

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

- 1) The average speed on a round-trip commute having a one-way distance d is given by the complex rational expression 1) _____

$$\frac{2d}{\frac{d}{r_1} + \frac{d}{r_2}}$$

in which r_1 and r_2 are the speeds on the outgoing and return trips, respectively. Fred and Mischa both drove to campus averaging 45 miles per hour and each returned home on the same route he used going and averaged 30 miles per hour. Fred's one-way route was 5 miles longer than Mischa's. Simplify the complex rational expression and answer the question: How does Fred's overall average speed compare with Mischa's?

- A) Fred's average speed is higher than Mischa's.
 B) Fred's average speed is lower than Mischa's.
 C) Not enough information is given to answer the question.
 D) Fred's average speed is the same as Mischa's.
- 2) Brandon can paint a fence in 12 hours and Elaine can paint the same fence in 11 hours. How long will they take to paint the fence if they work together? 2) _____
- A) $5\frac{13}{24}$ hr B) $5\frac{3}{4}$ hr C) $11\frac{1}{2}$ hr D) $5\frac{17}{23}$ hr

Find all values that make the rational expression undefined. If the rational expression is defined for all real numbers, so state.

- 3) $\frac{x^2 - 16}{x^2 - 10x + 16}$ 3) _____
- A) $x = 0$ B) $x = 4, x = -4$ C) $x = 8, x = 2$ D) $x = -8, x = -2$

Write an equation to describe the variation. Use k for the constant of proportionality.

- 4) x varies jointly as the square of y and the square of z . 4) _____
- A) $xy^2z^2 = k$ B) $x = ky^2z^2$ C) $x = k + y^2 + z^2$ D) $x + y^2 + z^2 = k$

Simplify the complex rational expression.

- 5) $\frac{x + 4 - \frac{32}{x}}{x - 8 + \frac{16}{x}}$ 5) _____
- A) $\frac{x^2 + 4x - 32}{x^2 - 8x + 16}$ B) $\frac{x + 4}{x - 8}$ C) $\frac{x + 8}{x - 4}$ D) $-\frac{1}{2}x - 1$

Solve or simplify, whichever is appropriate.

6) $\frac{x^2 + x}{x^2 + 13x + 42} = 1 + \frac{1}{x + 6}$

6) _____

A) $\frac{2x^2 + 15x + 49}{(x + 6)(x + 7)}$

B) $\{2\sqrt{2}\}$

C) $\left\{-\frac{49}{13}\right\}$

D) $2x^2 + 15x + 49$

Find the missing expression.

7) $\frac{13x + 7}{x + 2} + \frac{?}{x + 2} = \frac{16x + 1}{x + 2}$

7) _____

A) $29x - 6$

B) $29x - 8$

C) $3x + 6$

D) $3x - 6$

Perform the indicated operation(s). Simplify if possible.

8) $\frac{8}{x + 7} - \frac{7}{3x + 21}$

8) _____

A) $\frac{17}{3(x + 7)^2}$

B) $\frac{17}{3(x + 7)}$

C) $\frac{1}{3(x + 7)}$

D) $\frac{-13}{3(x + 7)}$

Find the least common denominator of the rational expressions.

9) $\frac{1}{x^2 + 10x + 25}$ and $\frac{1}{x^2 + 5x}$

9) _____

A) $(x + 5)^2$

B) $x(x + 5)$

C) $x(x + 5)^2$

D) $x(x + 1)(x + 5)$

Solve the rational equation.

10) $7 - \frac{6}{x} = \frac{7x}{x + 6}$

10) _____

A) $\{-1, 1\}$

B) $\{-1\}$

C) $\{0, 1\}$

D) $\{1\}$

If y varies inversely as x, find the inverse variation equation for the situation.

11) $y = 0.8$ when $x = 0.4$

11) _____

A) $y = 2x$

B) $y = 3.125x$

C) $y = \frac{0.32}{x}$

D) $y = \frac{3.125}{x}$

Perform the indicated operation(s). Simplify if possible.

12) $\frac{x}{4x - 3} - \frac{3}{28x - 21}$

12) _____

A) $\frac{7x - 3}{4x - 3}$

B) $\frac{7x - 3}{7(4x - 3)}$

C) $\frac{28x - 84}{7(4x - 3)}$

D) $\frac{x - 3}{7(4x - 3)}$

Solve the equation for the specified variable.

13) $A = \frac{1}{2}h(B + b)$ for B

13) _____

A) $B = 2A - bh$

B) $B = \frac{2A + bh}{h}$

C) $B = \frac{A - bh}{h}$

D) $B = \frac{2A - bh}{h}$

Divide. Simplify if possible.

14) $\frac{x^2 - 5x + xy - 5y}{7x^2 - 7y^2} \div \frac{x - 5}{11x - 11y}$ 14) _____

A) $\frac{(x - 5)^2}{77(x - y)^2}$

B) $\frac{11(x^2 - 5x + xy - 5y)}{7(x + y)(x - 5)}$

C) $\frac{11}{7}$

D) 1

Solve.

15) The ratio of a quarterback's completed passes to attempted passes is 5 to 8. If he attempted 16 passes, find how many passes he completed. Round to the nearest whole number if necessary. 15) _____

A) 8 passes

B) 10 passes

C) 26 passes

D) 2 passes

If y varies directly as x, find the direct variation equation for the situation.

16) $y = 9$ when $x = \frac{1}{3}$ 16) _____

A) $y = x + \frac{26}{3}$

B) $y = \frac{1}{9}x$

C) $y = \frac{1}{27}x$

D) $y = 27x$

Solve the rational equation.

17) $1 + \frac{1}{x} = \frac{56}{x^2}$ 17) _____

A) $\left\{-\frac{1}{8}, \frac{1}{7}\right\}$

B) $\{8, 7\}$

C) $\{8, -7\}$

D) $\{-8, 7\}$

Simplify the rational expression. If the rational expression cannot be simplified, so state.

18) $\frac{y^2 - 14y + 49}{7 - y}$ 18) _____

A) $-y + 7$

B) $-y - 7$

C) $y + 7$

D) $y - 7$

Perform the indicated operation(s). Simplify if possible.

19) $\frac{x}{x^2 - 25} + \frac{5}{x + 5} - \frac{6}{x}$ 19) _____

A) $\frac{25(x - 6)}{(x + 5)(x - 5)}$

B) $\frac{25(x + 6)}{x(x + 5)(x - 5)}$

C) $\frac{-25(x - 6)}{x(x + 5)(x - 5)}$

D) $\frac{6x^2 - 25x + 150}{x(x + 5)(x - 5)}$

Solve.

20) It is recommended that there be at least 19 square feet of work space for every person in a conference room. A certain conference room is 10' by 12'. Find the maximum number of people the room can accommodate. 20) _____

A) 26 people

B) 6 people

C) 16 people

D) 7 people

Perform the indicated operation(s). Simplify if possible.

21) $\frac{14}{x-5} - \frac{3}{x-5}$

21) _____

A) $\frac{17}{x-5}$

B) $\frac{11}{x-5}$

C) $\frac{11}{x}$

D) $\frac{14(x-5)}{3(x-5)}$

Write an equation to describe the variation. Use k for the constant of proportionality.

22) P varies jointly as R and the cube of S.

22) _____

A) $P = kRS^3$

B) $P = k + R + S^3$

C) $P + R + S^3 = k$

D) $PRS^3 = k$

Solve the rational equation.

23) $\frac{x}{5} + \frac{3x}{7} = \frac{x}{35}$

23) _____

A) {21}

B) {105}

C) {35}

D) {0}

Perform the indicated operation(s). Simplify if possible.

24) $\frac{30}{5x} + \frac{81}{9x}$

24) _____

A) $\frac{15}{2x}$

B) $\frac{15}{x^2}$

C) $\frac{675}{45x}$

D) $\frac{15}{x}$

Simplify the complex rational expression.

25)

25) _____

$$\frac{\frac{8}{a} + 8}{\frac{8}{a} - 8}$$

A) $\frac{1+a}{1-a}$

B) $\frac{a^2}{8-a^2}$

C) $\frac{8(1+a)}{1-a}$

D) $8 - a^2$

Add or subtract as indicated. Simplify the result, if possible.

26) $\frac{-2}{x^2-25} - \frac{12}{25-x^2}$

26) _____

A) $-\frac{14}{x^2-25}$

B) $\frac{10}{x^2-25}$

C) $-\frac{10}{x^2-25}$

D) $\frac{14}{x^2-25}$

27) $\frac{2-x}{x-7} - \frac{2x+4}{7-x}$

27) _____

A) $-\frac{x-2}{x-7}$

B) $\frac{x-2}{x-7}$

C) $\frac{x+6}{x-7}$

D) $-\frac{x+6}{x-7}$

28) $\frac{6}{x-4} - \frac{3}{4-x}$

28) _____

A) $\frac{3}{4-x}$

B) $\frac{3}{x-4}$

C) $\frac{9}{x-4}$

D) $-\frac{3}{x-4}$

Solve.

- 29) If the resistance in an electrical circuit is held constant, the amount of current flowing through the circuit is directly proportional to the amount of voltage applied to the circuit. When 3 volts are applied to a circuit, 75 milliamperes of current flow through the circuit. Find the new current if the voltage is increased to 4 volts. 29) _____
- A) 12 milliamperes
B) 125 milliamperes
C) 96 milliamperes
D) 100 milliamperes

Simplify the complex rational expression.

- 30)
$$\frac{\frac{36r^2 - 9s^2}{rs}}{\frac{6}{s} - \frac{3}{r}}$$
 30) _____
- A) $6r + 3s$
B) $3r + 6s$
C) $\frac{rs}{6r + 3s}$
D) $\frac{3r + 6s}{rs}$

Perform the indicated operation(s). Simplify if possible.

- 31)
$$\frac{8}{x^2} - \frac{2}{x}$$
 31) _____
- A) $\frac{8 - 2x}{x^2}$
B) $\frac{8x + 2}{x^2}$
C) $\frac{8 + 2x}{x^2}$
D) $\frac{2x - 8}{x}$

Solve the problem.

- 32) A painter can finish painting a house in 8 hours. Her assistant takes 10 hours to finish the same job. How long would it take for them to complete the job if they were working together? 32) _____
- A) $4\frac{4}{9}$ hr
B) 7 hr
C) 9 hr
D) $\frac{9}{40}$ hr

Answer Key

Testname: RATIONAL EXPRESSIONS AND EQUATIONS

- 1) D
- 2) D
- 3) C
- 4) B
- 5) C
- 6) C
- 7) D
- 8) B
- 9) C
- 10) D
- 11) C
- 12) B
- 13) D
- 14) C
- 15) B
- 16) D
- 17) D
- 18) A
- 19) C
- 20) B
- 21) B
- 22) A
- 23) D
- 24) D
- 25) A
- 26) B
- 27) C
- 28) C
- 29) D
- 30) A
- 31) A
- 32) A