Unit 1 Test Study Guide
(Equations & Inequalities)

Name: KEY

Date: _____ Block: _____

Topic 1: Operations & Expressions

Simplify each expression.

1. $[18-(-1-7)^2]+16\div 2^4$

$[18-(-8)^2]+16\div 16$

$[18-64]+16\div 16$

$[-46]+1$ → **-45**

2. $\dfrac{4+\sqrt{121}-2\cdot 3^3}{|-19-2(-8)|}$

$\dfrac{4+11-2(27)}{|-19+16|}$

$\dfrac{4+11-54}{|-3|}$ → $\dfrac{15-54}{3}$ → $\dfrac{-39}{3}$ → **-13**

3. $10a-5ab+4b$ (if $a=\frac{2}{5}$ and $b=-\frac{1}{6}$)

$10\left(\frac{2}{5}\right)-5\left(\frac{2}{5}\right)\left(\frac{-1}{6}\right)+4\left(\frac{-1}{6}\right)$

$4-2\left(\frac{-1}{6}\right)+\frac{-2}{3}$

$4+\frac{1}{3}-\frac{2}{3}$ → $\frac{13}{3}-\frac{2}{3}$

$\frac{12}{3}+\frac{1}{3}-\frac{2}{3}$ → **$\frac{11}{3}$**

4. $\sqrt{|-x^2-4y^2|}$ (if $x=3$ and $y=-2$)

$\sqrt{|-(3)^2-4(-2)^2|}$

$\sqrt{|-9-16|}$

$\sqrt{|-25|}$ → $\sqrt{25}$ → **5**

Topic 2: Multi-Step Equations & Word Problems

Solve each equation.

5. $3(7-9k)+23k=4k-(24-k)$

$21-27k+23k=4k-24+k$

$21-4k=5k-24$

$\frac{45}{9}=\frac{9k}{9}$

$k=\frac{45}{9}=5$ → **k=5**

6. $7-\frac{5}{2}(8n-18)=14-10(2n-3)$

$7-\frac{5}{2}(8n)+\frac{5}{2}\left(\frac{18}{1}\right)=14-20n+30$

$7-20n+45=14-20n+30$

$-2n+52=-20n+44$

$52\neq 44$ → **$\emptyset$**

7. $\dfrac{7x-3}{3}=\dfrac{3x-4}{8}$

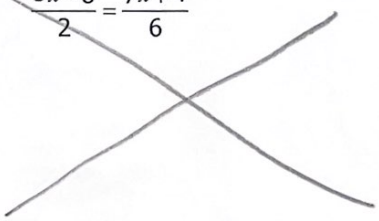
$8(7x-3)=3(3x-4)$

$56x-24=9x-12$

$47x=12$

$x=\frac{12}{47}$ → **$x=\frac{12}{47}$**

8. $\dfrac{5x-8}{2}=\dfrac{7x+4}{6}$



9. The width of a rectangle is four less than one half the length. If the perimeter of the rectangle is 94 meters, find the area of the rectangle.

10. Find three consecutive odd numbers such that the sum of five times the smaller number and twice the larger number is 33 more than six times the median number.

Topic 3: Absolute Value Equations

Solve each equation. Be sure to check for extraneous solutions.

11. $|-7-9x|=2$

$-7-9x=2$ $\quad -7-9x=-2$

$-9x=9$ $\quad -9x=5$

$x=-1$ $\quad x=\frac{-5}{9}$

check

$|-7-9(-1)|=2$ $\quad |-7-9(-5/9)|=2$

$|-7+9|=$ $\quad |-7+5|=$

$|2|=$ $\quad |-2|=2$

$2=2\checkmark$ $\quad 2=2\checkmark$

$x=-1, \frac{-5}{9}$

12. $\frac{|5n-10|}{-2}=-15$

$|5n-10|=30$

$5n-10=30$ $\quad 5n-10=-30$

$5n=40$ $\quad 5n=-20$

$n=8$ $\quad n=-4$

$n=8, -4$

check:

$\frac{|5(8)-10|}{-2} \stackrel{?}{=} -15$ $\quad \frac{|5(-4)-10|}{-2} =$

$\frac{|30|}{-2} =$ $\quad \frac{|-30|}{-2} =$

$-15 = -15 = \checkmark -15$ $\quad \frac{30}{-2} = -15 = -15$ ✓

13. $2-10|k+1|=-78$

$-2 \quad -2$

$-10|k+1|=-80$

$|k+1|=8$

$k+1=8$ $\quad k+1=-8$

$k=7$ $\quad k=-9$

$k=7, -9$

check

$2-10|7+1|=-78$ $\quad 2-10|-9+1|=$

$2-10|8|=$ $\quad 2-10|-8|=$

$2-10(8)$ $\quad 2-10(8)=$

$2-80$ $\quad 2-80=$

$-78=-78\checkmark$ $\quad -78=-78\checkmark$

14. $|2m+7|=6m+13$

$2m+7=6m+13$

$-7 \quad -7$

$2m=6m+6$

$-4m=6$

$m=\frac{-6}{4}=-3/2$

$2m+7=-(6m+13)$

$2m+7=-6m-13$

$2m=-6m-20$

$8m=-20$

$m=\frac{-20}{8}=\frac{-5}{2}$

$m=\frac{-3}{2}$

check

$|2(\frac{-3}{2})+7|=6(\frac{-3}{2})+13$ $\quad |2(\frac{-5}{2})+7|=6(\frac{-5}{2})+13$

$|-3+7|=-9+13$ $\quad |-5+7|=-15+13$

$|4|=4$ $\quad |2|=-2$

$4=4\checkmark$ $\quad 2 \neq -2$

extraneous

Topic 4: Multi-Step Inequalities

Solve each inequality. Write your answer in interval notation.

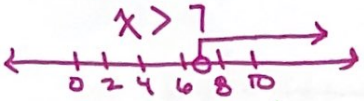
15. $33x - 8(3x + 9) > -9$

$33x - 24x - 72 > -9$

$9x - 72 > -9$

$9x > 63$

$x > 7$



Interval Notation: $(7, \infty)$

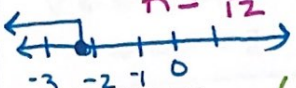
16. $-11 - 8k \geq 23 - (7 - 4k)$

$-11 - 8k \geq 23 - 7 + 4k$

$-11 - 8k \geq 16 + 4k$

$-12k \geq 27$

$k \leq \frac{-27}{12}$ $\quad k \leq \frac{-9}{4}$



Interval Notation: $(-\infty, -\frac{9}{4}]$

17. $11(5u - 4) - 7u \geq 8(6u - 7)$

$55u - 44 - 7u \geq 48u - 56$

$48u - 44 \geq 48u - 56$

$-44 \geq -56$ ✓

All real numbers

Interval Notation: $(-\infty, \infty)$

18. $-\frac{5}{3}\left(\frac{9}{10}x + 15\right) < 7 - \left(8 - \frac{9}{2}x\right)$

$-\frac{3}{2}x - 25 < 7 - 8 + \frac{9}{2}x$

$-\frac{3}{2}x - 25 < -1 + \frac{9}{2}x$

$-25 < -1 + \frac{12}{2}x$

$-24 < 6x$

$-4 < x$

Interval Notation: $(-4, \infty)$

Topic 5: Compound Inequalities

Solve each compound inequality. Write your answer in interval notation.

19. $-18 \leq 2b - 8 < -8$

$-18 \leq 2b - 8$ and $2b - 8 < -8$

$-10 \leq 2b$ $\quad 2b < 0$

$-5 \leq b$ $\quad b < 0$

$-5 \leq b < 0$

Interval Notation: $[-5, 0)$

20. $m + 5 > 11$ or $8 - 10m \geq 33$

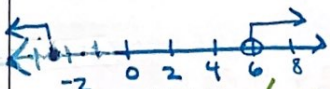
$-5 \quad -5$

$m > 6$ OR $-10m \geq 25$

$-8 \quad -8$

$m \leq \frac{-25}{10}$

$m \leq -\frac{5}{2}$



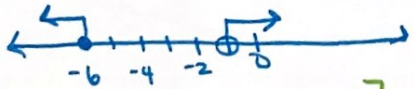
Interval Notation: $(-\infty, -\frac{5}{2}] \cup (6, \infty)$

21. $7p + 5 \leq -37$ or $-10p < 10$

$-5 \quad -5$

$7p \leq -42$ $\quad p > -1$

$p \leq -6$ OR $p > -1$

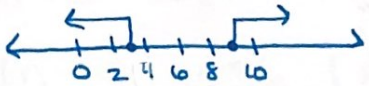


Interval Notation: $(-\infty, -6] \cup (-1, \infty)$

22. $7 - 3x \leq -20$ or $5x - 6 \leq 9$

$-3x \leq -27$ $\quad 5x \leq 15$

$x \geq 9$ OR $x \leq 3$



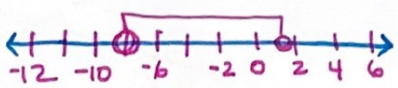
Interval Notation: $(-\infty, 3] \cup [9, \infty)$

23. $9y - 2 < 13$ and $3y - 2 > -29$

$9y < 15$ $\quad 3y > -27$

$y < \frac{15}{9}$ $\quad y > -9$

$y < \frac{5}{3}$

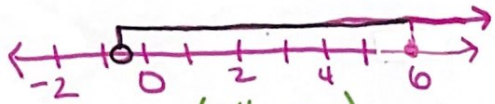


Interval Notation: $(-9, \frac{5}{3})$

24. $10 + 2w \geq 22$ or $5w - 8 > -12$ not on test

$2w \geq 12$ OR $5w > -4$

$w \geq 6$ $\quad w > \frac{-4}{5}$



Interval Notation: $(-\frac{4}{5}, \infty)$

Topic 6: Absolute Value Inequalities

Solve each absolute value inequality. Write your answer in interval notation.

25. $|9-a| \geq 2$

$9-a \geq 2$ or $9-a \leq -2$

$-9 \quad -9$ $\quad -a \leq -11$

$-a \geq -7$ $\quad a \geq 11$

$a \leq 7$ OR

Interval Notation: $(-\infty, 7] \cup [11, \infty)$

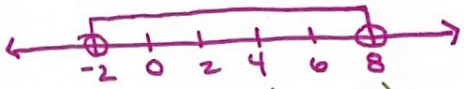
26. $\frac{|v-3|}{-5} > -1$

$|v-3| < 5$ flip sign (mult by $\frac{1}{-5}$)

$v-3 < 5$ and $v-3 > -5$

$v < 8$ and $v > -2$

$-2 < v < 8$



Interval Notation: $(-2, 8)$

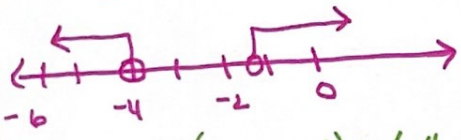
27. $|3n+8|+1 > 5$

$|3n+8| > 4$

$3n+8 > 4$ or $3n+8 < -4$

$3n > -4$ $\quad 3n < -12$

$n > -\frac{4}{3}$ or $\quad n < -4$



Interval Notation: $(-\infty, -4) \cup (-\frac{4}{3}, \infty)$

28. $-3-6|4x-10| < -87$

$+3 \quad +3$

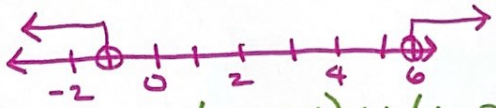
$-6|4x-10| < -84$

$|4x-10| > 14$ flip.

$4x-10 > 14$ OR $\quad 4x-10 < -14$

$4x > 24$ $\quad 4x < -4$

$x > 6$ OR $\quad x < -1$



Interval Notation: $(-\infty, -1) \cup (6, \infty)$

Topic 7: Factoring Polynomials

Directions: Factor each polynomial completely.

29. $12p^2 - 40p - 32$

30. $v^3 - 15v^2 + 54v$

$v(v^2 - 15v + 54)$

$v(v-6)(v-9)$

both neg sum

1 54

2 27

3 18

-6 -9 -15

31. $3w^2 + 10w + 7$

32. $n^3 - 5n^2 - 50n$

$n(n^2 - 5n - 50)$

$n(n-10)(n+5)$

↓neg sum

1 -50

2 -25

1 -12

5 -10 -5

33. $g^2 + 3g - 40$

34. $3k^2 - 57k + 180$

35. $4m^2 - m - 14$

36. $8r^2 + 16r - 10$