



\_\_\_\_\_ 5. Simplify this expression:

$$\frac{5b^6}{6} \div \frac{7b^3}{4}$$

A.  $\frac{35b^3}{24}, b \neq 0$

B.  $\frac{10b^3}{21}, b \neq 0$

C.  $\frac{10b^9}{21}, b \neq 0$

D.  $\frac{35b^9}{24}, b \neq 0$

\_\_\_\_\_ 6. Simplify this expression:

$$\frac{5(n+8)}{7} \cdot \frac{7}{9(n+8)}$$

A.  $\frac{5}{9}, n \neq -8$

B.  $\frac{5(n+8)^2}{9}$

C.  $\frac{5(n+8)}{9(n+8)}, n \neq -8$

D.  $\frac{5}{9}$

\_\_\_\_\_ 7. Simplify.

$$\frac{6}{p} + \frac{8}{3}$$

A.  $\frac{14}{3p}, p \neq 0$

B.  $\frac{8p+18}{p+3}, p \neq -3$

C.  $\frac{14}{p+3}, p \neq -3$

D.  $\frac{8p+18}{3p}, p \neq 0$

\_\_\_\_\_ 8. Simplify.

$$\frac{8}{7x} - \frac{7}{3x}$$

A.  $\frac{1}{4x}, x \neq 0$

B.  $\frac{-25}{21x}, x \neq 0$

C.  $\frac{1}{21x}, x \neq 0$

D.  $\frac{1}{4}, x \neq 0$

\_\_\_\_\_ 9. Simplify.

$$\frac{5x-2}{3x} - \frac{x-5}{x^2}$$

A.  $\frac{4x+3}{3x^2}, x \neq 0$

B.  $\frac{4x-7}{3x-x^2}, x \neq 0, x \neq 3$

C.  $\frac{5(x^2-x+3)}{3x^2}, x \neq 0$

D.  $\frac{5(x^2-x+3)}{3x-x^2}, x \neq 0, x \neq 3$

\_\_\_\_\_ 10. Simplify.

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

A.  $\frac{17x^2+5}{4x}, x \neq 0$

B.  $\frac{-3x^2+5x+2}{-3x}, x \neq 0$

C.  $\frac{17x^2+5}{4x^2}, x \neq 0$

D.  $\frac{-3x^2+5x+2}{4x}, x \neq 0$

\_\_\_\_\_ 11. Simplify.

$$\frac{3-2y}{2y^3} - \frac{3-y}{6y^2}$$

A.  $\frac{-3y}{6y^3}, y \neq 0$

B.  $\frac{y^2-9y+9}{6y^3}, y \neq 0$

C.  $\frac{y^2-3y+3}{2y^3}, y \neq 0$

D.  $\frac{-y}{6y^3}, y \neq 0$

\_\_\_\_\_ 12. Simplify.

$$\frac{3z}{z+3} - \frac{6z}{z+3}$$

A.  $\frac{-3}{z+3}, z \neq -3$

B.  $\frac{-3z}{z+3}, z \neq -3$

C.  $\frac{-3z}{z+3}, z \neq 0$

D. none of the above

\_\_\_\_\_ 13. Simplify.

$$\frac{6}{x+4} - \frac{5}{(x+4)^2}$$

A.  $\frac{6x+19}{x+4}, x \neq -4$

B.  $\frac{1}{x+4}, x \neq -4$

C.  $\frac{1}{(x+4)^2}, x \neq -4$

D.  $\frac{6x+19}{(x+4)^2}, x \neq -4$

\_\_\_\_\_ 14. Simplify.

$$\frac{m+2}{m+6} + \frac{m-1}{m+4}$$

A.  $\frac{m+1}{m+10}, m \neq -6, m \neq -4, m \neq -10$

B.  $\frac{m+1}{(m+6)(m+4)}, m \neq -6, m \neq -4$

C.  $\frac{2m^2+11m+2}{(m+6)(m+4)}, m \neq -6, m \neq -4$

D.  $\frac{2m^2+11m+2}{m+10}, m \neq -6, m \neq -4, m \neq -10$

\_\_\_\_\_ 15. Solve.

$$\frac{2x-7}{x^2} = \frac{1}{7}$$

A.  $x = 7$

B.  $x = -14$

C.  $x = 7$  or  $x = -7$

D. no solution

\_\_\_\_\_ 16. Solve.

$$\frac{m}{m^2+6m+8} = \frac{1}{m^2-4}$$

A.  $a = -4$  or  $a = -2$

B.  $a = 4$  or  $a = -1$

C.  $a = -4$  or  $a = 1$

D.  $a = 4$  or  $a = 2$

\_\_\_\_\_ 17. Solve.

$$\frac{4}{n-3} = \frac{n-3}{n}$$

A.  $n = -1$  or  $n = 9$

B.  $n = 1$  or  $n = -9$

C.  $n = 1$  or  $n = 9$

D. no solution



**Short Answer**

23. Simplify this rational expression. State the non-permissible values of the variable.

$$\frac{10x^2 - 25x + 15}{90 - 40x^2}$$

24. Write this rational expression in simplest form. State the non-permissible values of  $x$ .

$$\frac{x^4 - 625y^4}{5x^2 + 21xy - 20y^2}$$

25. Simplify this expression:

$$\frac{-m^2p^5}{4mp^3} \cdot \frac{-10mp^3}{3m^5p}$$

26. Simplify this expression:

$$\frac{a + 2b}{a - 5b} \div \frac{a^2 - 4b^2}{a^2 - 25b^2}$$

27. Simplify this expression:

$$\frac{12m^2 - 2m - 2}{5m^2 - 2m - 3} \cdot \frac{20m^2 + 25m + 5}{20m^2 + 10m - 10}$$

28. Simplify this expression:

$$\frac{9x^2 - 4xy - 5y^2}{81x^2 - 25y^2} \cdot \frac{3y - 4x}{x^2 - y^2} \div \frac{3y - 4x}{6y + 6x}$$

29. Simplify.

$$\frac{4}{3x^2y^5} + \frac{5}{4x^5y^2}$$

30. Simplify.

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

31. Simplify.

$$d^2 + \frac{5}{2d} - \frac{5}{m}$$

32. Solve.

$$\frac{4}{3y} - \frac{5}{4y} = \frac{4}{3}$$

33. A liquid fertilizer requires dilution before use. How much liquid fertilizer must be added to 540 mL of water to make a 40% fertilizer solution?

34. Diluted acetic acid can be used as an environmentally friendly cleaning solution. What volume of acetic acid, in litres, should be added to 360 mL of water to make a 4% acetic acid solution?

**Problem**

35. Write this rational expression in simplest form. State the non-permissible values of the variable. Show your work.

$$\frac{x^4 - 34x^2 + 225}{4x^4 - 8x^3 - 60x^2}$$

36. Simplify this expression and state the non-permissible values. Show your work.

$$\frac{1 - \frac{9}{m^2}}{1 - \frac{3}{m}}$$

37. Write two equivalent forms of this rational expression. Describe your strategy.

$$\frac{-3(x+5)(x-9)}{2x(x-9)(x+1)}, x \neq 0, x \neq 9, x \neq -1$$

38. Determine the sum of the first five terms of this series:

$$\frac{1}{2b^2} + \frac{2}{3b^4} - \frac{3}{4b^6} + \frac{4}{5b^8} - \frac{5}{6b^{10}} + \dots$$

Describe your strategy.

39. Write  $\frac{x^2 + 7x - 10}{2x^2 - 50}$  as the sum or difference of two rational expressions with different denominators. Show your work.

40. A natural number,  $N$ , is 4 less than another natural number,  $M$ . The sum of the reciprocals of  $M$  and  $N$  is 5 times the reciprocal of twice the value of  $M$ . What are the two numbers? Describe your strategy.

41. A cyclist rode from town A to town B and back, a distance of about 4 km each way. On the trip out, there was a 6-km/h tailwind. On the return trip, there was a 7-km/h headwind. The total riding time was 3 h. To the nearest tenth of a kilometre per hour, what is the cyclist's average speed when there is no wind? Explain your solution.