Show all work!	Name: *Key*	Score

1. Given the points $P(-2,3)$ and $Q(4,-1)$, find:

a) The distance $d(P,Q)$.

$$d(PQ) = \sqrt{(4+2)^2 + (-1-3)^2}$$
$$= \sqrt{6^2 + 4^2}$$
$$= \sqrt{52}$$
$$= 2\sqrt{13}$$

Ans:_____

b) The slope of the segment $\overline{PQ}$.

$$m = \frac{-1-3}{4+2} = -\frac{4}{6} = -\frac{2}{3}$$

Ans:_____

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Tot	

2. a) Solve for x: $4(x-1) = 2x+1$.

$$4x - 4 = 2x + 1$$
$$2x = 5$$
$$x = 5/2$$

Ans:_____

b) Solve for x: $(3/x) + (4/x) = (1/x)$.

$$\frac{7}{x} = \frac{1}{x}$$
$$7 \neq 1 \quad \text{No sol}$$

Ans:___$\emptyset$___

3. Solve the Equations:

a) $3x^2 - 8x - 3 = 0$

$$\tfrac{1}{3}(3x-9)(3x+1) = 0$$
$$(x-3)(3x+1) = 0$$
$$x = 3 \quad \text{or} \quad 3x+1 = 0$$
$$3x = -1$$
$$x = -1/3$$

Ans:___$x = 3, -1/3$___

b) $x^2 = x+1$

$$x^2 - x - 1 = 0$$
$$x = \frac{1 \pm \sqrt{1+4}}{2} = \frac{1 \pm \sqrt{5}}{2} \quad (\text{Golden ratio})$$

Ans:_____

4. Find the equations of the lines passing through:

a) The points $(1,-3)$ and $(2,-4)$.

$$m = \frac{-4+3}{2-1} = -1$$
$$\frac{y+3}{x-1} = -1$$
$$y+3 = -x+1$$
$$y = -x-2$$

Ans:_____

b) The point $(1,2)$ and $\perp$ to the line $4x + 2y = 9$.

$$m_\perp = -\frac{1}{-2} = \frac{1}{2} \qquad 2y = 9 - 4x$$
$$\qquad\qquad\qquad\qquad\quad y = -2x + 9/2$$
$$\frac{y-2}{x-1} = \frac{1}{2}$$
$$y-2 = \tfrac{1}{2}x - \tfrac{1}{2}$$

Ans:___$y = \tfrac{1}{2}x + \tfrac{3}{2}$___

5. a) Solve: $\dfrac{3}{x-2} = \dfrac{1}{x-1} + \dfrac{7}{(x-1)(x-2)}$.

$$3(x-1) = (x-2) + 7$$
$$3x - 3 = x + 5$$
$$2x = 8$$
$$x = 4$$

Ans:_____

b) Solve: $2x^4 - 17x^2 - 9 = 0$

$$(x^2 - 9)(2x^2 + 1) = 0$$
$$x^2 = 9 \qquad 2x^2 = -1$$
$$x = \pm 3 \qquad x^2 = -\tfrac{1}{2}$$
$$\qquad\qquad x = \pm \tfrac{1}{\sqrt{2}} i$$

Ans:___$x = \pm 3, \pm \tfrac{1}{\sqrt{2}} i$___

Extra Space

6.	Solve: $\sqrt{15 + 2x} - x = 6$	
	$\sqrt{15 + 2x} = 6 + x$ $15 + 2x = 36 + 12x + x^2$ $0 = x^2 + 10x + 21$ $(x + 3)(x + 7) = 0$ $x = -3, -7$	Check $x = -3$ $\sqrt{15 - 6} + 3 = 6$ ✓ $x = -7$ $\sqrt{15 - 14} + 7 \neq 6$ ✗ Ans: $x = -3$

7.	How many cc. of pure HCl should be added to 20 cc. of a 30% HCl solution to get a 50% solution?	
		Amt	%			$100x + 600 = 50x + 1000$
		x	100%	$\frac{100}{100}x$		$50x = 400$
		20	30%	$\frac{30}{100} \cdot 20$		$x = 8$
		$x + 20$	50%	$\frac{50}{100}(x + 20)$		
	$\frac{100}{100}x + \frac{30}{100} \cdot 20 = \frac{50}{100}(x + 20)$	Ans:

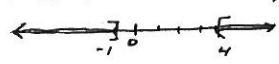| 8.	Solve the following inequalities:	
	a) $2 < 2x - 4 < 10$. $6 < 2x < 14$ $3 < x < 7$ Sol: $\{x \in \mathbb{R} \mid 3 < x < 7\}$ Ans: $(3, 7)$	b) $|3 - 2x| \geq 5$. $3 - 2x \geq 5$ or $3 - 2x \leq -5$ $-2x \geq 2$ $-2x \leq -8$ $x \leq -1$ $x \geq 4$ Ans: $(-\infty, -1] \cup [4, \infty)$

9.	Write in the form $a + ib$	
	a) $(4 + 3i)(4 - 3i). = 4^2 - 3^2 i^2$ $= 16 - 9(-1)$ $= 25$ Ans:	b) $\frac{4 + i}{4 - i} = \frac{4 + i}{4 - i}\left(\frac{4 + i}{4 + i}\right) = \frac{16 + 8i + i^2}{4^2 - i^2}$ $= \frac{15 + 8i}{16 + 1} = \frac{15}{17} + \frac{8}{17}i$ Ans:

10.	Solve the following system of equations:	
	$\begin{cases} 2x + y = 2 \\ 3x + 2y = 1 \end{cases}$ $y = 2 - 2x$ $\rightarrow -4x - 2y = -4$ $-x = -3$ $x = 3$ $\therefore y = -4$	Ans:

	Extra Space	