Secondary 2 Mathematics | Practice Paper 1

Inequalities | Simultaneous equations | Linear graphs

Name: _____ Class: _____ Date: _____

30 questions | 100 marks

Answer all questions. Show your working. A calculator may be used.
Give exact answers unless an estimate or a level of accuracy is requested.

Section A: Inequalities [30 marks]

1. [2 marks]

Solve the inequality.

$5(x-3)-2(x+4) \leq 8$

2. [3 marks]

Solve the inequality. Leave your answer in exact form.

$\frac{3x-2}{4} - \frac{1x+1}{6} > 2$

Section A: Inequalities [30 marks]

3. [3 marks]

Solve the compound inequality and represent your solution on the number line provided.

$-7<3x+2\leq 8$



4. [3 marks]

Solve the inequality. Hence state the smallest prime number that satisfies it.

$3x-7>26$

Section A: Inequalities [30 marks]

5. [3 marks]

An integer x satisfies both inequalities below.

$2x+3>-1$

$3x-1\leq 11$

(a) List all possible values of x. [2]

(b) Find the sum of all the possible values. [1]

6. [3 marks]

A student gives the following solution.

$5-4x\geq 17$

$-4x\geq 12$

$x\geq -3$

(a) Identify the error and explain why it is an error. [1]

(b) Write down the correct solution and represent it on the number line. [2]



Section A: Inequalities [30 marks]

7. [3 marks]

p and q are integers satisfying the restrictions below.

$-5 \leq p \leq 2$

$3 \leq q < 6$

(a) Find the greatest possible value of $(p-q)^2$. [1]

(b) Find the smallest possible value of pq. [1]

(c) Find the greatest possible value of $\frac{p}{q}$. [1]

8. [3 marks]

A class pays \$36 to book a workshop and \$7.50 for each student. The total must not exceed \$201. Let n be the number of students.

(a) Form an inequality in n. [1]

(b) Find the greatest possible value of n. [2]

Section A: Inequalities [30 marks]

9. [3 marks]

Two printing shops quote for the same job. Shop A charges $18 plus $0.12 per page. Shop B charges $6 plus $0.20 per page.

(a) Form an inequality for the cost from A to be strictly less than the cost from B. [1]

(b) Find the smallest whole number of pages for which A is cheaper. [2]

10. [4 marks]

A group books a room. The room hire is $84 and lunch costs $6 per person. Each person pays $10. The total collected must cover all costs, and the room can hold at most 30 people. Let n be the number of people.

(a) Form the necessary inequality or inequalities in n. [2]

(b) Find the smallest and greatest possible integer values of n. [2]

Section B: Simultaneous equations [35 marks]

11. [3 marks]

Solve the simultaneous equations.

$3x+2y=16$

$2x-3y=-11$

12. [3 marks]

Solve the simultaneous equations. Give exact answers.

$\frac{x}{2}+\frac{y}{3}=\frac{3}{4}$

$2x-3y=\frac{19}{2}$

Section B: Simultaneous equations [35 marks]

13. [3 marks]

Solve the simultaneous equations.

$3(x+2)-2(y-1)=-8$

$2(2x-y)+x=-20$

14. [3 marks]

Solve the simultaneous equations.

$0.4x+0.3y=1.7$

$0.7x-0.2y=0.8$

Section B: Simultaneous equations [35 marks]

15. [3 marks]

The point (2, 3) satisfies both equations below. Find a and b.

$ax+by=5$

$ay-bx=14$

16. [4 marks]

At a museum, 3 adult tickets and 2 child tickets cost $58. Two adult tickets and 5 child tickets cost $79.

(a) Define two variables and form two simultaneous equations. [2]

(b) Find the cost of an adult ticket and of a child ticket. [2]

Section B: Simultaneous equations [35 marks]

17. [4 marks]

Two walkers, Rina and Siti, start together from the same point and move at constant speeds. Rina is faster. If they travel in the same direction for 45 minutes, they are 1.5 km apart. If they travel in opposite directions for 30 minutes, they are 4 km apart.

(a) Form two simultaneous equations for their speeds in km/h. [2]

(b) Find both speeds. [2]

18. [4 marks]

A student claims that $x=1$ and $y=\frac{10}{3}$ solve the equations below.

$$2x+3y=12$$

$$4x-y=10$$

(a) Test the claim by substituting into BOTH equations. [2]

(b) Find the correct solution. [2]

Section B: Simultaneous equations [35 marks]

19. [4 marks]

Consider the pair of equations below, where k is a constant.

$2x+3y=7$

$4x+6y=k$

(a) Find the value of k for which there are infinitely many solutions. [1]

(b) State how many solutions there are for any other value of k. Explain your answer. [2]

(c) Could any value of k give exactly one solution? Explain. [1]

20. [4 marks]

A box contains 50-cent and 20-cent coins. There are 28 coins and their total value is $9.20. Find the number of coins of each type.

(a) Define two variables and form two simultaneous equations. [2]

(b) Solve your equations and answer the question. [2]

Section C: Linear graphs [35 marks]

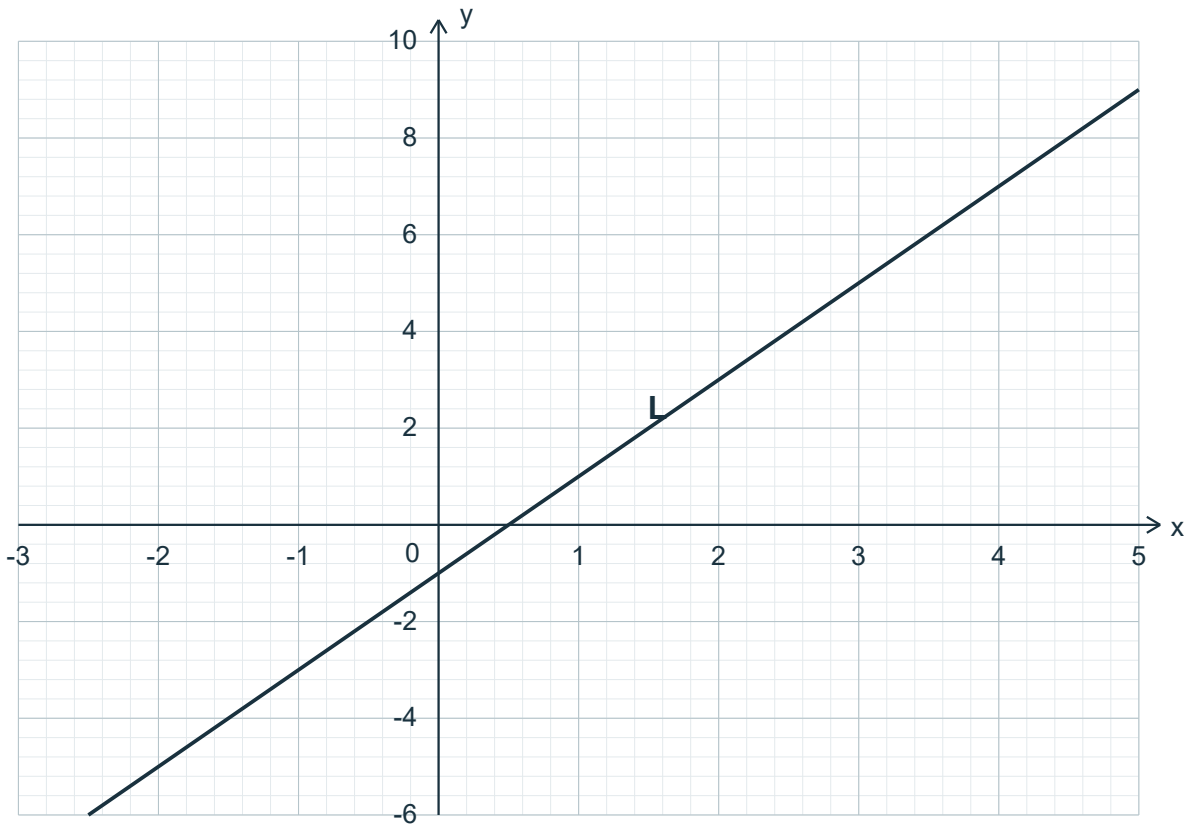
21. [3 marks]

The diagram shows a straight line L.

(a) Find the gradient of L. [1]

(b) Write down its y-intercept. [1]

(c) Write down the equation of L. [1]



Each numbered grid line shows the scale on that axis.

Section C: Linear graphs [35 marks]

22. [3 marks]

A straight line has the equation below.

$3x+2y=12$

(a) Write its equation in the form $y=mx+c$. [1]

(b) State the coordinates of its x-intercept and its y-intercept. [2]

23. [3 marks]

The point P has coordinates $(2,p)$ and lies on $y=3x-4$.

(a) Find p. [1]

(b) Determine whether $(3,6)$ lies on the same line. Show your working. [1]

(c) Write down the equation of the vertical line through P. [1]

Section C: Linear graphs [35 marks]

24. [3 marks]

A line passes through A(-2, 7) and B(4, -5).

(a) Find its gradient. [1]

(b) Find its equation. [1]

(c) A second line passes through (0, 2) and is parallel to AB. Find its equation. [1]

Section C: Linear graphs [35 marks]

25. [4 marks]

The equation of a line is given below.

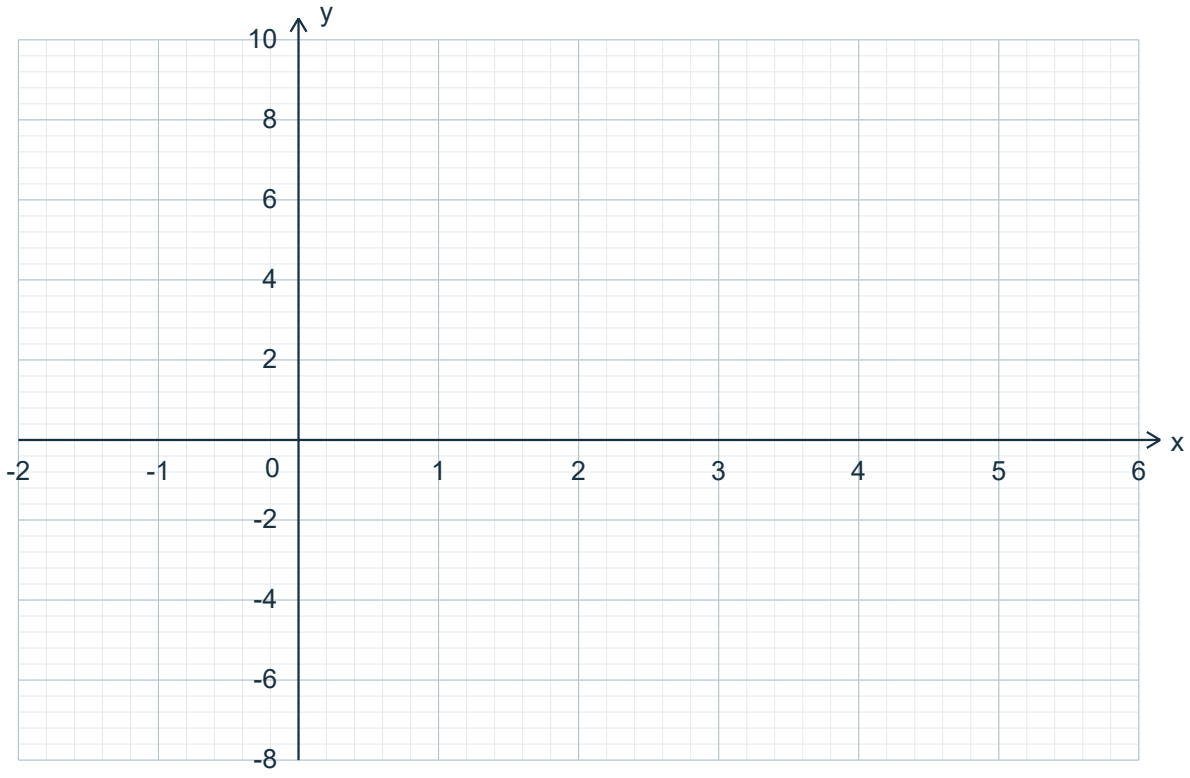
$$y=\frac{3}{2}x-2$$

x	-2	0	2	4	6
y					

(a) Complete the table. [1]

(b) Plot the points and draw the line on the axes provided. [2]

(c) Use your graph to estimate y when x = 3.5. [1]



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Section C: Linear graphs [35 marks]

26. [4 marks]

Use the axes provided for this question.

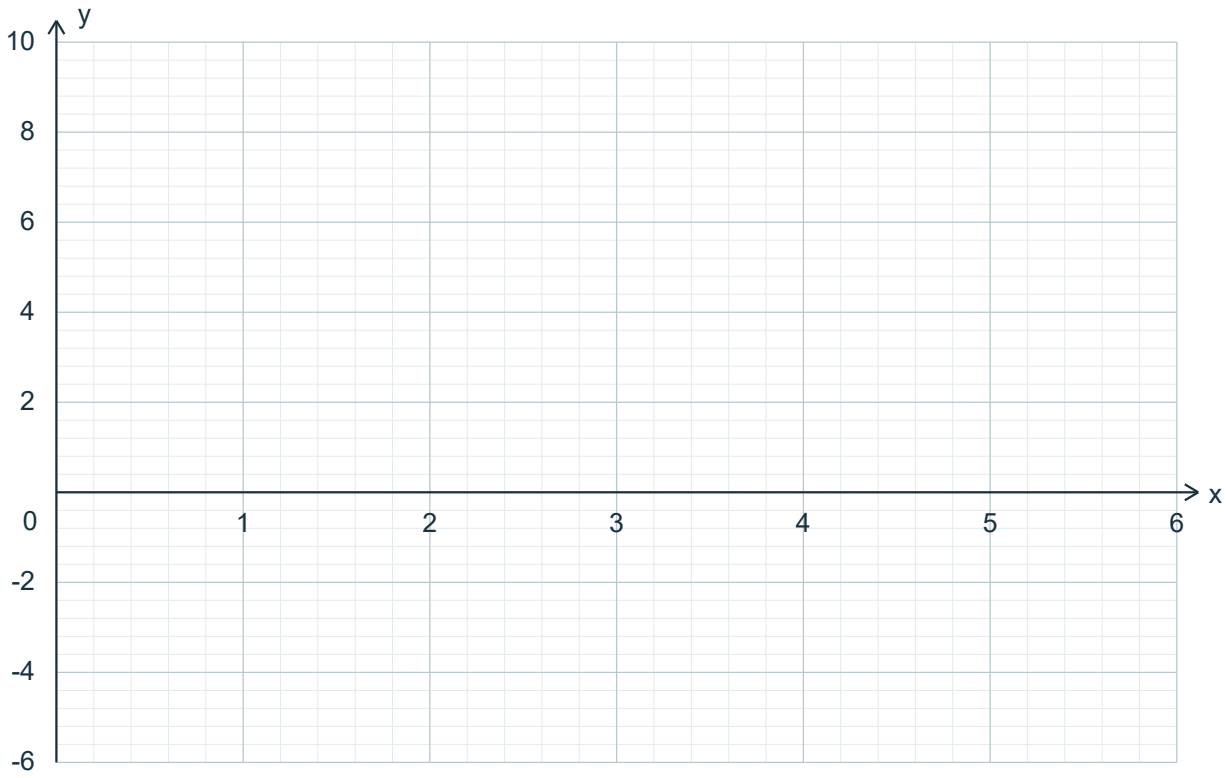
$y=2x-3$

$y=-x+6$

(a) Draw both lines for $0 \leq x \leq 6$, labelling each clearly. [2]

(b) Use your graphs to estimate the solution of the simultaneous equations. [1]

(c) Check your solution by substitution into both equations. [1]



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Section C: Linear graphs [35 marks]

27. [3 marks]

A bicycle-hire service charges a fixed fee plus a constant hourly rate. The total cost C dollars for h hours is linear. When h = 2, C = 18; when h = 8, C = 36.

(a) Find an equation connecting C and h. [1]

(b) Explain what the gradient represents in this context. [1]

(c) Draw the graph for $0 \le h \le 10$. [1]



Each numbered grid line shows the scale on that axis.

Section C: Linear graphs [35 marks]

28. [4 marks]

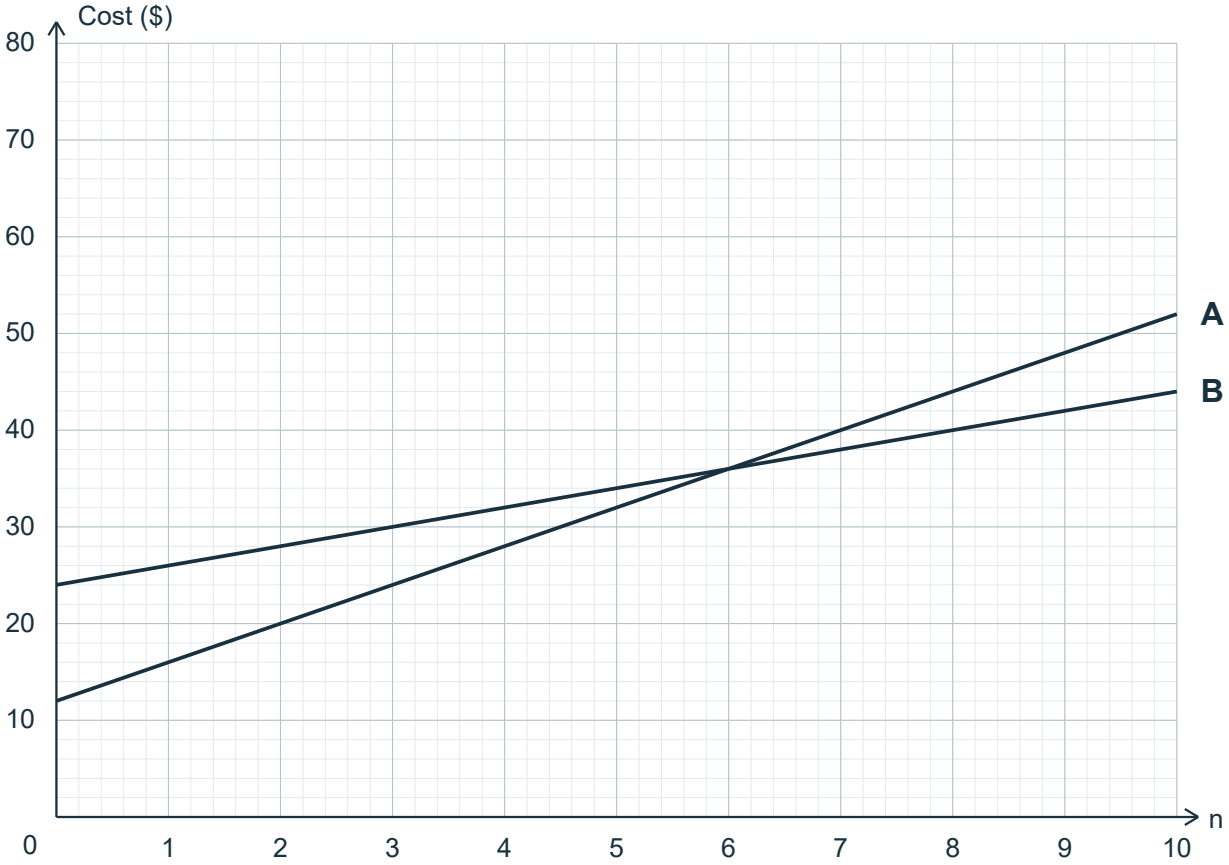
The graphs show the total costs of services A and B for n uses.

(a) Read the break-even number of uses. [1]

(b) Find an equation for the cost of A. [1]

(c) List the whole-number values of n shown for which A is cheaper. [1]

(d) B reduces its fixed fee by $6. Find the new break-even value of n. [1]



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Section C: Linear graphs [35 marks]

29. [4 marks]

Two lines L and M have the equations below.

L: $y=3x-2$

M: $y=-x+10$

(a) Find their point of intersection algebraically. [2]

(b) State the values of x for which L lies strictly above M. [1]

(c) Explain how your answers to the two parts are connected. [1]

Section C: Linear graphs [35 marks]

30. [4 marks]

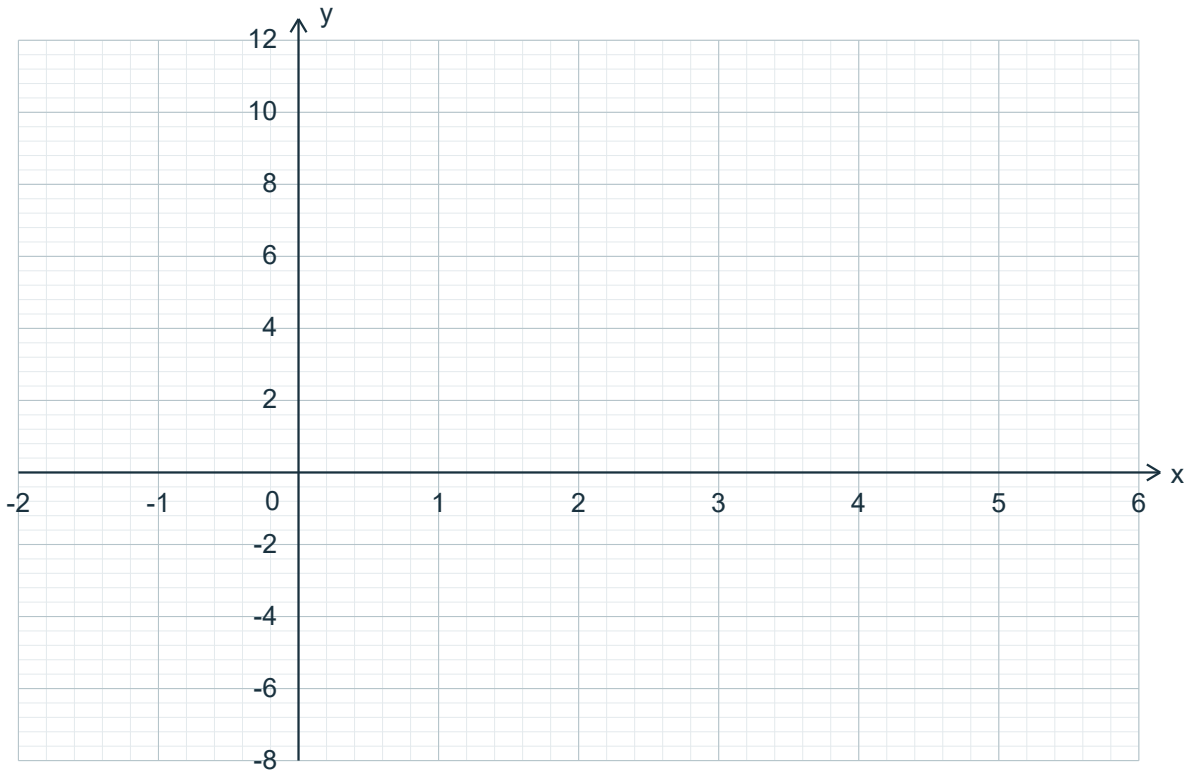
Line L passes through P(0, 4) and Q(2, 0). Line M has equation $y=x-2$.

(a) Find the equation of L. [1]

(b) Draw L and M on the axes provided. [1]

(c) Use the graphs to find their point of intersection. [1]

(d) List all integer values of x satisfying $-2 \leq x \leq 6$ for which the point on L has $y>-1$. [1]



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Practice Paper 1 | Final Answers

Inequalities

1. $x \leq \frac{31}{3}$

2. $x > \frac{32}{7}$

3. $-3 < x \leq 2$. Number line: open at -3, closed at 2, joined between.

4. $x > 11$; smallest prime: 13.

5. (a) -1, 0, 1, 2, 3, 4. (b) 9.

6. (a) The inequality sign must reverse when dividing by a negative number. (b) $x \leq -3$. Closed endpoint; arrow to the left.

7. (a) 100. (b) -25. (c) $\frac{2}{3}$.

8. (a) $36 + 7.50n \leq 201$. (b) 22.

9. Let n be the whole-number quantity in the question. (a) $18 + 0.12n < 6 + 0.20n$. (b) 151.

10. (a) $10n \geq 84 + 6n$ and $n \leq 30$, with n an integer. (b) Smallest: 21; greatest: 30.

Practice Paper 1 | Final Answers

Simultaneous equations

11. $x=2, y=5$.

12. $x=\frac{5}{2}, y=\frac{-3}{2}$.

13. $x=-2, y=5$.

14. $x=2, y=3$.

15. $a=4, b=-1$.

16. (a) x and y are the prices in dollars of one adult ticket and one child ticket, respectively. $3x+2y=58$; $2x+5y=79$. (b) Adult ticket: $12.00; child ticket: $11.00.

17. (a) u and v are the faster and slower speeds in km/h. $u-v=2$; $u+v=8$. (b) Faster: 5 km/h; slower: 3 km/h.

18. (a) First equation: satisfied. Second equation: left side is $\frac{2}{3}$, which is not 10. The claim is false. (b) $x=3, y=2$.

19. (a) $k=14$. (b) No solutions for any other k: the lines are distinct and parallel. (c) No; the lines can only coincide or be parallel.

20. (a) x: 50-cent coins; y: 20-cent coins. $x+y=28$; $0.50x+0.20y=9.20$. (b) 12 50-cent coins; 16 20-cent coins.

Practice Paper 1 | Final Answers

Linear graphs

21. (a) 2. (b) -1. (c) $y=2x-1$.

22. (a) $y=\frac{-3}{2}x+6$. (b) x-intercept $(4,0)$; y-intercept $(0,6)$.

23. (a) $p=2$. (b) No. (c) $x=2$.

24. (a) -2. (b) $y=-2x+3$. (c) $y=-2x+2$.

25. (a) y-values in table order: -5, -2, 1, 4, 7. (b) See final graphs. (c) $y=\frac{13}{4}$ (approximately 3.25).

26. (a) See final graphs. (b) $x=3$, $y=3$. (c) The solution satisfies both equations.

27. (a) $C=3h+12$. (b) $3 per hour. (c) See final graphs.

28. (a) $n=6$. (b) $C=4n+12$. (c) 0, 1, 2, 3, 4, 5. (d) $n=3$.

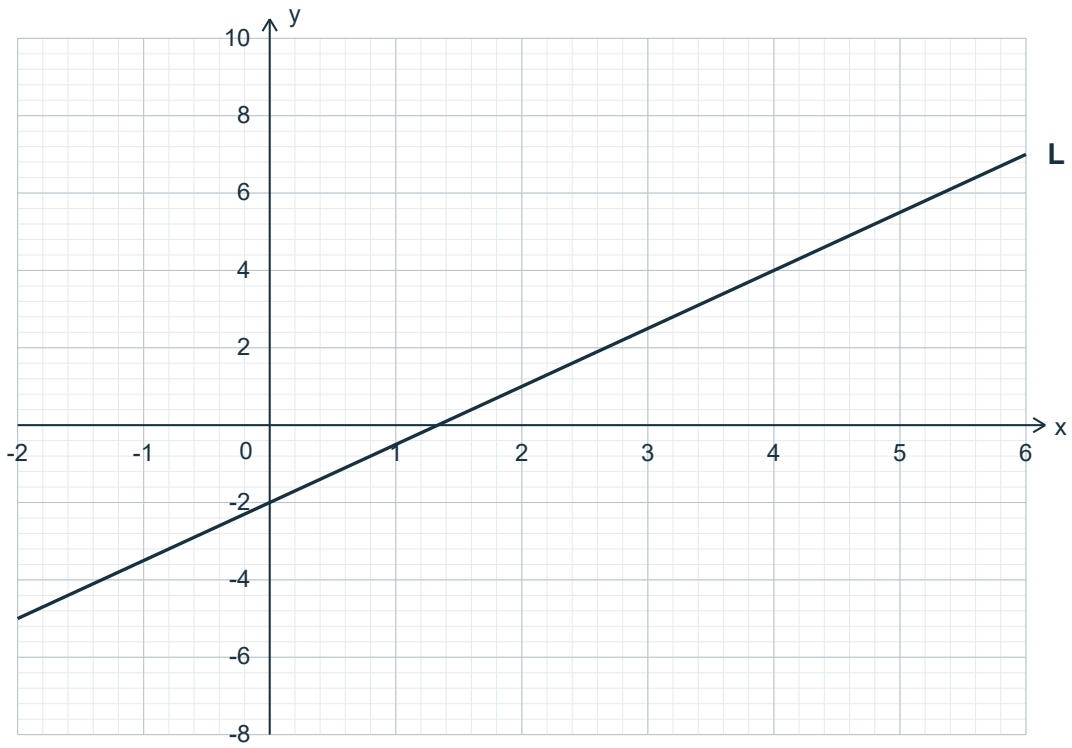
29. (a) $(3,7)$. (b) $x > 3$. (c) The intersection gives the boundary x-value; the strict inequality excludes it.

30. (a) $y=-2x+4$. (b) See final graphs. (c) $(2,0)$. (d) -2, -1, 0, 1, 2.

Practice Paper 1 | Final Answers

Final graphs

Question 25



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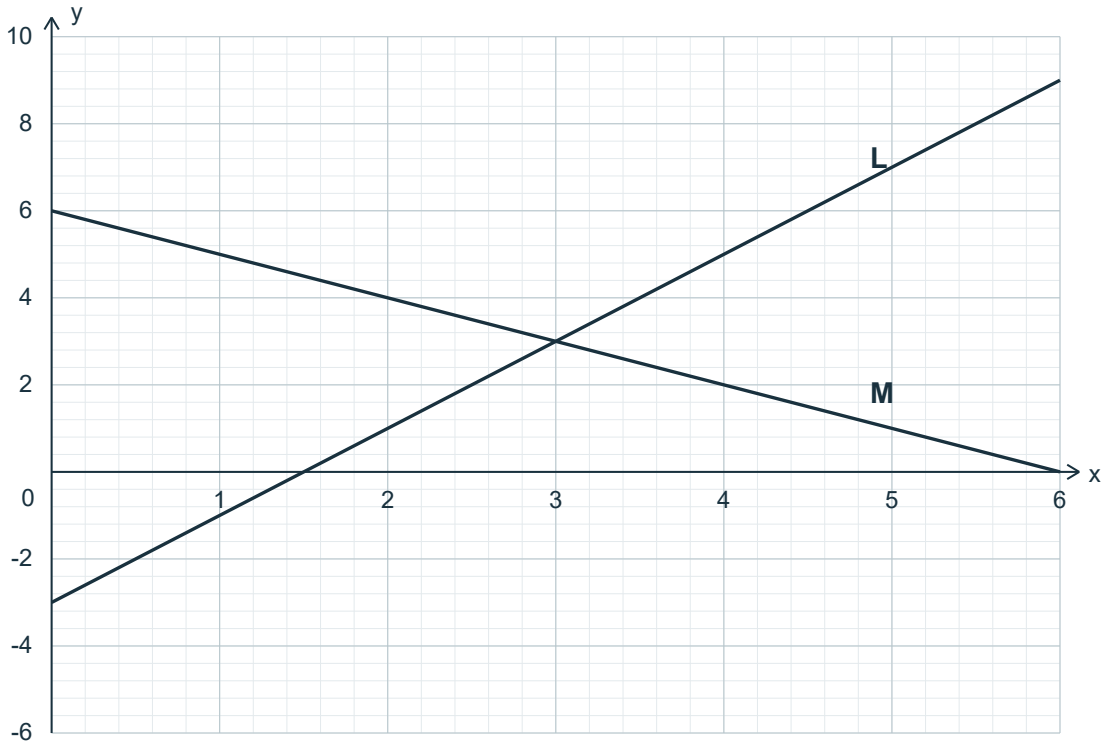
Question 26

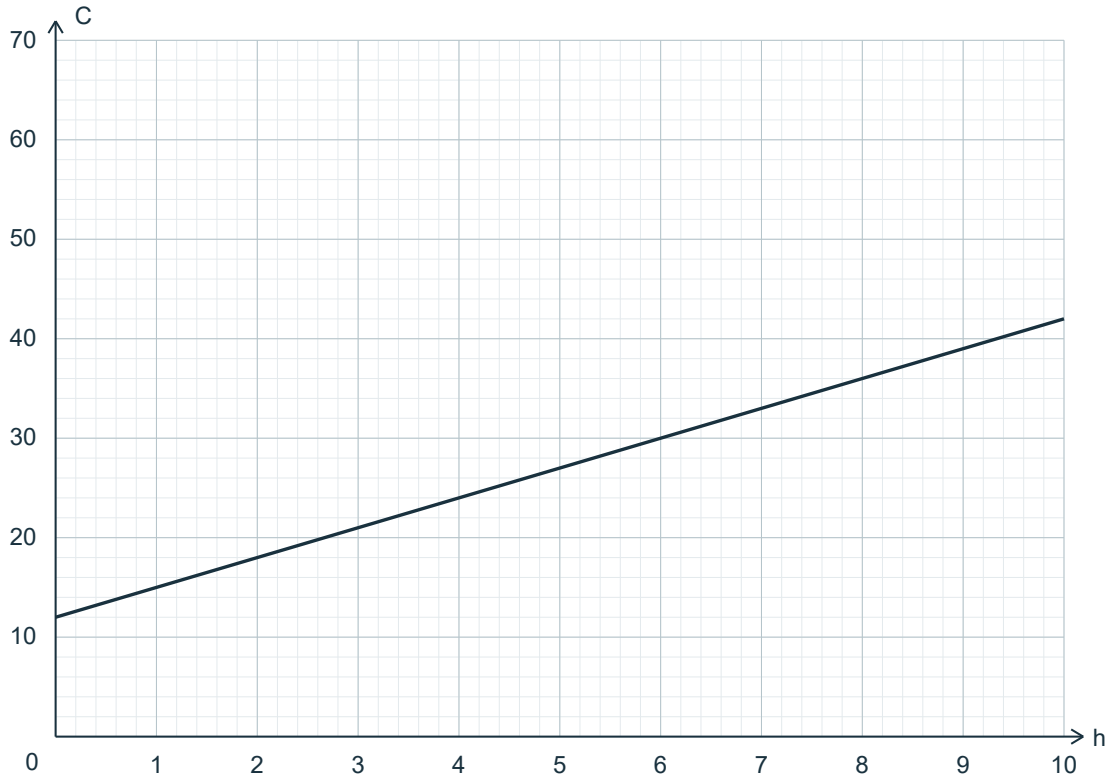


Each numbered grid line shows the scale on that axis.

Practice Paper 1 | Final Answers

Final graphs

Question 27



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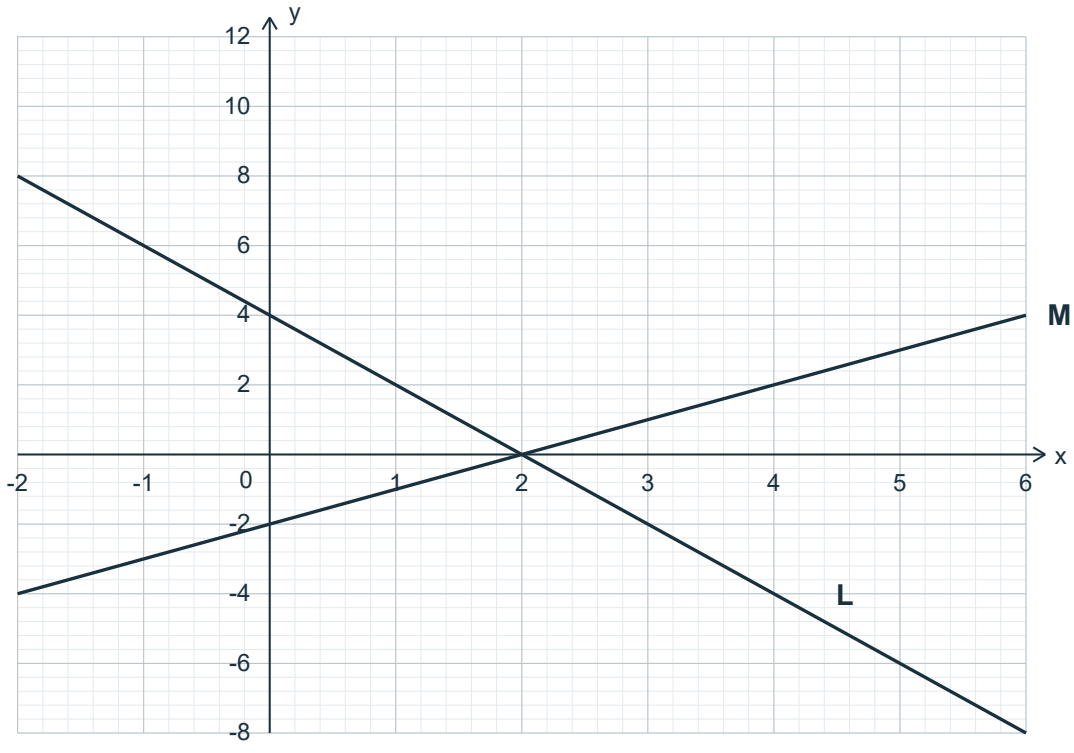
Question 30



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