INTERMEDIATE ALGEBRA    EXAM 1 A*         NAME _____

SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER.  Circle answers.
TURN IN <u>ALL</u> WORKSHEETS.  CALCULATORS ARE RECOMMENDED ON THIS TEST.

In 1 - 3, evaluate the expressions:

1. $-4-(-13)+(-5+10)$     2. $-2 + |-3| - |-5|$      3. $2(-3)^3 - 2^3$

In 4 - 5, find the value if $k = -2$ and $m = 3$

4. $k^2 - km + m^2$                    5.  $-k^2 - m^2$

In 6 - 11, solve for X:

6.  $3(X + 5) = 2X + 1$              7.  $6X - 3(5X + 2) = 4 - 5X$

8.  $3(2X - 5) = -2(5 - 3X) + 5$     9.  $aX - b = cX - d$

10. $|2X - 4| = 6$         11. $|2X - 6| = -6$

In 12 - 16, solve for X, graph on a numberline, and give answers in interval notation.

12. $-3X + 6 < -6$

13. $\dfrac{2X - 4}{3} \geq 2$

14. $-2 < 6 - 2X \leq 10$

15a)  $X \leq 6$ or $X < -2$

16a)  $X < 2$ and $X \geq -3$

b)  $X \leq 6$ and $X < -2$

b)  $X \leq -3$ or $X > 4$

17. Use a calculator. Give answers in scientific notation:

a)  $0.00075 \times 80{,}000{,}000$

b)  $\dfrac{4\times10^{12} \cdot 3\times10^{-4}}{1.6\times10^{-16} \cdot 1.5\times10^{10}}$

18. Simplify:

$$\dfrac{X^{4a}\, X^{2a}}{X^{3a-4}}$$

19. Simplify:

$$\left( \dfrac{X^{12a}\, X^{3a}}{X^{5a}} \right)^2$$

20. Multiply:

  a)   $(2X - 5Y)^2$        b)   $[(2X - 5Y) - 5][(2X - 5Y) - 3]$

In 21 - 22, an equation is required.  Show all work!!

21.  Dr. H invested $17,000, some at 7% , and the rest at 10%.  If her total income for the year was $1310, how much was invested at each rate?

22.  How many liters of 20% solution should be mixed with 15 liters of 50% solution to obtain a 30% solution?

EXAM 1A* Solutions.

k = -2   m = 3

1. $-4-(-13)+(-5+10)$
$= -4+13+5 = \boxed{14}$

2. $-2+|-3|-|-5|$
$= -2+3-5 = \boxed{-4}$

3. $2(-3)^3-2^3$
$= 2(-27)-8$
$= -54-8 = \boxed{-62}$

4. $k^2-km+m^2$
$= (-2)^2-(-2)(3)+3^2$
$= 4+6+9 = \boxed{19}$

5. $-k^2-m^2$
$-(-2)^2-(3)^2$
$= -4-9 = \boxed{-13}$

6. $3(x+5) = 2x+1$
$3x+15 = 2x+1$
$\underline{-2x-15 \quad -2x-15}$
$\boxed{x = -14}$

7. $6x-3(5x+2) = 4-5x$
$6x-15x-6 = 4-5x$
$-9x-6 = 4-5x$
$\underline{+5x+6 \quad +6+5x}$
$-4x = 10$
$x = -\frac{10}{4} = \boxed{-\frac{5}{2}}$

8. $3(2x-5) = -2(5-3x)+5$
$6x-15 = -10+6x+5$
$-15 = -5$
NO WAY -- $\boxed{\text{NO SOLUTION}}$

9. $ax-b = cx-d$
$\underline{-cx+b \quad -cx+b}$
$ax-cx = b-d$
$x(a-c) = b-d$
$\frac{x(a-c)}{a-c} = \frac{b-d}{a-c}$
$\boxed{x = \frac{b-d}{a-c}}$

10. $|2x-4| = 6$
$2x-4 = 6 \qquad 2x-4 = -6$
$2x = 10 \qquad 2x = -2$
$\boxed{x = 5 \text{ or } x = -1}$

11. $|2x-6| = -6$
$\boxed{\text{NO SOLUTION}}$

12. $-3x+6 < -6$
$-3x < -12$
$x > 4$


$\boxed{(4, \infty)}$
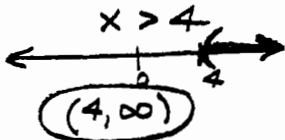
13. $\frac{2x-4}{3} \geq 2$
$2x-4 \geq 6$
$2x \geq 10$
$x \geq 5$


$\boxed{[5, \infty)}$

14. $-2 < 6-2x \leq 10$
$\underline{-6 \quad -6 \quad -6}$
$\frac{-8}{-2} < \frac{-2x}{-2} \leq \frac{4}{-2}$
$4 > x \geq -2$
or $-2 \leq x < 4$


$\boxed{[-2, 4)}$

15. $x \leq 6 \qquad x < -2$



a) or = UNION


$\boxed{(-\infty, 6]}$

b) and = INTERSECT.


$\boxed{(-\infty, -2)}$
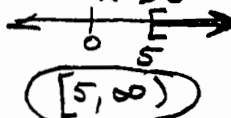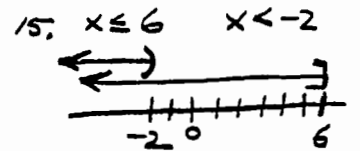
16. $x < 2$ and $x \geq -3$



a) and = INTERSECT.
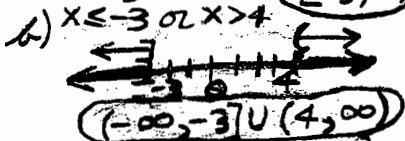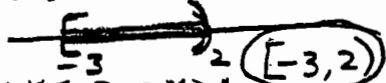

$\boxed{[-3, 2)}$

b) $x \leq -3$ or $x > 4$


$\boxed{(-\infty, -3] \cup (4, \infty)}$

17a) $60000 = \boxed{6 \times 10^4}$
b) $\boxed{5 \times 10^4}$

18. $\frac{x^{4a} \cdot x^{2a}}{x^{3a-4}} = x^{4a+2a-(3a-4)}$
$= x^{6a-3a+4}$
$= \boxed{x^{3a+4}}$

19. $\left(\frac{x^{12a} \cdot x^{3a}}{x^{5a}}\right)^2 = \left(x^{15a-5a}\right)^2$
$= \left(x^{10a}\right)^2 = \boxed{x^{20a}}$

20a) $(2x-5y)^2$
$= \boxed{4x^2-20xy+25y^2}$

20b) $[(2x-5y)-5][(2x-5y)-3]$
$= (2x-5y)^2-8(2x-5y)+15$
$= \boxed{4x^2-20xy+25y^2-16x+40y+15}$

21.

| P | $\times$ R | $=$ I |
|---|---|---|
| $x$ | .07 | $.07x$ |
| $17000-x$ | .10 | $.10(17000-x)$ |
| | | 1310 |

$.07x + .10(17000-x) = 1310$
$.07x + 1700 - .10x = 1310$
$-.03x = -390$
$x = \frac{-390}{-.03}$
$\boxed{x = 13000 \text{ @ } 7\%}$
$\boxed{17000-x = 4{,}000 \text{ @ } 10\%}$

22.

| LIQ | % | PURE |
|---|---|---|
| $x$ | .20 | $.20x$ |
| 15 | .50 | $.50(15)$ |
| $x+15$ | .30 | $.30(x+15)$ |

$.20x + .50(15) = .30(x+15)$
$.20x + 7.50 = .30x + 4.50$
$-.10x = -3.00$
$x = \frac{-3.00}{-.10}$
$\boxed{= 30 \text{ liters}}$

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INTERMEDIATE ALGEBRA    EXAM 1 B*        NAME _____
SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER.  Circle answers.
TURN IN **ALL** WORKSHEETS.  CALCULATORS ARE RECOMMENDED ON THIS TEST.

In 1 - 3, evaluate the expressions:

1.    $6 \cdot 8^2 - 2 \cdot 9^2$

2.    $\dfrac{-3|4 - 12| \div 4 + 4}{\sqrt{49} + 28 \div 2^2}$

3.   Evaluate $-X^2 - 3XY + Y^2$ when $X = 3$ and $Y = -4$

In 4 - 10, solve for X:

4.   $4(X - 2) = 8(6 - X) + 4$

5.   $2(3X - 3) + 5X = 11X - 6$

6.   $6(X - 5) - 7(7 - X) - 6 = 0$

7.    $\dfrac{4X + 7}{4} = X - 2$

8.   $cY + cX = a - bX$

9.   $|2X - 5| = -9$

10.  $|2X - 5| = 9$

In 11 - 19, solve for X, graph on a numberline, and give answers in interval notation.

11.   $3(X - 3) \leq 4X - 1$

12.   $5 + \dfrac{5X}{3} < -6$

13.   $-7 < \dfrac{7 - 2X}{3} \leq 5$

14.   Give interval notation:

   a)   $X < -8$

   b)   $X \geq -2$

15a)   $X < -8$  or  $X \geq -2$

   b)   $X < -8$  and  $X \geq -2$

16a)   $X < -8$  or   $X \leq -2$

   b)   $X < -8$  and   $X \leq -2$

17.   Use a calculator.   Give answers in scientific notation:

   a)   $75,000 \times 85,000,000$

   b)   $\dfrac{(4,000) \times (0.00009)}{(0.0016) \times (3,000,000)}$

18. Simplify: $\left(\dfrac{3X^{-4}Y^{-2}}{5X^{-1}Y^6}\right)^{-3}$

19. Multiply:

   a)   $(2X + 3Y)^2$                 b)   $[(2X + 3Y) - 5][(2X + 3Y) - 3]$

In 20 - 22, an equation is required.  Show all work!!

20. The length of a rectangle is 7 less than 3 times the the width.  If the perimeter is 746 meters, find the length and width.

21. Mr. Williams invested some money at 6%, and $4000 less than this amount at 9%.  The total income for the year was $2340.  How much was invested at each rate?

22.   How much pure (100%) alcohol must be mixed with 70 liters of 20% solution to bring it up to 60% strength?

EXAM 1B* Solutions.

**1.** $6 \cdot 8^2 - 2 \cdot 9^2$
$= 6 \cdot 64 - 2 \cdot 81$
$= 384 - 162$
$= \boxed{222}$

**2.** $\dfrac{-3|4-12| \div 4 + 4}{\sqrt{49} + 28 \div 2^2}$
$= \dfrac{-3 \cdot 8 \div 4 + 4}{7 + 28 \div 4}$
$= \dfrac{-6+4}{7+7} = \dfrac{-2}{14} = \boxed{-\dfrac{1}{7}}$

$x = 3, \ y = -4$

**3.** $-x^2 - 3xy + y^2$
$= -3^2 - 3(3)(-4) + (-4)^2$
$= -9 + 36 + 16$
$= \boxed{43}$

**4.** $4(x-2) = 8(6-x) + 4$
$4x - 8 = 48 - 8x + 4$
$4x - 8 = 52 - 8x$
$12x = 60$
$\boxed{x = 5}$

**5.** $2(3x-3) + 5x = 11x - 6$
$6x - 6 + 5x = 11x - 6$
$11x - 6 = 11x - 6$
$0 = 0$
Identity - TRUE for all $x$

**6.** $6(x-5) - 7(7-x) - 6 = 0$
$6x - 30 - 49 + 7x - 6 = 0$
$13x - 85 = 0$
$13x = 85$
$x = \dfrac{85}{13}$

**8.** $cy + cx = a - by$
$cx + bx = a - cy$
$x(c+b) = a - cy$
$\dfrac{x(c+b)}{c+b} = \dfrac{a-cy}{c+b}$
$\boxed{x = \dfrac{a-cy}{c+b}}$

**9.** $|2x-5| = -9$
$\boxed{\text{No Solution}}$

**10.** $|2x-5| = 9$
$2x - 5 = 9$ or $2x - 5 = -9$
$2x = 14 \qquad 2x = -4$
$\boxed{x = 7}$ or $\boxed{x = -2}$

**11.** $3(x-3) \le 4x - 1$
$3x - 9 \le 4x - 1$
$-x \le 8$
$x \ge -8$
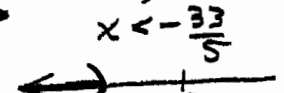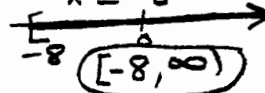
$\boxed{[-8, \infty)}$

**12.** $5 + \dfrac{5x}{3} < -6$
$\phantom{5} -5 \qquad -5$
$\dfrac{3}{5}\left(\dfrac{5x}{3}\right) < -11 \cdot \dfrac{3}{5}$
$x < -\dfrac{33}{5}$

$\boxed{\left(-\infty, -\dfrac{33}{5}\right)}$

**13.** $\dfrac{3}{2}(-7) \times \left(\dfrac{7-2x}{3}\right) \le \dfrac{3}{2}(5)$
$-21 < 7 - 2x \le 15$
$\dfrac{-7 \quad -7 \qquad -7}{}$
$\dfrac{-28}{-2} < \dfrac{-2x}{-2} \le \dfrac{8}{-2}$
$14 > x \ge -4$
$-4 \le x < 14$

$\boxed{[-4, 14)}$

**14.** a) $\boxed{(-\infty, -8)}$   b) $\boxed{[-2, \infty)}$

**15.** $x < -8 \qquad x \ge -2$

a) OR = UNION
$\boxed{(-\infty, -8) \cup [-2, \infty)}$
b) and = INTERSECT.
$\boxed{\text{No Solution}}$
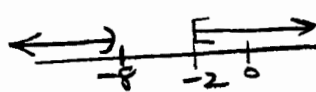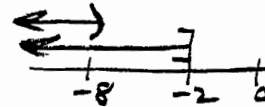
**16.** $x < -8 \qquad x \le -2$

a) OR = UNION
$\boxed{(-\infty, -2]}$
b) and = INTERS.
$\boxed{(-\infty, -8)}$

**17.** a) $\boxed{6.375 \times 10^{12}}$   b) $\boxed{7.5 \times 10^{-5}}$

**18.** $\left(\dfrac{3x^{-4}y^{-2}}{5x^{-1}y^6}\right)^3 = \left(\dfrac{3}{5}x^{-4+1}y^{-2-6}\right)^3$
$= \left(\dfrac{3}{5}x^{-3}y^{-8}\right)^3 = \dfrac{3^3}{5^3}x^{-9}y^{-24}$
$= \boxed{\dfrac{27}{125x^9y^{24}}}$

**19.** a) $(2x+3y)^2 = \boxed{4x^2 + 12xy + 9y^2}$
b) $[(2x+3y) - 5][(2x+3y) - 3]$
$= (2x+3y)^2 - 8(2x+3y) + 15$
$= \boxed{4x^2 + 12xy + 9y^2 - 16x - 24y + 15}$

**20.** Let $x = $ width
$3x - 7 = $ length
$2(x) + 2(3x-7) = 746$
$2x + 6x - 14 = 746$
$8x = 760$
$\boxed{x = 95m.}$
$\boxed{3x - 7 = 278m.}$

**21.**

| | P | R | I |
|---|---|---|---|
| | $x$ | .06 | .06x |
| | $x - 4000$ | .09 | .09(x-4000) |
| | | | #2340 |

$.06x + .09(x-4000) = 2340$
$.06x + .09x - 360 = 2340$
$.15x = 2700$
$x = \dfrac{2700}{.15} = 18000$ @ 6%
$18000 - 4000 = 14,000$ @ 9%

**22.**

| | LIQ. | % | PURE |
|---|---|---|---|
| | $x$ | 1.00 | 1.00(x) |
| | 70 | .20 | .20(70) |
| | $x+70$ | .60 | .60(x+70) |

$1.00x + .20(70) = .60(x+70)$
$1.00x + 14 = .60x + 42$
$-.60x - 14 \qquad -.60x - 14$
$.40x = 28$
$x = \dfrac{28}{.40} = \boxed{70\ell.}$