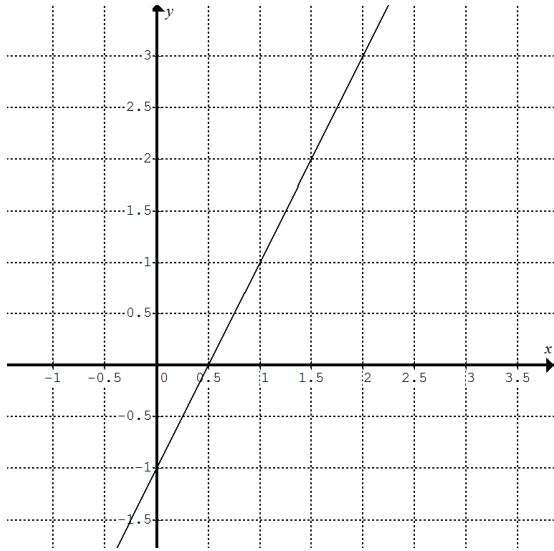




**2018 Year 10 math topic test: Simultaneous linear equations and inequalities** © itute 2018

Q1 The graph of  $2x = y + 1$  is shown below.



a. On the same set of axes (shown above) **accurately** sketch the graph of  $2x + \frac{y}{3} = 1$ . 3 marks

b. **Graphically** find the values of  $x$  and  $y$  satisfying both equations  $2x = y + 1$  and  $2x + \frac{y}{3} = 1$ . 2 marks

Q2 Find the solution to each of the following simultaneous equations in the form  $(x, y)$  if the solution exists, **otherwise** write **no solution**.

a.  $x = \frac{1}{3}$  and  $y = \frac{1}{-5}$  1 mark

b.  $x = \frac{1}{3}$  and  $x = \frac{1}{-5}$  1 mark

c.  $y = \frac{1}{-5}$  and  $x - 15y = 1$  2 marks



d.  $x = \frac{y}{-5}$  and  $x - 15y = 1$

2 marks

e.  $1 = x - y$  and  $3x = 1 + 2y$

2 marks

Q3 Consider inequalities  $x \geq \frac{2}{3}$  and  $x < 2$ .

a. Give **one** possible value of  $x$  which satisfies both inequalities  $x \geq \frac{2}{3}$  and  $x < 2$ .

1 mark

b. Give **one** possible value of  $x$  which satisfies either  $x \geq \frac{2}{3}$  or  $x < \frac{1}{2}$ .

1 mark

Q4 **Clearly and accurately** sketch the graphs of the following sets.

a.  $\{x : x < -3\}$

1 mark

b.  $\{x : x < -3 \text{ and } x \text{ is an integer greater than } -6\}$

2 marks

c.  $\{x : x < -3 \text{ and } x \leq -6\}$

2 marks



d.  $\{(x, y): x < -3\}$

3 marks

e.  $\{(x, y): y < -x\}$

3 marks

f.  $\{(x, y): x - y < 2\}$

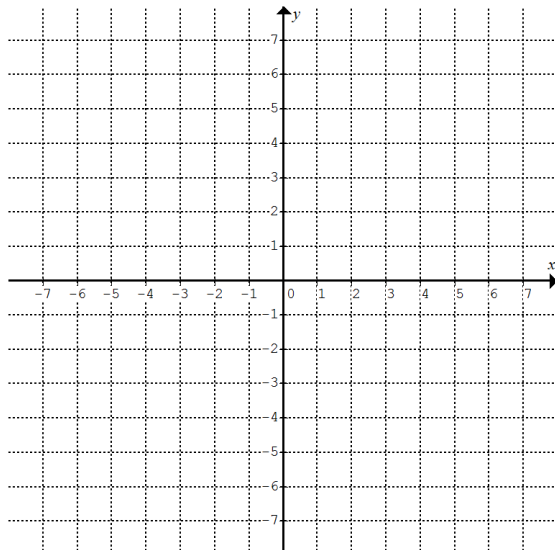
3 marks

Q5 Sketch accurately and shade the region in the Cartesian plane ( $x$ - $y$  plane) defined by the following inequalities.

4 marks

$$\frac{x}{2} + y < 2$$

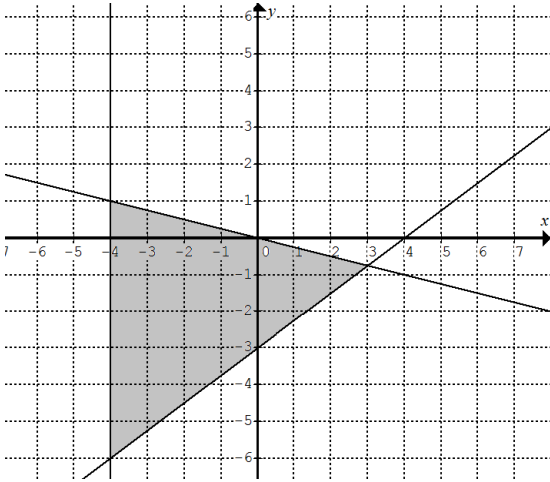
$$x - \frac{y}{3} \geq 1$$





Q6 Consider the shaded region and the boundary lines shown in the diagram below.

a. Write down three inequalities which define the shaded region including the boundary lines. 5 marks



Let  $S = x + 2y$  where  $x$  and  $y$  are the coordinates of a point in the shaded region including the boundary lines.

b. Determine the value of  $S$  for the point  $(1, -1)$ . 1 mark

c. Determine the minimum value of  $S$ . 2 marks

d. Determine the maximum value of  $S$ . 3 marks

Q7 The total mass of two identical bags of pears and three identical bags of apples is 32.5 kg. The total mass of one bag of pears and two bags of apple is 19.3 kg.

Let  $p$  kg be the mass of a bag of pears, and  $a$  kg be the mass of a bag of apples.

a. Set up two simultaneous equations involving  $p$  and  $a$  based on the given information. 2 marks

b. Find the mass of one bag of apples. 3 marks

c. Find the total mass of two bags of pears and one bag of apples. 1 mark