

Name: _____

Class Test – Algebra 3

Attempt all Questions

- Q1. (a) Solve the following inequality and show the solution on the number line.

$$x - 1 > 2(x - 3) - 1, \quad x \in N.$$

$$\begin{aligned}x - 1 &> 2x - 6 - 1 \\x - 2x &> -7 + 1 \\-x &> -6 \\x &< 6.\end{aligned}$$

10m

(0,2,5,8)



(b) (i) Find the solution set of E of $-4 > \frac{x-6}{2}, x \in Z$ Sm (0,2,4,5)

(ii) Find the solution set of F of $x \geq \frac{2x+1}{3}, x \in Z$ Sm (0,2,4,5)

(iii) Graph the solution sets of E and F on the same number line. Sm (0,2,4,5)

(iv) Find the solution set of $E \cap F$ and $E \cup F$.
Sm (0,2,5) Sm (0,2,5)

(i) $-8 > x - 6$
 $-x > 2$
 $x < -2$

(ii) $3x \geq 2x + 1$
 $x \geq 1$

(iii)



(iv) $E \cap F = \emptyset$ or $\{ \}$

$E \cup F = x < -2$ or $x \geq 1$

(c) Find the set of all real values of x for which $\frac{2x-5}{x-3} \leq \frac{5}{2}$.

$$x^2(x-3)^2$$

$$\frac{(2)(x-3)^2(2x-5)}{(x-3)} \leq \frac{5(x^2-6x+9)}{2}$$

$$(2x-6)(2x-5) \leq 5(x^2-6x+9)$$

$$4x^2-10x-12x+30 \leq 5x^2-30x+45$$

$$-x^2+22x-30 \leq 0$$

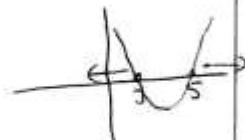
$$x^2-8x+15 \geq 0$$

$$\begin{array}{r} +15 \\ -3-5 \\ \hline \end{array}$$

$$(x-3)(x-5) \geq 0$$

$$x=3 \quad \text{or} \quad x=5$$

$$x \leq 3 \quad \text{or} \quad x \geq 5$$



15m (0, 4, 7, 11, 15)

Q2. (a) Solve $2|x+4| \leq |x+5|$

$$\begin{aligned}
 (2|x+4|)^2 &\leq (x+5)^2 \\
 4(x^2 + 8x + 16) &\leq x^2 + 10x + 25 \\
 4x^2 + 32x + 64 &\leq x^2 + 10x + 25 \\
 3x^2 + 22x + 39 &\leq 0 \quad (+17) \\
 3x^2 + 9x + 13x + 39 &= 0 \quad (+9+13) \\
 3x(x+3) + 13(x+3) &= 0 \\
 x = -3 \text{ or } x = -\frac{13}{3} &
 \end{aligned}$$

10m
(0, 2, 5, 8, 10)

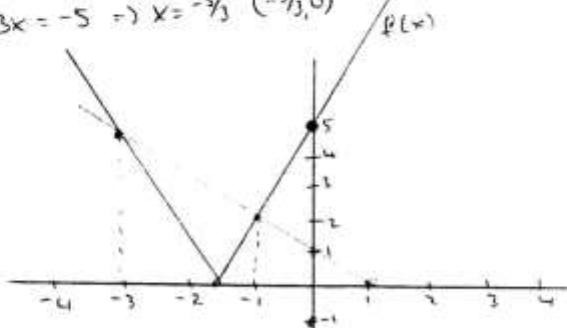


- (b) Using the same axes and scales, graph the functions $f(x) = |3x+5|$ and $h(x) = |x-1|$. Using your graph, find the values of $x \in \mathbb{R}$ for which: 6m x 2
(0, 2, 4, 6)

- (i) $f(x) = h(x)$ 3m (0, 3)
- (ii) $f(x) < h(x)$ 3m (0, 3)
- (iii) $h(x) \geq f(x)$ 2m (0, 2)

$$\begin{aligned}
 g(x) &= |3x+5| \\
 f(0) &= |0+5| = 5 \quad (0, 5) \\
 0 &= 3x+5 \\
 3x = -5 &\Rightarrow x = -\frac{5}{3} \quad \left(-\frac{5}{3}, 0\right)
 \end{aligned}$$

$$\begin{aligned}
 h(x) &= |x-1| \\
 h(0) &= |-1| = 1 \quad (0, -1) \\
 0 &= |x-1| \Rightarrow x = 1 \\
 &\quad (1, 0)
 \end{aligned}$$



- (i) $f(x) = h(x)$ at $x = -3$ and -1
- (ii) $f(x) < h(x) \Rightarrow$ red under green $= -3 < x < -1$
- (iii) $h(x) \geq f(x) \Rightarrow$ green above red $= -3 \leq x \leq -1$