Name:	Date:

Topic 1	Linear Inequality

Recap: Basic properties of Inequalities

Notation	Meaning
$x < a$	x is less than a.
$x \leq a$	x is less than or equal to a.
$x > a$	x is greater than a.
$a < x < b$	x is between a and b (exclusive).
$a \leq x \leq b$	x is between and b (inclusive).

In general, always make x the subject.

IMPORTAN T NOTE:

- **Rearranging terms in inequalities does not flip the sign.**
- **Inequality sign is reversed only when we multiply or divide both sides by a negative number.**
- $-x > 10$

  $x < 10$

Always make x the subject

👉**Linear Inequalities**

Example: $a < x \leq b$

- To solve linear inequalities, always make x the subject.
- Then, represent the solutions on a number line.

Example: 2014 ANGLICAN HIGH HIGH S4 PRELIM P1

Solve the inequality $\frac{x}{4} - \frac{3x-1}{2} > 5$.
Illustrate your solution on the number line.

$\frac{x}{4} - \frac{3x-1}{2} > 5$

$\frac{x - 6x + 2}{4} > 5$

$\frac{-5x + 2}{4} > \frac{20}{4}$

$-5x + 2 > 20$

$-5x > 18$

$x < -\frac{18}{5}$

$x < -3\frac{3}{5}$

2023 JUYING S2 EOY P1 Q2 [3 Marks]

1 Solve the inequality $15 > 1 - 2x$.

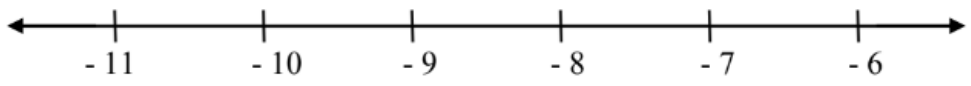
Ans: .....[2]

2023 CHANGKAT CHANGI SECONDARY S2 EOY P1 Q5 [4 Marks]

2 **(a)** Solve $-5x-1>-x+27$.

Answer ..... [2]

(b) Represent the solution in **(a)** on the number line provided below. [1]



(c) Write down the largest possible integer that satisfy the solution in (a).

Answer ..... [1]

2014 O LEVEL P2 Q1 [2 Marks]

3

(a) Solve the inequalities $\frac{4-5x}{2} > \frac{4x+1}{4}$.

Ans: (a) .....[2]

2024 ACS (I) S2 EOY P1 Q3 [2 Marks]

4 (a) Solve the inequality $\frac{x+1}{2} > x$

(a) .....[2]

(b) Given that $1 \leq p \leq 5$ and $-4 \leq q \leq 3$, write doen the

(i) Largest possible value of $2p - q$

(ii) Smallest possible value of pq^2

(iii) Smallest possible value of $\frac{q}{p}$.

(bi) ..... [1]

(bii) ..... [1]

(biii)..... [1]

Application Questions

2021 QUEENSWAY SECONDARY SCHOOL SEC 3 EOY P1 Q3 [3 Marks]

1. Given that x is an integer such that $-2 \leq x \leq 4$ and y is a prime number such that $3 \leq y < 20$, find

(a) the smallest possible value of $x^2 - y^2$,

Answer: ..... [1]

(b) the greatest possible value of $\frac{x}{y}$.

Answer: ..... [1]

(c) the smallest possible value of x^2y .

Answer: ..... [1]

2016 NYHG (S2) EOY P1 Q9b [4 Marks]

2.

Given that $3 \le a \le 5$ and $-2 \le b \le 4$ and that a and b are integers. find

(i) the smallest possible value of ab, [1]

(ii) the smallest possible value of $a^2 + b^2$, [1]

(iii) the biggest possible value of $a - \frac{b}{a}$. [2]

Ans

(a) ..... [1]

(b) ..... [1]

(c) ..... [2]

2012 ACS(I) S3 Final Year P1 Q2 [4 Marks]

3.

Given that $-5 < x < 2$, $1 \le y \le 6$ and x and y are integers, find

(a) The least possible value of $x+y^3$

(b) The least possible value of $\frac{y}{x}$

Ans

(a) ..... [2]

(b) ..... [2]

APPLICATION QUESTIONS: FORMING AN EXPRESSION

1. 2015 HOLY INNOCENTS' HIGH SEC 3 SA1 P1 Q10 [3 Marks]

In the first round of a math competition, students have to answer 40 questions.
10 points are awarded for every correct answer and 5 points deducted for every incorrect answer.
Students who score at least 300 points qualify for the next round.

Assuming the number of correct answers as x,

a) Form an inequality in x,
b) Solve the inequality in (a) and hence find the least number of correct answers needed to qualify for the next round.

Ans: (a) .....[1]
(b) .....[2]

2. 2014 DUNEARN SEC S3 SA1 Q7 [3 Marks]

A school organised a MCQ quiz for all Secondary 3 students. There were a total of 40 questions and the marks allocated were as follow:

Every correct question: 3 marks
Every incorrect question: Minus 2 marks
Question not attempted: No marks awarded / deducted.

A student was awarded the distinction grade if he/she achieved a minimum of 100 marks.
Using inequalities, calculate the minimum number of questions Ali attempted correctly if he was awarded the Distinction grade.

Answer (a)..... [3]

3. 2023 ACSI EOY S2 P1 Q10 [3 Marks]

The table below shows the charges for the same car model in two car rental companies. Car rental cost is computed based on booking fee plus hourly charges.

Company	Booking Fees ($)	Hourly Charge ($)
X	30	20
Y	70	12

Let n be the number of hours of car rental, where n is a whole number. Form and solve an inequality in n such that it is cheaper to rent the car from Company Y. Hence, find the minimum value of n.

Answer : Minimum value of n =.....hours [3]

4. 2018 TANJONG KATONG Secondary School S4 PRELIM EOY P1 Q12 [9 Marks]

Nurul works part-time in a supermarket.In one week, Nurul works f hours at the supermarket. Write down an inequality for the statement below.

Nurul must work at least 2 hours and less than 6 hours in a day.

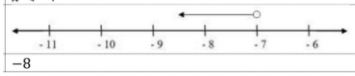
Answer .....[1]

Answer

Section 1.

$-4x > 28$

$x < -7$



-8

Q4.

a. $x < 1$

$b.\ 14\ /\ 0\ /-4$

Section 2

1. $x^2 - y^2 = 0 - 19^2$ $\quad \frac{x}{y} = \frac{4}{3}$
   $= -361$ _____/ $= 1\frac{1}{3}$ / 0

2. $-10\ /\ 9\ /\ 5\frac{2}{5}$

3. -3 and -6

Section 3 (Application)

1. $10(x) - 5(40 - x) \geq 300$

   $10(x) - 5(40 - x) \geq 300$
   $10x - 200 + 5x \geq 300$
   $15x \geq 500$
   $x \geq \frac{500}{15}$
   $x \geq 33\frac{1}{3}$

   The least number of correct answers is 34.

2. **Let the number of correct questions answered be x.**

   $3x \geq 100$

   $x \geq 33\frac{1}{3}$ ***while the rest of the questions remain non-attempted***

   Minimum no. of correct questions: 34
   (the idea is to score as many correct questions and leave the rest blank)

3. **(a)** $30 + 20n > 70 + 12n$
   $8n > 40$
   $n > 5$

   minimum value of $n = 6$

4. $2 \leq \frac{f}{7} < 6$