## A.APR.D.6: Rational Expressions 1b

1  Which expression represents $\dfrac{12x^3 - 6x^2 + 2x}{2x}$ in simplest form?

2  The expression $\dfrac{9x^4 - 27x^6}{3x^3}$ is equivalent to

3  Which expression is equivalent to $\dfrac{2x^6 - 18x^4 + 2x^2}{2x^2}$?

4  Which expression(s) are equivalent to $\dfrac{x^2 - 4x}{2x}$, where $x \neq 0$?

   I. $\dfrac{x}{2} - 2$   II. $\dfrac{x-4}{2}$   III. $\dfrac{x-1}{2} - \dfrac{3}{2}$

5  Which expression represents $\dfrac{2x^2 - 12x}{x - 6}$ in simplest form?

6  Which expression represents $\dfrac{25x - 125}{x^2 - 25}$ in simplest form?

7  For all values of $x$ for which the expression is defined, $\dfrac{x^2 + 3x}{x^2 + 5x + 6}$ is equivalent to

8  Which expression represents $\dfrac{x^2 - 3x - 10}{x^2 - 25}$ in simplest form?

9  Which fraction represents $\dfrac{x^2 - 25}{x^2 - x - 20}$ expressed in simplest form?

10  Which expression represents $\dfrac{x^2 - 2x - 15}{x^2 + 3x}$ in simplest form?

11  Written in simplest form, the fraction $\dfrac{x^3 - 9x}{9 - x^2}$, where $x \neq \pm 3$, is equivalent to

12  The expression $\dfrac{2x^2 + 10x - 28}{4x + 28}$ is equivalent to

13  Which expression represents $\dfrac{x^2 - x - 6}{x^2 - 5x + 6}$ in

simplest form?

14  If the area of a rectangle is represented by $x^2 + 8x + 15$ and its length is represented by $x + 5$, which expression represents the width of the rectangle?

15  Express in simplest form: $\dfrac{45a^4 b^3 - 90a^3 b}{15a^2 b}$

16  Express in simplest form: $\dfrac{x^2 - 1}{x^2 + 3x + 2}$

17  The area of a rectangle is represented by $x^2 - 5x - 24$. If the width of the rectangle is represented by $x - 8$, express the length of the rectangle as a binomial.

18  For all values of $x$ for which the expression is defined, $\dfrac{x^3 + 2x^2 - 9x - 18}{x^3 - x^2 - 6x}$, in simplest form, is equivalent to

19  Which expression can be rewritten as $(x + 7)(x - 1)$?
1)  $(x + 3)^2 - 16$
2)  $(x + 3)^2 - 10(x + 3) - 2(x + 3) + 20$
3)  $\dfrac{(x - 1)(x^2 - 6x - 7)}{(x + 1)}$
4)  $\dfrac{(x + 7)(x^2 + 4x + 3)}{(x + 3)}$

20  For all values of $x$ for which the expression is defined, write the expression below in simplest form.

$$\frac{2x^3 + x^2 - 18x - 9}{3x - x^2}$$

21  Written in simplest form, $\dfrac{c^2 - d^2}{d^2 + cd - 2c^2}$ where $c \neq d$, is equivalent to

# A.APR.D.6: Rational Expressions 1b
## Answer Section

1  ANS:
$6x^2 - 3x + 1$

$$\frac{12x^3 - 6x^2 + 2x}{2x} = \frac{2x(6x^2 - 3x + 1)}{2x} = 6x^2 - 3x + 1$$

REF:  011011ia

2  ANS:
$3x(1 - 3x^2)$

$$\frac{9x^4 - 27x^6}{3x^3} = \frac{9x^4(1 - 3x^2)}{3x^3} = 3x(1 - 3x^2)$$

REF:  fall0718ia

3  ANS:
$x^4 - 9x^2 + 1$

$$\frac{2x^2(x^4 - 9x^2 + 1)}{2x^2}$$

REF:  081222ia

4  ANS:
I, II, and III

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

REF:  011921aii

5  ANS:
$2x$

$$\frac{2x^2 - 12x}{x - 6} = \frac{2x(x - 6)}{x - 6} = 2x$$

REF:  060824ia

6  ANS:
$\dfrac{25}{x + 5}$

$$\frac{25x - 125}{x^2 - 25} = \frac{25(x - 5)}{(x + 5)(x - 5)} = \frac{25}{x + 5}$$

REF:  080821ia

7 ANS:

$\dfrac{x}{x+2}$

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

REF: 082215aii

8 ANS:

$\dfrac{x+2}{x+5}$

$\dfrac{x^2-3x-10}{x^2-25} = \dfrac{(x-5)(x+2)}{(x+5)(x-5)} = \dfrac{x+2}{x+5}$

REF: 061216ia

9 ANS:

$\dfrac{x+5}{x+4}$

$\dfrac{x^2-25}{x^2-x-20} = \dfrac{(x+5)(x-5)}{(x+4)(x-5)} = \dfrac{x+5}{x+4}$

REF: 011424ia

10 ANS:

$\dfrac{x-5}{x}$

$\dfrac{x^2-2x-15}{x^2+3x} = \dfrac{(x-5)(x+3)}{x(x+3)} = \dfrac{x-5}{x}$

REF: 060921ia

11 ANS:

$-x$

$\dfrac{x(x^2-9)}{-(x^2-9)} = -x$

REF: 012023aii

12 ANS:

$\dfrac{x-2}{2}$

$\dfrac{2x^2+10x-28}{4x+28} = \dfrac{2(x^2+5x-14)}{4x+28} = \dfrac{2(x+7)(x-2)}{4(x+7)} = \dfrac{x-2}{2}$

REF: 011327ia

13 ANS:

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

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

REF: 011130ia

14 ANS:

$x+3$

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

REF: 061307ia

15 ANS:

$3a^2b^2 - 6a$. $\dfrac{45a^4b^3 - 90a^3b}{15a^2b} = \dfrac{45a^4b^3}{15a^2b} - \dfrac{90a^3b}{15a^2b} = 3a^2b^2 - 6a$

REF: 081031ia

16 ANS:

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

REF: 011233ia

17 ANS:

$$\frac{x^2-5x-24}{x-8} = \frac{(x-8)(x+3)}{x-8} = x+3$$

REF: 061131ia

18 ANS:

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

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

REF: 061803aii

19  ANS:  1

1) $(x+3)^2 - 16 = x^2 + 6x + 9 - 16 = x^2 + 6x - 7 = (x+7)(x-1)$;  2)  $u = x+3$  ; 3)

$$u^2 - 10u - 2u + 20$$

$$u(u-10) - 2(u-10)$$

$$(u-2)(u-10)$$

$$(x+3-2)(x+3-10)$$

$$(x+1)(x-7)$$

$\dfrac{(x-1)(x-7)(x+1)}{(x+1)} = (x-1)(x-7)$;  4) $\dfrac{(x+7)(x+1)(x+3)}{(x+3)} = (x+7)(x+1)$

REF:  061808aii

20  ANS:

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

REF:  062331ai

21  ANS:

$\dfrac{-c-d}{d+2c}$

$$\frac{c^2 - d^2}{d^2 + cd - 2c^2} = \frac{(c+d)(c-d)}{(d+2c)(d-c)} = \frac{-(c+d)}{d+2c} = \frac{-c-d}{d+2c}$$

REF:  011818aii

4