SHARP

Worksheet 9: Inequalities

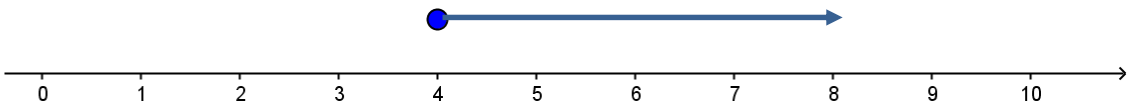
Grade 10 Technical Mathematics

1. Give the definition of each of the following words or symbols:

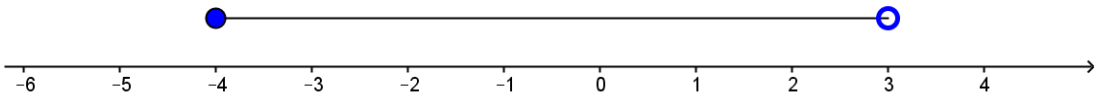
   a) set builder notation
   b) number line
   c) set
   d) [and]
   e) (and)
   f) $>$
   g) $\geq$
   h) o

2. Give the set builder notation for each of the following:

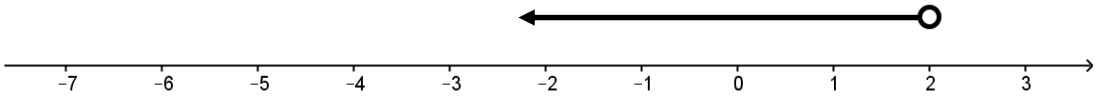
   a) [3; 6)
   b) $x \in Z, x \in (-4; 5]$
   c)



   d)



   e)



3. Draw a number line for each of the following:

   a) $x \in (-6; 2)$
   b) $\{x \in R: x > 3\}$
   c) $y \in Z \text{ and } [-3; 7)$
   d) $\{x \in N: x \geq -2\}$
   e) $\{x \in R: -4 < x \leq 5\}$

4. Solve the following inequalities and draw the solution on a number line.

a) $3x + 6 < 0$

b) $\frac{1}{3}x - 4 \geq 0$

c) $5(x - 7) \leq 4$

d) $5(7 - x) \leq 4$

e) $3(x + 4) > 4(x - 2)$

f) $\frac{1}{2}(x - 7) \geq x + 5$

g) $6(x - 3) - 3(x + 2) \leq 0$

h) $(x + 3)(x - 5) < (x + 4)(x - 7)$

i) $\frac{x+4}{3} + \frac{x-2}{4} > 1$

j) $7(3 - x) - 4(x + 1) \geq 3(x - 7)$

k) $(x - 8)(x + 9) \geq (x + 4)(x - 6)$

l) $\frac{3+x}{5} - \frac{x-6}{7} < 4 - x$

m) $5(x - 3) + 12(x - 11) \leq x + 3$

n) $\frac{1}{3}(x + 3) - 3 \geq 7$

o) $6(x - 3) < 4(8 - x) + 3(x - 7)$

p) $\frac{x-3}{2} - \frac{x-4}{3} \leq \frac{x+5}{5} + \frac{x-1}{6}$

q) $(x - 5)(x + 2) \geq (x - 6)(x - 3)$

r) $\frac{1}{2}(x + 4) - \frac{1}{4}(x - 4) \geq \frac{1}{3}$

5. Read the following questions carefully before answering. Show all your steps.

a) A company would like to manufacture water bottles. The equipment is rented monthly and costs R16 000 a month and each water bottle costs R17 to produce. If the water bottles are sold for R45. How many water bottles does the company need to sell to start making a profit?

b) A taxi charges a flat rate of R10, and an additional cost of 30 cents per kilometer. If you have a maximum of R22, how far can you travel?

c) A box which measures $x + 2cm$ in length and $x - 3cm$ in breadth, must have the same area or less as a box that has a length of $x - 4cm$ and a breadth of $x + 6cm$. What are the possible values of x?

d) You are comparing the cost of 2 cellphone contracts. The first contract has a base rate of R150, plus an additional R1 per minute for every call made. The second contract charges a rate of R2.50 per minute but has no base rate. When will it be better to have the first contract?

e) In physics, the formula $s = ut + \frac{1}{2}at^2$ gives the distance (s in m) when an initial speed (u in m/s) and acceleration (a in m/s) are applied over time (t in seconds). If a bus has 150m in which to stop and 3 seconds in which to stop and he was travelling at 60km/h, how fast would the bus decelerate?