

1. Choose the **smallest** set of Real numbers that the number below belongs to.

$$-\sqrt{\frac{450}{5}} = -\sqrt{90} \approx -9.4868\dots$$

- A. Rational
- B. Irrational
- C. Integer
- D. Not a Real number
- E. Whole

↑
NON-REPEATING,
NON-TERMINATING

2. Simplify the expression below and choose the interval the simplification is contained within.

$$\begin{aligned}
 & 8 - 1 \div 13 * 12 - \underline{(15 * 9)} \\
 & \boxed{-127.92} \\
 & = 8 - 1 \div 13 * 12 - 135 \\
 & = 8 - \frac{1}{13} * 12 - 135 \\
 & = 8 - \frac{12}{13} - 135 \\
 & = 8 - 0.92 - 135 = -127.92
 \end{aligned}$$

3. Choose the **smallest** set of Complex numbers that the number below belongs to.

$$\begin{aligned}
 & \frac{-9}{-8} + 7i^2 \\
 & A. \text{ Pure Imaginary} \\
 & \boxed{B.} \text{ Rational} \\
 & C. \text{ Nonreal Complex} \\
 & D. \text{ Not a Complex Number} \\
 & E. \text{ Irrational}
 \end{aligned}$$

$$\begin{aligned}
 & = \frac{9}{8} + 7(-1) \\
 & = \frac{9}{8} - 7 \\
 & = \frac{9}{8} - \frac{56}{8} = -\frac{47}{8}
 \end{aligned}$$

↓ FRACTION!

4. Simplify the expression below into the form $a + bi$. Then, choose the intervals that a and b belong to.

$$(8 - 3i)(6 - 2i)$$

$$\begin{array}{c} 48 + (-16i) + (-18i) + 6(-1) \\ \hline = 48 - 16i - 18i - 6 \\ = 42 - 34i \end{array}$$

$a = \boxed{42}$ $b = \boxed{-34}$

A. $a \in [52, 61]$ and $b \in [-4.8, 0.3]$
B. $a \in [52, 61]$ and $b \in [1.8, 4.1]$
C. $a \in [38, 43]$ and $b \in [32.9, 34.6]$
D. $a \in [43, 49]$ and $b \in [5.8, 8]$
E. $a \in [38, 43]$ and $b \in [-35.8, -31.9]$

5. Simplify the expression below into the form $a + bi$. Then, choose the intervals that a and b belong to.

*COMPLEX CONJUGATE OF $6-5i$ IS $6+5i$

$$a = \boxed{1.836} \quad b = \boxed{-5.803}$$

- A. $a \in [1.4, 2.5]$ and $b \in [-357, -352.8]$
B. $a \in [111.7, 113]$ and $b \in [-10.1, -3.8]$
C. $a \in [1.4, 2.5]$ and $b \in [-10.1, -3.8]$
D. $a \in [-4.8, 0]$ and $b \in [8.7, 12.8]$
E. $a \in [-8.2, -3.9]$ and $b \in [-3.6, -2]$

$$\left(\frac{-18 - 44i}{6 - 5i} \right) \left(\frac{6+5i}{6+5i} \right)$$

$$\begin{array}{c} -18 & -44i \\ \hline 6 & -108 & -264i \\ 5i & -90i & -220i^2 \end{array}$$

$$= -\frac{108 + (-264i) + (-90i) + (-220)(-1)}{6^2 + (-5)^2}$$

$$= \frac{-108 - 264i - 90i + 220}{36 + 25}$$

$$= \frac{112 - 354i}{61} = \frac{112}{61} - \frac{354}{61}i$$

$$= \boxed{1.836 - 5.803i}$$

6. First, find the equation of the line containing the two points below. Then, write the equation as $y = mx + b$ and choose the intervals that contain m and b .

$$\begin{array}{c} \downarrow(x_1, y_1) \quad \downarrow(x_2, y_2) \\ (5, -9) \text{ and } (-2, -7) \end{array}$$

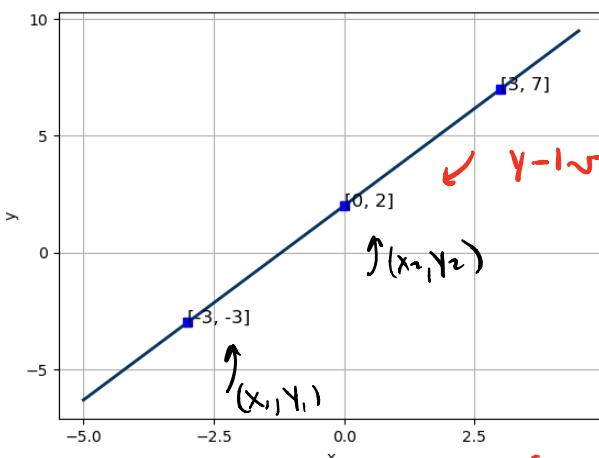
$m = \boxed{-0.286}$ $b = \boxed{-7.57}$

1. SLOPE: $m = \frac{-7 - (-9)}{-2 - 5} = \frac{2}{-7} = \boxed{-0.286}$

- A. $m \in [-0.65, 0.2]$ and $b \in [-8.2, -7.2]$ $y = mx + b \Rightarrow y = -\frac{2}{7}x + b$
 $-9 = -\frac{2}{7}(5) + b$
 $-9 = -\frac{10}{7} + b$
 $\frac{+10}{7} = \frac{+10}{7}$
 $\frac{-9 + 10}{7} = b \Rightarrow \boxed{y = -0.286x - 7.57}$
- B. $m \in [-1, 2]$ and $b \in [6.7, 8.9]$
C. $m \in [-1, 4]$ and $b \in [-5.7, -4]$
D. $m \in [-2, 3]$ and $b \in [-15.1, -13.5]$
E. $m \in [0.01, 0.51]$ and $b \in [-7.2, -5.8]$

7. Write the equation of the line in the graph below in the form $Ax + By = C$. Then, choose the intervals that contain A , B , and C .

$$m = \frac{2 - (-3)}{0 - (-3)} = \frac{5}{3}$$



✓ Y-INTERCEPT IS WHERE $x=0$, AND WE ARE GIVEN THIS POINT! SO, $b=2$

$$A = \boxed{-5}$$

$$B = \boxed{3}$$

$$C = \boxed{6}$$

$$\Rightarrow y = mx + b$$

$$y = \frac{5}{3}x + 2$$

- A. $A \in [0.79, 2.05]$, $B \in [-1.1, -0.85]$, and $C \in [-2.7, -1.4]$ $\frac{-5}{3}x = -\frac{5}{3}x$
B. $A \in [2.54, 3.25]$, $B \in [4.81, 5.2]$, and $C \in [8.6, 10.5]$ $(-\frac{5}{3}x + y = 2)^3$
C. $A \in [0.16, 1.27]$, $B \in [0.98, 2.44]$, and $C \in [8.6, 10.5]$
D. $A \in [3.95, 6.21]$, $B \in [-3.45, -2.23]$, and $C \in [-6.3, -5.4]$ $(-5x + 3y = 6)(-1)$
E. $A \in [-5.39, -4.21]$, $B \in [2.19, 3.31]$, and $C \in [3.7, 8]$ $5x - 3y = -6$

$$y = 1.2x - 12.4$$

Module 2 - Linear Equations

Progress Exam 1

8. Find the equation of the line described below. Write the linear equation as $y = mx + b$ and choose the intervals that contain m and b .

Perpendicular to $5x + 6y = 14$ and passing through the point $(2, -10)$.

$$m = \boxed{1.2} \quad b = \boxed{-12.4}$$

$$\begin{array}{r} 5x + 6y = 14 \\ -5x \quad -5x \\ \hline 6y = -5x + 14 \\ \frac{6y}{6} = \frac{-5x + 14}{6} \\ y = -\frac{5}{6}x + \frac{14}{6} \\ \text{SLOPE} = -\frac{5}{6} \end{array}$$

PERPENDICULAR
 $\Rightarrow \text{NEW SLOPE IS}$
 $m = \frac{6}{5} = 1.2 \star$
 $y = 1.2x + b$
 $-10 = 1.2(2) + b$
 $-10 = 2.4 + b$
 $\boxed{-12.4 = b}$

A. $m \in [-1, 4]$ and $b \in [-3, 1]$
 B. $m \in [0.72, 1.19]$ and $b \in [-15, -11]$
 C. $m \in [-1.66, -0.66]$ and $b \in [-10, -7]$
 D. $m \in [0.89, 1.52]$ and $b \in [-13, -10]$
 E. $m \in [0, 3]$ and $b \in [10, 13]$

9. Solve the equation below. Then, choose the interval that contains the solution.

$$x = \boxed{0.7586}$$

- A. $x \in [-2.24, 0.18]$
 B. $x \in [1.29, 2.32]$
 C. $x \in [0.21, 0.41]$
 D. $x \in [0.39, 0.96]$
 E. There are no Real solutions.

$$\begin{array}{rcl} -3(-9x - 12) & = & -7(-8x - 2) \\ (-3)(-9x) + (-3)(-12) & = & (-7)(-8x) + (-7)(-2) \\ 27x + 36 & = & 56x + 14 \\ -27x & & \hline -14 & = & -14 \\ \frac{22}{29} & = & \frac{29x}{29} \\ \frac{22}{29} & = & x \\ 0.7586 & = & x \end{array}$$

10. Solve the linear equation below. Then, choose the interval that contains the solution.
 $\star \text{LCD IS } 30$

$$\left(\frac{5x - 4}{2} - \frac{7x + 3}{5} = \frac{-5x + 7}{6} \right) 30$$

$$15(5x - 4) - 30(7x + 3) = 30(-5x + 7)$$

- A. $x \in [7.19, 7.27]$
 B. $x \in [1.94, 1.96]$
 C. $x \in [1.22, 1.29]$
 D. $x \in [1.32, 1.35]$
 E. There are no Real solutions.

$$\begin{array}{rcl} 15(5x - 4) - 6(7x + 3) & = & 5(-5x + 7) \\ 75x - 60 - 42x - 18 & = & -25x + 35 \\ 33x - 78 & = & -25x + 35 \\ +25x & & \hline 58x - 78 & = & 35 \\ +78 & & \hline 58x & = & 113 \end{array}$$

$$\boxed{x = \frac{113}{58} = 1.948}$$

11. Using an interval or intervals, describe all the x -values within or including a distance of the given values.

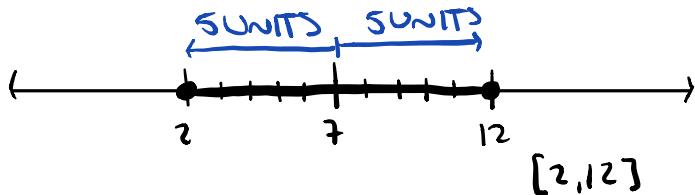
No more than 5 units from the number 7.

A. $[-2, 12]$

B. $(2, 12)$

C. $[2, 12]$

D. $(-2, 12)$



12. Solve the linear inequality below. Then, choose the constant and interval combination that describes the solution set.

A. $(-\infty, a]$, where $a \in [0, 6]$

B. $[a, \infty)$, where $a \in [1.4, 4.3]$

C. $[a, \infty)$, where $a \in [-7, 1]$

D. $(-\infty, a]$, where $a \in [-6.2, -1.1]$

E. $(-\infty, \infty)$

$$3x - 9 \leq 6x - 3$$

$$\begin{array}{r} a = \boxed{-2} \end{array} \quad \begin{array}{r} -3x \quad -3x \\ \hline -9 \leq 3x - 3 \\ +3 \quad +3 \\ \hline -6 \leq 3x \\ \hline 3 \quad 3 \\ -2 \leq x \end{array}$$



$$[-2, \infty)$$

13. Solve the linear inequality below. Then, choose the constant and interval combination that describes the solution set.

$$\text{LCD: } 36$$



$$(-1.1163, \infty)$$

$$a = \boxed{-1.1163}$$

$$36\left(-\frac{10x}{9} + 1\right) > 36\left(-\frac{7x}{2} - \frac{5}{3}\right)$$

A. $(-\infty, a]$, where $a \in [-1, 3]$

B. $(-\infty, a)$, where $a \in [-4, 1]$

C. (a, ∞) , where $a \in [-5, 1]$

D. (a, ∞) , where $a \in [0, 3]$

E. There is no solution to the inequality.

$$86x + 36 > -60$$

$$\begin{array}{r} -36 \quad -36 \\ \hline 86x > -96 \end{array}$$

$$\frac{86x}{86} > \frac{-96}{86}$$

$$x > -\frac{96}{86} \Rightarrow \boxed{x > -1.1163}$$

14. Solve the linear inequality below. Then, choose the constant and interval combination that describes the solution set.

$$\begin{array}{r} -6 + 5x > 7x \\ \hline -5x \end{array}$$

$$\frac{-6}{2} > \frac{2x}{2}$$

$$\underline{-3 > x}$$

$$-6 + 5x > 7x \quad \text{or} \quad 9 + 4x < 6x$$

$$a = \boxed{-3}$$

$$b = \boxed{4.5}$$

$$\begin{array}{r} 9 + 4x < 6x \\ -4x -4x \\ \hline \frac{9}{2} < \frac{2x}{2} \end{array}$$

$$\frac{9}{2} < x \Rightarrow \underline{4.5 < x}$$

$$-3 > x \text{ or } 4.5 < x$$

- A. $(-\infty, a) \cup (b, \infty)$, where $a \in [-3.7, -2.8]$ and $b \in [3.2, 5.6]$
- B. $(-\infty, a] \cup [b, \infty)$, where $a \in [-3.3, -1.7]$ and $b \in [3.1, 4.7]$
- C. $(-\infty, a] \cup [b, \infty)$, where $a \in [-4.7, -3.8]$ and $b \in [2.2, 4.4]$
- D. $(-\infty, a) \cup (b, \infty)$, where $a \in [-5.7, -4.1]$ and $b \in [1.5, 4]$
- E. $(-\infty, \infty)$



$$(-\infty, -3) \cup (4.5, \infty)$$

15. Solve the linear inequality below. Then, choose the constant and interval combination that describes the solution set.

$\downarrow \text{LCD: 7}$

$$\left(6 + 4x < \frac{37x - 9}{7} \leq 6 + 5x \right) \text{?}$$

$$a = \boxed{5.6} \quad b = \boxed{25.5}$$

$$7(6 + 4x) < 7\left(\frac{37x - 9}{7}\right) \leq 7(6 + 5x)$$

- A. $(a, b]$, where $a \in [-30, -24]$ and $b \in [-10, -3]$
- B. $[a, b)$, where $a \in [1, 6]$ and $b \in [25, 26]$
- C. $[a, b)$, where $a \in [-30, -23]$ and $b \in [-7, 1]$
- D. $(a, b]$, where $a \in [3, 9]$ and $b \in [23, 27]$
- E. There is no solution to the inequality.

$$42 + 28x < 37x - 9 \leq 42 + 35x$$

$$42 + 28x < 37x - 9$$

AND

$$37x - 9 \leq 42 + 35x$$

$$42 + 28x < 37x - 9$$

$$\underline{-28x -28x}$$

$$37x - 9 \leq 42 + 35x$$

$$\underline{-35x -35x}$$

$$x > 5.6 \text{ AND } x \leq 25.5$$

$$5.6 < x \leq 25.5$$

$$42 < 9x - 9$$

$$\underline{+9 +9}$$

$$2x - 9 \leq 42$$

$$\underline{+9 +9}$$

$$\leftarrow \textcolor{red}{\underline{\underline{5.6}} \quad \underline{\underline{25.5}}} \rightarrow$$

$$\frac{51}{9} < \frac{9x}{9}$$

$$\frac{2x}{2} \leq \frac{51}{2}$$

$$(5.6, 25.5]$$

$$\frac{51}{9} < x \Rightarrow 5.6 < x$$

$$\begin{aligned} x &\leq \frac{51}{2} \\ x &\leq 25.5 \end{aligned}$$