(a-2) + (4a+5)(a+1)}{(a+1)(a-2)}$$

$$= \frac{9a-18-2a^2+4a+4a^2+9a+5}{(a+1)(a-2)}$$

$$= \frac{2a^2+22a-13}{(a+1)(a-2)}$$

Match each Defined Expression on the left with the correct Simplified Expression on the right. Each Simplified Expression may be used once, more than once or not at all.	
Defined Expression	Simplified Expression
82. $\frac{3x^2}{4} \times \frac{2}{6x}$	A. $\frac{x}{3}$
83. $\frac{3x^3 + 9x^2}{2x^2 + 2x - 12} \times \frac{4x - 8}{6x}$	B. $\frac{x+6}{x-4}$
84. $\frac{4x^3 - x}{2x^2 - 5x - 3} \div \frac{2x^3 - 9x^2 + 4x}{x^2 + 3x - 18}$	C. $\frac{x}{4}$
	D. $2x$
	E. $x$
	F. $\frac{x-6}{x-4}$

Answers

82. C

83. E

84. B

$$82. \frac{6x^2}{24x} = \frac{x}{4}$$

$$83. \frac{3x^2(x+3)}{2(x^2+x-6)} \cdot \frac{4(x-2)}{6x} = \frac{x(x+3)}{(x+3)(x+2)} \cdot \frac{(x-2)}{1} = x$$

$$\begin{array}{r} 2x+1 \\ \hline x-3 \end{array}$$

$$84. \frac{x(4x^2-1)}{(2x+1)(x-3)} \cdot \frac{(x+6)(x-3)}{x(2x^2-9x+4)} = \frac{x(2x+1)(2x-1)}{(2x+1)(x-3)} \cdot \frac{(x+6)(x-3)}{x(2x-1)(x-4)} = \frac{x+6}{x-4}$$

$$\begin{array}{r} 2x+1 \\ \hline x-4 \end{array}$$

