

A.APR.D.6: Rational Expressions 1

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

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

2 The expression $\frac{9x^4 - 27x^6}{3x^3}$ 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

$$\frac{2x^6 - 18x^4 + 2x^2}{2x^2}?$$

- 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 $\frac{x^2 - 4x}{2x}$, where $x \neq 0$?

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

- 1) II, only
- 2) I and II
- 3) II and III
- 4) I, II, and III

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

- 1) 0
- 2) $2x$
- 3) $4x$
- 4) $2x + 2$

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

- 1) $\frac{5}{x}$
- 2) $\frac{-5}{x}$
- 3) $\frac{25}{x - 5}$
- 4) $\frac{25}{x + 5}$

7 Written in simplest form, the fraction $\frac{x^3 - 9x}{9 - x^2}$,

where $x \neq \pm 3$, is equivalent to

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

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

- 1) $\frac{2}{5}$
- 2) $\frac{x+2}{x+5}$
- 3) $\frac{x-2}{x-5}$
- 4) $\frac{-3x-10}{-25}$

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

- 1) $\frac{5}{4}$
- 2) $\frac{x-5}{x-4}$
- 3) $\frac{x+5}{x+4}$
- 4) $\frac{25}{x+20}$

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

- 1) -5
- 2) $\frac{x-5}{x}$
- 3) $\frac{-2x-5}{x}$
- 4) $\frac{-2x-15}{3x}$

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

- 1) $1 - \frac{x}{x+2}$
- 2) $\frac{x}{x+2}$
- 3) $\frac{3x}{5x+6}$
- 4) $1 + \frac{1}{2x+6}$

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

- 1) $\frac{x-2}{2}$
- 2) $x-1$
- 3) $\frac{x+2}{2}$
- 4) $\frac{x+5}{2}$

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

- 1) $\frac{x+2}{x-2}$
- 2) $\frac{-x-6}{-5x+6}$
- 3) $\frac{1}{5}$
- 4) -1

- 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) $x^2 + 7x + 10$

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

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

- 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 The expression $\frac{-3x^2 - 5x + 2}{x^3 + 2x^2}$ can be rewritten as

- 1) $\frac{-3x - 3}{x^2 + 2x}$
- 2) $\frac{-3x - 1}{x^2}$
- 3) $-3x^{-1} + 1$
- 4) $-3x^{-1} + x^{-2}$

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

equivalent to

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

- 20 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) $\frac{(x - 1)(x^2 - 6x - 7)}{(x + 1)}$
- 4) $\frac{(x + 7)(x^2 + 4x + 3)}{(x + 3)}$

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

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

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

- 1) $\frac{c + d}{d + 2c}$
- 2) $\frac{c - d}{d + 2c}$
- 3) $\frac{-c - d}{d + 2c}$
- 4) $\frac{-c + d}{d + 2c}$

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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

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

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: 082215aai

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:

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

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: 4

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

REF: 061723aii

19 ANS: 3

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

REF: 061803aii

20 ANS: 1

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

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

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

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

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

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

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

REF: 061808aii

21 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

22 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