XT - MATHS Grade 11

Name: _____   **Class:** _____

Subject: Linear Programming   **Date:** _____

Total Marks: 156

Question 1: True/False [4]

G a m e I N C is a factory that manufactures computer games and TV games.
A maximum of **80** computer games and **50** TV games can be manufactured daily.
The factory can only produce **100** games in a working day.

If x is the number of computer games and y is the number of TV games, then:
$x + y \leq 130 \; ; \quad x \leq 80 \; ; \quad y \leq 50$

TRUE	FALSE

Question 2: True/False [20]

A stationery shop sells boxes of white paper (x) and boxes with multi-coloured paper (y).
A small printing business has a standing order of at least **6** boxes of each per week.
The shop can only stock a maximum of **20** boxes of paper every week.

Last week, the profit on white paper was **R 40** per box and it was **R 60** per box of coloured paper.
This week, the profit on white paper is **R 42** per box after a price increase and it is **R 30** per box of coloured paper due to a stock clearance sale.

The maximum profit will change from **R 1 080** to **R 768**.

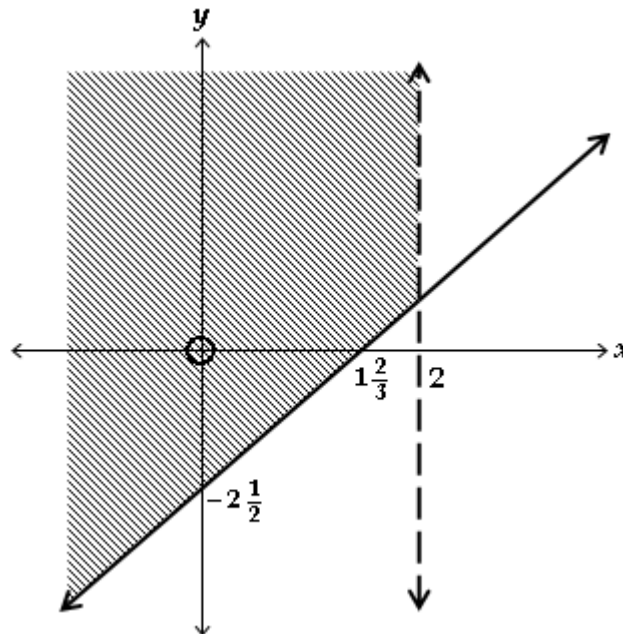| TRUE	FALSE

Question 3 refers to the following graphic

Figure 1: 11-0005

Question 3: True/False [4]

The sketch represents the intersection of the inequalities $2y - 3x + 5 \geq 0$ and $x < 2$

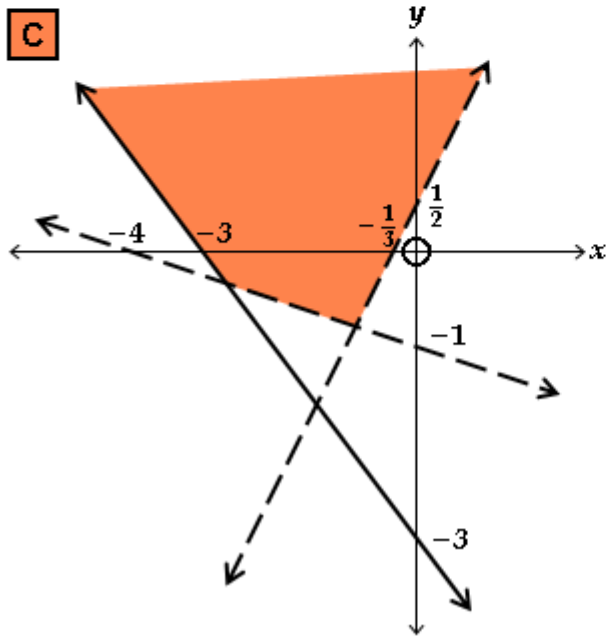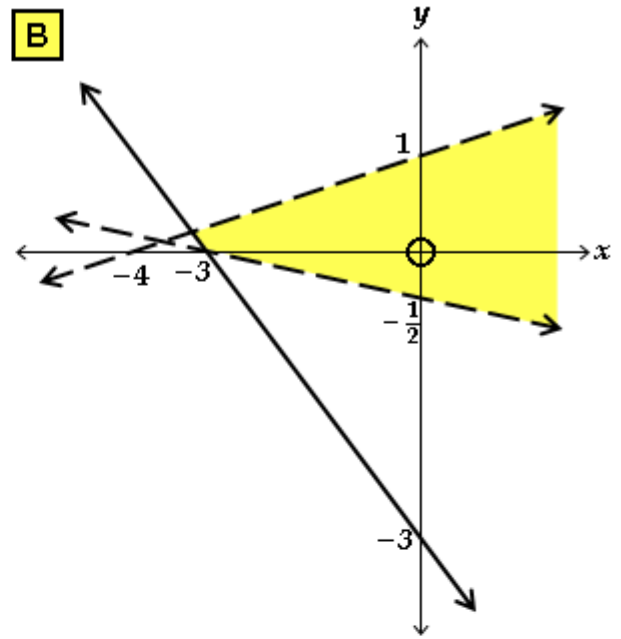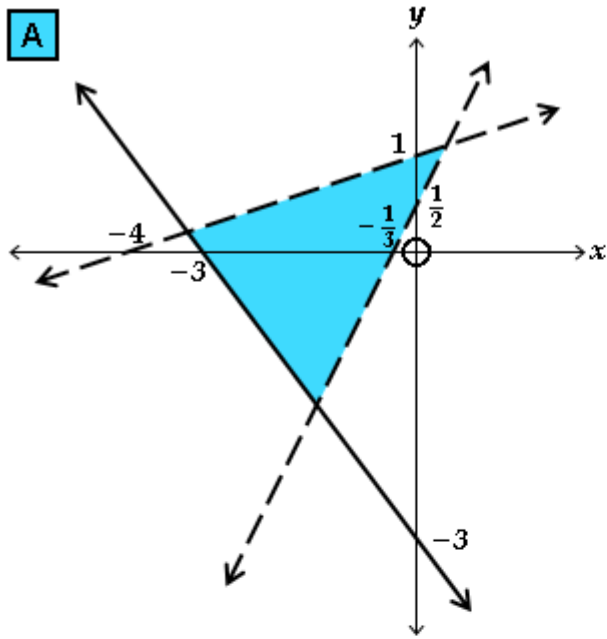| TRUE	FALSE

Question 4 refers to the following graphic
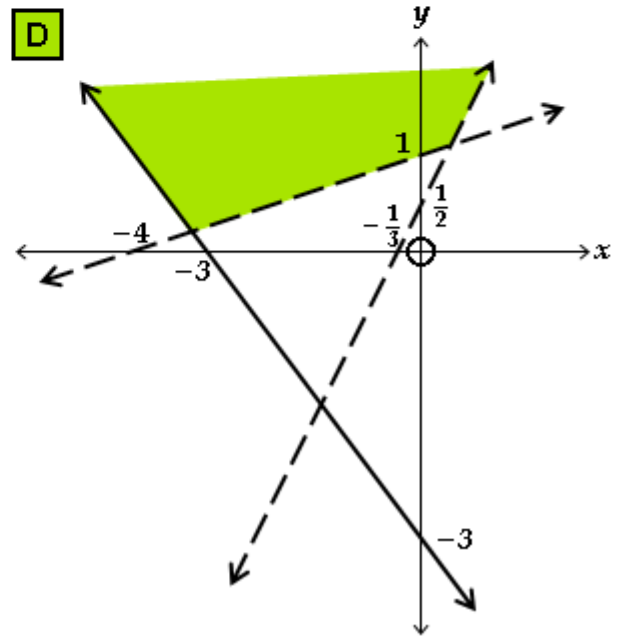
Figure 2: 11-0009

Question 4: Multiple Choice [6]

Graph ... represents the intersection of the inequalities: $x + y \geq -3$ and $2y - 1 > 3x$ and $4y - 4 - x < 0$

A	A
B	B
C	C
D	D

Question 5 refers to the following graphic

A

B

C

D
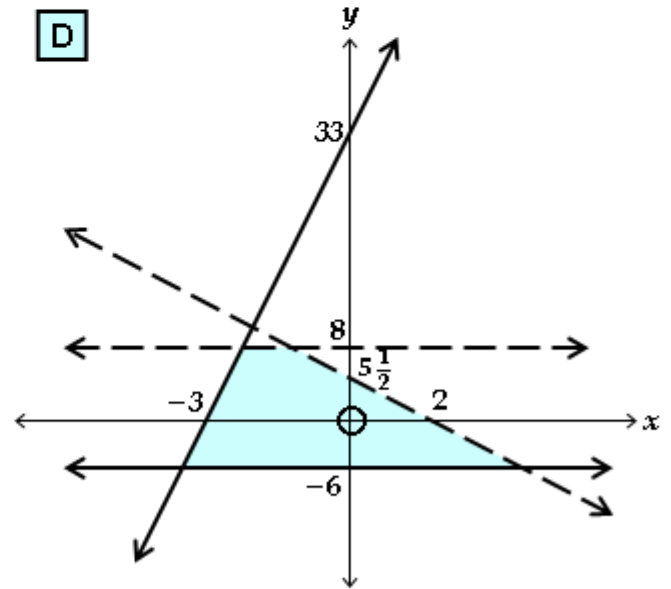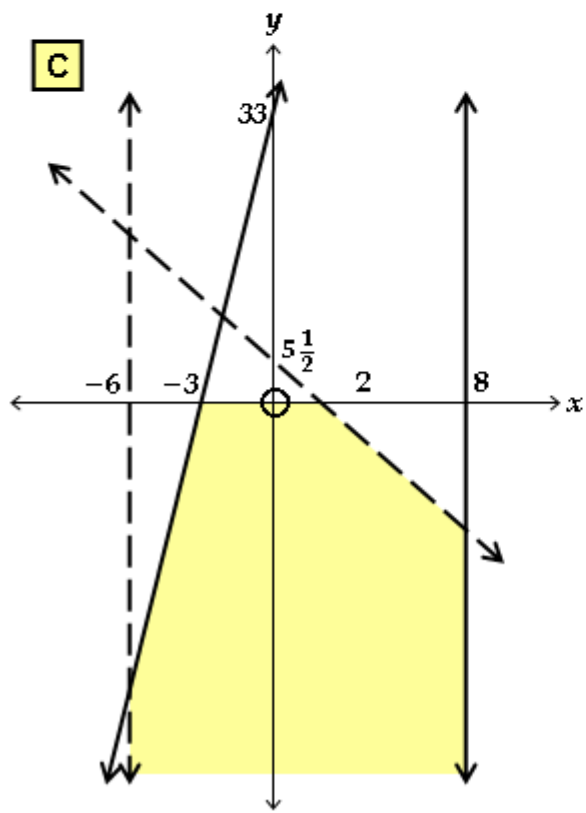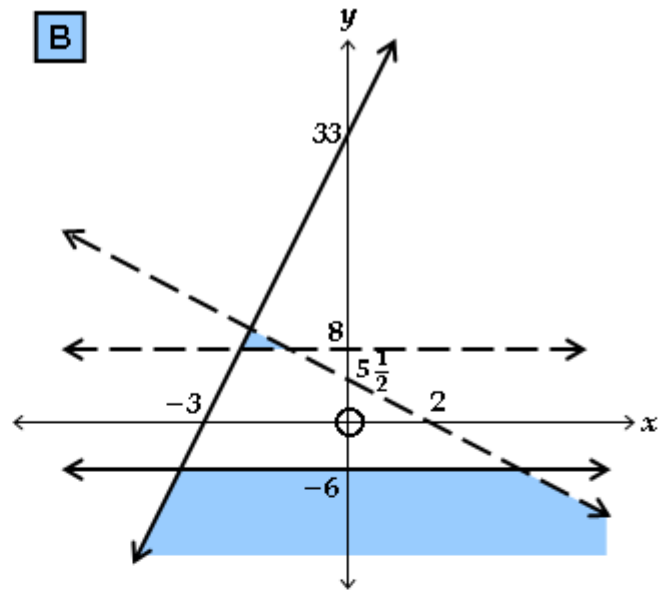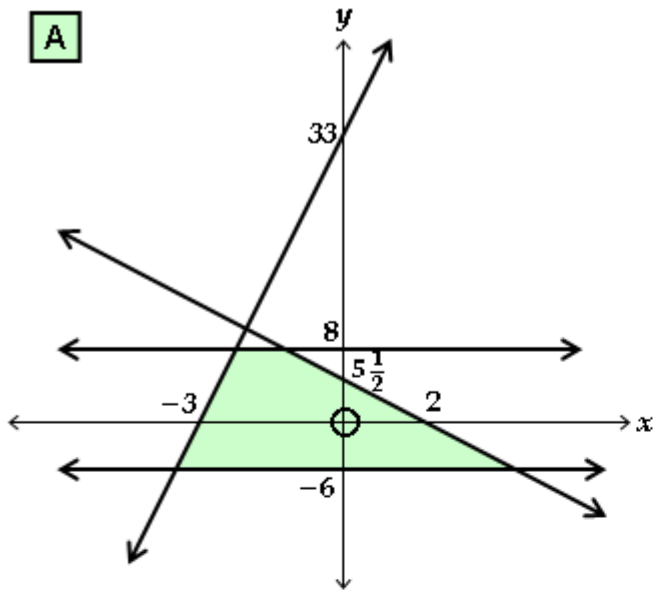
Figure 3: 11-0010

Question 5: Multiple Choice [6]

$8 > y \geq -6$ and $2 - \frac{4}{11}y > x$ and $11x - y + 33 \geq 0$

The graphical representation of the solution to the above system of inequalities is given by graph ...

A	A
B	B
C	C
D	D

Question 6: Multiple Choice [18]

The Clock Co. produces two different versions of a clock, namely an analogue version and a digital version.
The analogue version provides an income of **R 80** each and the digital version provides an income of **R 100** each.
They can only produce **20** of the analogue clocks per week and **40** of the digital clocks per week.
The packaging department can only send out a maximum of **50** clocks per week.
They need an income of at least **R 2 200** per week to meet overheads.
If the profit on an analogue clock is **R 10** and it is **R 20** on a digital clock, the maximum profit realised by **The Clock Co.** per week is …

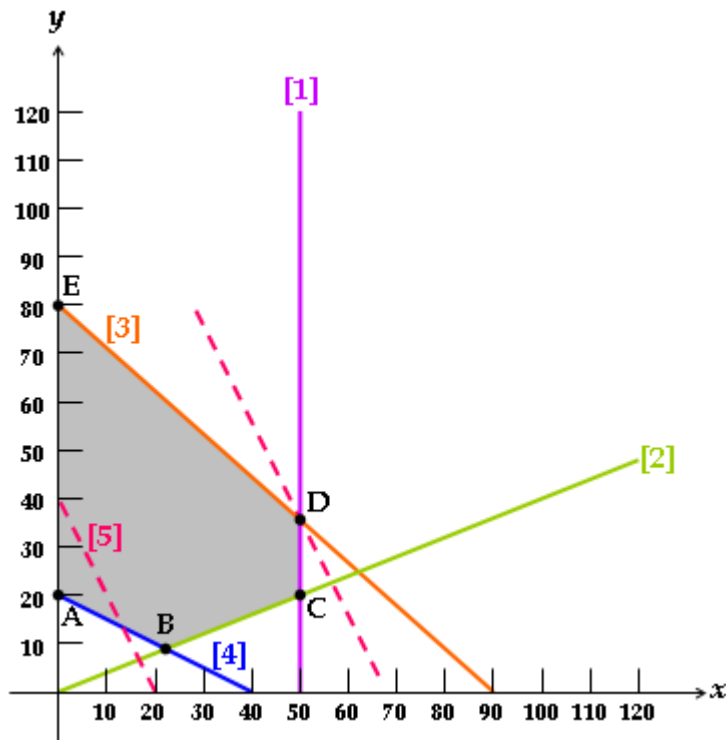| A | R 500 |
B	R 600
C	R 700
D	R 800
E	R 900

Question 7 refers to the following graphic

Figure 4: 11-0011

Question 7: Socrates [2]

Consider the given graph.

The shaded region is the feasible region for constraints [1], [2], [3] and [4].
The objective function is indicated by the dotted line [5] and it represents profit.
If you wish to maximise profits, the solution will be found at the point marked …

Type the correct letter only.

Question 8: Socrates [12]

IVEYN is a wine farm with two presses for pressing grapes to make wine.
Depending on the types of grapes (red or white) the machines produce different quantities of juice.
To ensure productivity, the two machines together must produce at least **1 200** ℓ of grape juice each day.
The white wine press always produces at least twice as much juice as the red wine press.
Due to limitations in the availability of grapes, the two presses can produce no more than **1 800** ℓ of grape juice per day
The maximum amount of juice yielded by the red wine press a day in litres is ...

Type the number only.

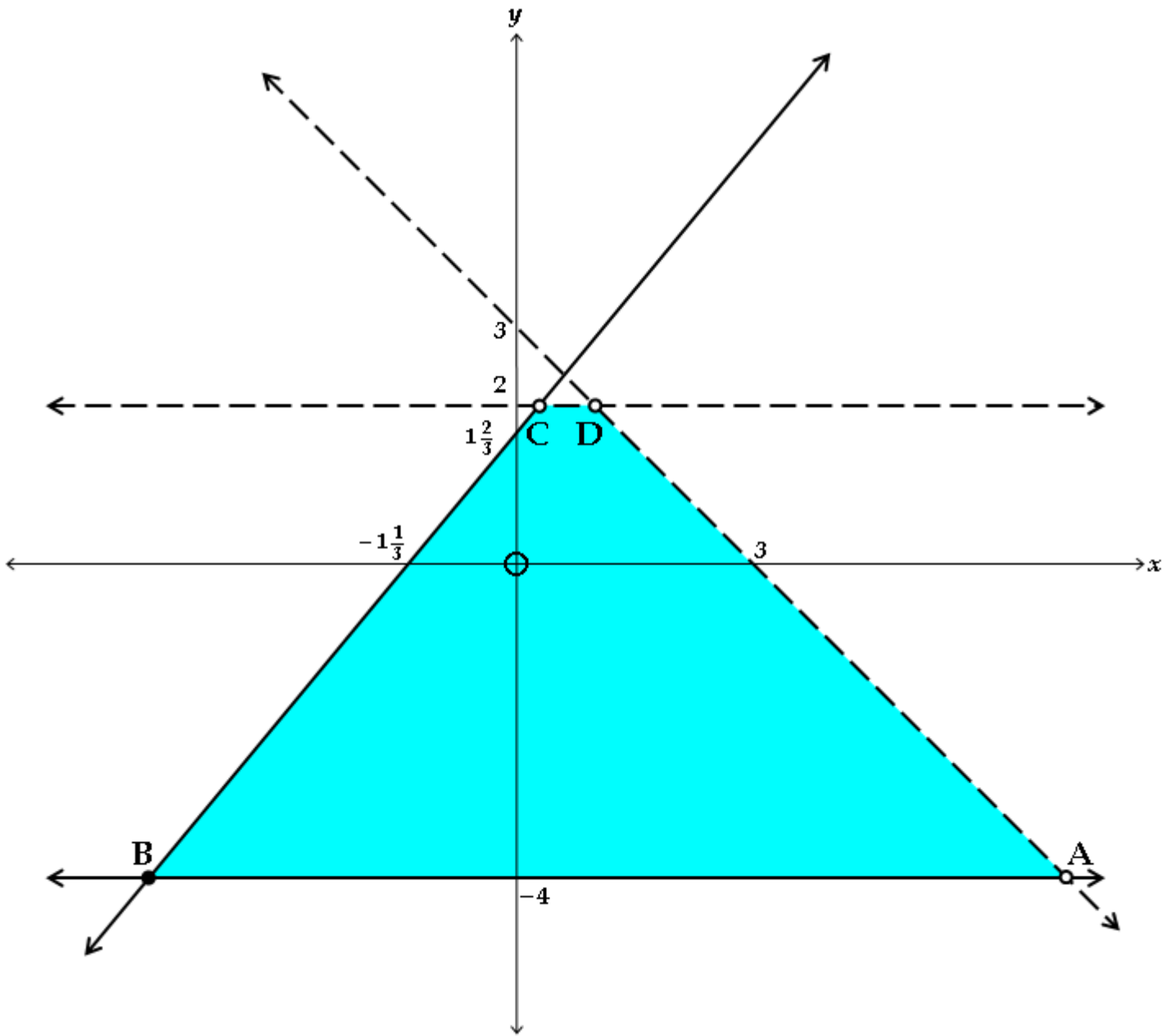*Question 9 refers to the following graphic*

Figure 5: 11-0013

Question 9: Socrates [4]

The given graph shows the polygonal region formed by the intersection of the following system of inequalities:

$$-4 \leq y < 2 \quad \text{and} \quad y + x < 3 \quad \text{and} \quad 25 - 15y + 17x \geq 0$$

The coordinates of **A** are ...

Type the coordinates as an ordered pair.

Question 10: Socrates [36]

$$-2 \leq 2y - 3x \leq 24 \quad \text{and} \quad -8 \leq \tfrac{3}{2}y + x \leq 5$$

The type of quadrilateral formed by the graphs of the intersection of the given set of inequalities will be a ...

Question 11: Cloze [3]

Determine the implicit constraints in the following circumstances: (constraints that are not stated, but that can be assumed from the situation).

(1) Two dice (one called **x** and the other **y**) are rolled and the score is the sum of the values of the top faces.

(2) Liquid **x** and liquid **y** are mixed together in a certain ratio.

(3) A landowner farms with both sheep (**x**) and goats (**y**) in the same field.

1		2	
3			

▸ **x** and **y** are real numbers   ▸ **x** and **y** are counting numbers   ▸ **x** and **y** are positive numbers

▸ **x, y** are natural numbers less than or equal to **6**.   ▸ **x, y** are natural numbers less than or equal to **2**.

Question 12: Cloze [15]

Good Dog! dog foods contain meat and wheat.

Each gram of meat provides **2 units** of vitamins and **3 units** of fatty acids. Each gram of wheat provides **3 units** of vita

The combined foods required for a balanced meal needs at least **125 units** of vitamins and **150 units** of fatty acids.

Let x be the number of grams of meat and y be the number of grams of wheat.

The constraint describing the vitamins is (Ans. 1).
The constraint describing the fatty acids is (Ans. 2).
If the dog food must contain both ingredients and if the ratio of the cost of meat to the cost of wheat is **5 : 4**,
then to achieve a minimum cost, there must be (Ans. 3) grams of meat and (Ans. 4) grams of wheat.

1		2	
3		4	

▸ 15   ▸ $2x + 3y \geq 125$ ▸ 20

▸ $3x + 2y \geq 150$ ▸ 40   ▸ $2x + 3y \geq 150$

▸ $3x + 2y \geq 125$ ▸ $2x + 3y \leq 125$ ▸ $3x + 2y \leq 150$

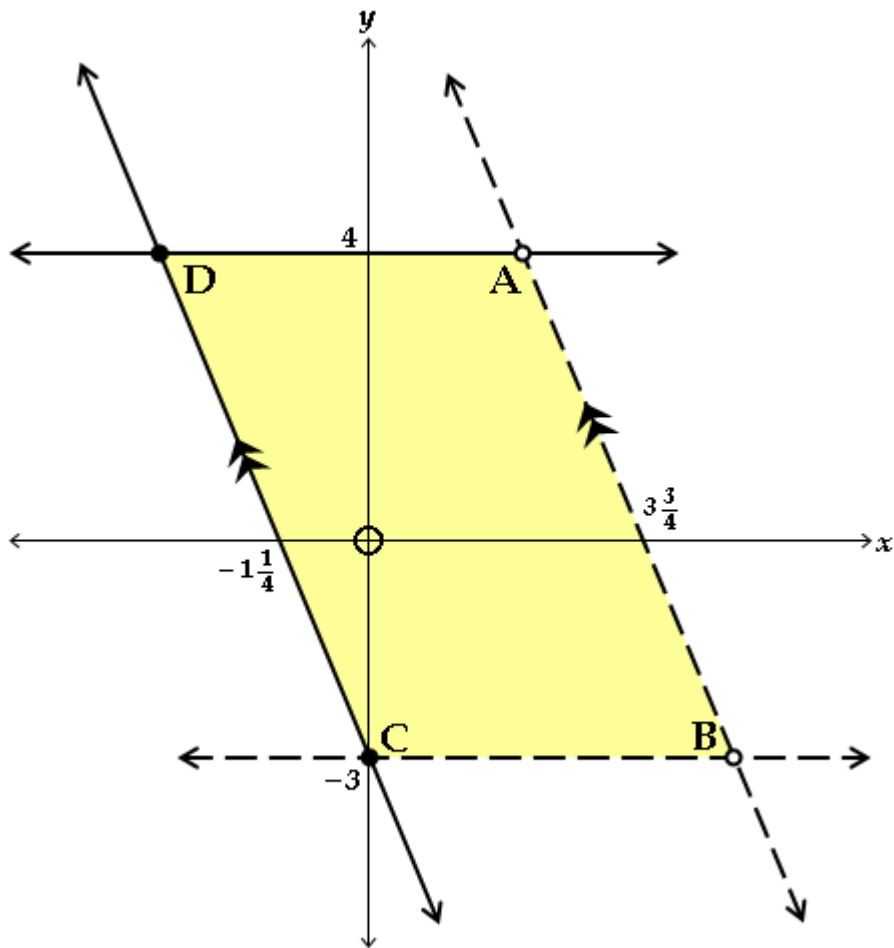*Question 13 refers to the following graphic*

Figure 6: 11-0016

Question 13: Cloze [12]

The given graph shows the polygonal region formed by a system of inequalities. The line passing through D and C represents the inequality (Ans. 1). The coordinates of A are (Ans. 2).

1	

2	

▶ $5y + 12x + 15 \leq 0$

▶ $5y \geq -12x - 15$

▶ $5y + 12x > -3$

▶ $\left(3\frac{5}{12} ; 4 \right)$

▶ $\left(1\frac{5}{12} ; 4 \right)$

▶ $\left(2\frac{1}{12} ; 4 \right)$

Question 14: True/False [10]

◀ᴸloudSPEAKER ᴿ▶ is a company that produces standard and deluxe speakers.

They must manufacture at least 8 speakers in total a day to be profitable.

The factory cannot make more than 8 standard speakers and 10 deluxe speakers a day.

Considering the above constraints, it would be possible for the factory to make 4 standard and 5 deluxe speakers and still remain profitable.

Let x represent the standard speakers and y represent the deluxe speakers.

TRUE	FALSE

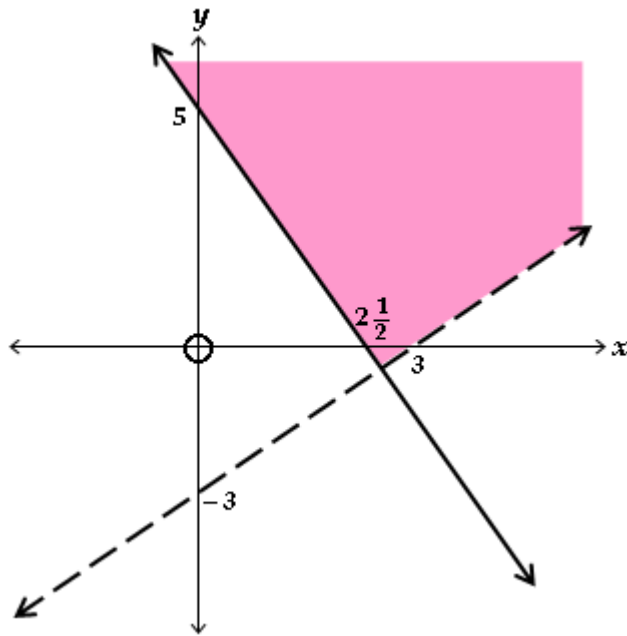*Question 15 refers to the following graphic*

Figure 7: 11-0006

Question 15: True/False [4]

The sketch represents the intersection of the inequalities $y > x - 3$ and $y \geq -2x + 5$

TRUE	**FALSE**

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15 Questions, 10 Pages