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Unit 11 - Rational Expressions and Functions Test

Simplify the following rational expressions.

1. $\dfrac{3xy+9y^2}{12y}$

2. $\dfrac{15a+20b}{6a+8b}$

3. $\dfrac{9x^2-81}{4x+12}$

4. $\dfrac{x^2+3x-4}{x^2-16}$

Perform the indicated operation for the following rational expressions.

5. $\dfrac{5xy^2}{14x^2y}\times\dfrac{28x^2}{10y^2}$

6. $\dfrac{3x+6y}{10xy}\times\dfrac{20y}{10x^2+20xy}$

7. $\dfrac{5a+10ab}{x^2-1}\div\dfrac{1+2b}{x+1}$

8 $\dfrac{6a-3}{5b-5}\div\dfrac{12a-6}{b-1}$

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Unit 11 - Rational Expressions and Functions Test

9. $\frac{3x+1}{x-1}-\frac{2x}{x-1}$

10. $\frac{3a-6}{6}-\frac{5a}{4}$

11. $3x+4+\frac{2x+3}{6}$

12. $\frac{3}{a-b}+\frac{2}{a+b}$

Divide the following polynomials.

13. $3x^3+4x^2-9x \ \ by\ x$

14. $a^5+2a^4-3a^3+4a-5 \ \ by\ a+1$

Find the unknown value of the following rational expressions.

15. $\frac{3}{x+1}+\frac{1}{x+1}=5$

16. $\frac{5z-1}{3}-\frac{2z+4}{6}=8$

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Unit 11 - Rational Expressions and Functions Test

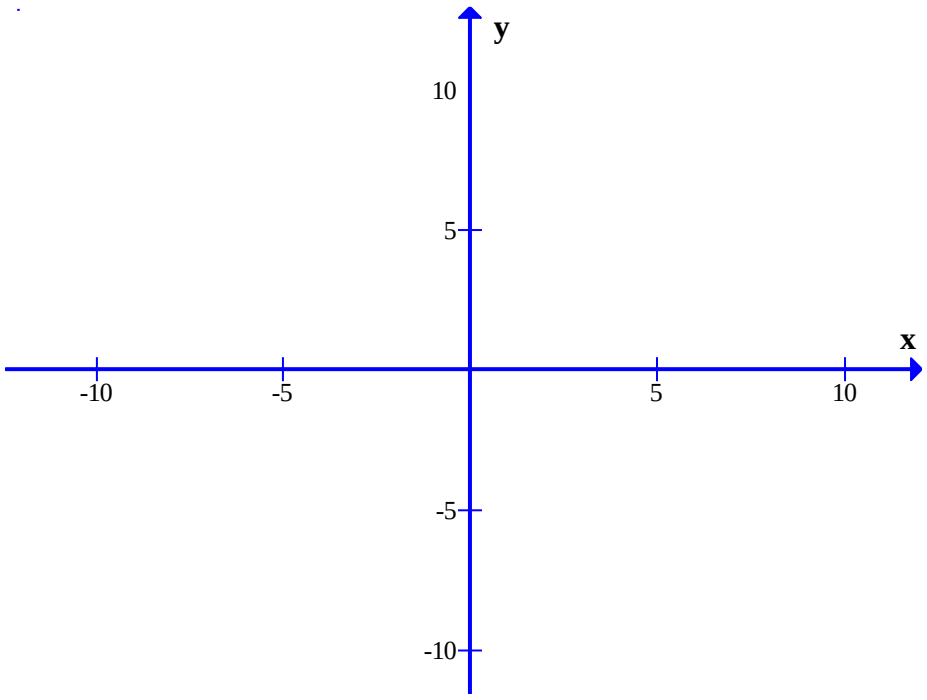
Solve problems involving inverse variation.

17. If 15 carpenters can build a house in 20 days, how long will it take 20 carpenters to do the same work, provided it can be done as efficient by 15 as by 20?

18. A train can travel point A to point B in 5 minutes at the speed of 100 kilometer per hour, how long will it take the slower train to travel the same distance with a speed of 60 kilometers per hour?

19. Find the x and y intercept of $y = \frac{4x+9}{2x-2}$.

20. Draw the Graph of $y = \frac{4x+9}{2x-2}$.



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Unit 11 - Rational Expressions and Functions Test

ANSWER

Simplify the following rational expressions.

1. $\dfrac{3xy+9y^2}{12y}$

Solution:

$$=\frac{3y(x+3y)}{12y}=\frac{x+3y}{4}$$

2. $\dfrac{15a+20b}{6a+8b}$

Solution:

$$=\frac{5(3a+4b)}{2(3a+4b)}=\frac{5}{2}$$

3. $\dfrac{9x^2-81}{4x+12}$

Solution:

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

4. $\dfrac{x^2+3x-4}{x^2-16}$

Solution:

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

Perform the indicated operation for the following rational expressions.

5. $\dfrac{5xy^2}{14x^2y}\times\dfrac{28x^2}{10y^2}$

Solution:

$$\frac{5x\,\cancel{y^2}}{14\cancel{x^2}\,y}\times\frac{28\cancel{x^2}}{10\,\cancel{y^2}}=\frac{2x}{2y}$$

6. $\dfrac{3x+6y}{10xy}\times\dfrac{20y}{10x^2+20xy}$

Solution:

$$\frac{3\cancel{(x+2y)}}{\cancel{10}\,x\,\cancel{y}}\times\frac{2\,\cancel{(10y)}}{10x\,\cancel{(x+2y)}}=\frac{6}{5x^2}$$

7. $\dfrac{5a+10ab}{x^2-1}\div\dfrac{1+2b}{x+1}$

Solution:

$$=\frac{5a\,\cancel{(1+2b)}}{\cancel{(x+1)}\,(x-1)}\times\frac{\cancel{x+1}}{\cancel{1+2b}}=\frac{5a}{x-1}$$

8 $\dfrac{6a-3}{5b-5}\div\dfrac{12a-6}{b-1}$

Solution:

$$\frac{3\,\cancel{(2a-1)}}{5\,\cancel{(b-1)}}\times\frac{\cancel{b-1}}{6\,\cancel{(2a-1)}}=\frac{3}{30}=\frac{1}{10}$$

9. $\dfrac{3x+1}{x-1}-\dfrac{2x}{x-1}$

Solution:

$$\frac{3x+1-2x}{x-1}=\frac{x+1}{x-1}$$

10. $\dfrac{3a-6}{6}-\dfrac{5a}{4}$

Solution:

$$\frac{(3a-6)(4)-(5a)(6)}{12}=\frac{12a-24-30a}{12}$$

$$=\frac{-18a-24}{12}=\frac{-6(3a+8)}{12}=-\frac{3a+8}{12}$$

11. $3x+4+\dfrac{2x+3}{6}$

Solution:

$$=6(3x+4)+6\left(\frac{2x+3}{6}\right)$$

$$=18x+24+2x+3$$

$$=20x+27$$

12. $\dfrac{3}{a-b}+\dfrac{2}{a+b}$

Solution:

$$\frac{3(a+b)+2(a-b)}{a^2-b^2}=\frac{3a+3b+2a-2b}{a^2-b^2}=\frac{5a-b}{a^2-b^2}$$

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Unit 11 - Rational Expressions and Functions Test

Divide the following polynomials.

13. $3x^3+4x^2-9x \;\; by \; x$

Solution:

$$=\frac{3x^3+4x^2-9x}{x}=3x^2+4x-9$$

14. $a^5+2a^4-3a^3+4a-5 \;\; by \; a+1$

Solution:

$$\begin{array}{cccccc|c} a^5 & a^4 & a^3 & a^2 & a & c & \\ 1 & 2 & -3 & 0 & 4 & -5 & \underline{-1} \\ & -1 & -1 & 4 & -4 & 0 & \\ \hline 1 & 1 & -4 & 4 & 0 & -5 & \end{array}$$

$$a^4+a^3-4a^2+4a-\frac{5}{a+1}$$

Find the unknown value of the following rational expressions.

15. $\frac{3}{x+1}+\frac{1}{x+1}=5$

Solution:

$$4=5(x+1)$$

$$4=5x+5$$

$$x=-\frac{1}{5}$$

16. $\frac{5z-1}{3}-\frac{2z+4}{6}=8$

Solution:

$$6\left(\frac{5z-1}{3}\right)-6\left(\frac{2z+4}{6}\right)=8(6)$$

$$10z-2-2z-4=48$$

$$8z=54$$

$$z=\frac{27}{4}$$

Solve problems involving inverse variation.

17. If 15 carpenter can build a house in 20 days, how long will it take 20 carpenters to do the same work, provided it can be done as efficient by 15 as by 20?

Solution:

Carpenters	Days
15	20
20	?

$$20=\frac{k}{15} \qquad k=300$$

$$d=\frac{300}{20}=15 \;\; days$$

18. A train can travel point A to point B in 5 minutes at the speed of 100 kilometer per hour, How long will it take the slower train to travel the same distance with a speed of 60 kilometers per hour?

Solution:

Speed	Time
100	5
60	?

$$5=\frac{k}{100} \qquad k=500$$

$$t=\frac{500}{60}8.33$$ **8 minutes 20 seconds**

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Unit 11 - Rational Expressions and Functions Test

19. Find the x and y intercept of $y=\frac{4x+9}{2x-2}$.

Solution:

Y-Intercept

$$y=\frac{4(0)+9}{2(0)-2}=-\frac{9}{2}$$

X-Intercept

$$4x+9=0$$

$$4x=9$$

$$x=\frac{9}{4}$$

20. Draw the Graph of $y=\frac{4x+9}{2x-2}$.

Vertical intercept: $2x-2=0 \qquad x=1$

Horizontal intercept: $y=\frac{a}{b}=\frac{4}{2}=2$

f(x)=(4x+9)/(2x-2)