Show all work on your own paper.

1. If y varies inversely as the square root of x, and $y = 4$ when $x = 9$, find y when $x = 4$.

2. If y varies jointly with r and s^2 and inversely as t, and $y = 90$ when $r = 5$, $s = 3$, and $t = 2$, find r when $y = 80$, $s = 2$, and $t = 6$.

3. The lateral area (L) of a pyramid varies jointly as the perimeter (p) of its base and slant height (s). If the lateral area of a pyramid is 60 cm^2 when the base perimeter is 20 cm and the slant height is 6 cm, find the slant height when the lateral area is 10 cm^2 and the base perimeter is 5 cm. (more Geometry memories…)

Simplify completely.

4. $\dfrac{1 - 4x^{2n}}{4x^{2n} - 4x^n + 1}$

5. $\dfrac{x^3 + x^2 - y^3 - y^2}{x^2 - 2xy + y^2}$

6. $\dfrac{x^2 y^3 - 3xy^3}{x^3 - 2x^2} \cdot \dfrac{(x-2)^2}{xy^3 - 2y^3}$

7. $\dfrac{6x^2 - 32x + 10}{3x - 15} \div \dfrac{3x^3 + 11x^2 - 4x}{2x^2 - 32}$

8. $\left(\dfrac{1}{x^2 - xy + y^2} \right)\left(x^2 y^{-1} + y^2 x^{-1} \right)\left(\dfrac{1}{x^2} - \dfrac{1}{y^2} \right)^{-1}$

9. $\dfrac{1}{x} + \dfrac{4}{x^2 - 4} - \dfrac{2}{x^2 - 2x}$

10. $\dfrac{3x}{x^2 + 3x + 2} - \dfrac{3x + 6}{x^2 + 4x + 4}$

11. $\dfrac{5}{2x^2 + 3x - 2} - \dfrac{3}{x^2 - 4} + \dfrac{3}{2x^2 - 5x + 2}$

12. $\dfrac{\dfrac{1}{3x^2} - \dfrac{25}{3y^2}}{\dfrac{1}{x^2 y} + \dfrac{5}{xy^2}}$

13. $\dfrac{\dfrac{x + y}{x - y} + 1}{\dfrac{xy}{x^2 - y^2} + \dfrac{x}{x + y}}$

14. $\dfrac{1}{x - \dfrac{1}{x + \dfrac{1}{x - \dfrac{1}{x}}}}$

Solve for x.

15. $\dfrac{x}{x - 5} = \dfrac{2x + 7}{x - 1}$

16. $\dfrac{2x^2 + 15}{x^3 + 1} - \dfrac{6}{x^2 - x + 1} = \dfrac{5}{x + 1}$

17. $\dfrac{1}{2x^2 - 3x + 1} + \dfrac{1}{2x + 1} + \dfrac{4}{4x^2 - 1} = 0$

Graph. Locate 3 points per branch and show asymptotes. State the domain and range.

18. $y = \dfrac{-3}{x} + 2$

19. $y = \dfrac{4}{x-2} + 3$

20. $y = \dfrac{6}{2x+1} - 2$

Write and solve an equation for each problem.

21. John paddled his kayak 10 km upstream against a 3 km/hr current and back to his starting point in $3\frac{1}{2}$ hours. Find his paddling rate in still water.

22. Machine A can fill a grain storage bin in half the time it takes machine B. Working together, it takes the two machines 4 hours to fill the bin. Working alone, how long does machine B take to fill the bin?

23. Dan starts a business manufacturing golf balls, spending $42,000 on supplies and equipment. Dan also spends $12 per dozen on manufacturing. How many dozens of golf balls must be produced to reach an average total cost per dozen of $15?

24. Mike's current point total in his college math class is 330 out of 370 total points. How many points must Mike score on the next 50-point test so that his average will be 90%?

25. The sum of a number and five times its reciprocal is $10\frac{1}{2}$. Find the number.

26. A car's braking distance (d) in feet can be modeled by the formula $d = s + \dfrac{s^2}{20}$, where s is the speed at which the car is travelling, in miles per hour. Find the speed that results in a braking distance of 75 feet. (No tailgating!)

ΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩΩ ΩΩΩΩΩΩΩΩΩΩΩΩΩΩ

Answers:
1. 6
2. 30
3. 4
4. $\dfrac{-\left(1+2x^n\right)}{2x^n - 1}$
5. $\dfrac{x^2 + xy + y^2 + x + y}{x - y}$
6. $\dfrac{x-3}{x}$
7. $\dfrac{4(x-4)}{3x}$
8. $\dfrac{xy}{y-x}$
9. $\dfrac{x+4}{x(x+2)}$
10. $\dfrac{-3}{(x+2)(x+1)}$

11. $\dfrac{1}{(x=2)(x-2)}$
12. $\dfrac{y-5x}{3}$
13. $\dfrac{2(x+y)}{x}$
14. $\dfrac{x^3}{x^4 - x^2 + 1}$
15. 7, -5
16. $\dfrac{-4}{3}$
17. -2
18. D: $x \neq 0$, R: $y \neq 2$
19. D: $x \neq 2$, R: $y \neq 3$
20. D: $x \neq \dfrac{-1}{2}$, R: $y \neq$ -2
21. 7 km/hr
22. 12 hrs
23. 14,000 dozens

24. 48 pts
25. $\dfrac{1}{2}$, 10
26. 30 mph