Pearson Edexcel
Award

AAL30/01

Algebra

Level 3
Calculator NOT allowed

Transcription of the Braille Version

UEB Grade 2

U66325A

[braille page 1]

AAL30/01
Pearson Edexcel
Award

Algebra
Level 3
Calculator NOT allowed

Time: 2 hours

YOU MUST HAVE
Ruler
Compasses

YOU WILL BE GIVEN
Diagram Booklet
Bumpons for Question 5(a)
Bumpons for Question 12(c)
Bumpons for Question 15
Bumpons for Question 19(a)
Bumpons for Question 20(a)
Bumpons for Question 20(b)

[braille page 2]

INSTRUCTIONS

Write your centre number, candidate number, surname and other names on your answer paper.

Answer ALL questions.

Answer the questions on your answer paper or on the separate diagrams.

CALCULATORS ARE NOT ALLOWED.

INFORMATION

The total mark for this paper is 90.

The number of marks for EACH question are shown in brackets, for example: [2 marks] – use this as a guide as to how much time to spend on each question.

There may be spare copies of some diagrams.

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ADVICE

Read each question carefully before you start to answer it.
Try to answer every question.
Check your answers if you have time at the end.
Please note: this paper contains facing pages.
[A contents page for this examination paper will be found as a separate booklet. This is to assist the candidate in locating selected books].

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[braille page 4]

Answer ALL questions.
Write your answers on your answer paper.
You must write down all the stages in your working.
You must NOT use a calculator.

1. (a) Expand and simplify $(y+3)(2y-3)$ [2 marks]

(b) Expand and simplify $(2+5x)^2$ [2 marks]

(c) Simplify $(8r^{12})^{\frac{1}{3}}$ [2 marks]

(d) Simplify $t^{-2} \times t^{-\frac{3}{4}}$ [1 mark]

[Total for Question 1 is 7 marks]

[braille page 5]

2. Make x the subject of $w = \dfrac{3x^2 + 2}{x^2 + 1}$

[Total for Question 2 is 3 marks]

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3. Use the quadratic formula to solve the equation $3x^2 - 2x = 6$

Give your answer in the form $\dfrac{p \pm \sqrt{q}}{r}$ where p, q and r are integers.

[Total for Question 3 is 2 marks]

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4. Look at the diagram for Question 4 in the diagram booklet.

Describe the four inequalities that have been drawn on the grid to bound the shaded region R.

[Total for Question 4 is 5 marks]

[braille page 6]

5. (a) Look at the diagram for Question 5(a) in the diagram booklet.

On the grid in the diagram booklet, construct the graph of $x^2 + y^2 = 49$

Drawing film and bumpons are provided if you wish to use them.
[2 marks]

Given that $a > 0$, the point A with coordinates $(0, a)$ lies on the graph of $x^2 + y^2 = 49$

(b) Write the equation of the tangent to this graph at A. [1 mark]

[Total for Question 5 is 3 marks]

[braille page 7]

6. (a) Solve $7 - 2y < 3y - 8$ [2 marks]

(b) (i) Factorise $x^2 + x - 6$ [1 mark]

(ii) Hence solve $x^2 + x - 6 < 0$ [2 marks]

[Total for Question 6 is 5 marks]

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7. (a) Find an equation of the straight line which passes through the origin and is parallel to the straight line with equation $3x = 4y + 7$
[1 mark]

(b) Find the gradient of a line perpendicular to the line with equation $2x = 5y + 8$ [2 marks]

[Total for Question 7 is 3 marks]

[braille page 8]

8. Here is a quadratic equation.

$9x^2 - 12x + 4 = 0$

Use the discriminant to determine whether the equation has

2 real and different roots
OR 2 real and equal roots
OR no real roots.

[Total for Question 8 is 2 marks]

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9. (a) Factorise $6x^2y^2 - 9x^3y$ [2 marks]

(b) Factorise $p^4 - p^2q^2$ [2 marks]

[Total for Question 9 is 4 marks]

[braille page 9]

10. $x^2 + 6x + 13$ can be written in the form $(x + a)^2 + b$

(a) Find the value of *a* and the value of *b*. [2 marks]

a = _
b = _

The curve with equation $y = x^2 + 6x + 13$ has a turning point at the point *A*.

(b) Write down the coordinates of *A*. [1 mark]

[Total for Question 10 is 3 marks]

[braille page 10]

11. The first term of an arithmetic series is 4
The common difference of the series is 7

(a) Find an expression, in terms of *n*, for the *n*th term of the series. Give your answer in its simplest form. [2 marks]

The *p*th term of the series is 102

(b) Work out the value of *p*. [1 mark]

(c) Find the sum of the first 100 terms of this series. [2 marks]

[Total for Question 11 is 5 marks]

[braille page 11]

12. The average speed, *v* km/h, for a journey of a given distance is inversely proportional to the time, *t* hours, taken to complete the journey.

When $v = 60$, $t = 4$

(a) Find a formula for *v* in terms of *t*. [3 marks]

(b) Calculate the value of *t* when $v = 80$ [2 marks]

(c) Look at the diagram for Question 12(c) in the diagram booklet.
Using the axes in the diagram booklet, sketch the graph of *v* against *t*.
Drawing film and bumpons are provided if you wish to use them.
[1 mark]

[Total for Question 12 is 6 marks]

[braille page 12]

13. Here is a quadratic equation $6x^2 + 5x - 12 = 0$

(i) Write down the sum of the roots of this equation. [1 mark]

(ii) Write down the product of the roots of this equation.
[1 mark]

[Total for Question 13 is 2 marks]

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14. $V = \frac{f(wh - 3)}{3} + f$

Work out the value of *h* when $V = 20$, $f = 12$ and $w = \frac{f}{2}$

[Total for Question 14 is 3 marks]

[braille page 13]

15. Look at the diagram for Question 15 in the diagram booklet.

Using the axes in the diagram booklet, sketch the graph $y = \frac{1}{x-2}$

Drawing film and bumpons are provided if you wish to use them.

Write any asymptotes and the coordinates of any point of intersection of the graph with the axes.

[Total for Question 15 is 4 marks]

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16. Solve the simultaneous equations

$$y = 3x^2 + 6x - 1$$
$$y - 1 = x$$

[Total for Question 16 is 4 marks]

[braille page 14]

17. (a) Expand and simplify $(3 + \sqrt{12})(5 - 3\sqrt{3})$ [3 marks]

(b) Rationalise the denominator of $\frac{2-\sqrt{13}}{1-\sqrt{13}}$

Give your answer in the form $\frac{p-\sqrt{13}}{q}$ where p and q are integers.

[3 marks]

[Total for Question 17 is 6 marks]

[braille page 15]

18. The straight line L passes through the points *A* and *B*.
The coordinates of *A* are (3, –8)
The coordinates of *B* are (–1, 7)

Find an equation for L
Give your answer in the form $ax + by + c = 0$ where *a*, *b* and *c* are integers.

[Total for Question 18 is 3 marks]

[braille page 16, facing page 17]

19. Look at the diagram for Question 19(a) in the diagram booklet. It shows a graph. The table on the facing page shows the values of $y = 2^{x-1}$ for integer values of *x* from –2 to 4

(a) On the grid in the diagram booklet, plot the points for the graph of $y = 2^{x-1}$ for values of *x* from –2 to 4
Bumpons are provided if you wish to use them. [2 marks]

(b) Use your graph to find an estimate, to one decimal place, for the solution of $2^x = 12$ [2 marks]

(c) Use the trapezium rule to find an estimate for the area of the region under the curve and between *x* = 1, *x* = 4 and the *x*-axis. Use 3 strips of equal width. [2 marks]

[Total for Question 19 is 6 marks]

[braille page 17]

x	y
–2 ….	$\frac{1}{8}$
–1 ….	$\frac{1}{4}$
0 ……	$\frac{1}{2}$
1 …….	1
2 ……	2
3 ……	4
4 ……	8

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[braille page 18]

20. Look at the diagram for Question 20(a) in the diagram booklet. It shows the graph of $y = \mathrm{f}(x)$

3 distinct points have been labelled A, B and C

(a) On the grid in the diagram booklet, plot the positions of A_1, B_1 and C_1 for the graph of $y = \mathrm{f}(x) - 2$

Bumpons are provided if you wish to use them. [2 marks]

[Question 20 continues on the next page]

[braille page 19]

[Question 20 continued]

(b) Look at the diagram for Question 20(b) in the diagram booklet. It shows the graph of $y = \mathrm{f}(x)$

3 distinct points have been labelled A, B and C

On the grid in the diagram booklet, plot the positions of A_2, B_2 and C_2 for the graph of $y = \mathrm{f}(2x)$

Bumpons are provided if you wish to use them. [2 marks]

[Total for Question 20 is 4 marks]

[braille page 20]

21. (a) Express $\frac{3}{x+4} + \frac{1}{x-4}$ as a single fraction.
Give your answer in its simplest form. [3 marks]

(b) Hence, or otherwise, solve $\frac{3}{x+4} + \frac{1}{x-4} = \frac{4}{5}$ [3 marks]

[Total for Question 21 is 6 marks]

[braille page 21]

22. Look at the diagram for Question 22 in the diagram booklet.
It shows a speed-time graph for the first 35 minutes of a training ride for a cyclist.

(a) For how many minutes is the cyclist accelerating? [1 mark]

(b) Work out the greatest acceleration of the cyclist.
Give your answer in km/h^2 [2 marks]

(c) What does the area under the graph represent? [1 mark]

[Total for Question 22 is 4 marks]
TOTAL FOR PAPER IS 90 MARKS

::::::::::::
END OF PAPER

Diagram Booklet

Diagram for Question 4

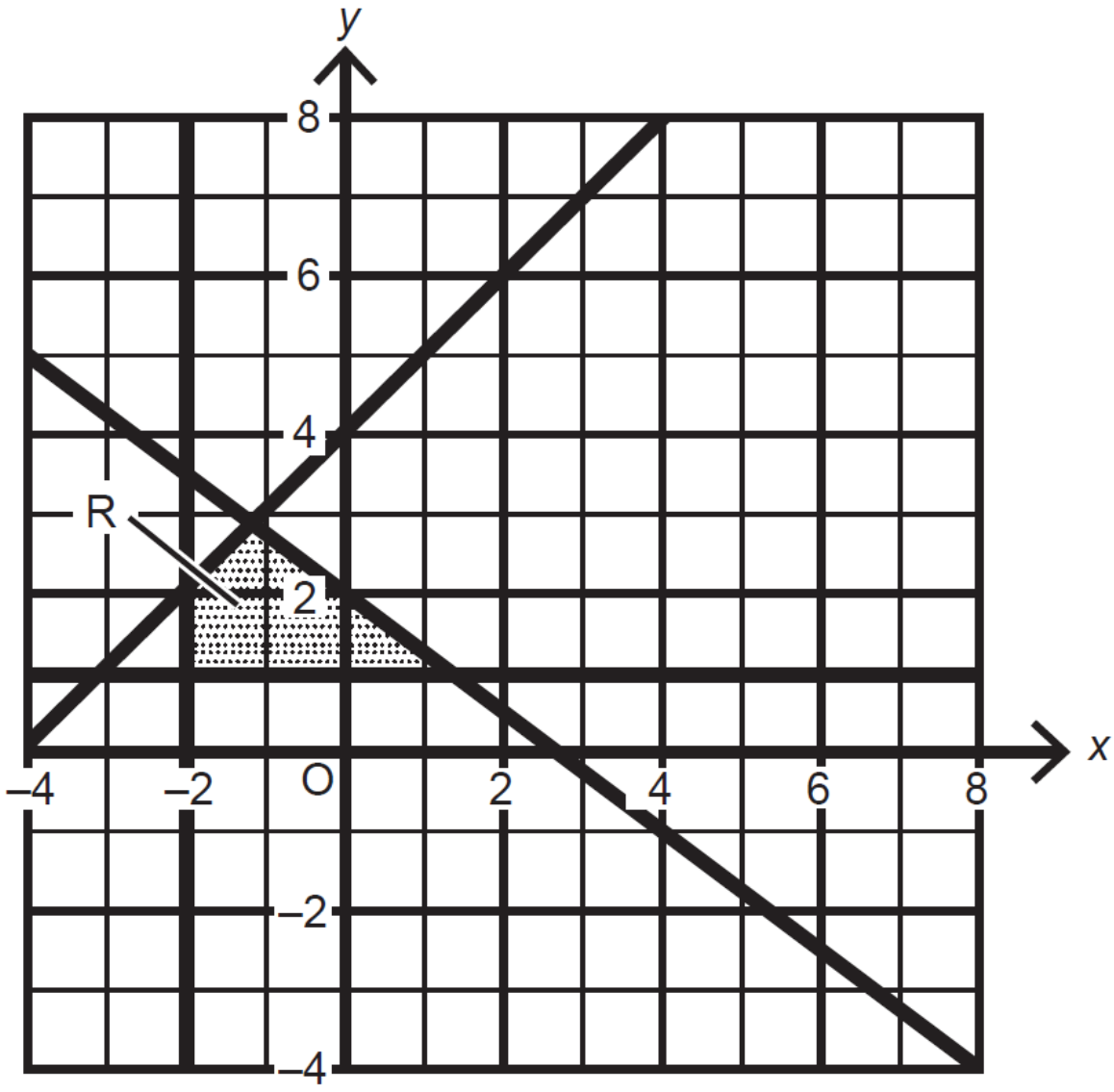

Diagram for Question 5(a)

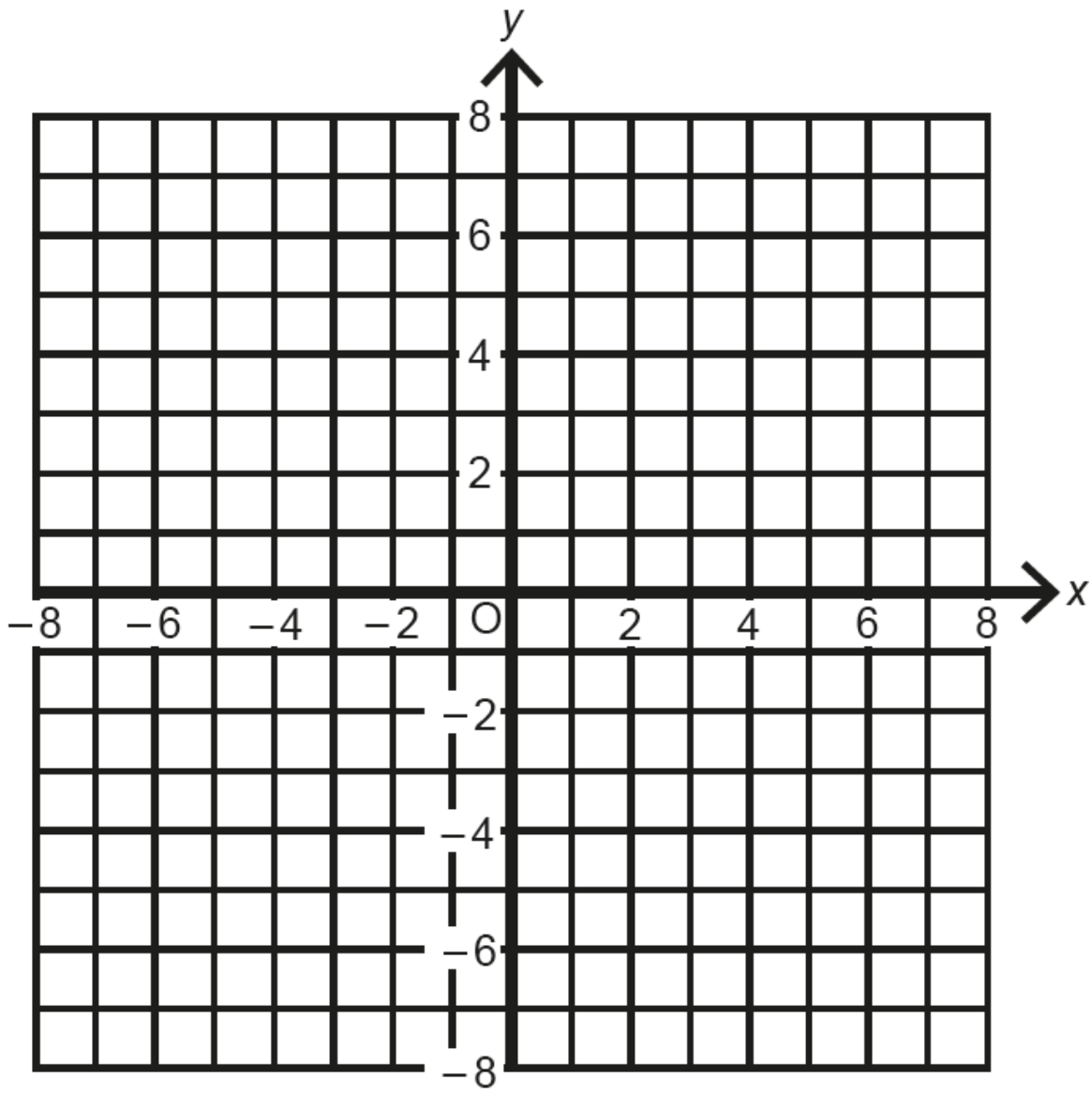

Diagram for Question 12(c)

Diagram for Question 15

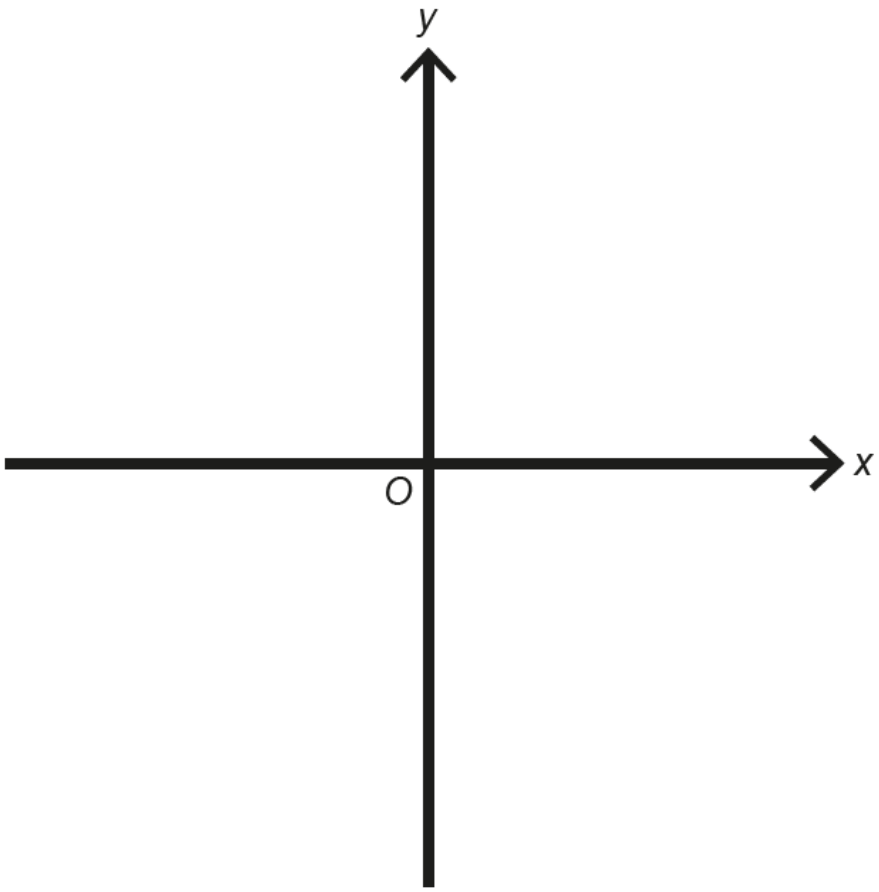

Diagram for Question 19(a)

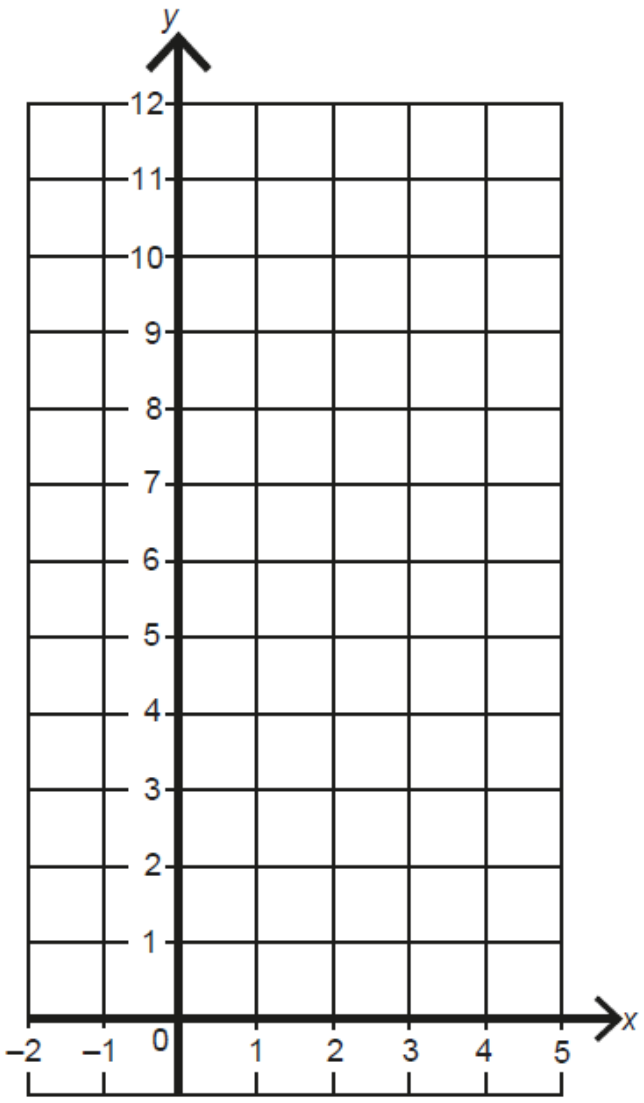

Diagram for Question 20(a)

[Please note: the first cell has been removed from the minus signs.]

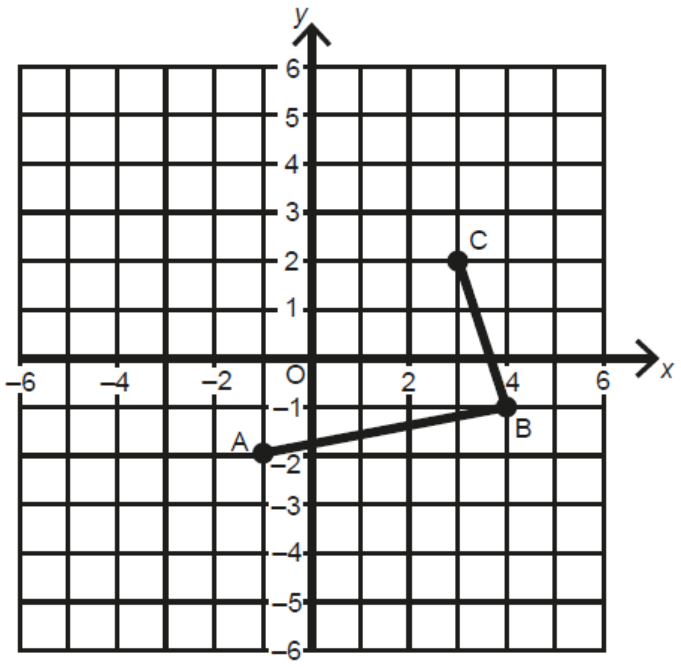

Diagram for Question 20(b)

[Please note: the first cell has been removed from the minus signs.]

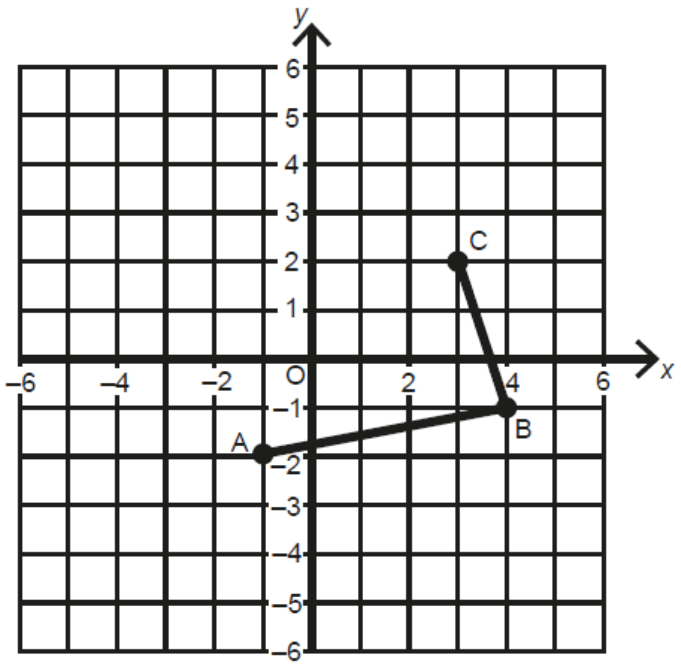
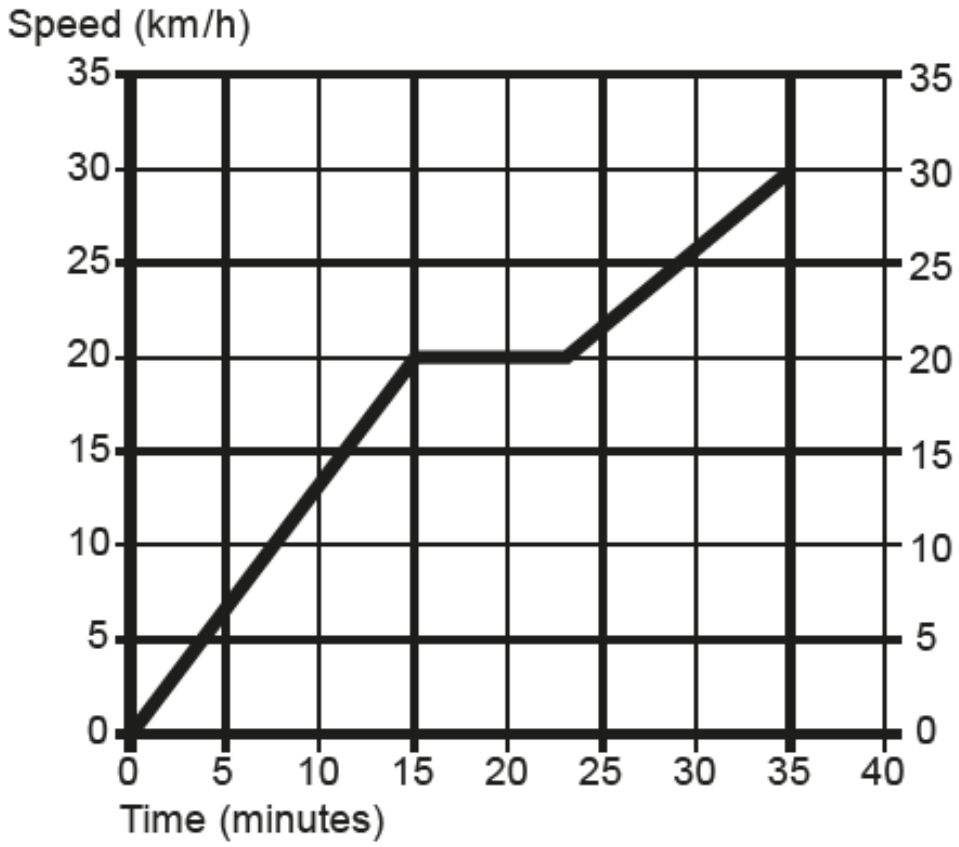
Diagram for Question 22