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Mathematics

Question

1. (a) Find the truth set of the inequality; $3x - 7 < 2x + 5 \leq 4x - 3$

(b) What is the point of intersection of the lines $y = 2x - 3$ and $y = -x + 9$

(c) A car salesman earns a commission of 8% on every car he sells. He sells a car with a marked price of GH¢45,000. A VAT of 15% is also charged on the marked price.

(i) Find the commission the salesman earns

(ii) Find the total amount the buyer pays for the car

Solution

1. (a) Left inequality:

$$3x - 7 < 2x + 5$$

$$3x - 2x < 5 + 7$$

$$\Rightarrow x < 12$$

Right inequality: $2x + 5 \leq 4x - 3$

$$5 + 3 \leq 4x - 2x$$

$$8 \leq 2x$$

$$\frac{8}{2} \leq \frac{2x}{2}$$

$$4 \leq x$$

$$\Rightarrow x \geq 4$$

$$4 \leq x$$

$$\Rightarrow x \geq 4$$

Putting the two together:

$$4 \leq x < 12$$

(b) For the point of intersection set the two equations equal

$$y = 2x - 3 \text{ and } y = -x + 9$$

$$2x - 3 = -x + 9$$

$$2x + x = 9 + 3$$

$$3x = 12$$

$$\Rightarrow \frac{3x}{3} = \frac{12}{3}$$

$$\Rightarrow x = 4$$

Finding the y value, using

$$y = 2x - 3$$

$$y = 2(4) - 3$$

$$= 8 - 3$$

$$= 5$$

\(\therefore\) the point of intersection is $(4, 5)$

(c) Commission at 8%

$$\Rightarrow \frac{8}{100} \times 45,000$$

$$= \text{GH¢} 3,600.00$$

VAT of 15%

$$\Rightarrow \frac{15}{100} \times 45,000$$

$$= \text{GH¢} 6,750.00$$

Total buyer pays = GH¢ 45,000

$$+ 6,750$$

$$= \text{GH¢} 51,750.00$$