Name : _____ ( )

Class : _____ Date : _____

Marks : _____ /100

CHAPTER 8

Inequalities

[Time allowed: 35 minutes]

1. Express each of the following sentences in an inequality and solve the inequality.

(a) The product of 3 and x plus 2 is less than or equal to 9. (5 marks)

$3x + 2 \leq 9$

$3x \leq 9 - 2$

$3x \leq 7$

$x \leq \frac{7}{3}$

(b) The sum of x and six times x is greater than 14. (5 marks)

$x + 6x > 14$

$7x > 14$

$x > 2$

(c) The product of 8 and 2 is not less than half of x. (5 marks)

$2(8) \geq 5 - \frac{x}{2}$ multiply both sides by 2

$16 \geq 5 - \frac{x}{2}$

$32 \geq 10 - x$

$32 - 10 \geq -x$

$22 \geq -x$

$x \geq -22$

2. (a) Is $x = -2$ a solution of the inequality $4x - 7 < 1$? (4 marks)

Sub $x = -2$ into the inequality

$4x - 7 < 1$

$4(-2) - 7 < 1$

$-8 - 7 < 1$

$-15 < 1$

Since this condition is satisfied,

$x = -2$ is a solution.

(b) Is $x = 1$ a solution of the inequality $2x + 9 \geq 11$? (4 marks)

LHS		RHS
$2x+9$		11.
$2(1)+9$	$\geq$	11
$2+9$		11.
11		11

TRUE.

Since condition is satisfied. $x=1$ is a solution.

(c) Is $x = \frac{4}{3}$ a solution of the inequality $2 - x \geq 1$? (4 marks)

$2 - x \geq 1$.

$2 - \frac{4}{3}$		1.
$\frac{2}{3}$	$\geq$	1.

$\therefore x = \frac{4}{3}$ is not a solution.

FALSE.

3. Solve the following inequalities and represent the solutions graphically.

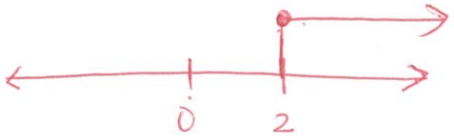
(a) $4x - 7 \geq x - 1$ (5 marks)

$4x - 7 \geq x - 1$

$4x - x \geq -1 + 7$

$3x \geq 6$

$x \geq 2$ //



(b) $\frac{1-x}{3} > -4$ (7 marks)

$\frac{1-x}{3} > -4$. Multiply 3 by both sides.

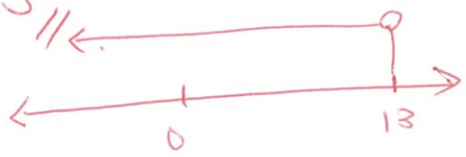
$3\left(\frac{1-x}{3}\right) > 3(-4)$

$1 - x > -12$

$-x > -12 - 1$

$-x > -13$

$x < 13$ //



(c) $2(x+1) - 5 \leq 103$ (7 marks)

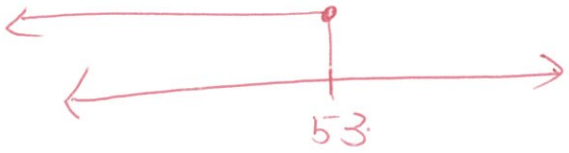
$2(x+1) - 5 \leq 103$

$2x + 2 - 5 \leq 103$

$2x - 3 \leq 103$

$2x \leq 106$

$x \leq 53$ //



(3) (d) $\frac{x+1}{2} < \frac{1-x}{3}$ (9 marks)

$\frac{x+1}{2} < \frac{1-x}{3}$ cross multiply

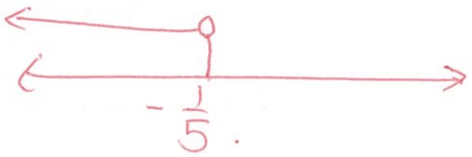
$3(x+1) < 2(1-x)$.

$3x+3 < 2-2x$.

$3x+2x < 2-3$.

$5x < -1$

$x < -\frac{1}{5}$



4. The difference between two integers is 5, and their sum is not less than 93, find the smallest value of the smaller integer. (7 marks)

let the smaller integer be x
let the larger integer be $x+5$.

$(x)+(x+5) \geq 93$

$x+x+5 \geq 93$

$2x+5 \geq 93$

$2x \geq 88$

$x \geq 44$.

at least 44

$\therefore$ Smallest value of x is 44.

5. In a Mathematics competition, 3 marks are given for each correct answer and 2 marks are deducted for each wrong answer. If Kelly has answered 20 questions and has obtained less than 15 marks, at most how many questions has she answered correctly? (9 marks)

Let # of right answers be x (3 points each).
Let # of wrong answers be $(20-x)$. (-2 points each)

$$3x + [-2(20-x)] < 15$$

$$3x + (-40+2x) < 15$$

$$5x - 40 < 15$$

$$5x < 15 + 40$$

$$5x < 55$$

$$x < 11$$

$\therefore$ She answered 10 questions correctly.

NOT 11

6. If $x > 15$, express the ranges of values of a, b and c in inequalities.

(a) $a = 3x$ (4 marks)

set of value

$3(x) > (15)$

$3x > 45$

$\therefore a > 45$

(b) $b = 5 - 3x$ (4 marks)

from a) $3x > 45$

$\therefore -3x < -45$

$5 - 3x \mid 5 - 3x < 5 - 45 \longrightarrow 5 - 3x < -40$

$b < -40$

b

(c) $c = \dfrac{5-3x}{2}$ (4 marks)

From b) $5-3x < -40$.

$\dfrac{5-3x}{2} < \dfrac{-40}{2}$

$\therefore c < -20$.

7. Prove that the following statements are correct.

(a) If $a > -2$ and $b > 3$, then $a + b > 1$. (4 marks)

LHS	>	RHS
$a+b$	>	1
a	>	-2
$a+b$		$-2+3$
$a+b$	>	1

$a > -2$ since

$\therefore$ This is true.

TRUE

(b) If $a < -3$ and $b > 4$, then $ab < -12$. (4 marks)

* Don't we. other numbers to prove.

LHS	<	RHS
ab		-12.
$(-3)(4)$	<	-12.
a	<	-3
ab		$-3(4)$
ab	<	-12.

This statement is true.

8. A mobile phone service payment is charged as follows:

First 1 000 minutes	\$65
Every minute thereafter	\$0.8

(Less than 1 minute will be charged for 1 minute.)

Mr. Lee is a user of the plan and he expects the charge for this month is at most \$120. At most how long has Mr. Lee spent on the mobile phone this month? (9 marks)

Use 1 variable.

Let t be the number of minutes used after 1000 mins

Total time	1000	t	$1000+t$
Cost	65	$0.8t$	$65+0.8t$

≤ 120

$65+0.8t \leq 120$

$0.8t \leq 120-65$

$0.8t \leq 55$

$t \leq 68.75$

Since they count per minute.

Mr Lee can talk at most 68.

∴ His total is 1068 minutes

— End of Paper —