A∞Ω
MATH@TD

Name Solutions

MCR3U

MCR3U U1 - Rational Expressions Test K ____/14 T ____/21 C ____/5

Multiple Choice K ____/5

Identify the choice that best completes the statement or answers the question.

A 1. Simplify $(11v^2 - 6vw - 3w^2) - (-7v^2 + vw + 13w^2)$.
a. $18v^2 - 7vw - 16w^2$
b. $4v^2 - 5vw + 10w^2$
c. $2(vw)^2 - 7vw$
d. $18v^2 - 5vw + 10w^2$

A 2. Which of the following represents the first step for factoring $g^3 + 5g^2 + 2g + 10$ by grouping?
a. $g^2(g+5) + 2(g+5)$
b. $(g^2+5) + (2g+5)$
c. $(g+5)^3$
d. $(g+5)(g+5) + (g+2)(g+2)$

D 3. Which of the following are factors for the polynomial $9x^2 - 16$?
a. $(9x-16)(x+1)$
b. $(3x-4)(3x-4)$
c. $(9x+4)(x-4)$
d. $(3x+4)(3x-4)$

A 4. Which of the following are factors for the polynomial $2q^2 + 24q + 72$?
a. $2(q+6)(q+6)$
b. $2(q+9)(q+8)$
c. $(2q+9)(q+8)$
d. $2(q+9)(q+4)$

C 5. What are the restrictions on the variable for $\frac{d^2 + 10d + 25}{5d^2 - 25d}$?
a. $d \neq -5, 0, 5$
b. $d \neq 0$
c. $d \neq 0, 5$
d. No restrictions

Full Solution - Write clear and thorough solutions to the following problems. You can receive up to 4 Communication Points for how well your mathematics is presented.

6. Expand and simplify. K ____/2
$(x+5)(x-3) + (x-6)(x+1)$

$= x^2 - 3x + 5x - 15 + x^2 + 1x - 6x - 6$

$= 2x^2 - 3x - 21$

7. Factor $n^3 + 4n^2 + 3n + 12$ by grouping. K ____/2

$= n^2(n+4) + 3(n+4)$

$= (n+4)(n^2+3)$

8. Simplify and state any restrictions on the variable. **K ____/2**

$\frac{12w^4}{21w^6}$

4 w's

$= \frac{(3)(4)\,w^4}{(3)(7)\,w^6}$, $w \neq 0$

6 w's

we can cancel

$= \frac{4}{7w^2}$

$\Rightarrow \frac{w \cdot w \cdot w \cdot w}{w \cdot w \cdot w \cdot w \cdot w \cdot w}$ ← all "gone"

2 left

9. Simplify and state any restrictions on the variable. **K ____/3**

$\frac{q^2 - 14q + 49}{q^2 - 49}$

$= \frac{(q-7)^2}{(q-7)(q+7)}$, $q \neq 7, -7$.

$q^2 - 14q + 49$; $\times$: 1×49, $+$: $-7 + -7 = -14$ ← square!

$= (q-7)(q-7) = (q-7)^2$

$= \frac{q-7}{q+7}$ //

$q^2 - 49 \Rightarrow$ difference of squares

root 1, root 2

$(q-7)(q+7)$

10. Simplify $\frac{2x^2 + 7x + 3}{x - 4} \times \frac{x^2 - 16}{x^2 + 8x + 15}$ and state any restrictions on the variables. **T ____/4**

← diff of squares

$x^2 + 8x + 15$; $\times$: 1×15, $+$: $3 + 5 = 8 \Rightarrow 5, 3$

$= \frac{(x+3)(2x+1)}{x-4} \times \frac{(x-4)(x+4)}{(x+3)(x+5)}$, $x \neq 4, -3, -5$

$= \frac{(2x+1)(x+4)}{x+5}$ ⇐ factored form is your friend

when the squared term has a coefficient NOT 1

$2x^2 + 7x + 3$

$= 2x^2 + 6x + 1x + 3$ ⇒ decomposition

$= 2x(x+3) + 1(x+3)$

$= (x+3)(2x+1)$

$\times$: 2×3, $+$: $6 + 1 = 7$

6, 1

11. Simplify $\dfrac{4-x}{3x^2-4x-4} \div \dfrac{5x-20}{6x^2-17x+10}$ and state any restrictions on the variables. **T ____/4**

common factor "5"

$= \dfrac{4-x}{(x-2)(3x+2)} \div \dfrac{5(x-4)}{(x-2)(6x-5)}$, restriction here because of division, $x \neq 2, -\frac{2}{3}, +\frac{5}{6}, 4$

$= \dfrac{-1(4-x)}{(x-2)(3x+2)} \times \dfrac{(x-2)(6x-5)}{5(x-4)}$

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

$3x^2-4x-4$: $-12, -4$: $-6, +2$

$= 3x^2-6x+2x-4$

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

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

$6x^2-17x+10$: $(6)(10)=60$: $-12, -5$

$= 6x^2-12x-5x+10$

$= 6x(x-2)-5(x-2)$

$= (x-2)(6x-5)$

12. Simplify and state any restrictions on the variable. **T ____/4**

$\dfrac{5k}{k^2-k-6} + \dfrac{4}{k^2+4k+4}$

-6 : $-3, +2$; 4 : $2, 2$

$= \dfrac{5k}{(k-3)(k+2)} + \dfrac{4}{(k+2)(k+2)}$, $x \neq 3, -2$.

CD: $(k-3)(k+2)(k+2)$

$= \dfrac{5k(k+2)}{(k-3)(k+2)(k+2)} + \dfrac{4(k-3)}{(k-3)(k+2)(k+2)}$

If this is negative BE CAREFUL

$= \dfrac{5k^2+10k+4k-12}{(k-3)(k+2)^2}$

$= \dfrac{5k^2+14k-12}{(k-3)(k+2)^2}$ //

← you need to collect like terms in the numerator → expand and simplify

leave the common denominator alone - do not expand it

BE CAREFUL – for the love of humanity!

13. Simplify and state any restrictions on the variable. **T ____/4**

$$\frac{m}{3m^2-9m+6}-\frac{2m+1}{3m^2+3m-6}$$

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

$$=\frac{m}{3(m-2)(m-1)}-\frac{(2m+1)}{3(m+2)(m-1)},\quad m\neq 2,1,-2.$$

CD: $3(m-2)(m-1)(m+2)$

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

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

$$=\frac{-m^2+5m+2}{3(m-2)(m-1)(m+2)}$$

14. Simplify and state any restrictions on the variable. Remember the order of operations. **T ____/5**

$$\frac{7x}{5x^2-125}+\frac{4}{3x+15}\div\frac{2x}{x^2+8x+15}$$

Nothing this complicated on the test!

common factor when you can diff of squares

$$=\frac{7x}{5(x^2-25)}+\frac{4}{3(x+5)}\div\frac{2x}{(x+3)(x+5)}$$

$$=\frac{7x}{5(x-5)(x+5)}+\frac{4}{3(x+5)}\div\frac{2x}{(x+3)(x+5)},\quad x\neq 5,-5,-3,0$$

because of the division!

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

$$=\frac{7x}{5(x-5)(x+5)}+\frac{4(x+3)}{6x}$$

CD: $(5)(x-5)(x+5)(6)(x)=30x(x-5)(x+5)$

$$=\frac{7x(6x)}{30x(x-5)(x+5)}+\frac{4(x-3)(5)(x^2-25)}{30x(x-5)(x+5)}$$

$$=\frac{42x^2+20(x-3)(x^2-25)}{30x(x-5)(x+5)}$$

15. In the picture I have made a terrible error. Explain to me the mistake I have made. **C ____/1**

$$\frac{(x-2)(x+3)}{(x+3)(2x-5)},\quad x\neq -3,+\frac{5}{2}$$

$$=\frac{x-2}{2x-5}$$

I forgot restrictions!

$$= \frac{42x^2 + 20(x^3 - 25x - 3x^2 + 75)}{30x(x-5)(x+5)}$$

$$= \frac{42x^2 + 20x^3 - 500x - 60x^2 + 1500}{30x(x-5)(x+5)}$$

$$= \frac{20x^3 - 18x^2 - 500x + 1500}{30x(x-5)(x+5)}$$

yikes!