

Unit 1 Test Study Guide (Equations & Inequalities)

Name: Key

Date: _____ Block: _____

Topic 1: The Real Numbers & Properties

List ALL sets to which each value belongs. (Use R, I, Q, Z, W, N)

1. $\frac{\sqrt{3}}{\sqrt{3}} = 1$

N, W, Z, Q, R

2. $5.08\bar{3}$

Q, R

3. $\frac{-\sqrt{256}}{2} = \frac{-16}{2} = -8$

Z, Q, R

4. 2π

I, R

Name the property that justifies each statement.

5. $\frac{x^3}{y} \cdot 1 = \frac{x^3}{y}$

Multiplicative Identity

6. $6a^2 + ab = ab + 6a^2$

Commutative Prop of Addition

7. $(mn) + -(mn) = 0$

Additive Inverse

8. $\sqrt{7}(\sqrt{2} - \sqrt{10}) = \sqrt{7} \cdot \sqrt{2} - \sqrt{7} \cdot \sqrt{10}$

Distributive Property

9. $5p^2 \cdot (4p \cdot 3) = (5p^2 \cdot 4p) \cdot 3$

Associative Property of Mult.

10. $\frac{1}{9s} \cdot 9s = 1$

Multiplicative Inverse

Answer true/false. If false, give a counterexample.

11. Perfect squares are closed under multiplication.

True

12. Irrational numbers are closed under division.

False

$\frac{2\pi}{\pi} = 2$

Topic 2: Operations & Expressions

Simplify each expression.

13. $[18 - (-1 - 7)^2] + 16 \div 2^4$

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

$[-46] + 1$

$\boxed{-45}$

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

$\frac{4 + 11 - 2 \cdot 27}{|-19 + 16|}$

$\frac{15 - 54}{3} = \frac{-39}{3} = \boxed{-13}$

15. $10a - 5ab + 4b$

(if $a = \frac{2}{5}$ and $b = -\frac{1}{6}$)

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

$4 + \frac{1}{3} - \frac{2}{3} = \boxed{\frac{11}{3}}$

16. $\sqrt{-x^2 - 4y^2}$

(if $x = 3$ and $y = -2$)

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

$\sqrt{-9 - 16}$

$\sqrt{25} = \boxed{5}$

Topic 3: Multi-Step Equations & Word Problems

Solve each equation.	
<p>17. $3(7 - 9k) + 23k = 4k - (24 - k)$</p> $21 - 27k + 23k = 4k - 24 + k$ $21 - 4k = 5k - 24$ $21 = 9k - 24$ $45 = 9k$ $\boxed{5 = k}$	<p>18. $7 - \frac{5}{2}(8n - 18) = 14 - 10(2n - 3)$</p> $7 - 20n + 45 = 14 - 20n + 30$ $-20n + 52 = -20n + 44$ $52 \neq 44$ $\boxed{\text{No Solution!}}$
<p>19. $\frac{7x-3}{3} = \frac{3x-4}{8}$</p> $8(7x-3) = 3(3x-4)$ $56x - 24 = 9x - 12$ $47x - 24 = -12$ $47x = 12$ $\boxed{x = \frac{12}{47}}$	<p>20. If $SA = \frac{1}{2}lp + B$, find p</p> $SA - B = \frac{1}{2}lp$ $2(SA - B) = lp$ $\boxed{\frac{2SA - 2B}{l} = p}$
<p>21. 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.</p> <p>let $x = \text{length}$ $2(x) + 2(\frac{1}{2}x - 4) = 94$ width = 13 m</p> <p>let $\frac{1}{2}x - 4 = \text{width}$ $2x + x - 8 = 94$ length = 34 m</p> $3x = 102$ $x = 34$ <p style="text-align: right;">Area = $13(34)$ $\boxed{= 442 \text{ m}^2}$</p>	
<p>22. 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.</p> <p>let $x = \text{first cons. odd integer}$ $5(x) + 2(x+4) = 6(x+2) + 33$</p> <p>let $x+2 = \text{middle cons. odd integer}$ $5x + 2x + 8 = 6x + 12 + 33$</p> <p>let $x+4 = \text{largest cons. odd integer}$ $7x + 8 = 6x + 45$</p> $x = 37$ $\boxed{37, 39, 41}$	

Topic 4: Absolute Value Equations

Solve each equation. Be sure to check for extraneous solutions.	
<p>23. $-7 - 9x = 2$</p> $-7 - 9x = 2$ $-9x = 9$ $x = -1 \quad \checkmark$ $-7 - 9x = -2$ $-9x = 5$ $x = -\frac{5}{9} \quad \checkmark$ $\boxed{\left\{-1, -\frac{5}{9}\right\}}$	<p>24. $\frac{ 5n-10 }{-2} = -15$</p> $ 5n-10 = 30$ $5n-10 = 30$ $5n = 40$ $n = 8 \quad \checkmark$ $5n-10 = -30$ $5n = -20$ $n = -4 \quad \checkmark$ $\boxed{\{-4, 8\}}$

25. $2 - 10|k+1| = -78$

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

$|k+1| = 8$

$k+1 = 8$
 $k = 7 \checkmark$

$k+1 = -8$
 $k = -9 \checkmark$

$\{-9, 7\}$

26. $|2m+7| = 6m+13$

$2m+7 = 6m+13$

$7 = 4m+13$

$-6 = 4m$

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

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

$8m+7 = -13$

$8m = -20$

$m = -\frac{5}{2}x$

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

Topic 5: Multi-Step Inequalities

Solve and graph each inequality. Write your answer in interval notation.

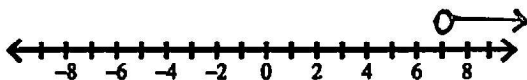
27. $33x - 8(3x + 9) > -9$

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

$9x - 72 > -9$

$9x > 63$

$x > 7$



Interval Notation: $(7, \infty)$

28. $-11 - 8k \geq 23 - (7 - 4k)$

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

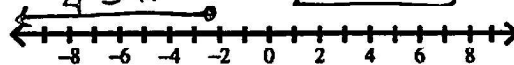
$-11 - 8k \geq 16 + 4k$

$-11 \geq 16 + 12k$

$-27 \geq 12k$

$-\frac{9}{4} \geq k$

$k \leq -\frac{9}{4}$



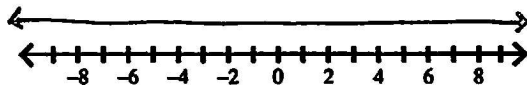
Interval Notation: $(-\infty, -\frac{9}{4}]$

29. $11(5u - 4) - 7u \geq 8(6u - 7)$

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

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

$-44 \geq -56$



Interval Notation: \mathbb{R} all real numbers

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

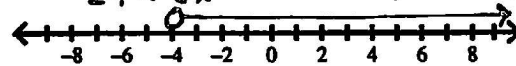
$-\frac{3}{2}x - 25 < 7 - 8 + \frac{9}{2}x$

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

$-25 < -1 + 6x$

$-24 < 6x$

$-4 < x$ $x > -4$



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

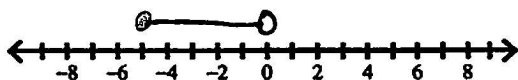
Topic 6: Compound Inequalities

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

31. $-18 \leq 2b - 8 < -8$

$-10 \leq 2b < 0$

$-5 \leq b < 0$



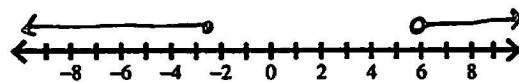
Interval Notation: $[-5, 0)$

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

$m > 6$

$-10m \geq 25$

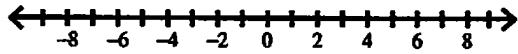
or $m \leq -\frac{5}{2}$



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

33. $7p + 5 \leq -37$ and $-10p < 10$

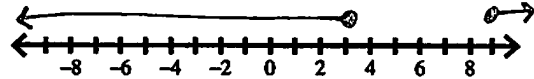
$7p \leq -42$
 $p \leq -6$ and $p > -1$



Interval Notation: ~~\emptyset~~ NO solution

34. $7 - 3x \leq -20$ or $5x - 6 \leq 9$

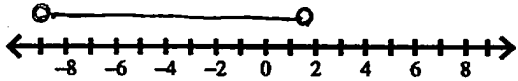
$-3x \leq -27$ $5x \leq 15$
 $x \geq 9$ $x \leq 3$



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

35. $9y - 2 < 13$ and $3y - 2 > -29$

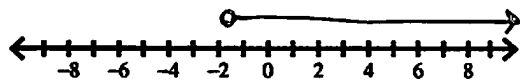
$9y < 15$ $3y > -27$
 $y < \frac{5}{3}$ and $y > -9$



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

36. $10 + 2w \geq 22$ or $5w - 8 > -12$

$2w \geq 12$ $5w > -4$
 $w \geq 6$ or $w > -\frac{4}{5}$



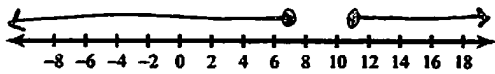
Interval Notation: $(-\frac{4}{5}, \infty)$

Topic 7: Absolute Value Inequalities

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

37. $|9 - a| \geq 2$

$9 - a \geq 2$ $9 - a \leq -2$
 $-a \geq -7$ $-a \leq -11$
 $a \leq 7$ or $a \geq 11$

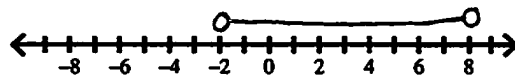


Interval Notation: $(-\infty, 7] \cup [11, \infty)$

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

$|v-3| < 5$

$v-3 < 5$ $v-3 > -5$
 $v < 8$ and $v > -2$

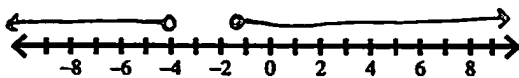


Interval Notation: $(-2, 8)$

39. $|3n+8|+1 > 5$

$|3n+8| > 4$

$3n+8 > 4$ $3n+8 < -4$
 $3n > -4$ $3n < -12$
 $n > -\frac{4}{3}$ $n < -4$



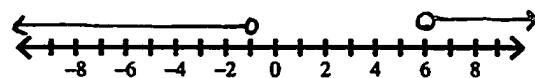
Interval Notation: $(-\infty, -4) \cup (-\frac{4}{3}, \infty)$

40. $-3 - 6|4x-10| < -87$

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

$|4x-10| > 14$

$4x-10 > 14$ $4x-10 < -14$
 $4x > 24$ $4x < -4$
 $x > 6$ or $x < -1$



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