

H Math 3 - Rational Unit REVIEW

Multiple Choice
Identify the choice that best completes the statement or answers the question.

Multiply or divide. State any restrictions on the variables.

1. $\frac{d^2}{d+3} \cdot \frac{d^2+d-6}{d^2-6d}$

- a. $\frac{d-2}{d-6}, d \neq -3, 6$
 b. $\frac{d^2-2d}{d-6}, d \neq -3, 0, 6$
 c. $\frac{d^2-2d}{d-6}, d \neq -3, 6$
 d. $\frac{d-2}{d-6}, d \neq -3, 0, 6$

2. $\frac{a-4}{a+1} + \frac{a-6}{a^2-5a-6}$

- a. $\frac{a-4}{a-6}, a \neq 6, 6$
 b. $\frac{a-4}{a-6}, a \neq -1, 6$
 c. $\frac{a-4}{(a+1)^2(a-6)}, a \neq -1, 6, 6$
 d. $\frac{a-4}{(a+1)^2(a-6)}, a \neq -1, 6$

3. $\frac{3x^2}{2x^2} \cdot \frac{9y^3}{c^4}$

- a. $\frac{27c^4}{d^{11}}, c \neq 0, d \neq 0$
 b. $27c^4d^{11}, c \neq 0, d \neq 0$
 c. $\frac{27}{c^2d}, c \neq 0, d \neq 0$
 d. $\frac{c^2d}{27}, c \neq 0, d \neq 0$

Simplify the complex fraction.

$\frac{\frac{5}{9} \cdot \frac{1}{4y} - \frac{4}{5y} \cdot \frac{1}{4}}{\frac{5}{4} \cdot \frac{1}{4} - \frac{2}{5y} \cdot \frac{1}{4}} = \frac{-\frac{11}{20y}}{\frac{25}{20}} = \frac{-11}{25} \cdot \frac{20y}{25} = \frac{-11}{28}$

- a. $-\frac{1}{2}$
 b. $-\frac{11}{28}$
 c. -2
 d. $-\frac{28}{11}$

5. $\frac{y^2-8}{y^2+7y+12} \cdot \frac{y-8}{y+2} = \frac{y-8}{y+2} \cdot \frac{y-8}{y+2}$

- a. $\frac{(v-8)(v+3)}{(v+2)(v-3)}$
 b. $\frac{(v-8)(v+2)}{(v+4)^2(v+3)}$
 c. $\frac{(v-8)(v+2)}{(v+4)(v+3)}$
 d. $\frac{v-8}{(v+2)(v+3)}$

Add or subtract. Simplify if possible.

6. $\frac{a^2-7a+6}{a^2+3a-4} - \frac{2}{a+4}$

- a. $\frac{a-6}{a+4}$
 b. $\frac{a^2-7a+4}{a^2+3a-4}$
 c. $\frac{a-6}{a+4}$
 d. $a-8$

7. $\frac{t^2+2t-3}{t^2+5t+6} + \frac{t^2+t-2}{t^2+6t-7}$

- a. $\frac{2t^2+3t-5}{2t^2+11t-1}$
 b. $\frac{2t^2+3t-5}{(t+2)(t+7)}$
 c. $\frac{t^2+6t-7}{(t+2)(t+7)}$
 d. $\frac{2t^2+10t-3}{(t+2)(t+7)}$

8. $\frac{6}{p+6} - \frac{p^2-36}{3p-12}$

- a. $\frac{p-6}{(p-6)(p+6)}$
 b. $\frac{p^2+p-42}{9}$
 c. $\frac{9}{(p-6)(p+6)}$
 d. $\frac{3p+6+6}{(p-6)(p+6)}$

9. If R is the total resistance for a parallel circuit with two resistors of resistances r_1 and r_2 , then

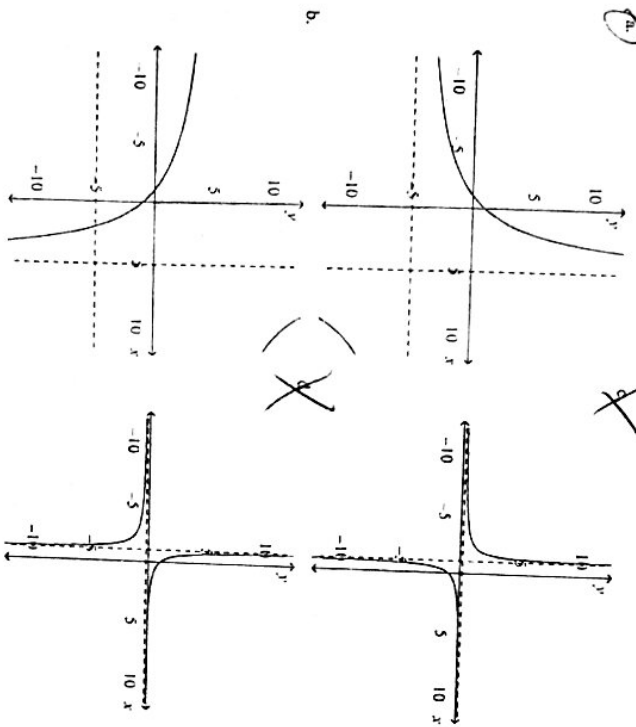
$\frac{1}{R} = \frac{1}{r_1} + \frac{1}{r_2}$. Find the resistance r_1 if the total resistance R is 20 ohms and r_2 is 60 ohms. Round your answer to the nearest ohm if necessary.

- a. 1120 ohms
 b. 15 ohms
 c. 30 ohms
 d. 90 ohms

$3r_1 = 60 + r_1$
 $2r_1 = 60$
 $r_1 = 30$

Sketch the asymptotes and graph the function.

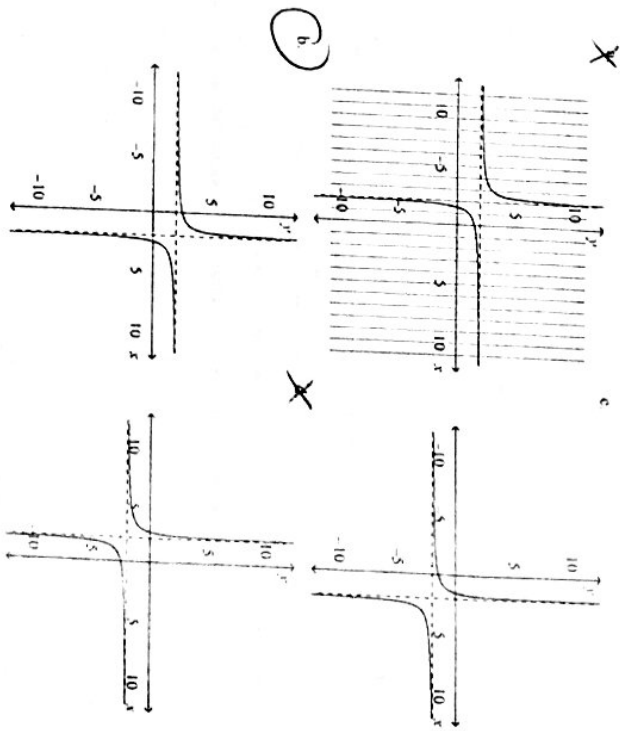
10. $y = \frac{-5x - 5}{x - 5}$



$-4x + 8 = -2x + 2$
 $6 = 2x$
 $x = 3$

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11. $y = \frac{-1}{x-2} + 2$



Solve the equation. Check the solution.

12. $\left(\frac{7}{3x} + \frac{5}{x} = 4\right) 3x$ $7 + 15 = 12x$

13. $\frac{-2}{x-2} = \frac{-4}{x-1}$ $\frac{2x-2}{11} = \frac{2}{6}$

14. $\left(\frac{9}{10} + \frac{2}{x+1} = \frac{2}{5}\right)$ $\frac{22}{9} = 2$

10(x+1) a. -3 b. 3 c. $\frac{9}{2}$ d. 4

$9x + 9 + 20 = 4x + 4$ $9x - 29 = 4x - 29$

$5x = -35$
 $x = -5$

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15. $\frac{y}{y+2} + \frac{7}{y-5} = \frac{14}{y^2-3y-10}$

a. 0 and -2 b. 5 c. -2 d. 8

$(y-5)(y+2)$
 $y^2-3y-10 = (y-5)(y+2)$
 $y^2-5y+7y+14 = 14$
 $y^2+2y = 0$
 $y(y+2) = 0$
 $y = 0$ or $y = -2$

16. Describe the vertical asymptote(s) and point(s) of discontinuity for the graph of $y = \frac{(x+2)(x-5)}{(x-5)(x-1)}$.
- a. asymptote: $x=1$ and point of discontinuity: $x=5$
 b. asymptotes: $x=1$ and $x=5$
 c. asymptote: $x=-1$ and point of discontinuity: $x=-5$
 d. asymptote: $x=2$ and point of discontinuity: $x=1$

Simplify the rational expression. State any restrictions on the variable.

$K = \frac{34}{85 \cdot 24} = \frac{2}{10}$

17. $\frac{m^2+11m+28}{m+4} - \frac{m+4}{m-7}$

a. $m-7, m \neq 4$
 b. $-m+7, m \neq 4$
 c. $m+7, m \neq -4$
 d. $-m-7, m \neq -4$

18. The amount of oil used by a ship traveling at a uniform speed varies jointly with the distance and the square of the speed. The ship uses 34 barrels of oil in traveling 85 miles at 24 mph. How many barrels of oil are used when the ship travels 28 miles at 49 mph? Round your answer to the nearest tenth of a barrel, if necessary.
- a. 3.0 barrels b. 142.9 barrels c. 11.3 barrels d. 47.1 barrels

19. Desjager Dolls, Inc., found that the number N of dolls sold varies directly with their advertising budget A and inversely with the price P of each doll. The company sold 2200 dolls when \$16,000 was spent on advertising and the price of a doll was set at \$70. Determine the number of dolls sold when the amount spent on advertising is increased to \$36,000. Round to the nearest whole number.
- a. 1,090 dolls b. 4,950 dolls c. 2,200 dolls d. 2,453 dolls

20. Write an equation for the translation of $y = \frac{-1}{x}$ that has the asymptotes $x = -2$ and $y = 2$.
- a. $y = \frac{-1}{x+2} + 2$
 b. $y = \frac{-1}{x+2} - 2$
 c. $y = \frac{-1}{x-2} - 2$
 d. $y = \frac{-1}{x-2} + 2$

21. Simplify $\sqrt[3]{135a^{15}b^{15}}$. Assume that all variables are positive.
- a. $3a^5b^5$
 b. $3a^5b^5\sqrt[3]{3a}$
 c. $3a^5b^5\sqrt[3]{5a}$
 d. none of these

$\sqrt[3]{135} = 3\sqrt[3]{5}$
 $\sqrt[3]{135} = 3\sqrt[3]{3 \cdot 3 \cdot 5} = 3 \cdot 3 \cdot \sqrt[3]{5} = 9\sqrt[3]{5}$
 $a^{15} = (a^3)^5$
 $b^{15} = (b^3)^5$

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22. Find the horizontal asymptote of the graph of $y = \frac{6x^2+6x+7}{-2x^2+9x+7}$.
- a. no horizontal asymptote
 b. $y=0$
 c. $y = -\frac{6}{7}$
 d. $y=1$

23. Find the inverse of $y = 7x - 1$. $x = 7y - 1$
- a. $f^{-1}(x) = 7x + 1$
 b. $f^{-1}(x) = \frac{1}{7}x - \frac{1}{7}$
 c. $f^{-1}(x) = \frac{1}{7}x + \frac{1}{7}$
 d. $f^{-1}(x) = 7x - 1$

Solve #25 and #26. Check for extraneous solutions.

24. $\sqrt{x+10} - 8 = 2$

a. 0 b. 90 c. 100 d. 110

25. $2x = \sqrt{18 - 6x}$

a. $\frac{1}{2}$ and -3 b. -3 c. $\frac{1}{2}$ d. $\frac{1}{2}$

26. Find the least common multiple of $x^2 - 10x + 24$ and $x^2 - 8x + 12$.
- a. $(x+4)(x+6)(x+2)$
 b. $(x-4)(x+2)(x-6)$
 c. $(x-6)(x-2)(x+4)$
 d. $(x-4)(x-6)(x-2)$

27. A drama club is planning a bus trip to New York City to see a Broadway play. The cost per person for the bus rental varies inversely as the number of people going on the trip. If it will cost \$29 per person if 62 people go on the trip, how much will it cost per person if 71 people go on the trip? Round your answer to the nearest cent, if necessary.
- a. \$24.63 b. \$1,798.00 c. \$75.32 d. \$33.21

$(x-6)(x-4) = (x-6)(x-2)$

$C = \frac{k}{P}$
 $C = \frac{29(62)}{71}$

$29 = \frac{k}{62}$
 $k = 29(62)$