A.APR.D.6: Rational Expressions 1a

1 Which expression represents $\dfrac{12x^3 - 6x^2 + 2x}{2x}$ in simplest form?
1) $6x^2 - 3x$
2) $10x^2 - 4x$
3) $6x^2 - 3x + 1$
4) $10x^2 - 4x + 1$

2 The expression $\dfrac{9x^4 - 27x^6}{3x^3}$ is equivalent to
1) $3x(1 - 3x)$
2) $3x(1 - 3x^2)$
3) $3x(1 - 9x^5)$
4) $9x^3(1 - x)$

3 Which expression is equivalent to $\dfrac{2x^6 - 18x^4 + 2x^2}{2x^2}$?
1) $x^3 - 9x^2$
2) $x^4 - 9x^2$
3) $x^3 - 9x^2 + 1$ `
4) $x^4 - 9x^2 + 1$

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. $\dfrac{x-1}{2} - \dfrac{3}{2}$
1) II, only
2) I and II
3) II and III
4) I, II, and III

5 Which expression represents $\dfrac{2x^2 - 12x}{x - 6}$ in simplest form?
1) 0
2) $2x$
3) $4x$
4) $2x + 2$

6 Which expression represents $\dfrac{25x - 125}{x^2 - 25}$ in simplest form?
1) $\dfrac{5}{x}$
2) $\dfrac{-5}{x}$
3) $\dfrac{25}{x - 5}$
4) $\dfrac{25}{x + 5}$

7 Written in simplest form, the fraction $\dfrac{x^3 - 9x}{9 - x^2}$, where $x \neq \pm 3$, is equivalent to
1) $-x$
2) x
3) $\dfrac{-x(x + 3)}{(3 + x)}$
4) $\dfrac{x(x - 3)}{(3 - x)}$

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

1) $\dfrac{2}{5}$

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

3) $\dfrac{x-2}{x-5}$

4) $\dfrac{-3x-10}{-25}$

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

1) $\dfrac{5}{4}$

2) $\dfrac{x-5}{x-4}$

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

4) $\dfrac{25}{x+20}$

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

1) -5

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

3) $\dfrac{-2x-5}{x}$

4) $\dfrac{-2x-15}{3x}$

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

1) $1 - \dfrac{x}{x+2}$

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

3) $\dfrac{3x}{5x+6}$

4) $1 + \dfrac{1}{2x+6}$

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

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

2) $x - 1$

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

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

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

1) $\dfrac{x+2}{x-2}$

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

3) $\dfrac{1}{5}$

4) -1

2

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?
    1) $x + 3$
    2) $x - 3$
    3) $x^2 + 6x + 5$
    4) $x^2 + 7x + 10$

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) $\dfrac{(x + 7)(x^2 + 4x + 3)}{(x + 3)}$

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

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

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

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

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

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
    1) 3
    2) $-\dfrac{17}{2}$
    3) $\dfrac{x + 3}{x}$
    4) $\dfrac{x^2 - 9}{x(x - 3)}$

A.APR.D.6: Rational Expressions 1a
Answer Section

1 ANS: 3

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

REF: 011011ia

2 ANS: 2

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

REF: fall0718ia

3 ANS: 4

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

REF: 081222ia

4 ANS: 4

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

REF: 011921aii

5 ANS: 2

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

REF: 060824ia

6 ANS: 4

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

REF: 080821ia

7 ANS: 1

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

REF: 012023aii

8 ANS: 2

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

REF: 061216ia

9 ANS: 3

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

REF: 011424ia

10 ANS: 2

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

REF: 060921ia

11 ANS: 2

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

REF: 082215aii

12 ANS: 1

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

REF: 011327ia

13 ANS: 1

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

REF: 011130ia

14 ANS: 1

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

REF: 061307ia

15 ANS:

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

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: 3

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

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: 3

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

REF: 011818aii