A.APR.D.7: Complex Fractions 1

1 The expression $\dfrac{\dfrac{a-1}{a}}{\dfrac{a^2-1}{a^2}}$ is equivalent to

1) $\dfrac{a}{a+1}$ 2) $\dfrac{a+1}{a}$ 3) $\dfrac{a}{a-1}$ 4) $\dfrac{a-1}{a}$

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

1) $3x-9$ 2) $2x+6$ 3) $3x$ 4) $\dfrac{3}{x+3}$

3 In a science experiment, when resistor A and resistor B are connected in a parallel circuit, the total resistance is $\dfrac{1}{\frac{1}{A}+\frac{1}{B}}$. This complex fraction is equivalent to

1) 1 2) $\dfrac{AB}{A+B}$ 3) $A+B$ 4) AB

4 The expression $\dfrac{\frac{1}{x}+\frac{3}{y}}{\frac{2}{xy}}$ is equivalent to

1) $\dfrac{3}{2}$ 2) $\dfrac{3x+y}{2xy}$ 3) $\dfrac{3xy}{2}$ 4) $\dfrac{3x+y}{2}$

5 The expression $\dfrac{\frac{1}{3}+\frac{1}{3x}}{\frac{1}{x}+\frac{1}{3}}$ is equivalent to

1) $\dfrac{x+1}{x+3}$ 2) 2 3) $\dfrac{3x+3}{x+3}$ 4) $\dfrac{1}{3}$

6 Written in simplest form, the expression $\dfrac{\frac{x}{4}-\frac{1}{x}}{\frac{1}{2x}+\frac{1}{4}}$ is equivalent to

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

7 The expression $\dfrac{\frac{a}{b}-\frac{b}{a}}{\frac{1}{a}+\frac{1}{b}}$ is equivalent to

1) $a+b$ 2) $a-b$ 3) ab 4) $\dfrac{a-b}{ab}$

8 In simplest form, $\dfrac{\frac{1}{x^2}-\frac{1}{y^2}}{\frac{1}{y}+\frac{1}{x}}$ is equal to

1) $\dfrac{x-y}{xy}$ 2) $\dfrac{y-x}{xy}$ 3) $x-y$ 4) $y-x$

9 The expression $\dfrac{\frac{1}{x}+\frac{1}{y}}{\frac{1}{x^2}-\frac{1}{y^2}}$ is equivalent to

1) $\dfrac{xy}{y-x}$ 2) $\dfrac{xy}{x-y}$ 3) $\dfrac{y-x}{xy}$ 4) $y-x$

10 The expression $\dfrac{\frac{1}{3}-\frac{1}{x}}{\frac{3}{x}-1}$ is equivalent to

1) $\frac{1}{3}$ 2) $-\frac{1}{3}$ 3) 3 4) -3

11 The expression $\dfrac{\frac{a}{b}-1}{\frac{a}{b}+1}$ is equivalent to

1) $\dfrac{a+b}{a-b}$ 2) $\dfrac{a-b}{a+b}$ 3) $\dfrac{1}{a-b}$ 4) $\dfrac{1}{a+b}$

12 The fraction $\dfrac{\frac{x}{y}+x}{\frac{1}{y}+1}$ is equivalent to

1) $\dfrac{2xy}{1+y}$ 2) $\dfrac{x^2y}{1+y}$ 3) x 4) $2x$

13 When simplified, the complex fraction $\dfrac{1+\frac{1}{x}}{\frac{1}{x}-x}$, $x \neq 0$, is equivalent to

1) 1 2) -1 3) $\dfrac{1}{1-x}$ 4) $\dfrac{1}{x-1}$

14 Which expression is equivalent to the complex fraction $\dfrac{\frac{1}{a}-a}{\frac{1}{a}+1}$?

1) $+1$ 2) -1 3) $1-a$ 4) $-(1-a)$

15 In simplest form, the expression $\dfrac{\frac{1}{x}-1}{x-\frac{1}{x}}$ is equivalent to

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

16 The complex fraction $\dfrac{x-\frac{1}{3}}{3-\frac{1}{x}}$ is equivalent to

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

17 The expression $\dfrac{\frac{4}{x}-2}{6-\frac{12}{x}}$ is equal to

1) -1 2) $\dfrac{3}{x}$ 3) $-3x$ 4) $-\dfrac{1}{3}$

18 The fraction $\dfrac{b+\frac{b}{a}}{a-\frac{1}{a}}$ is equivalent to

1) b 2) $\dfrac{b}{a-1}$ 3) $\dfrac{2ab}{a^2-1}$ 4) $\dfrac{a-1}{b}$

19 The expression $\dfrac{a+\dfrac{b}{c}}{d-\dfrac{b}{c}}$ is equivalent to

1) $\dfrac{c+1}{d-1}$ 2) $\dfrac{a+b}{d-b}$ 3) $\dfrac{ac+b}{cd-b}$ 4) $\dfrac{ac+1}{cd-1}$

20 The complex fraction $\dfrac{x-y}{\dfrac{1}{y}-\dfrac{1}{x}}$ is equivalent to

1) -1 2) 0 3) $\dfrac{1}{xy}$ 4) xy

21 The fraction $\dfrac{1+\dfrac{1}{x}}{1-\dfrac{1}{x^2}}$ is equivalent to

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

22 The expression $\dfrac{\dfrac{x^2}{y}-y}{\dfrac{x}{y}+1}$ is equivalent to

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

23 Which expression is equivalent to the complex fraction $\dfrac{\dfrac{x}{x+2}}{1-\dfrac{x}{x+2}}$?

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

24 The expression $\dfrac{1-\dfrac{x}{x-y}}{\dfrac{1}{x-y}}$ is equivalent to

1) $1-x$ 2) $1-y$ 3) y 4) $-y$

25 The expression $\dfrac{\dfrac{2x}{x+1}}{1-\dfrac{x}{x+1}}$ is equivalent to

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

26 The simplest form of $\dfrac{1-\dfrac{4}{x}}{1-\dfrac{2}{x}-\dfrac{8}{x^2}}$ is

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

27 When $x^{-1}-1$ is divided by $x-1$, the quotient is

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

28 When $x^{-1}+1$ is divided by $x+1$, the quotient equals

1) 1 2) $\dfrac{1}{x}$ 3) x 4) $-\dfrac{1}{x}$

A.APR.D.7: Complex Fractions 1
Answer Section

1 ANS: 1 REF: 069618siii
2 ANS: 1 REF: 010320siii
3 ANS: 2

$$1 \div \left(\frac{1}{A} + \frac{1}{B}\right) = 1 \div \frac{B+A}{AB} = 1 \cdot \frac{AB}{A+B}$$

REF: 060112b
4 ANS: 4

$$\frac{\frac{3x+y}{xy}}{\frac{2}{xy}} = \frac{3x+y}{xy} \cdot \frac{xy}{2} = \frac{3x+y}{2}$$

REF: 011603a2
5 ANS: 1

$$\left(\frac{1}{3} + \frac{1}{3x}\right) \div \left(\frac{1}{x} + \frac{1}{3}\right) = \frac{3x+3}{9x} \div \frac{x+3}{3x} = \frac{3(x+1)}{9x} \cdot \frac{3x}{x+3} = \frac{x+1}{x+3}$$

REF: 010706b
6 ANS: 2

$$\frac{\frac{x}{4} - \frac{1}{x}}{\frac{1}{2x} + \frac{1}{4}} = \frac{\frac{x^2-4}{4x}}{\frac{2x+4}{8x}} = \frac{(x+2)(x-2)}{4x} \times \frac{8x}{2(x+2)} = x-2$$

REF: fall0920a2
7 ANS: 2

$$\left(\frac{a}{b} - \frac{b}{a}\right) \div \left(\frac{1}{a} + \frac{1}{b}\right) = \frac{a^2-b^2}{ab} \div \frac{a+b}{ab} = \frac{a^2-b^2}{ab} \cdot \frac{ab}{a+b} = \frac{a^2-b^2}{a+b} = \frac{(a+b)(a-b)}{a+b} = a-b$$

REF: 010206b
8 ANS: 2

$$\left(\frac{1}{x^2} - \frac{1}{y^2}\right) \div \left(\frac{1}{y} + \frac{1}{x}\right) = \frac{y^2-x^2}{x^2y^2} \div \frac{x+y}{xy} = \frac{y^2-x^2}{x^2y^2} \cdot \frac{xy}{x+y} = \frac{(y+x)(y-x)}{xy} \cdot \frac{1}{x+y} = \frac{y-x}{xy}$$

REF: 060317b
9 ANS: 1

$$\left(\frac{1}{x} + \frac{1}{y}\right) \div \left(\frac{1}{x^2} - \frac{1}{y^2}\right) = \frac{y+x}{xy} \div \frac{y^2-x^2}{x^2y^2} = \frac{y+x}{xy} \cdot \frac{x^2y^2}{y^2-x^2} = \frac{y+x}{1} \cdot \frac{xy}{(y-x)(y+x)} = \frac{xy}{y-x}$$

REF: 060415b

10 ANS: 2

$$(\frac{1}{3}-\frac{1}{x})\div(\frac{3}{x}-1)=\frac{x-3}{3x}\div\frac{3-x}{x}=\frac{x-3}{3x}\cdot\frac{x}{3-x}=\frac{x-3}{3}\cdot\frac{1}{3-x}=-\frac{1}{3}$$

REF: 060713b

11 ANS: 2 REF: 069818siii

12 ANS: 3

$$(\frac{x}{y}+x)\div(\frac{y+1}{y})=\frac{x+xy}{y}\cdot\frac{y}{y+1}=\frac{x+xy}{y+1}=\frac{x(1+y)}{y+1}=x$$

REF: 010312b

13 ANS: 3

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

REF: 080513b

14 ANS: 3

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

REF: 080706b

15 ANS: 4 REF: 089531siii

16 ANS: 3 REF: 068934siii

17 ANS: 4 REF: 089027siii

18 ANS: 2 REF: 060128siii

19 ANS: 3

$$\frac{a+\frac{b}{c}}{d-\frac{b}{c}}=\frac{\frac{ac+b}{c}}{\frac{cd-b}{c}}=\frac{ac+b}{c}\cdot\frac{c}{cd-b}=\frac{ac+b}{cd-b}$$

REF: 011405a2

20 ANS: 4 REF: 088735siii

21 ANS: 4 REF: 018924siii

22 ANS: 4 REF: 080119siii

23 ANS: 2

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

REF: 080220b

24 ANS: 4

$$\frac{1-\dfrac{x}{x-y}}{\dfrac{1}{x-y}} = (1-\frac{x}{x-y})\cdot(x-y) = (x-y)-x = -y$$

REF: 060919b

25 ANS: 4 REF: 010126siii

26 ANS: 2

$$\frac{1-\dfrac{4}{x}}{1-\dfrac{2}{x}-\dfrac{8}{x^2}} \times \frac{x^2}{x^2} = \frac{x^2-4x}{x^2-2x-8} = \frac{x(x-4)}{(x-4)(x+2)} = \frac{x}{x+2}$$

REF: 061305a2

27 ANS: 2

$$\frac{x^{-1}-1}{x-1} = \frac{\dfrac{1}{x}-1}{x-1} = \frac{\dfrac{1-x}{x}}{x-1} = \frac{\dfrac{-(x-1)}{x}}{x-1} = -\frac{1}{x}$$

REF: 081018a2

28 ANS: 2

$$\frac{x^{-1}+1}{x+1} = \frac{\dfrac{1}{x}+1}{x+1} = \frac{\dfrac{1+x}{x}}{x+1} = \frac{1}{x}$$

REF: 011211a2