INTERMEDIATE ALGEBRA EXAM 2 X* 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. $x^3 - 16x$ **2.** $16x^3 + 250y^3$ **3.** $(2x - y)^2 - 5(2x - y) - 24$

4. $x^3 + 4x^2 - 9x - 36$ **5.** $9a^3b - 9a^2b$ **6.** $8x^2 - 13x - 6$

In 7 – 9, solve for *x*:

7. $x^2 + 5x = 0$ **8.** $x(x - 4) = 5$ **9.** $(x - 3)(x + 3) = 8x$

In 10 – 14, perform the indicated operations (add, subtract, multiply, or divide.)
REDUCE ALL FRACTIONS COMPLETELY!

10. $\dfrac{x^3 - 2x^2 - 2xy + 4y}{x^3 - 8}$ **11.** $\dfrac{4 - x^2}{12x^3y^4} \div \dfrac{x^2 - 2x - 8}{4xy^2}$

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12. $\dfrac{7}{12x^3y} - \dfrac{2}{15xy^4}$

13. $\dfrac{2x}{x^2-6x+9} - \dfrac{5}{x^2-8x+15}$

14. $\dfrac{x}{x^3+27} + \dfrac{9}{x^2-9}$

In 15 – 18, solve for *x*:

15. $\dfrac{4}{x} = \dfrac{x-8}{5}$

16. $\dfrac{4}{x-4} = \dfrac{-2}{x-4}$

17. $\dfrac{1}{F} = \dfrac{1}{x} + \dfrac{1}{U}$

18. $\dfrac{x}{x-5} + \dfrac{3}{x-2} = \dfrac{15}{(x-5)(x-2)}$

In 19 – 20, divide:

19. $\dfrac{20x^3-10x^2+5x}{10x^2}$

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

21. **The time (t) that it takes to arrive at a destination varies inversely as velocity (v) traveled. If the time is 20 minutes when the velocity is 10, write an equation and find the value of k. Find the time when velocity is 2.**

In 22 - 25, simplify the complex fractions:

22. $\dfrac{2 - \frac{1}{x}}{x - \frac{1}{2}}$

23. $\dfrac{1 - \frac{2}{x-2}}{1 + \frac{2}{x-2}}$

24. $(4x^{-1} - 4y^{-1})^{-1}$

25. $\dfrac{(2x)^{-2} - 2^{-2}}{2x^{-2} - 2^{-2}}$

Intermediate Algebra Exam 2x* Solutions

1. x^3-16x

$x(x^2-16)$

$\boxed{x(x-4)(x+4)}$

2. $16x^3+250y^3$

$2(8x^3+125y^3)$

$\boxed{2(2x+5y)(4x^2-10xy+25y^2)}$

3. $(2x-y)^2-5(2x-y)-24$

$[(2x-y)-8][(2x-y)+3]$

$\boxed{(2x-y-8)(2x-y+3)}$

4. $x^3+4x^2-9x-36$

$x^2(x+4)-9(x+4)$

$(x+4)(x^2-9)$

$\boxed{(x+4)(x-3)(x+3)}$

5. $9a^3b-9a^2b$

$\boxed{9a^2b(a-1)}$

6. $8x^2-13x-6$

$\boxed{(8x+3)(x-2)}$

7. $x^3+5x=0$

$x(x+5)=0$

$\boxed{x=0 \quad x=-5}$

8. $x(x-4)=5$

$x^2-4x-5=0$

$(x-5)(x+1)=0$

$\boxed{x=5 \quad x=-1}$

9. $(x-3)(x+3)=8x$

$x^2-9=8x$

$x^2-8x-9=0$

$(x-9)(x+1)=0$

$\boxed{x=9 \quad x=-1}$

10. $\dfrac{x^3-2x^2-2xy+4y}{x^3-8}$

$\dfrac{x^2(x-2)-2y(x-2)}{x^3-8}$

$\dfrac{(x-2)(x^2-2y)}{(x-2)(x^2+2x+4)}$

$\boxed{\dfrac{x^2-2y}{x^2+2x+4}}$

11. $\dfrac{4-x^2}{12x^3y^4} \div \dfrac{x^2-2x-8}{4xy^2}$

$\dfrac{(2-x)(2+x)}{12x^3y^4} \cdot \dfrac{4xy^2}{(x-4)(x+2)}$

$\dfrac{(2-x)}{3x^2y^2} \cdot \dfrac{1}{(x-4)}$

$\boxed{\dfrac{2-x}{3x^2y^2(x-4)}}$

12. $\dfrac{7}{12x^3y} - \dfrac{2}{15xy^4}$

LCD $= 60x^3y^4$

$\dfrac{7 \cdot 5y^3}{12x^3y \cdot 5y^3} \quad \dfrac{2 \cdot 4x^2}{15xy^4 \cdot 4x^2}$

$\boxed{\dfrac{35y^3-8x^2}{60x^3y^4}}$

13. $\dfrac{2x(x-5)}{(x-3)^2(x-5)} - \dfrac{5(x-3)}{(x-3)(x-5)(x-3)}$

$\dfrac{2x^2-10x-5x+15}{(x-3)^2(x-5)}$

$\boxed{\dfrac{2x^2-15x+15}{(x-3)^2(x-5)}}$

14. $\dfrac{x(x-3)}{(x+3)(x^2-3x+9)} + \dfrac{9(x^2-3x+9)}{(x-3)(x+3)}$

$\dfrac{x^2-3x+9x^2-27x+81}{(x+3)(x^2-3x+9)(x-3)}$

$\boxed{\dfrac{10x^2-30x+81}{(x-3)(x+3)(x^2-3x+9)}}$

15. $\dfrac{4}{x} = \dfrac{x-8}{5}$

$4 \cdot 5 = x(x-8)$

$20 = x^2-8x$

$0 = x^2-8x-20$

$0 = (x-10)(x+2)$

$\boxed{x=10 \quad x=-2}$

16. $\dfrac{4}{x-4} = \dfrac{-2}{x-4}$

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

$4x-16 = -2x+8$

$+2x+16 \quad +2x+16$

$6x = 24$ Reject $x \neq 4$

$x=4$

$\boxed{\text{No Sol}}$

17. $\dfrac{1}{F} = \dfrac{1}{x} + \dfrac{1}{U}$ (FxU)

$XU = UF + Fx$

$-Fx \qquad -Fx$

$XU - Fx = UF$

$\dfrac{x(U-F)}{U-F} = \dfrac{UF}{U-F}$

$\boxed{x = \dfrac{UF}{U-F}}$

18. $\dfrac{x}{x-5} + \dfrac{3}{x-2} = \dfrac{15}{(x-5)(x-2)}$ $((x-5)(x-2))$

$x(x-2)+3(x-5) = 15$

$x^2-2x+3x-15 = 15$

$-15 \qquad -15$

$x^2+x-30 = 0$

$(x+6)(x-5) = 0$

$\boxed{x=-6}$ $x \neq 5$ Reject $x \neq 5$

19. $\dfrac{20x^3}{10x^2} - \dfrac{10x^2}{10x^2} + \dfrac{5x}{10x^2}$

$\boxed{2x-1+\dfrac{1}{2x}}$

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

3 | 1 −2 −10 4

↓ 3 3 −21

1 1 −7 −17

$\boxed{x^2+x-7-\dfrac{17}{x-3}}$

21. $t = \dfrac{k}{V}$

$\dfrac{20}{1} = \dfrac{k}{10}$

$\boxed{k=200}$

$t = \dfrac{200}{V}$

$t = \dfrac{200}{2}$

$\boxed{t=100}$

22. $\dfrac{2-\frac{1}{x}}{x-\frac{1}{2}} = \dfrac{\left(2-\frac{1}{x}\right) \div \left(x-\frac{1}{2}\right)}{} = \dfrac{2x-1}{x} \div \dfrac{2x-1}{2}$

$= \dfrac{2x-1}{x} \cdot \dfrac{2}{2x-1} = \boxed{\dfrac{2}{x}}$

OR

$\dfrac{2x\left(2-\frac{1}{x}\right)}{2x\left(x-\frac{1}{2}\right)} = \dfrac{4x-2}{2x^2-x}$

$= \dfrac{2(2x-1)}{x(2x-1)}$

23. $\dfrac{\frac{x-2}{1}\left(1-\frac{2}{x-2}\right)}{\frac{x-2}{1}\left(1+\frac{2}{x-2}\right)} = \dfrac{x-2-2}{x-2+2}$

$= \boxed{\dfrac{x-4}{x}}$

24. $\left(4x^{-1}-4y^{-1}\right)^{-1}$

$\left(\dfrac{4}{x}-\dfrac{4}{y}\right)^{-1}$

$\left(\dfrac{4y-4x}{xy}\right)^{-1}$

$\boxed{\dfrac{xy}{4y-4x}}$ or $\boxed{\dfrac{xy}{4(y-x)}}$

25. $\dfrac{(2x)^{-2}-2^{-2}}{2x^{-2}-2^{-2}}$

$\dfrac{4x^2\left(\frac{1}{4x^2}-\frac{1}{4}\right)}{4x^2\left(\frac{2}{x^2}-\frac{1}{4}\right)}$

$\boxed{\dfrac{1-x^2}{8-x^2}}$ or $\boxed{\dfrac{(1-x)(1+x)}{8-x^2}}$ or $\boxed{\dfrac{x^2-1}{x^2-8}}$