



Name: \_\_\_\_\_

St Leonard's College

## 10A Linear Relations Mixed Review

### Section A

### Skills

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Complete the questions in section A without using your calculator. Include working throughout.

1. Solve the following equations:

(a)  $5x + 3 = -4(1 - x)$

(b)  $\frac{x + 2}{2} - 6 = \frac{5x}{3}$

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2. Solve the following inequalities.

(a)  $4 - 2x > 5$

(b)  $-4 \leq \frac{3(2 - 3x)}{5}$

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3. Solve the following equations simultaneously.

(a)  $y = 2x - 1$   
 $y = 5x + 2$

(b)  $3x + 2y = -10$   
 $x + 4y = 5$

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4. Find the equation of the line:

(a) joining the points  $(-3, 8)$  and  $(5, -2)$

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(b) parallel to the  $y$ -axis and passing through the point  $(3, 2)$ .

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5. Sketch the graphs of each of the following labelling axis intercepts with coordinates.

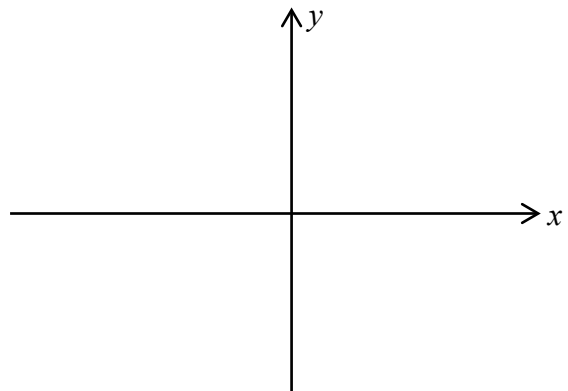
(a)  $y = 3x - 4$

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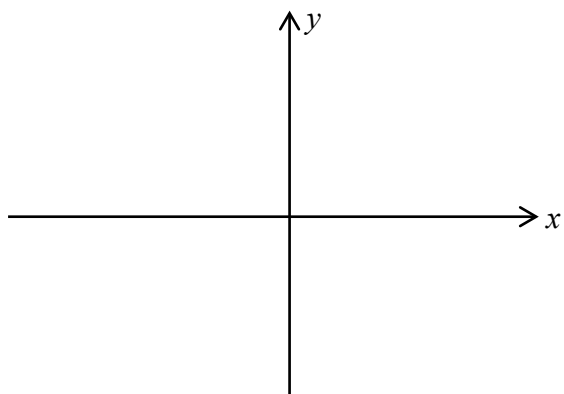
(b)  $2x + 5y = -10$

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6. A line has equation  $5x - 3y = 15$ .

(a) Find the gradient of the line.

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(b) Find the equation of the line which is perpendicular to  $5x - 3y = 15$  and passes through the point  $(0, 4)$ .

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(c) For the graph of the equation  $5x - 3y = 15$ , find the exact length of the line segment joining the  $x$  and the  $y$  intercepts

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(d) Find the midpoint of the line segment joining the  $x$  and  $y$  intercepts of the function  $5x - 3y = 15$ .

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7. **(Extension)** Find the value of  $a$  in the following if:

(a) the line  $2x + ay = 4$  is perpendicular to the line  $y = 4x - 3$

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(b) the line  $2x + ay = 4$  and the line  $3x + y = 2$  have no point of intersection.

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8. **(Extension)** Consider the simultaneous linear equations  $(p - 2)x + y = 6$  and  $px + 2y = k$ . Find the values of  $p$  and  $k$  such that the linear equations intersect at the point  $(1, 5)$ .

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## Section B

## Applications

*This section can be completed with a CAS calculator. Where more than one mark is allocated, an appropriate method must be shown.*

1. Sixty students on 'The Great Victorian Bike Ride' consume either three meals a day or four meals a day. 213 meals are consumed on one particular day.

(a) Define two variables and set up two equations that would help determine how many students ate four meals on this day.

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(b) Solve the equations to find how many students ate four meals on this day.

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2. Show that the triangle with vertices at  $(8, -2)$ ,  $(1, -3)$  and  $(9, -9)$  is isosceles.

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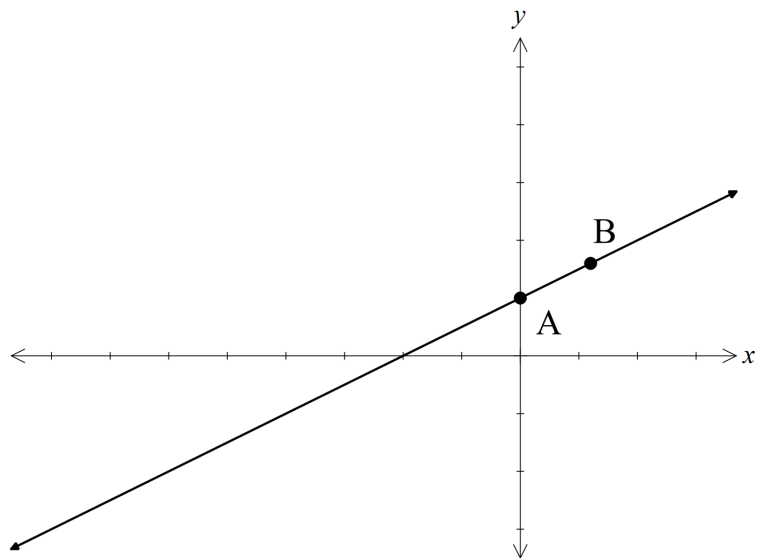
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3. The graph of the line  $-x + 2y = 2$  is shown. A line segment AB forms one boundary of a portion of land.



(a) A second boundary exists along the line perpendicular to  $-x + 2y = 2$  and goes through the point  $(1, 2)$  (and point B). Find the equation of this line.

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(b) On the axes above, sketch the graph of the line from part (a). Label all intercepts.

**(c) (Extension)** The second boundary is a line segment that runs along the line from part (a), starting from point B to the  $y$ -axis intercept (point C). The area of land is also bounded by a fence that runs along  $x = 0$  (the  $y$  axis). Shade the bounded region.

**(d) (Extension)** If concrete posts are to be placed at the 3 corners (points A, B and C) of the triangular region and a fence run between them, state the exact coordinates of the posts and find the exact length of the fence that would run between posts B and C.

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**END OF TASK**