SOLVING INEQUALITIES

A INEQUALITIES

A.1 RECOGNIZING INEQUALITIES

MCQ 1: Is $2x - 3 = 0$ an inequality?

- ☐ Yes.
- ☐ No.

MCQ 2: Is $5x + 1 > 0$ an inequality?

- ☐ Yes.
- ☐ No.

MCQ 3: Is $x - 4 \leq 2$ an inequality?

- ☐ Yes.
- ☐ No.

MCQ 4: Is $3x + 2 = 7$ an inequality?

- ☐ Yes.
- ☐ No.

B PROPERTIES OF INEQUALITIES

B.1 FINDING THE SOLUTION SET OF INEQUALITIES

MCQ 5: For $2x - 6 \geq 0$, the set of solutions is:

- ☐ $[3, +\infty)$
- ☐ $(-\infty, 6]$
- ☐ $(-\infty, 3]$
- ☐ $[6, +\infty)$

MCQ 6: For $3x - 5 \leq 10$, the set of solutions is:

- ☐ $\left[\frac{5}{3}, +\infty\right)$
- ☐ $(-\infty, 3]$
- ☐ $(-\infty, 5]$
- ☐ $[5, +\infty)$

MCQ 7: For $-2x + 3 \geq 5$, the set of solutions is:

- ☐ $(-\infty, 1]$
- ☐ $[1, +\infty)$
- ☐ $(-\infty, -1]$
- ☐ $[-1, +\infty)$

MCQ 8: For $3x - 2 < 4$, the set of solutions is:

- ☐ $(-\infty, 2]$
- ☐ $[2, +\infty)$
- ☐ $(-\infty, 2)$
- ☐ $(2, +\infty)$

B.2 SOLVING INEQUALITIES: LEVEL 1

Ex 9: Solve $2x - 6 \geq 0$. Justify your answer.

Ex 10: Solve $4x + 2 > 6$. Justify your answer.

Ex 11: Solve $5 - 3x \leq 2$. Justify your answer.

Ex 12: Solve $-x + 4 < 7$. Justify your answer.

B.3 SOLVING INEQUALITIES: LEVEL 2

Ex 13: Solve $2x - 2 > 4x + 1$. Justify your answer.

Ex 14: Solve $3(2x - 1) \leq 5x + 4$. Justify your answer.

Ex 15: Solve $-4x + 7 < 2x - 3$. Justify your answer.

Ex 16: Solve $5 - 2(x + 1) \geq 3x$. Justify your answer.

C SOLVING NON-LINEAR INEQUALITIES USING A SIGN TABLE

C.1 COMPLETING TABLES OF SIGNS FOR LINEAR EXPRESSIONS

Ex 17: Complete the table of signs for the expression $x - 2$.

x	$-\infty$ $\qquad$ $+\infty$
$x - 2$	

Ex 18: Complete the table of signs for the expression $3 - x$.

x	$-\infty$ $\qquad$ $+\infty$
$3 - x$	

Ex 19: Complete the table of signs for the expression $2x - 4$.

x	$-\infty$ $\qquad$ $+\infty$
$2x - 4$	

Ex 20: Complete the table of signs for the expression $1 - 2x$.

x	$-\infty$ $\qquad$ $+\infty$
$1 - 2x$	

C.2 READING TABLE OF SIGNS

Ex 21:

x	$-\infty$		0		2		$+\infty$
x		$-$	0	$+$		$+$	
$(x - 2)$		$-$		$-$	0	$+$	
$x(x - 2)$		$+$	0	$-$	0	$+$	

For $x = -1$, the sign of $x(x - 2)$ is $\begin{matrix} \square - \\ \square + \end{matrix}$.

Ex 22:

x	$-\infty$		-2		2		$+\infty$
$4 - 2x$		$+$		$+$	0	$-$	
$2 + x$		$-$	0	$+$		$+$	
$(4 - 2x)(2 + x)$		$-$	0	$+$	0	$-$	

For $x = 3$, the sign of $(4 - 2x)(2 + x)$ is $\begin{matrix} \square - \\ \square + \end{matrix}$.

Ex 23:

x	$-\infty$		1		2		$+\infty$
$(x - 2)$		$-$		$-$	0	$+$	
$(x - 1)$		$-$	0	$+$		$+$	
$(x - 2)(x - 1)$		$+$	0	$-$	0	$+$	

For $x = \frac{3}{2}$, the sign of $(x - 2)(x - 1)$ is $\begin{matrix} \square - \\ \square + \end{matrix}$.

Ex 24:

x	$-\infty$		-1		$\frac{1}{2}$		$+\infty$
$1 - 2x$		$+$		$+$	0	$-$	
$-1 - x$		$+$	0	$-$		$-$	
$(1-2x)(-1-x)$		$+$	0	$-$	0	$+$	

For $x = 0$, the sign of $(1 - 2x)(-1 - x)$ is $\begin{matrix} \square - \\ \square + \end{matrix}$.

C.3 IDENTIFYING THE SIGN TABLE FOR EXPRESSIONS

MCQ 25: Choose the correct table of signs for the expression $(x-2)(x-1)$.

x	$-\infty$		1		2		$+\infty$
$(x-2)$		$+$		$+$	0	$-$	
$(x-1)$		$-$	0	$+$		$+$	
$(x-2)(x-1)$		$-$	0	$+$	0	$-$	

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x	$-\infty$		1		2		$+\infty$
$(x-2)$		$-$		$-$	0	$+$	
$(x-1)$		$-$	0	$+$		$+$	
$(x-2)(x-1)$		$+$	0	$-$	0	$+$	

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x	$-\infty$		-2		-1		$+\infty$
$(x-2)$		$-$		$+$	0	$+$	
$(x-1)$		$-$	0	$-$		$+$	
$(x-2)(x-1)$		$+$	0	$-$	0	$+$	

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MCQ 26: Choose the correct table of signs for the expression $(3-x)(x+1)$.

x	$-\infty$		-1		3		$+\infty$
$(3-x)$		$+$		$+$	0	$-$	
$(x+1)$		$-$	0	$+$		$+$	
$(3-x)(x+1)$		$-$	0	$+$	0	$-$	

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x	$-\infty$		-1		3		$+\infty$
$(3-x)$		$-$		$-$	0	$+$	
$(x+1)$		$-$	0	$+$		$+$	
$(3-x)(x+1)$		$+$	0	$-$	0	$+$	

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x	$-\infty$		-1		3		$+\infty$
$(3-x)$		$+$		$+$	0	$-$	
$(x+1)$		$+$	0	$-$		$-$	
$(3-x)(x+1)$		$+$	0	$-$	0	$+$	

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MCQ 27: Choose the correct table of signs for the expression $(2-x)(-2-x)$.

x	$-\infty$		-2		2		$+\infty$
$(2-x)$		$+$		$+$	0	$-$	
$(-2-x)$		$+$	0	$-$		$-$	
$(2-x)(-2-x)$		$+$	0	$-$	0	$+$	

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x	$-\infty$		-2		2		$+\infty$
$(2-x)$		$-$		$-$	0	$+$	
$(-2-x)$		$-$	0	$-$		$+$	
$(2-x)(-2-x)$		$+$	0	$-$	0	$+$	

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x	$-\infty$		-2		2		$+\infty$
$(2-x)$		$+$		$+$	0	$-$	
$(-2-x)$		$+$	0	$-$		$+$	
$(2-x)(-2-x)$		$-$	0	$+$	0	$-$	

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MCQ 28: Choose the correct table of signs for the expression $(2x-1)(x+3)$.

x	$-\infty$		-3		$\frac{1}{2}$		$+\infty$
$(2x-1)$		$-$		$+$	0	$+$	
$(x+3)$		$-$	0	$-$		$+$	
$(2x-1)(x+3)$		$+$	0	$-$	0	$+$	

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x	$-\infty$		-3		$\frac{1}{2}$		$+\infty$
$(2x-1)$		$-$		$-$	0	$+$	
$(x+3)$		$-$	0	$+$		$+$	
$(2x-1)(x+3)$		$+$	0	$-$	0	$+$	

x	$-\infty$		-3		$\frac{1}{2}$		$+\infty$
$(2x-1)$		$+$		$-$	0	$-$	
$(x+3)$		$-$	0	$+$		$+$	
$(2x-1)(x+3)$		$+$	0	$-$	0	$+$	

x	$-\infty$ $\quad$ $+\infty$
$(2-x)$	
$(2+x)$	
$(2-x)(2+x)$	

C.4 COMPLETING TABLES OF SIGNS FOR FACTORIZED QUADRATIC EXPRESSIONS

Ex 29: Complete the table of signs for the expression $(x-2)(x-1)$.

x	$-\infty$ $\quad$ $+\infty$
$(x-2)$	
$(x-1)$	
$(x-2)(x-1)$	

Ex 30: Complete the table of signs for the expression $x(1-x)$.

x	$-\infty$ $\quad$ $+\infty$
x	
$(1-x)$	
$x(1-x)$	

Ex 31: Complete the table of signs for the expression $(2-x)(3-x)$.

x	$-\infty$ $\quad$ $+\infty$
$(2-x)$	
$(3-x)$	
$(2-x)(3-x)$	

Ex 32: Complete the table of signs for the expression $(2-x)(2+x)$.