

INTERMEDIATE ALGEBRA EXAM 2 T* NAME _____

SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER. Circle answers.
TURN IN ALL WORKSHEETS. CALCULATORS ARE PERMITTED ON THIS TEST.

$$x^3 - y^3 = (x - y)(x^2 + xy + y^2)$$

$$x^3 + y^3 = (x + y)(x^2 - xy + y^2)$$

In 1 - 6, factor completely:

1. $x^2 - 49x$

2. $8p^3 - 27q^3$

3. $(2x - y)^2 - 7(2x - y) + 12$

4. $x^3 - 3x^2 - 9x + 27$

5. $5x^2 + 3x - 8$

6. $(x + 3y)^2 - 25$

In 7-8, solve for x :

7. $x^2 + 5x = 14$

8. $(x - 3)(x - 2) = 12$

In 9 - 12, perform the indicated operations (add, subtract, multiply, or divide.)
REDUCE ALL FRACTIONS COMPLETELY!

9. $\frac{x^2 - 10x + 25}{x^3 - 125}$

10. $\frac{x^2 - x}{x^2 - x - 12} \div \frac{1 - x^2}{x^2 - 3x - 4}$

INTERMEDIATE ALGEBRA EXAM 2 T* NAME _____

11. $\frac{5}{6x^3y} + \frac{3}{10xy^2}$

12. $\frac{x}{2x^2 - 5x + 2} - \frac{5}{2x^2 + 5x - 3}$

13. $\frac{9}{x^2 - 6x + 9} - \frac{3}{x^2 - 9}$

In 14 - 16, solve for x:

14. $A = \frac{x}{x+y}$

15. $\frac{x}{x-4} = \frac{-6}{x+4}$

16. $\frac{x}{x-5} + \frac{3}{x-2} = \frac{15}{(x-5)(x-2)}$

In 17 - 18, divide:

17. $\frac{10x^3 - 20x^2 + 5}{10x^2}$

18. $\frac{x^3 - 2x^2 - 10x + 4}{x+3}$

INTERMEDIATE ALGEBRA EXAM 2 T* NAME _____

19. The illumination (I) from a light varies inversely as the square of the distance (d) from the light source. If the illumination is 4 units when the distance is 10 feet, find the value of k. Find the illumination I when distance is 5 feet.

In 20 - 23, simplify the complex fractions:

20.
$$\frac{1 - \frac{2}{x}}{x - \frac{4}{x}}$$

21.
$$\frac{1 - \frac{2}{x-2}}{1 + \frac{2}{x+2}}$$

22. $(y^{-1} - x^{-1})^{-1}$

23.
$$\frac{2x^{-1} - (3x)^{-1}}{1 - (3x)^{-2}}$$

INTERMEDIATE ALG. EXAM 2 T* Solutions

1. $x^2 - 49x$
 $x(x-49)$

2. $8p^3 - 27q^3$
 $(2p-3q)(4p^2+6pq+9q^2)$

3. $(2x-y)^2 - 7(2x-y) + 12$
 $[2x-y-3][2x-y-4]$
 $(2x-y-3)(2x-y-4)$

4. $x^3 - 3x^2 - 9x + 27$
 $x^2(x-3) - 9(x-3)$
 $(x-3)(x^2-9)$
 $(x-3)(x-3)(x+3)$
 $(x-3)^2(x+3)$

5. $5x^2 + 3x - 8$
 $(5x+8)(x-1)$

6. $(x+3y)^2 - 25$
 $[x+3y-5][x+3y+5]$
 $(x+3y-5)(x+3y+5)$

7. $x^2 + 5x = 14$
 $x^2 + 5x - 14 = 0$
 $(x+7)(x-2) = 0$
 $x = -7 \quad x = 2$

8. $(x-3)(x-2) = 12$
 $x^2 - 5x + 6 = 12 = 0$
 $x^2 - 5x - 6 = 0$
 $(x-6)(x+1) = 0$
 $x = 6 \quad x = -1$

9. $\frac{x^2 - 10x + 25}{x^2 - 125}$
 $\frac{(x-5)(x-5)}{(x-5)(x^2+5x+25)}$
 $\frac{x-5}{x^2+5x+25}$

10. $\frac{x^2 - x}{x^2 - 12} \div \frac{1-x^2}{x^2 - 3x - 4}$
 $\frac{x(x-1)}{(x-4)(x+3)} \cdot \frac{(x-4)(x+1)}{(1-x)(1+x)}$
 $\frac{-x}{x+3}$

11. $\frac{5}{6x^3y} + \frac{3}{10xy^2}$ LCD = $30x^3y^2$
 $\frac{5 \cdot 5y}{6x^3y \cdot 5y} + \frac{3 \cdot 3x^2}{10xy^2 \cdot 3x^2}$
 $\frac{25y + 9x^2}{30x^3y^2}$

12. $\frac{x}{(2x-1)(x-2)} - \frac{5}{(2x-1)(x+3)}$
 $\frac{x(x+3)}{(2x-1)(x-2)(x+3)} - \frac{5(x-2)}{(2x-1)(x+3)(x-2)}$
 $\frac{x^2+3x-5x+10}{(2x-1)(x-2)(x+3)}$
 $\frac{x^2-2x+10}{(2x-1)(x-2)(x+3)}$

13. $\frac{9}{(x-3)^2} - \frac{3}{(x-3)(x+3)}$
 $\frac{9(x+3)}{(x-3)^2(x+3)} - \frac{3(x-3)}{(x-3)(x+3)(x-3)}$
 $\frac{9x+27-3x+9}{(x-3)^2(x+3)}$
 $\frac{6x+36}{(x-3)^2(x+3)}$

14. $A = \frac{x}{x+y}$
 $AX + AY = X$
 $AX - X = -AY$
 $X(A-1) = -AY$
 $x = \frac{-AY}{A-1}$ or $\frac{AY}{1-A}$

15. $\frac{x}{x-4} = \frac{-6}{x+4}$
 $x^2 + 4x = -6x + 24$
 $x^2 + 10x - 24 = 0$
 $(x+12)(x-2) = 0$
 $x = -12 \quad x = 2$

16. $\frac{x}{x+5} + \frac{3}{x+2} = \frac{15}{(x-3)(x+2)}$
 $x^2 - 2x + 3x - 15 = 15$
 $x^2 + x - 30 = 0$
 $(x+6)(x-5) = 0$
 $x = -6 \quad x = 5$

17. $\frac{10x^3}{10x^2} - \frac{20x^2}{10x^2} + \frac{5}{10x^2}$
 $= x - 2 + \frac{1}{2x^2}$

18. $\frac{x^3 - 2x^2 - 10x + 4}{x+3}$
 $\begin{array}{r} x^3 - 2x^2 - 10x + 4 \\ - (x^3 + 3x^2) \\ \hline -5x^2 - 10x + 4 \\ - (-5x^2 - 15x - 15) \\ \hline 5x + 19 \end{array}$
 $x^2 - 5x + 5 - \frac{11}{x+3}$

19. $I = \frac{k}{d^2} \rightarrow I = \frac{400}{d^2}$
 $\frac{4}{1} = \frac{k}{10^2}$
 $k = 400$
 $I = \frac{400}{25} = 16$

20. $\frac{x(1-\frac{2}{x})}{x(x-\frac{4}{x})}$
 $= \frac{x-2}{x^2-4}$
 $= \frac{x-2}{(x-2)(x+2)}$
 $= \frac{1}{x+2}$

21. $1 + \frac{2}{x-2} = (1 + \frac{2}{x-2}) \div (1 - \frac{2}{x+2})$
 $1 - \frac{2}{x+2} = \frac{x-2+2}{x+2} = \frac{x}{x+2}$
 $= \frac{x}{x-2} \cdot \frac{x+2}{x}$
 $= \frac{x+2}{x-2}$

22. $(\frac{1}{y} - x^{-1})^{-1}$
 $= (\frac{1}{y} - \frac{1}{x})^{-1}$
 $= (\frac{x-y}{xy})^{-1} = \frac{xy}{x-y}$

23. $\frac{3x^{-1} - (3x)^{-1}}{1 - (3x)^{-2}} = \frac{\frac{3}{x} - \frac{1}{3x}}{1 - \frac{1}{9x^2}}$
 $(\frac{3}{x} - \frac{1}{3x}) \div (1 - \frac{1}{9x^2})$
 $\frac{3x}{3x} \div \frac{9x^2}{9x^2} = \frac{24x}{9x^2-1}$