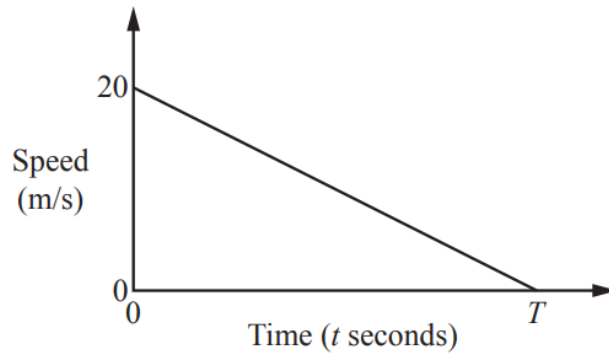


1. 4024/11/M/J/16 Q24

The diagram shows the speed-time graph of a train which slows down from 20m/s to a stop in T seconds.



(a) (i) Find an expression, in terms of T , for the retardation of the train.

Answer m/s^2 [1]

(ii) Find the speed of the train when $t = \frac{3}{4}T$.

Answer m/s [1]

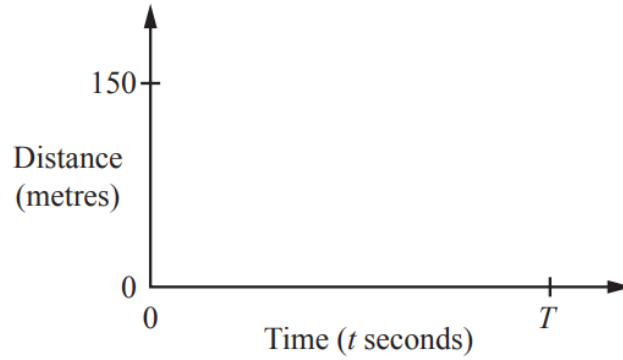
(b) The distance travelled by the train between $t = 0$ and $t = T$ is 150m.

(i) Find T .

Answer $T =$ [1]

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(ii) On the diagram, sketch the distance–time graph of the train.

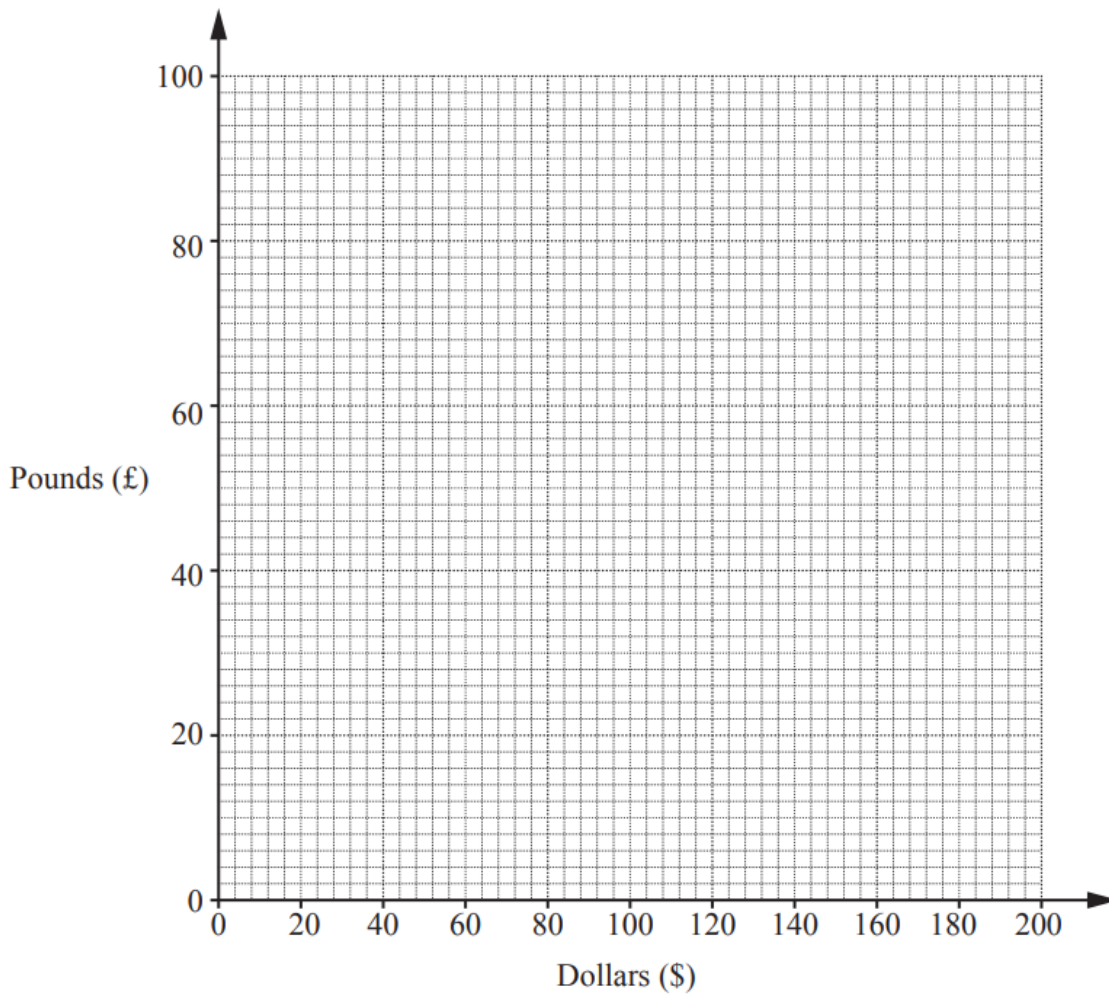


[1]

2. 4024/12/M/J/16 Q3

It is given that 100 dollars (\$) is equivalent to 56 pounds (£).

(a) Use this information to draw a conversion graph between pounds and dollars on the grid below.



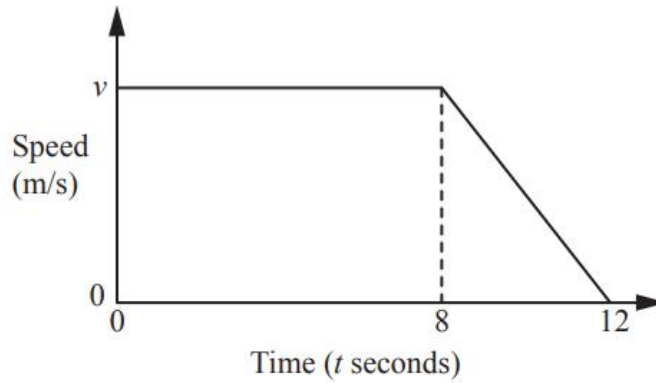
[1]

(b) Use your graph to convert \$64 to pounds.

Answer £ [1]

3. 4024/12/M/J/16 Q18

The diagram is the speed-time graph for part of a car's journey.



The retardation of the car between $t = 8$ and $t = 12$ is 4 m/s^2 .

(a) Find v .

Answer $v =$ [1]

(b) Find the total distance travelled by the car in the 12 seconds.

Answer m [2]

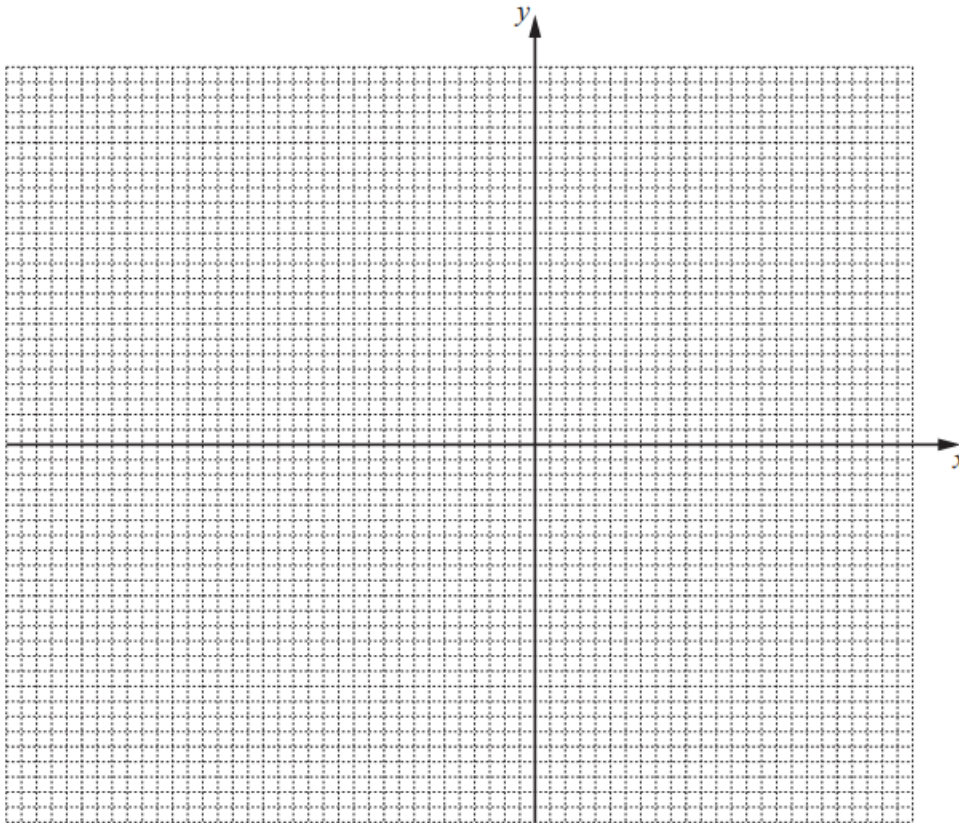
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4. 4024/21/M/J/16 Q3

The table below is for $y = x^2 + x - 3$.

x	-3	-2	-1	0	1	2
y	3	-1	-3	-3	-1	3

- (a) Using a scale of 2 cm to 1 unit on the x -axis for $-3 \leq x \leq 2$ and a scale of 1 cm to 1 unit on the y -axis for $-4 \leq y \leq 4$, plot the points from the table and join them with a smooth curve.



[2]

- (b) (i) Use your graph to estimate the solutions of the equation $x^2 + x - 3 = 0$.

Answer $x = \dots\dots\dots$ or $\dots\dots\dots$ [1]

[CONTINUED ON NEXT PAGE]

(ii) Use your graph to estimate the solutions of the equation $x^2 + x - 5 = 0$.

Answer $x = \dots\dots\dots$ or $\dots\dots\dots$ [2]

(c) By drawing a tangent, estimate the gradient of the curve at $(1, -1)$.

Answer $\dots\dots\dots$ [2]

(d) The equation $x^2 - x - 1 = 0$ can be solved by drawing a straight line on the graph of $y = x^2 + x - 3$.

(i) Find the equation of this straight line.

|

Answer $\dots\dots\dots$ [2]

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(ii) Draw this straight line and hence solve $x^2 - x - 1 = 0$.

Answer $x = \dots\dots\dots$ or $\dots\dots\dots$ [2]

5. 4024/22/M/J/16 Q8

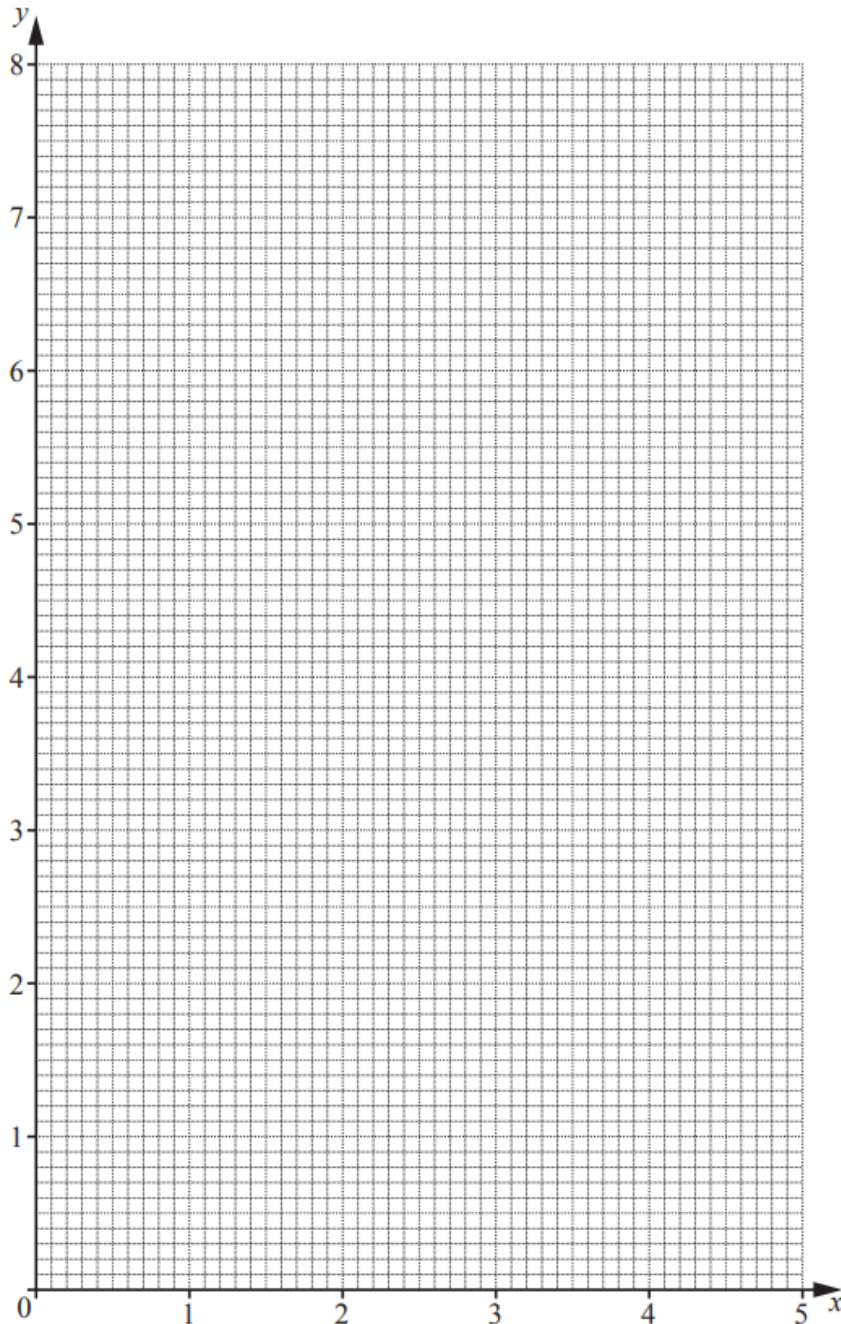
The table below shows some values of x and the corresponding values of y for $y = \frac{1}{4} \times 2^x$.

x	0	1	2	3	4	5
y	$\frac{1}{4}$		1	2	4	8

(a) Complete the table.

[1]

(b) On the grid below, draw the graph of $y = \frac{1}{4} \times 2^x$.



[2]

(c) By drawing a suitable line, find the gradient of your graph where $x = 4$.

Answer [2]

(d) (i) Show that the line $2x + y = 6$, together with the graph of $y = \frac{1}{4} \times 2^x$, can be used to solve the equation

$$2^x + 8x - 24 = 0 .$$

[1]

(ii) Hence solve $2^x + 8x - 24 = 0$.

Answer $x =$ [2]

(e) The points P and Q are $(2, 3)$ and $(5, 4)$ respectively.

(i) Find the gradient of PQ .

Answer [1]

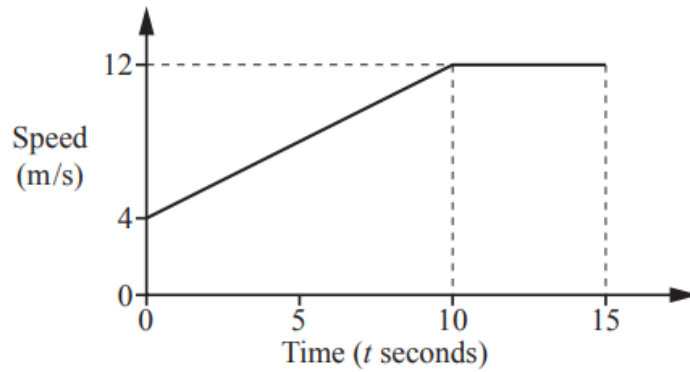
(ii) On the grid, draw the line l , parallel to PQ , that touches the curve $y = \frac{1}{4} \times 2^x$. [1]

(iii) Write down the equation of l .

Answer [2]

6. 4024/11/O/N/16 Q22

The diagram is the speed-time graph of part of a car's journey.



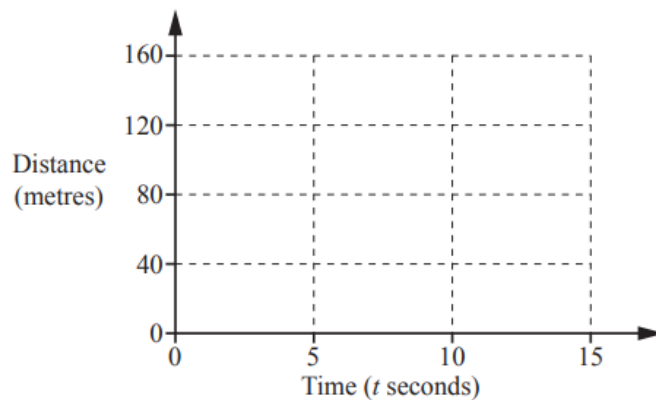
(a) Find the speed when $t = 8$.

Answer m/s [2]

(b) Find the distance travelled by the car from $t = 0$ to $t = 10$.

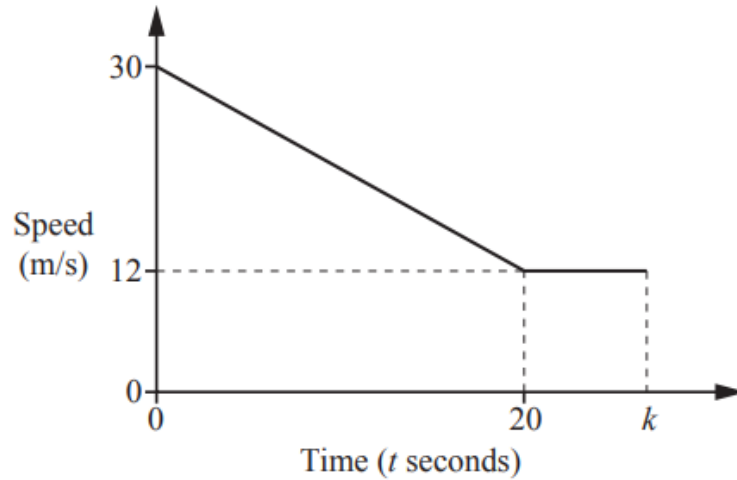
Answer m [2]

(c) On the diagram below sketch the distance-time graph for $t = 0$ to $t = 15$.



[2]

7. 4024/12/O/N/16 Q27



The diagram shows the speed-time graph of a car which slows down from 30m/s to 12m/s in 20 seconds, and then continues at a speed of 12 m/s.

(a) Find the retardation when $t = 10$.

(b) Find the distance travelled by the car between $t = 0$ and $t = 20$. Answer m/s² [1]

Answer m [2]

(c) The distance travelled by the car between $t = 20$ and $t = k$ is 60 m.
Find the value of k .

Answer $k =$ [2]

8. 4024/21/O/N/16 Q8

$$y = \frac{3}{5} \times 2^x$$

The table shows some values of x and the corresponding values of y , correct to one decimal place where necessary.

x	-1.5	-1	0	1	2	2.5	3	3.5	4
y	p	0.3	0.6	1.2	2.4	3.4	4.8	6.8	9.6

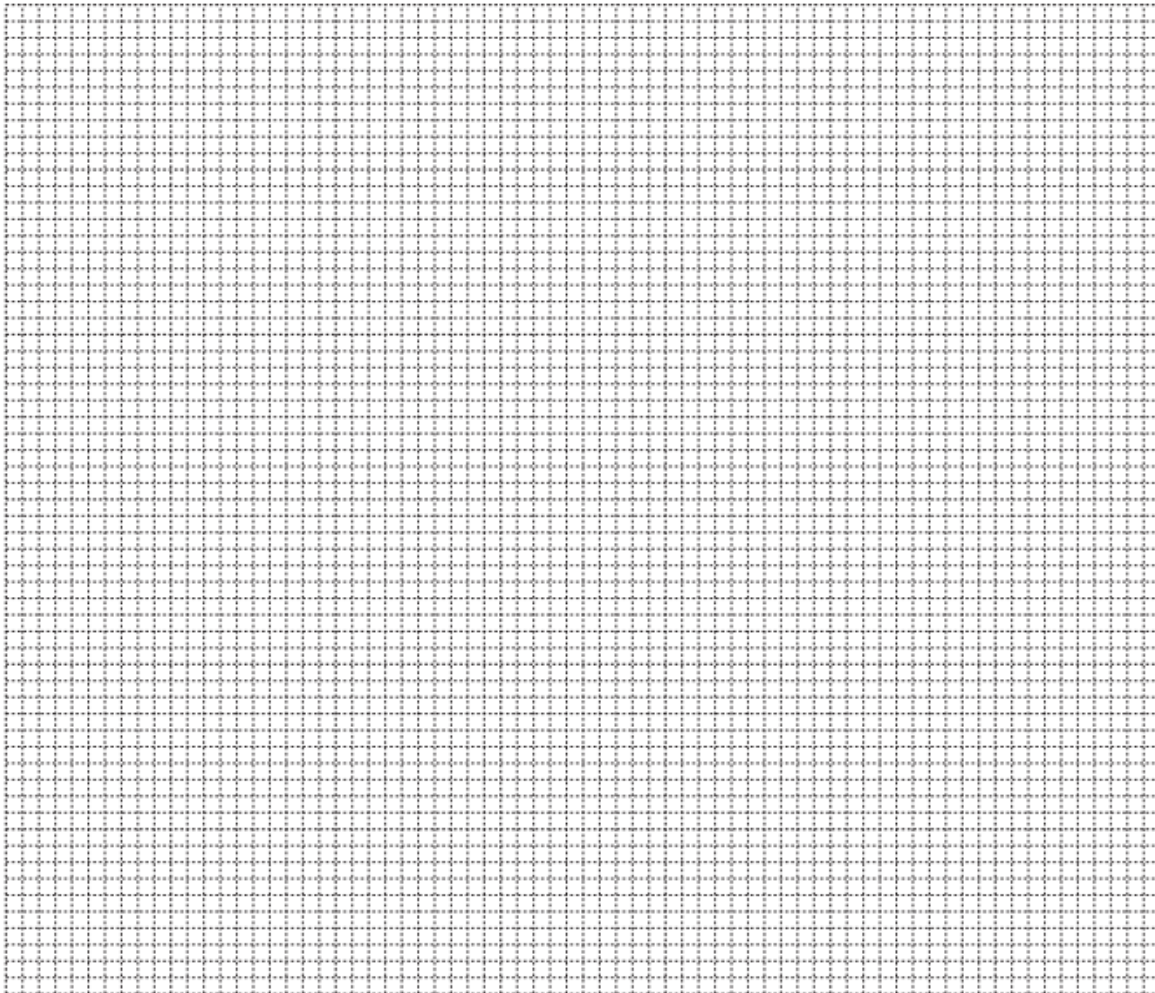
(a) Calculate p .

Answer [1]

(b) On the grid,

- using a scale of 2 cm to 1 unit, draw a horizontal x -axis for $-2 \leq x \leq 4$,
- using a scale of 1 cm to 1 unit, draw a vertical y -axis for $0 \leq y \leq 10$,
- plot the points from the table and join them with a smooth curve.

[3]



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(c) By drawing a tangent, estimate the gradient of the curve at the point where $x = 2.5$.

Answer [2]

(d) (i) On the same grid, draw the straight line that passes through $(-0.4, 0)$ and $(2, 3.6)$.

[1]

(ii) Find the equation of this line in the form $y = mx + c$.

Answer [2]

(iii) Write down the x -coordinates of the points where the line intersects the curve.

Answer $x =$ and $x =$ [1]

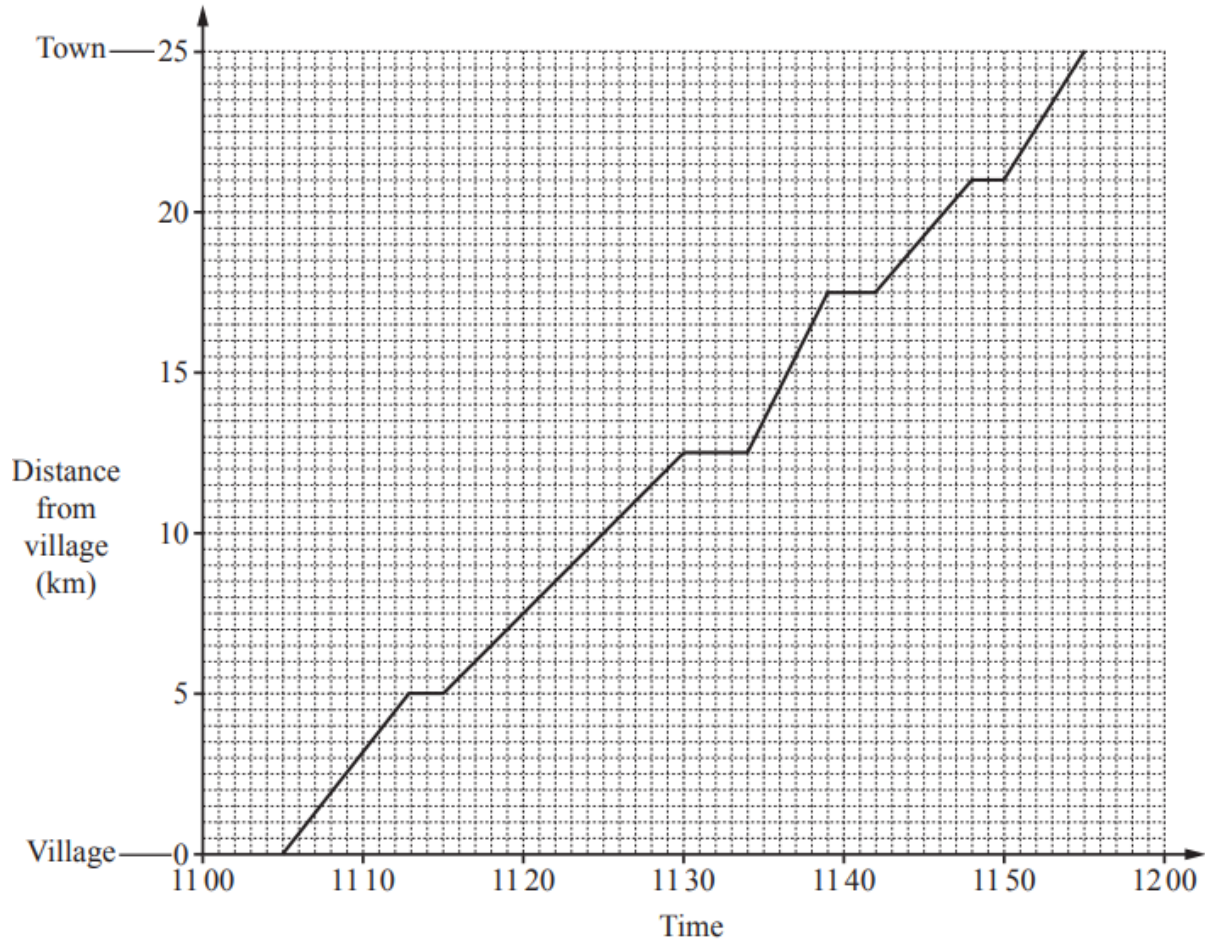
(iv) These x -coordinates satisfy the equation

$$2^x = Ax + B.$$

Find the values of A and B .

Answer $A =$ $B =$ [2]

9. 4024/11/M/J/17 Q20



The distance-time graph shows the journey of a red bus travelling from a village to a town.

(a) Find the total length of time for which the bus is stopped during the journey.

Answerminutes [1]

(b) Find the average speed of the bus over the **whole** journey from the village to the town.

Answer km/h [1]

(c) A yellow bus leaves the **town** at 11 25 and travels non-stop along the same road to the village at a constant speed of 50 km/h.

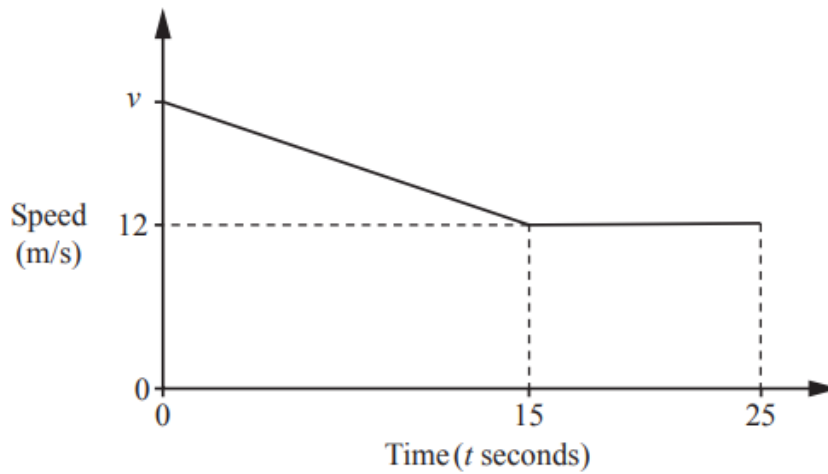
(i) On the graph draw the distance-time graph for the yellow bus. [1]

(ii) At what time does the yellow bus meet the red bus?

Answer [1]

10. 4024/12/M/J/17 Q18

The diagram is the speed-time graph for 25 seconds of a car's journey.



The car slows down uniformly from a speed of v m/s to a speed of 12 m/s in 15 seconds. It then travels at constant speed for a further 10 seconds.

- (a) The retardation of the car is 0.4 m/s^2 .

Calculate the value of v .

Answer $v = \dots\dots\dots$ [2]

- (b) Calculate the distance travelled by the car from $t = 0$ to $t = 25$.

Answer $\dots\dots\dots$ m [2]

11. 4024/21/M/J/17 Q5

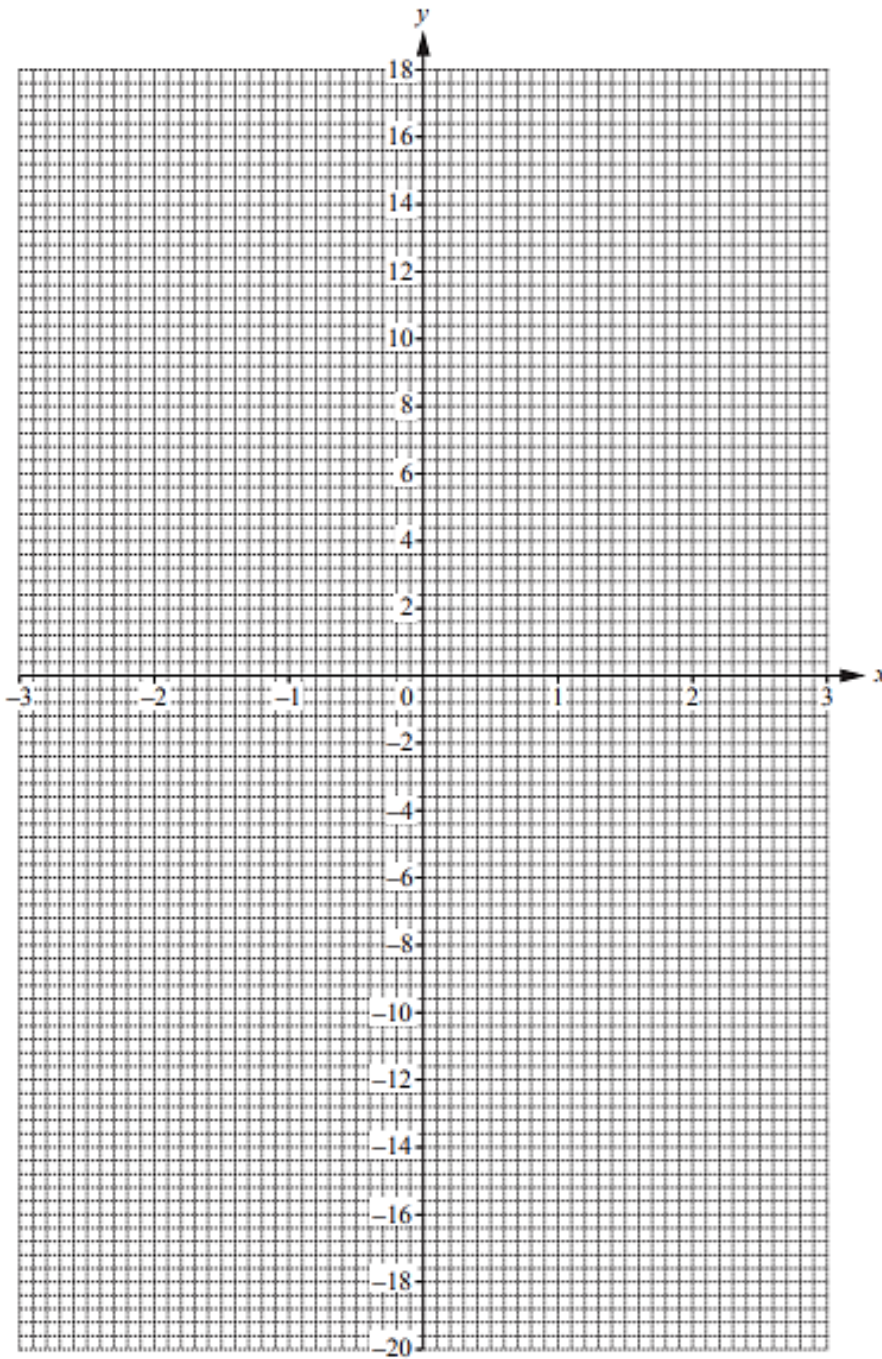
The table below is for $y = x^3 - 3x - 1$.

x	-3	-2	-1	0	1	2	3
y	-19	-3	1	-1	-3	1	

(a) Complete the table.

[1]

(b) On the grid, draw the graph of $y = x^3 - 3x - 1$.



[3]

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(c) Use your graph to solve $x^3 - 3x - 1 = 0$.

Answer $x = \dots\dots\dots$ [2]

(d) Use your graph to estimate the gradient of the curve when $x = -1.5$.

Answer $\dots\dots\dots$ [2]

(e) (i) On the grid draw the graph of $y = 4x + 3$. [1]

(ii) The line $y = 4x + 3$ and the curve $y = x^3 - 3x - 1$ can be used to solve the equation $x^3 = ax + b$.

Find the values of a and b .

Answer $a = \dots\dots\dots b = \dots\dots\dots$ [2]

(iii) Use your graph to find one of the **negative** solutions of $x^3 = ax + b$.

Answer $x = \dots\dots\dots$ [1]

12. 4024/22/M/J/17 Q5

(a) Express as a single fraction, as simply as possible, $\frac{1}{2x} + \frac{2}{5x}$.

Answer [1]

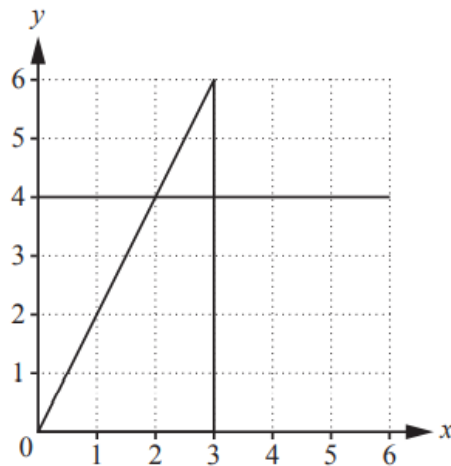
(b) Simplify $4(3x - 2y + 1) - (5x - 3y + 1)$.

Answer [2]

(c) Solve $3x^2 - x - 5 = 0$, giving your answers correct to 2 decimal places.

Answer $x = \dots\dots\dots$ or $\dots\dots\dots$ [3]

(d)



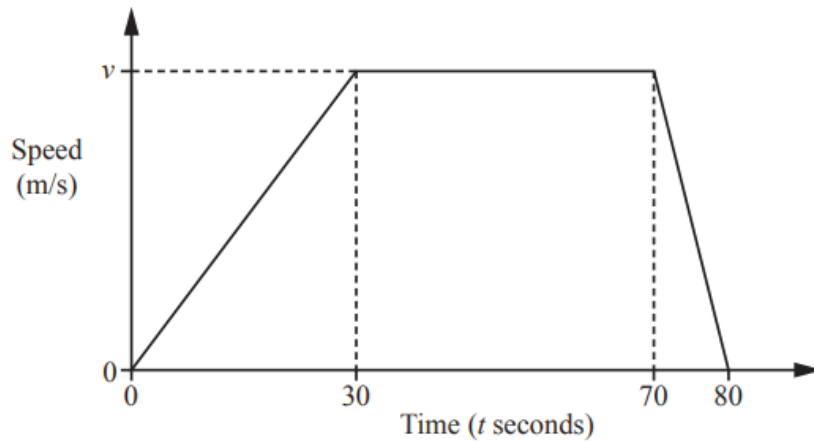
(i) Draw the graph of $x + 2y = 5$. [2]

(ii) Shade the region defined by these inequalities and label it R.

$x \leq 3$ $y \leq 4$ $y \leq 2x$ $x + 2y \geq 5$ [1]

13. 4024/11/O/N/17 Q22

The diagram is the speed-time graph of a train which travels between two stations.



- (a) Find an expression, in terms of v , for the retardation of the train.

Answer m/s^2 [1]

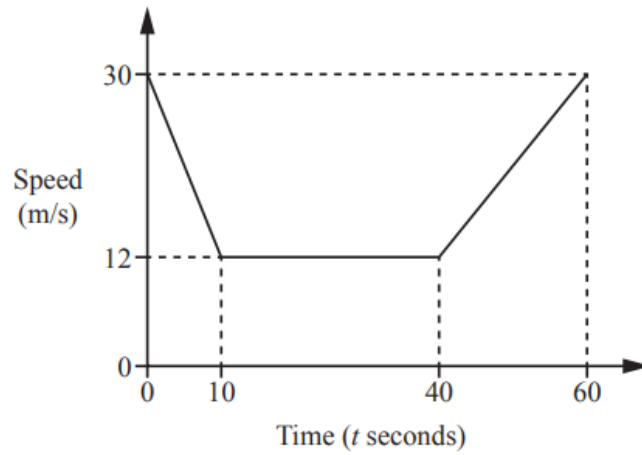
- (b) The distance between the two stations is 1.2 km.

Find v .

Answer $v =$ [3]

14. 4024/12/O/N/17 Q24

The diagram is the speed-time graph of part of a train's journey.



(a) Calculate the speed when $t = 5$.

Answer m/s [1]

(b) Calculate the acceleration.

Answer m/s^2 [1]

(c) Calculate the distance travelled from $t = 40$ to $t = 60$.

Answer m [2]

15. 4024/21/O/N/17 Q7b

(b) The table below shows some values of x and the corresponding values of y for $y = x + \frac{3}{x} - 3$.

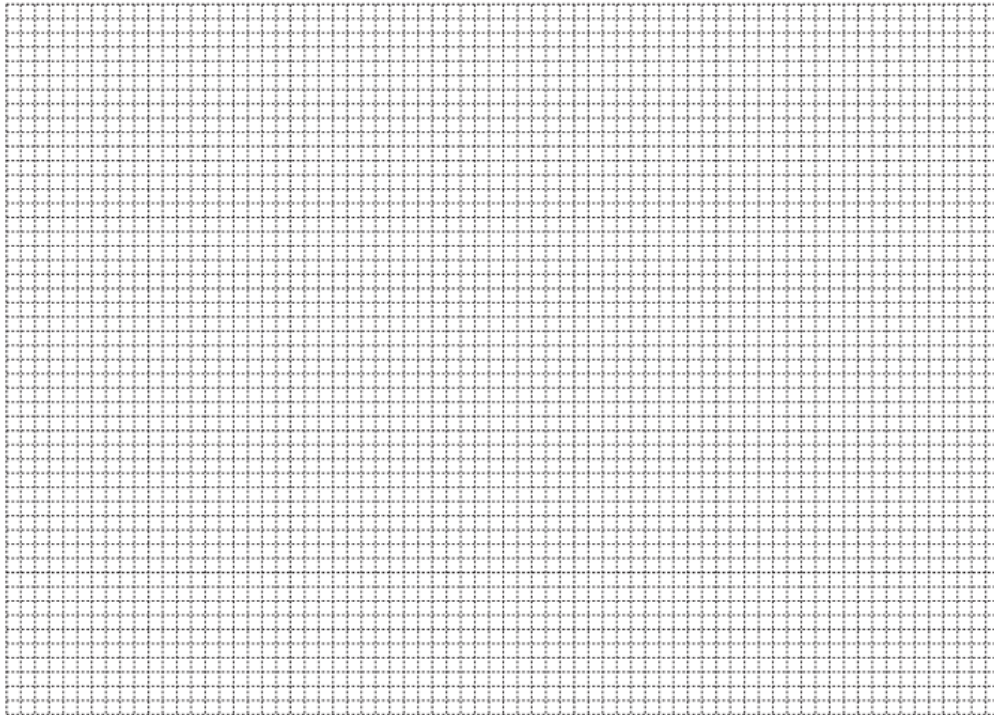
x	0.5	1	1.5	2	3	4	5	6
y	3.5	1	0.5	0.5	1	1.75	2.6	

(i) Complete the table.

[1]

(ii) Using a scale of 2 cm to 1 unit on both axes, draw a horizontal x -axis for $0 \leq x \leq 7$ and a vertical y -axis for $0 \leq y \leq 4$.

Draw the graph of $y = x + \frac{3}{x} - 3$ for $0.5 \leq x \leq 6$.



[3]

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(iii) By drawing a tangent, estimate the gradient of the curve at (1, 1).

Answer [2]

(iv) Use your graph to solve the equation $x + \frac{3}{x} = 5$.

Answer $x =$ or [2]

16. 4024/22/O/N/17 Q7

(a) The variables x and y are connected by the equation $y = 3 + x - \frac{x^2}{2}$.

Some corresponding values of x and y are given in the table below.

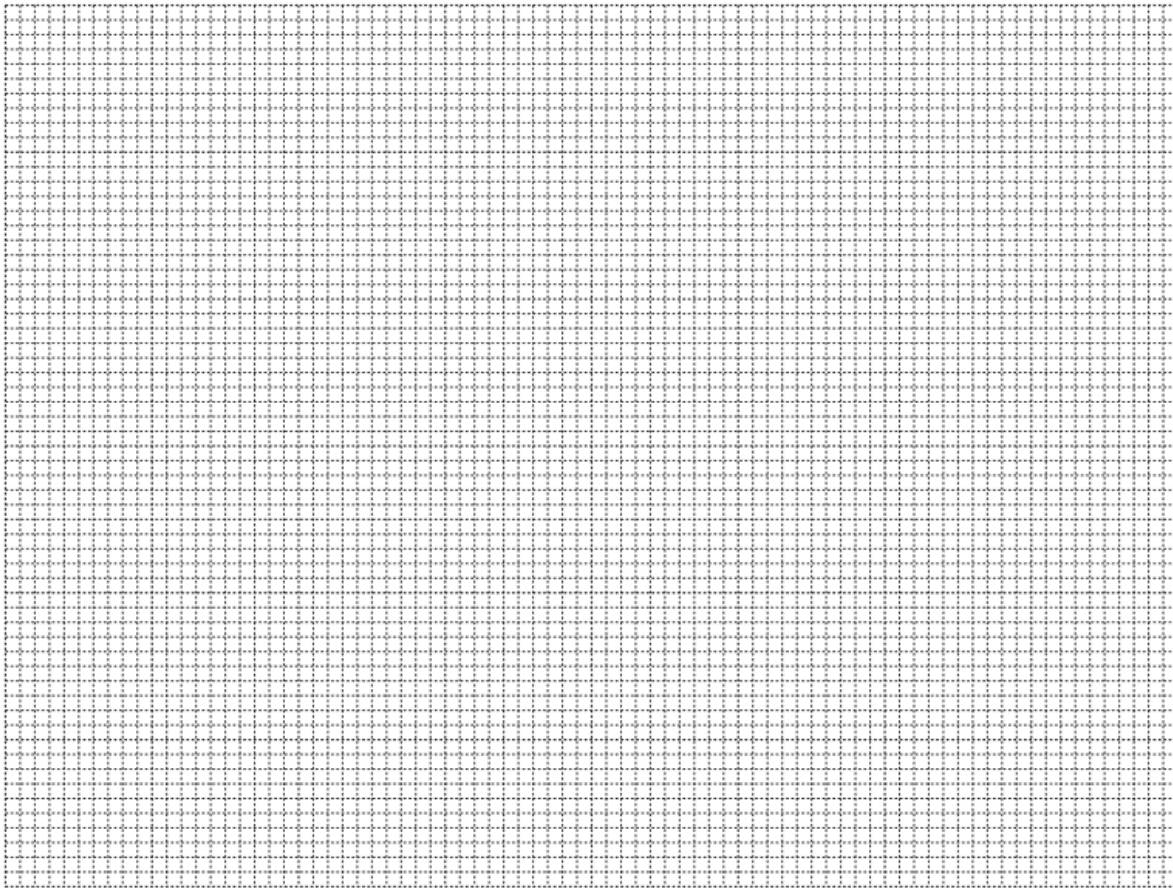
x	-3	-2	-1	0	1	2	3	4	5
y		-1	1.5	3	3.5	3	1.5	-1	

(i) Complete the table.

[1]

(ii) Using a scale of 2 cm to 1 unit, draw a horizontal x -axis for $-3 \leq x \leq 5$.
Using a scale of 1 cm to 1 unit, draw a vertical y -axis for $-5 \leq y \leq 5$.

Draw the graph of $y = 3 + x - \frac{x^2}{2}$ for $-3 \leq x \leq 5$.



[3]

(iii) By drawing a tangent, estimate the gradient of the curve at (3, 1.5).

Answer [2]

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(iv) The points of intersection of the graph of $y = 3 + x - \frac{x^2}{2}$ and the line $y = k$ are the solutions of the equation $10 + 2x - x^2 = 0$.

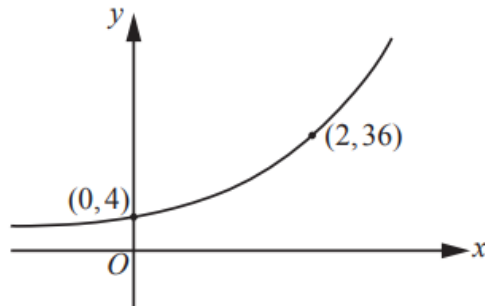
(a) Find the value of k .

Answer [1]

(b) By drawing the line $y = k$ on your graph, find the solutions of the equation $10 + 2x - x^2 = 0$.

Answer [2]

(b) This is a sketch of the graph of $y = pa^x$, where $a > 0$. The graph passes through the points $(0, 4)$ and $(2, 36)$.



(i) Write down the value of p .

Answer [1]

(ii) Find the value of a .

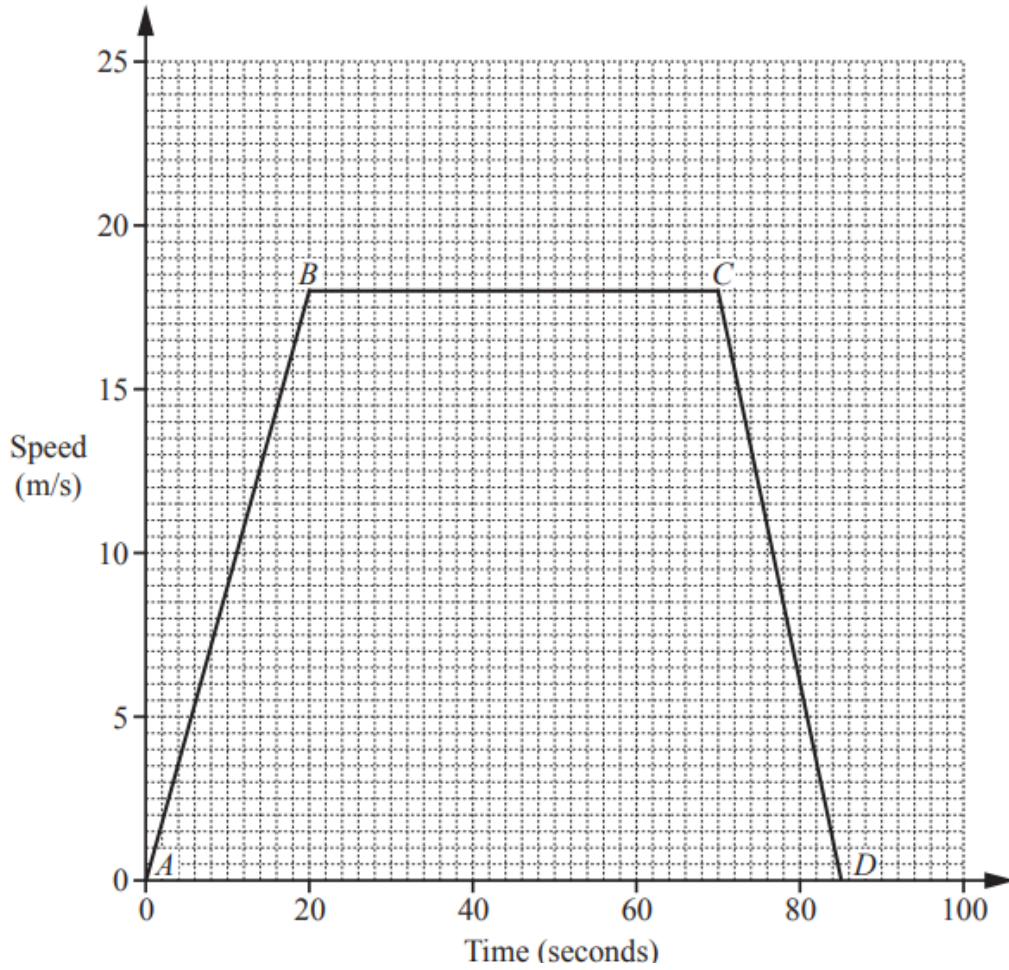
Answer [1]

(iii) The graph passes through the point $(4, q)$.

Find the value of q .

Answer [1]

17. 4024/11/M/J/18 Q18



The speed-time graph shows the motion of a car.

(a) Describe **fully** the motion of the car represented by each of the lines *AB*, *BC* and *CD* on the graph.

AB has been done for you.

AB Accelerates for the first 20 s at 0.9 m/s^2 .

BC

CD [3]

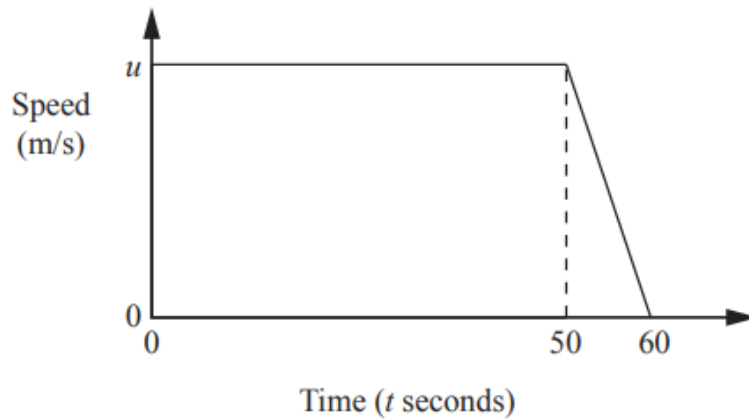
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(b) Find the total distance travelled by the car during this motion.

Answer m [2]

18. 4024/12/M/J/18 Q25

The diagram is the speed–time graph for 60 seconds of a train’s journey.
At the beginning of this part of the journey the train is travelling at u m/s.



Giving each answer in its simplest form, find expressions in terms of u , for

(a) the deceleration for the last 10 seconds,

Answer m/s^2 [1]

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(b) the speed when $t = 55$,

Answer m/s [1]

(c) the distance travelled during these 60 seconds.

Answer m [2]

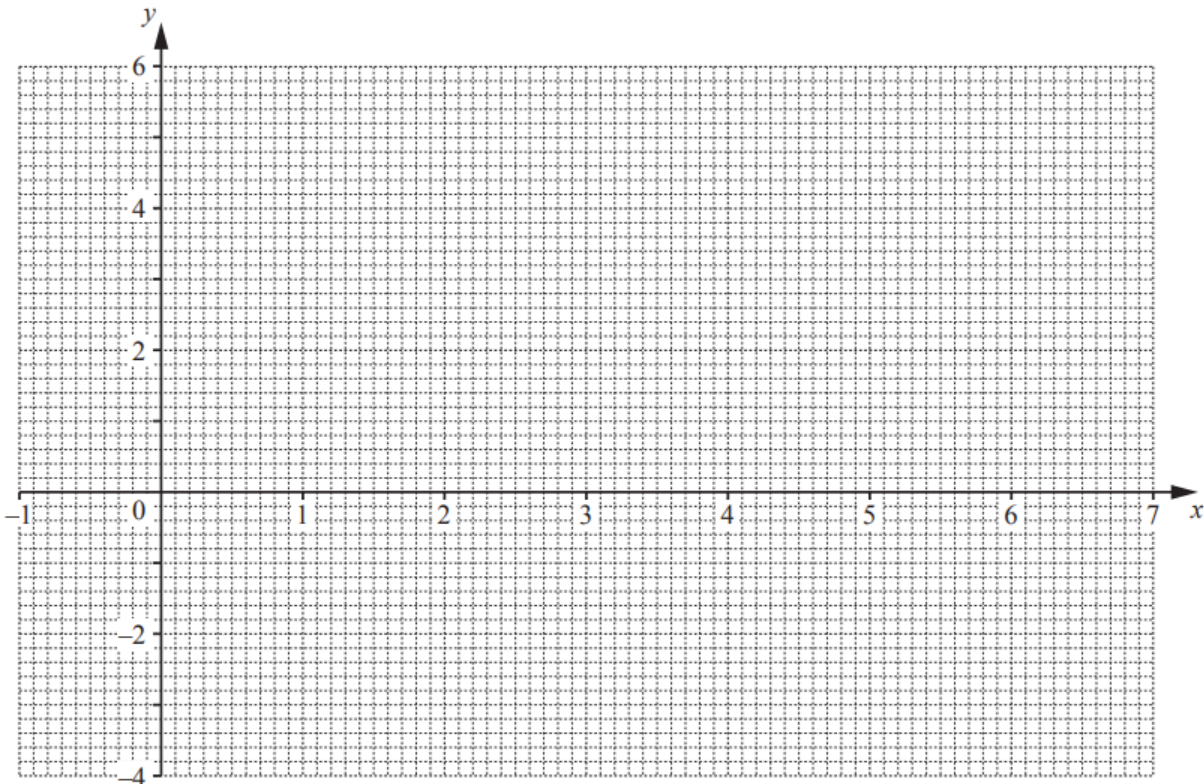
19. 4024/22/M/J/18 Q6

(a) Complete the table for $y = \frac{x^2}{2} - 3x + 2$.

x	-1	0	1	2	3	4	5	6	7
y		2	-0.5	-2	-2.5	-2	-0.5	2	

[1]

(b) Draw the graph of $y = \frac{x^2}{2} - 3x + 2$ for $-1 \leq x \leq 7$.



[3]

(c) By drawing a tangent, estimate the gradient of the curve at $x = 1.5$.

Answer [2]

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(d) Complete these inequalities to describe the range of values of x where $y \geq 0$.

Answer $x \leq$

$x \geq$ [2]

(e) (i) On the same grid, draw the line $4y + 3x = 12$. [2]

(ii) The x -coordinates of the points of intersection of this line and the curve are the solutions of the equation $2x^2 + Ax + B = 0$.

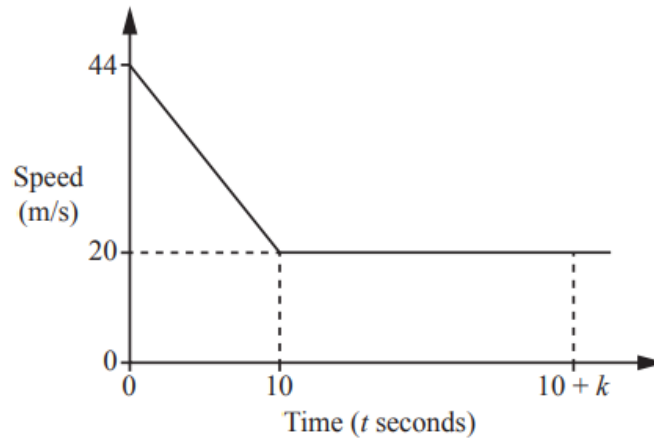
Find the value of A and the value of B .

Answer $A =$

$B =$ [2]

20. 4024/11/O/N/18 Q24

The diagram is the speed–time graph of part of a train’s journey.



The train slows down uniformly from a speed of 44 m/s to a speed of 20 m/s in a time of 10 seconds. It then continues at a constant speed of 20 m/s

- (a) Find the deceleration when $t = 5$.

Answer m/s^2 [1]

- (b) Find the speed when $t = 5$.

Answer m/s [1]

- (c) The distance travelled from $t = 0$ to $t = 10$ is equal to the distance travelled from $t = 10$ to $t = 10 + k$.

Find k .

Answer $k =$ [3]

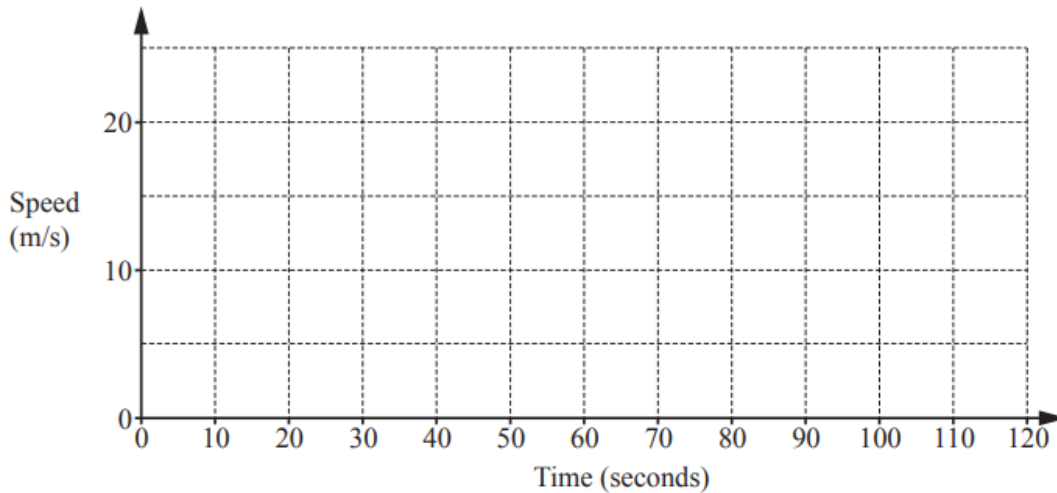
21. 4024/12/O/N/18 Q24

A train travels between two stations, starting and finishing at rest.

For this journey it

- accelerates uniformly, from rest, for the first 30 seconds until it reaches a speed of 20 m/s
- travels at a constant speed of 20 m/s for the next 60 seconds
- slows down uniformly for the last 20 seconds until it stops.

(a) On the grid, draw the speed–time graph for this journey.



[2]

(b) Calculate the distance between the stations.

Answer m [2]

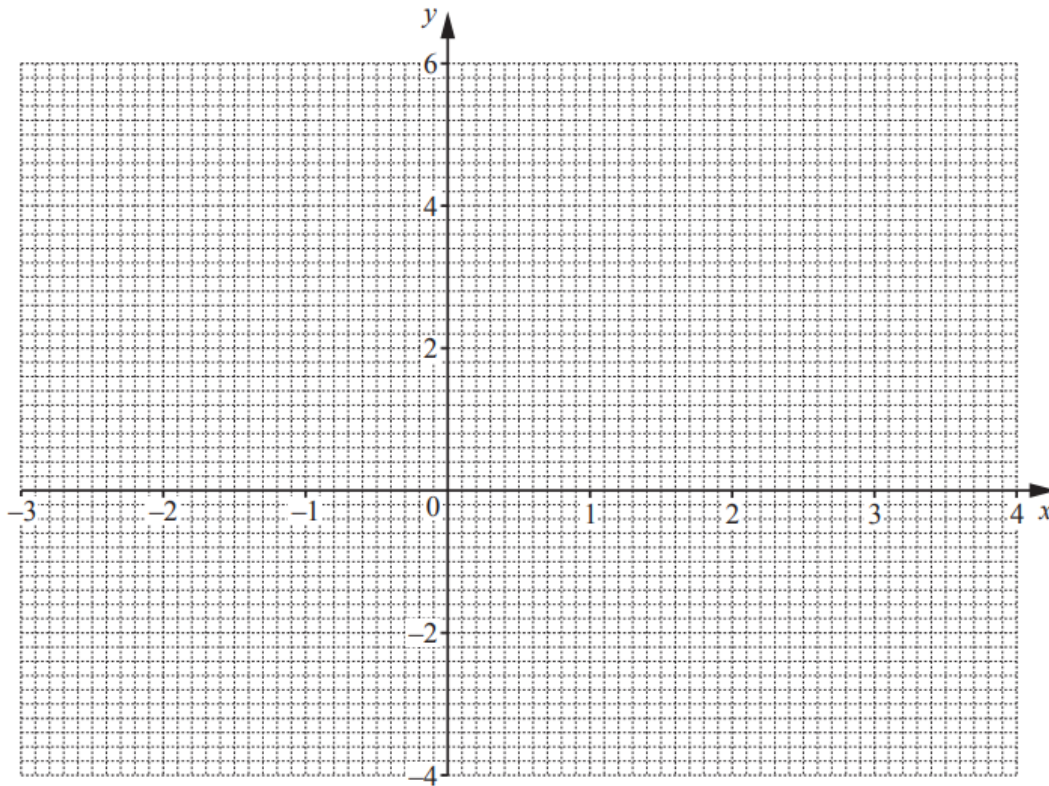
22. 4024/21/0/N/18 Q5

(a) Complete the table for $y = \frac{x}{5}(6 + 2x - x^2)$.

x	-3	-2	-1	0	1	2	3	4
y	5.4	0.8	-0.6	0	1.4	2.4	1.8	

[1]

(b) Draw the graph of $y = \frac{x}{5}(6 + 2x - x^2)$ for $-3 \leq x \leq 4$.



[3]

(c) By drawing a tangent, estimate the gradient of $y = \frac{x}{5}(6 + 2x - x^2)$ at $(-2, 0.8)$.

Answer [2]

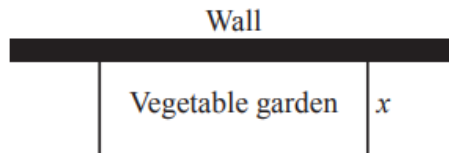
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(d) Use your graph to solve the equation $x(6 + 2x - x^2) = 10$.

Answer [3]

23. 4024/22/O/N/18 Q6

Zara fences off a piece of land next to a wall to make a vegetable garden.



The garden is a rectangle with the wall as one side of the rectangle.
The area of the garden is 18 square metres.
The width of the garden is x metres.

(a) The total length of fencing required for the garden is y metres.

Show that $y = 2x + \frac{18}{x}$.

[1]

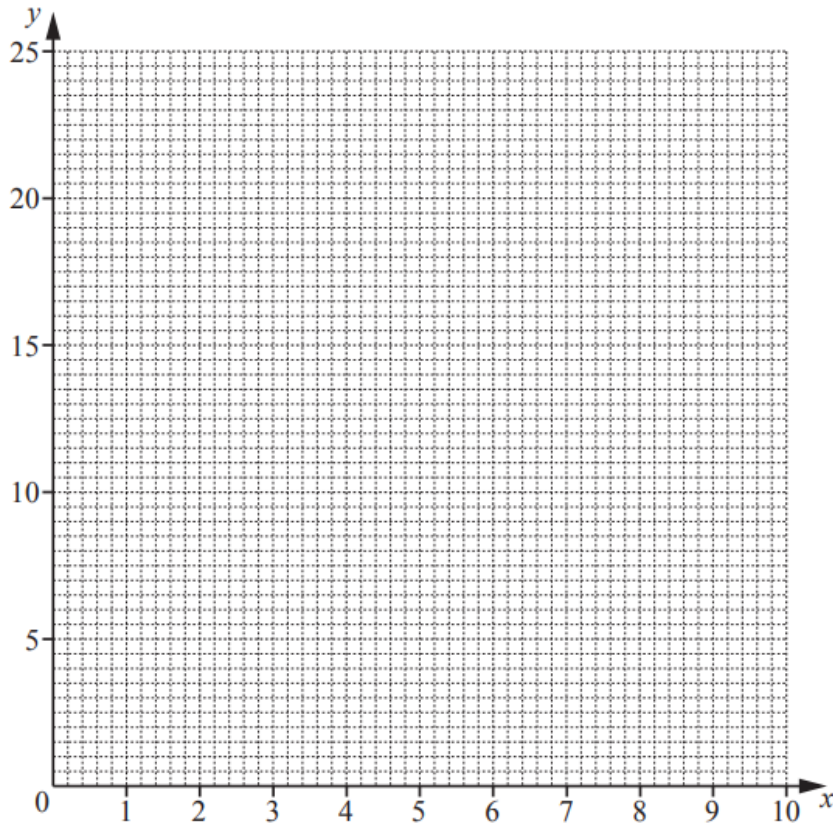
(b) (i) Complete the table for $y = 2x + \frac{18}{x}$.

x	1	2	3	4	5	6	7	8	9
y			12	12.5	13.6	15	16.6	18.3	

[2]

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(ii) On the grid, draw the graph of $y = 2x + \frac{18}{x}$ for $1 \leq x \leq 9$.



[3]

(c) Use your graph to find the two possible widths of the garden if 14 metres of fencing is used.

Answer m or m [2]

(d) The fencing costs \$20 per metre.

(i) Find the minimum amount it will cost Zara to build the fence.

Answer \$ [2]

(ii) Zara wants to spend no more than \$350 on the fence.

Find the greatest possible width of the garden Zara can make.

Answer m [2]

24. 4024/12/M/J/19 Q9

(b) Calculate the acceleration of the car in the first 20 seconds of the journey.

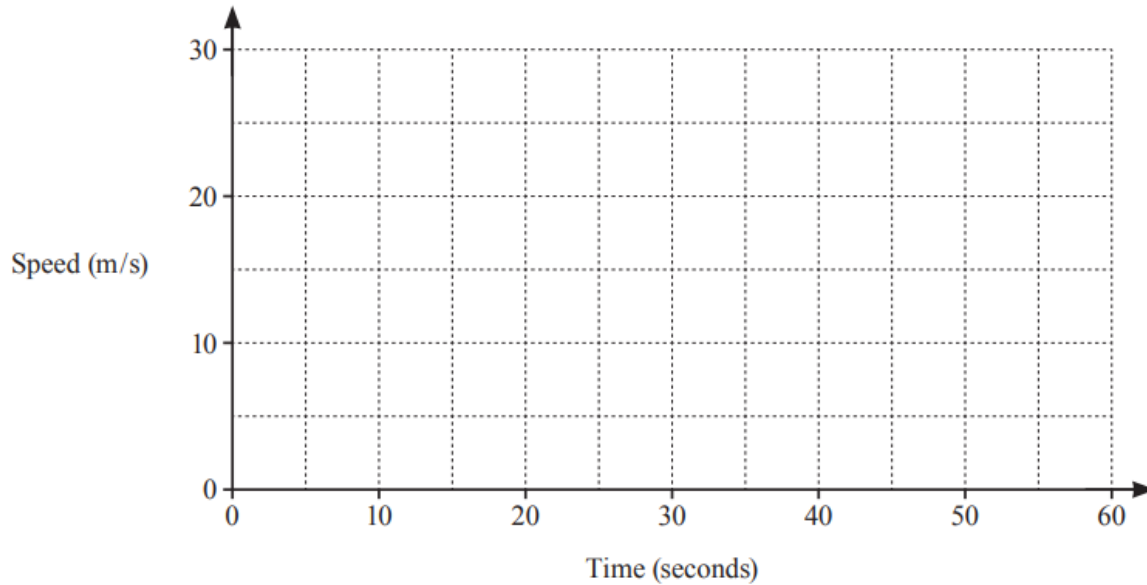
.....m/s² [1]

A car starts a journey from rest.

It moves with constant acceleration for 20 seconds until it reaches a speed of 15 m/s.

It then moves at a constant speed of 15 m/s for 40 seconds.

(a) On the grid, draw the speed–time graph for the car’s journey.



[2]

(b) Calculate the acceleration of the car in the first 20 seconds of the journey.

.....m/s² [1]

25. 4024/22/M/J/19 Q7

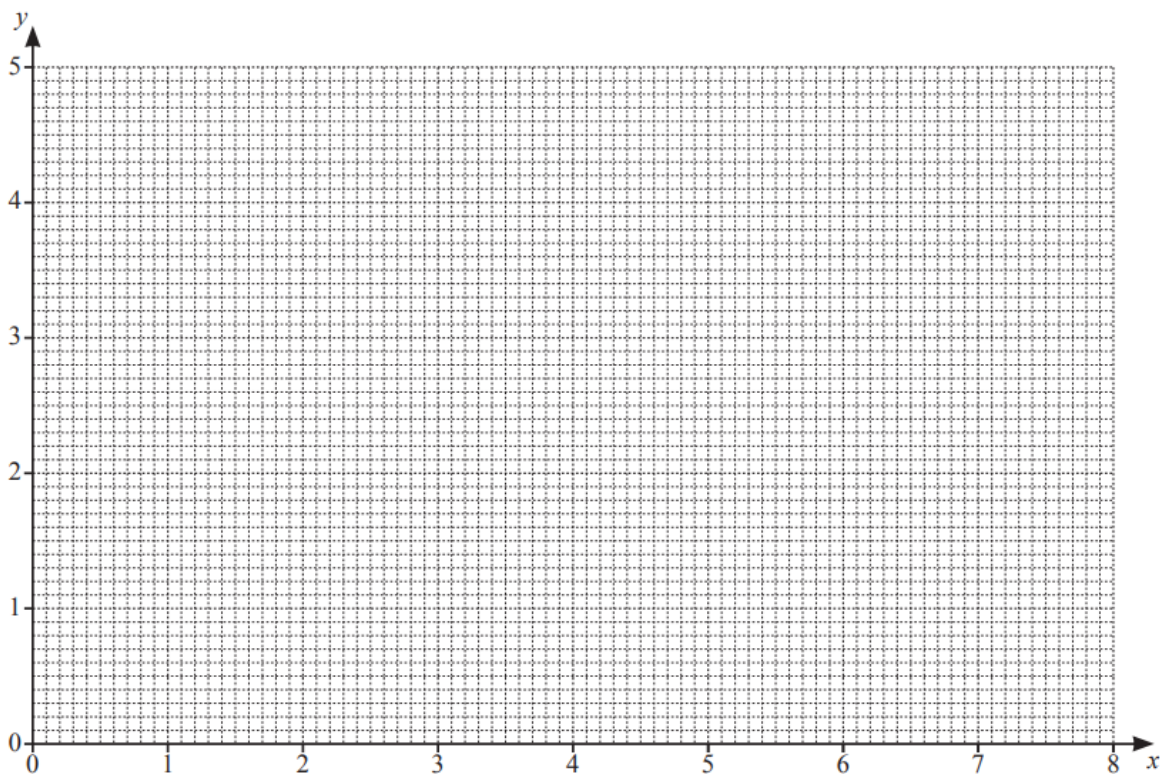
The table shows some values for $y = 1 + \frac{2}{x}$, given correct to 2 decimal places where appropriate.

x	0.5	1	2	3	4	5	6	7	8
y	5	3	2	1.67	1.5	1.4	1.33	1.29	

(a) Complete the table.

[1]

(b) Draw the graph of $y = 1 + \frac{2}{x}$ for $0.5 \leq x \leq 8$.



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- (c) The line L crosses the graph of $y = 1 + \frac{2}{x}$ at $x = 2$ and $x = 5$.

Find the equation of L .

..... [3]

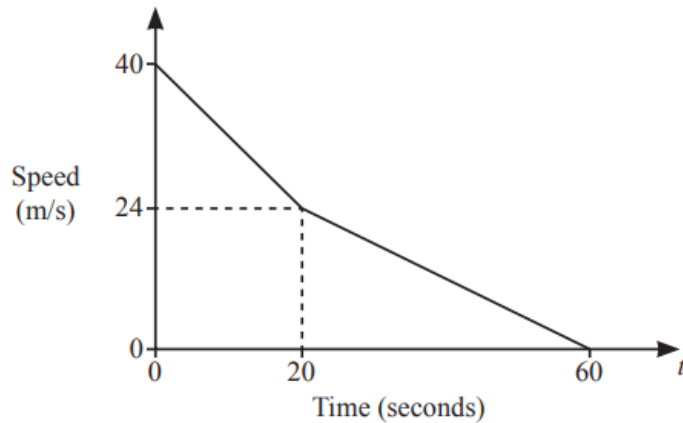
- (d) A line with gradient $-\frac{1}{3}$ crosses the graph of $y = 1 + \frac{2}{x}$ when $x = 1$ and when $x = k$.

By drawing a suitable line on your grid, find k .

$k =$ [2]

26. 4024/11/O/N/19 Q23

The diagram is the speed–time graph representing part of a train’s journey.



The train slows down uniformly from a speed of 40 m/s to a speed of 24 m/s in a time of 20 seconds. It then slows down uniformly for a further 40 seconds, until it stops.

(a) Find the deceleration between $t = 20$ and $t = 60$.

..... m/s^2 [1]

(b) Find the speed when $t = 50$.

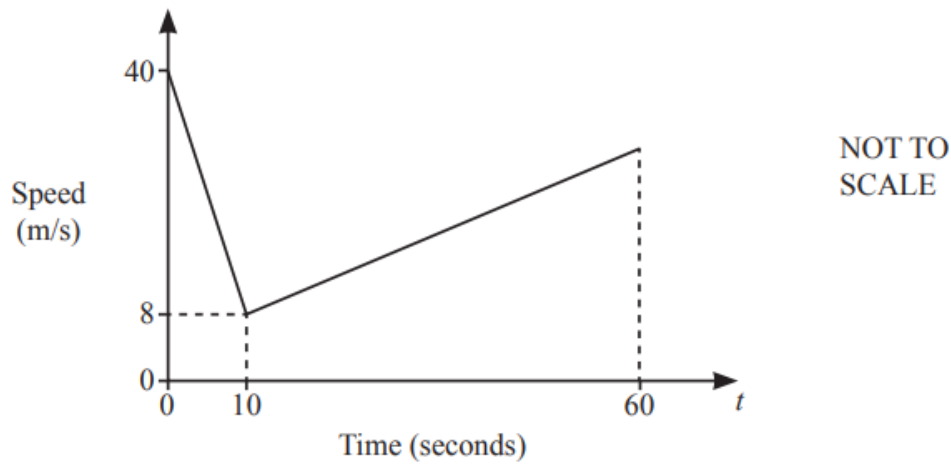
..... m/s [1]

(c) Find the distance travelled from $t = 0$ to $t = 20$.

..... m [2]

27. 4024/12/O/N/19 Q25

The diagram is the speed–time graph representing part of a train’s journey.



The train slows down uniformly from a speed of 40 m/s to a speed of 8 m/s in a time of 10 seconds. It then accelerates uniformly during the next 50 seconds.

- (a) Find the deceleration between $t = 0$ and $t = 10$.

..... m/s^2 [1]

- (b) Find the distance travelled from $t = 0$ to $t = 10$.

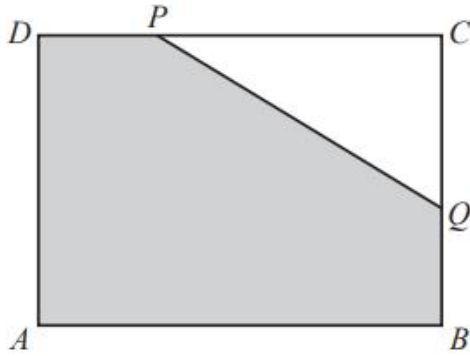
..... m [2]

- (c) Between $t = 10$ and $t = 60$, the acceleration is 0.4 m/s^2 .

Calculate the speed when $t = 60$.

..... m/s [2]

28. 4024/21/O/N/19 Q8



NOT TO
SCALE

Rectangle $ABCD$ has area 80 cm^2 .
Triangle PCQ is removed from one corner of the rectangle.
 $BQ = DP = 4 \text{ cm}$.
 $AB = x \text{ cm}$.

(a) Write down an expression, in terms of x , for CP .

..... [1]

(b) Explain why $CQ = \left(\frac{80}{x} - 4\right) \text{ cm}$.

.....
.....
.....
..... [1]

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(c) Show that the shaded area, $y \text{ cm}^2$, is given by

$$y = 32 + 2x + \frac{160}{x}.$$

[3]

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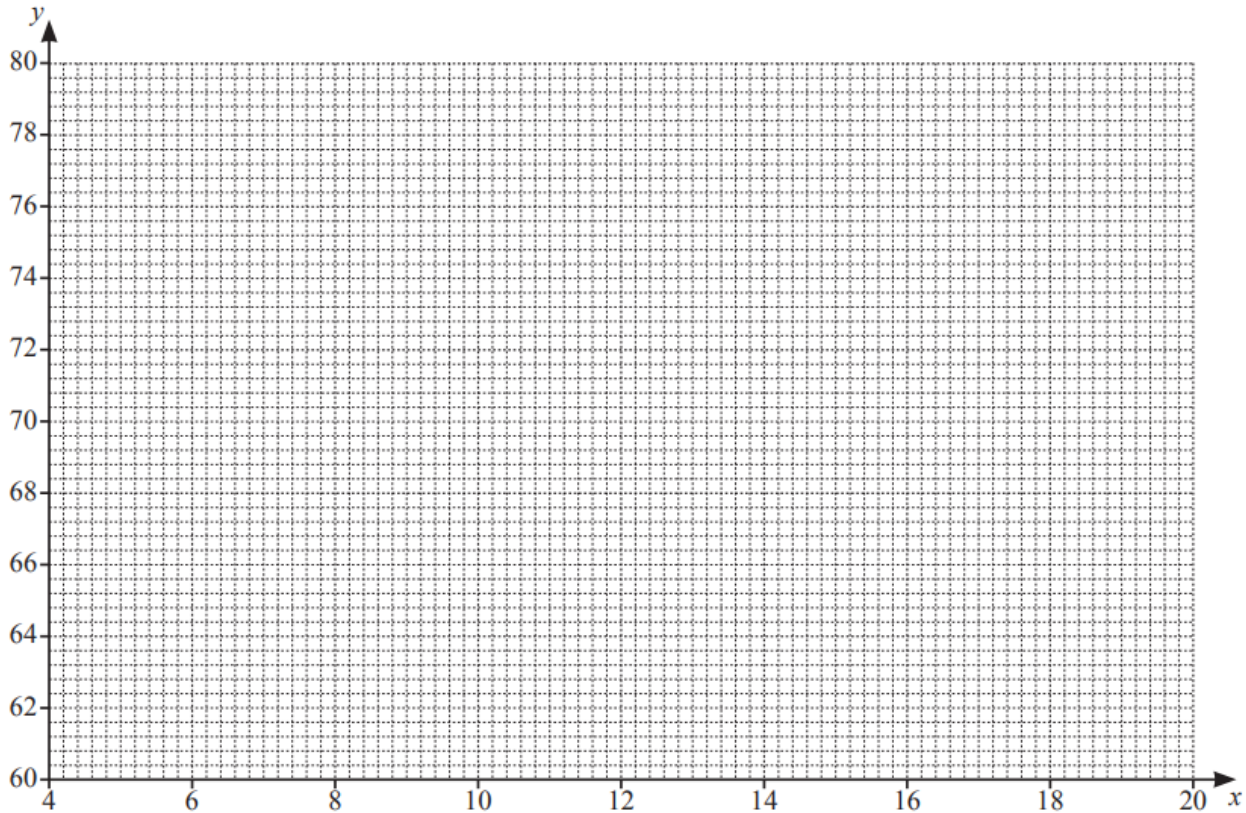
(d) Complete the table for $y = 32 + 2x + \frac{160}{x}$.

Values are given to 1 decimal place where appropriate.

x	4	6	8	10	12	14	16	18	20
y	80	70.7	68	68	69.3	71.4		76.9	80

[1]

(e) On the grid, draw the graph of $y = 32 + 2x + \frac{160}{x}$ for $4 \leq x \leq 20$.



[3]

(f) Use your graph to find the minimum possible shaded area.

..... cm^2 [1]

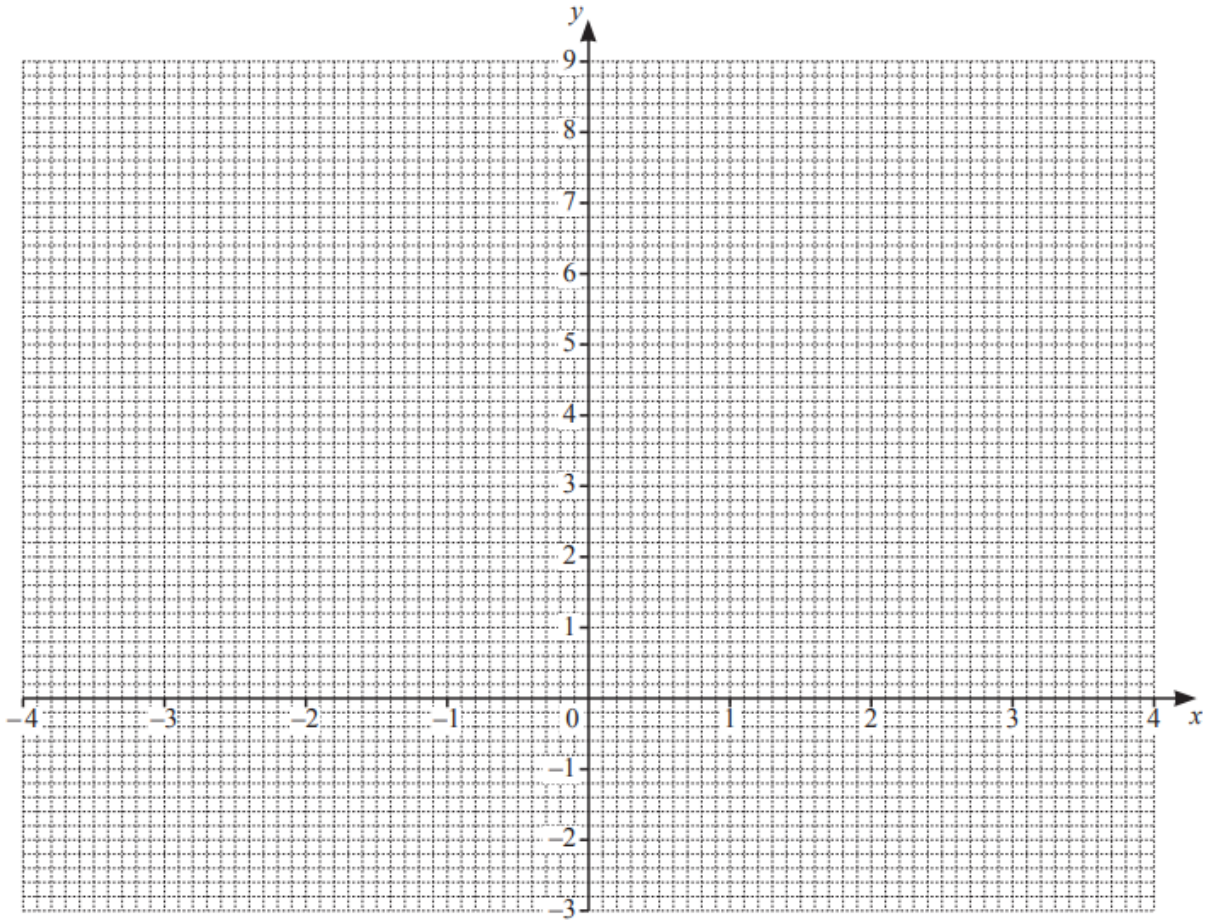
29. 4024/22/O/N/19 Q4

(a) Complete the table for $y = 3 + 2x - \frac{x^3}{5}$.

x	-4	-3	-2	-1	0	1	2	3	4
y	7.8	2.4	0.6	1.2	3	4.8	5.4	3.6	

[1]

(b) Draw the graph of $y = 3 + 2x - \frac{x^3}{5}$ for $-4 \leq x \leq 4$.



[3]

(c) By drawing a tangent, estimate the gradient of the graph of $y = 3 + 2x - \frac{x^3}{5}$ at (1, 4.8).

..... [2]

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(d) (i) On the grid, draw the line $2y + x = 8$.

(ii) Write down the x -coordinates of the points where the line intersects the graph of $y = 3 + 2x - \frac{x^3}{5}$.

..... [2]

(iii) These x -coordinates are the solutions of the equation $2x^3 + Ax + B = 0$.

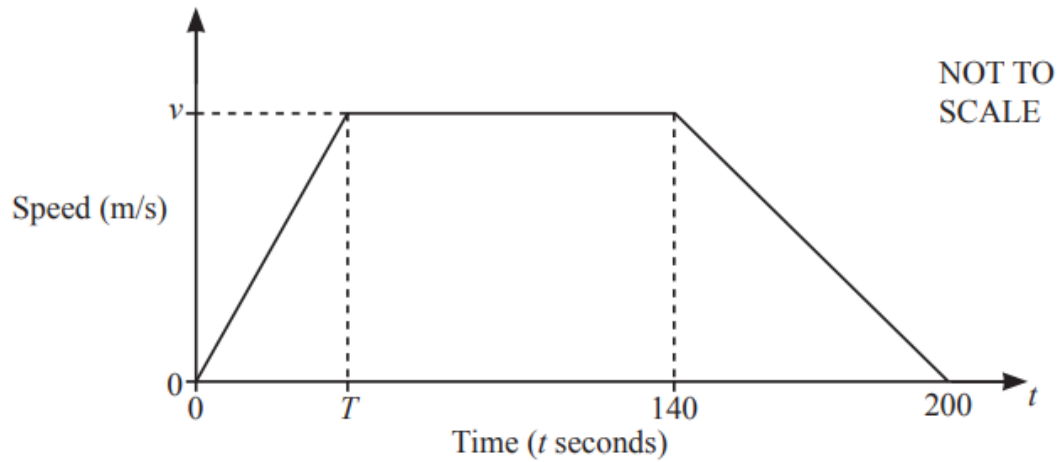
Find the value of A and the value of B .

$A =$

$B =$ [3]

30. 4024/12/M/J/20 Q18

The diagram is the speed–time graph for part of a car’s journey.



- (a) The deceleration of the car between $t = 140$ and $t = 200$ is 0.2 m/s^2 .

Find the value of v .

$$v = \dots\dots\dots [2]$$

- (b) The car travels a total of 1800 m in the 200 seconds.

Find the value of T .

$$T = \dots\dots\dots [3]$$

31. 4024/21/M/J/20 Q6

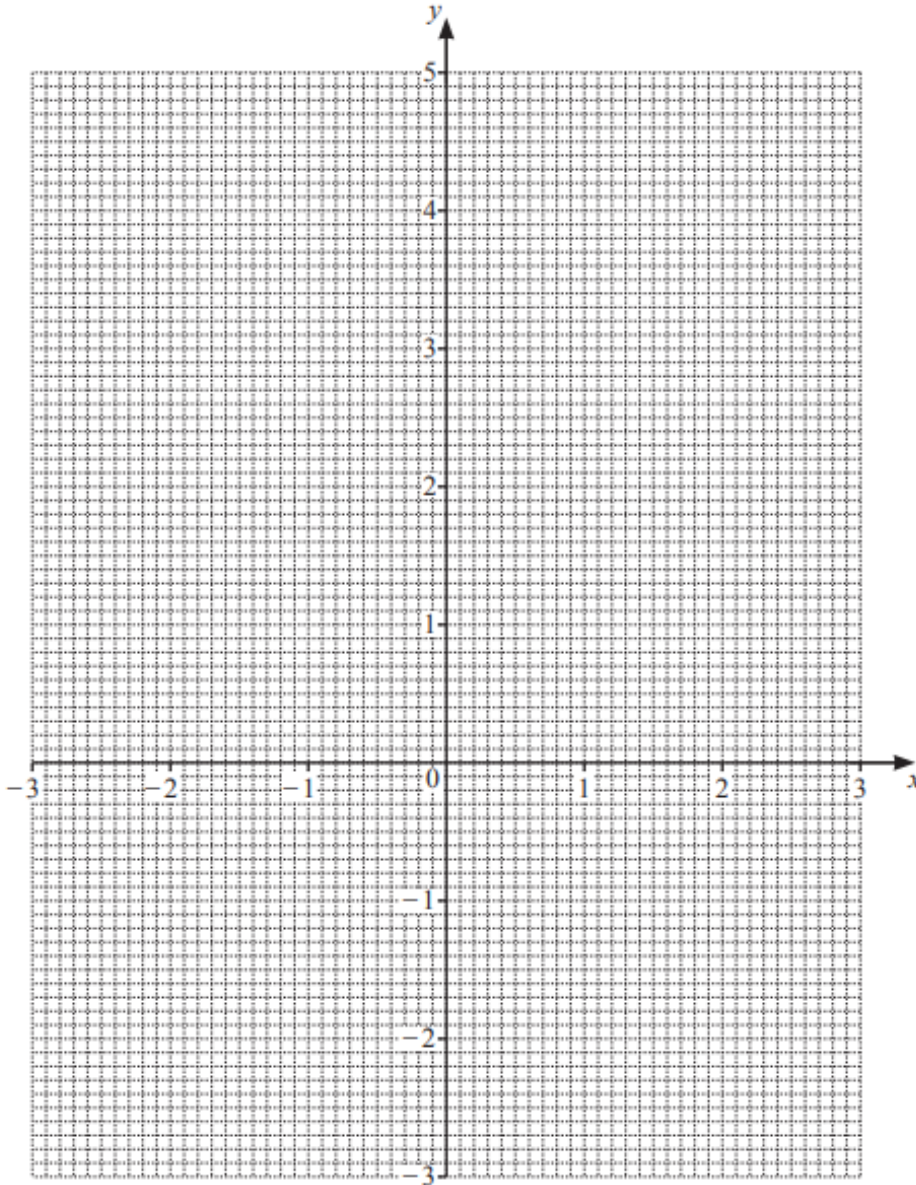
(a) The table shows some values for $y = \frac{x^3}{4} - x + 1$.

x	-3	-2	-1	0	1	2	3
y	-2.75	1	1.75	1	0.25	1	

(i) Complete the table.

[1]

(ii) Draw the graph of $y = \frac{x^3}{4} - x + 1$ for $-3 \leq x \leq 3$.



[3]

(iii) (a) On the same grid, draw the graph of $y = \frac{1}{3}x + 1$.

[2]

..... [2]

- (c) The values of x where $y = \frac{1}{3}x + 1$ crosses $y = \frac{x^3}{4} - x + 1$ are the solutions of the equation $Ax^3 = Bx$.

Given that A and B are integers, find A and B .

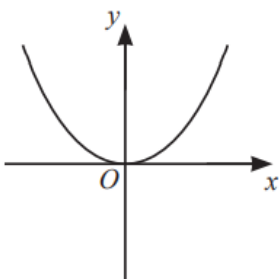
$A = \dots\dots\dots B = \dots\dots\dots$ [2]

- (b) Here are four equations.

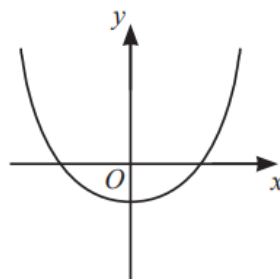
$$y = x^2 - 2x \quad y = 2x^2 - 2 \quad y = x^2 + 2x \quad y = 2x^2$$

The graphs of three of these equations are sketched below.

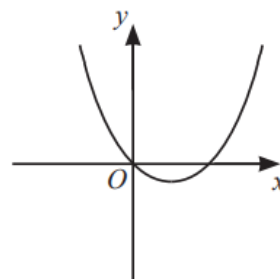
Write the correct equation below each graph.



.....



.....



.....

[2]

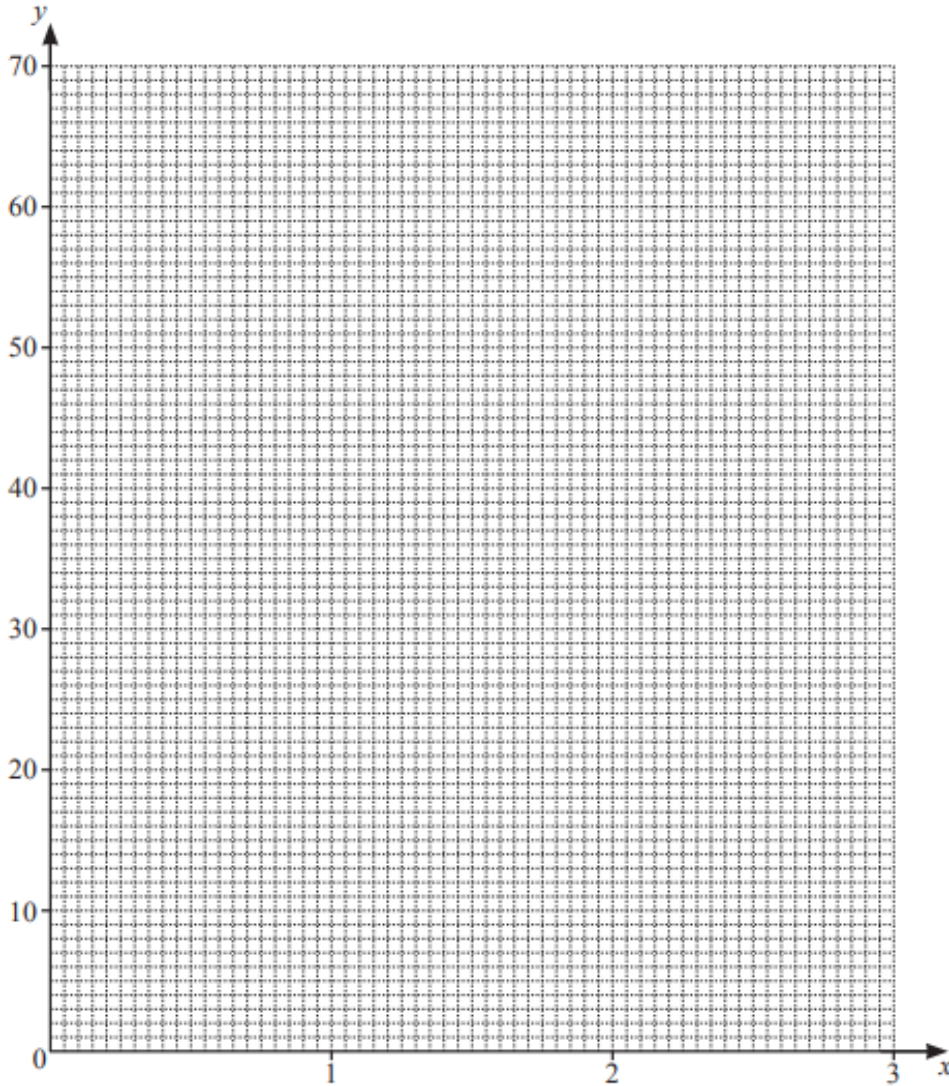
(a) The table shows some values for $y = 4^x$.

x	0	0.5	1	1.5	2	2.5	3
y			4	8	16	32	64

(i) Complete the table.

[1]

(ii) Draw the graph of $y = 4^x$ for $0 \leq x \leq 3$.



[3]

(iii) By drawing a tangent, estimate the gradient of the curve when $x = 2$.

..... [2]

(iv) The solutions of the equation $3(4^x) + ax + b = 0$ can be found from the points of intersection of $y = 4^x$ and $y = 20x - 12$.

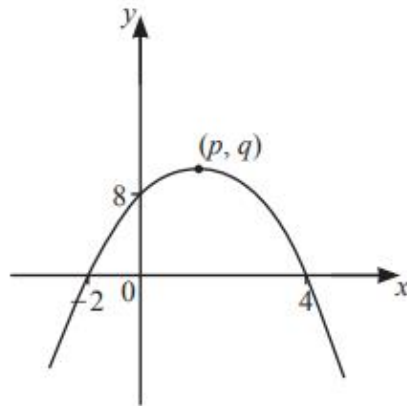
(a) Find the value of a and the value of b .

$a = \dots\dots\dots b = \dots\dots\dots$ [2]

(b) By drawing the line $y = 20x - 12$ on the grid opposite, find all the solutions of $3(4^x) + ax + b = 0$.

..... [3]

(b) Here is a sketch of the graph of a quadratic function.



NOT TO SCALE

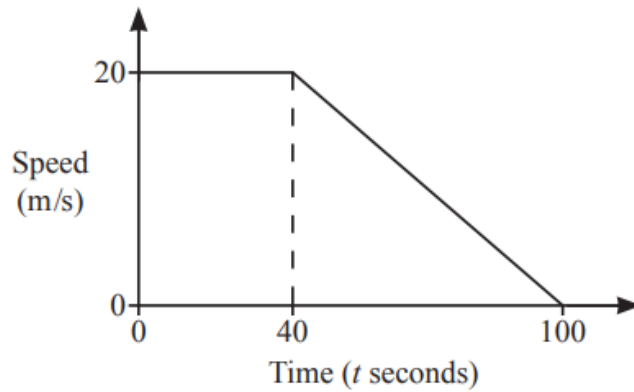
The curve has a maximum point (p, q) .

Find the value of p and the value of q .

$p = \dots\dots\dots q = \dots\dots\dots$ [3]

33. 4024/11/O/N/20 Q23

The diagram is the speed–time graph representing part of a train’s journey.



NOT TO SCALE

The train moves at a constant speed of 20m/s for 40 seconds.
It then slows down uniformly for a further 60 seconds until it stops

(a) Find the deceleration between $t = 40$ and $t = 100$.

..... m/s^2 [1]

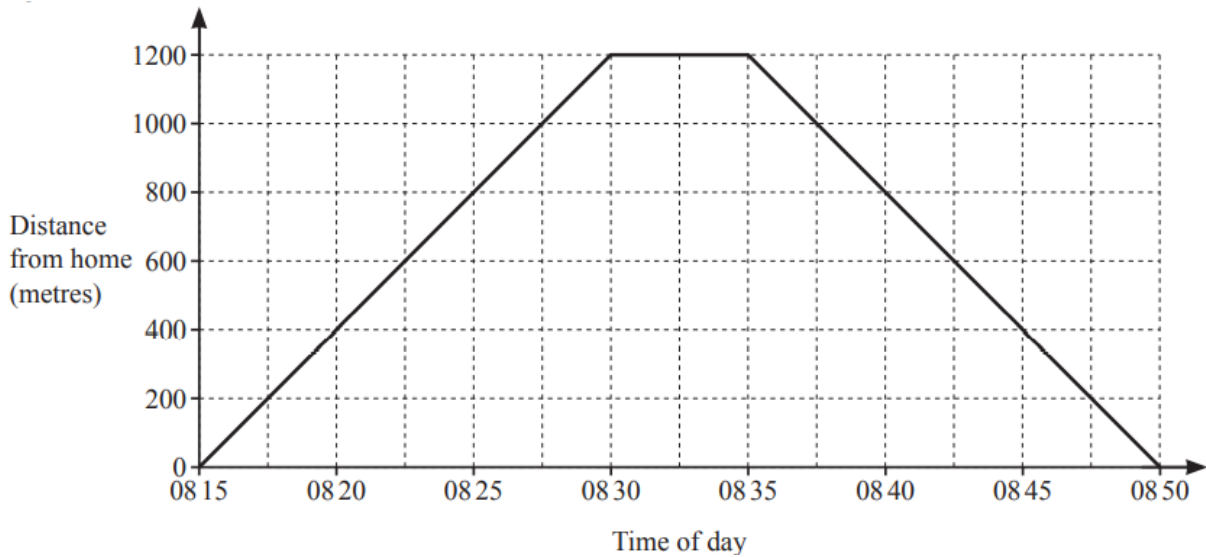
(b) Find the value of t when the speed is 10m/s.

$t =$ [1]

(c) Find the average speed during the 100 seconds.

..... m/s [3]

34. 4024/12/O/N/20 Q18



The diagram is the distance–time graph of Safira’s journey from home to a shop and back again. She leaves home at 08 15 and returns at 08 50.

(a) How many minutes does she stay in the shop?

..... minutes [1]

(b) At 08 30, her brother leaves home and goes to the shop. He walks at the same speed as Safira.

(i) On the grid, draw the graph of his journey to the shop. [1]

(ii) How far is he from the **shop** when he meets Safira?

..... m [1]

(c) Calculate the speed Safira walks to the shop. Give your answer in km/h.

..... km/h [2]

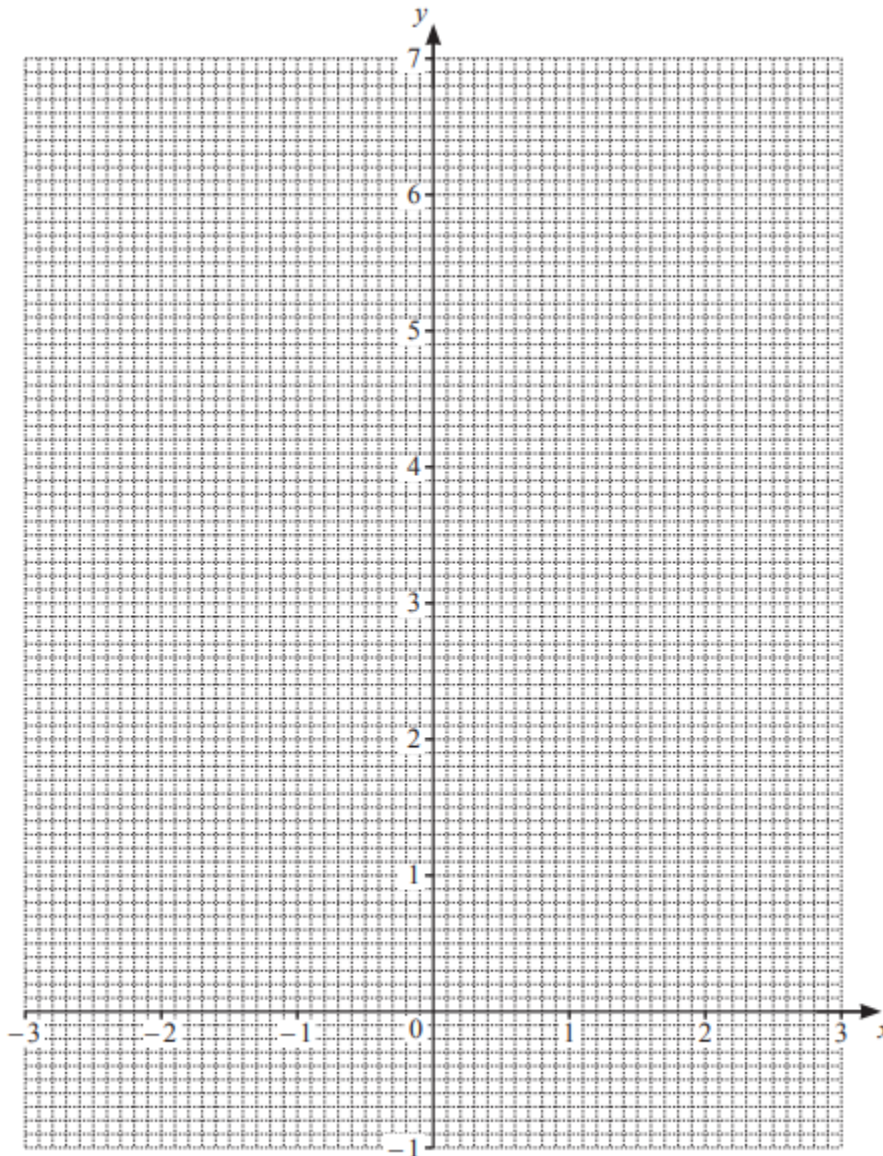
35. 4024/21/O/N/20 Q4

(a) Complete the table for $y = \frac{4}{5} \times 2^x$.

x	-3	-2	-1	0	1	2	3
y		0.2	0.4	0.8	1.6	3.2	6.4

[1]

(b) On the grid, draw the graph of $y = \frac{4}{5} \times 2^x$ for $-3 \leq x \leq 3$.



[3]

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(c) By drawing a tangent, estimate the gradient of $y = \frac{4}{5} \times 2^x$ when $x = 2$.

..... [2]

(d) Use your graph to estimate the solution of the equation $4 \times 2^x = 5$.

$x =$ [1]

36. 4024/22/O/N/20 Q3

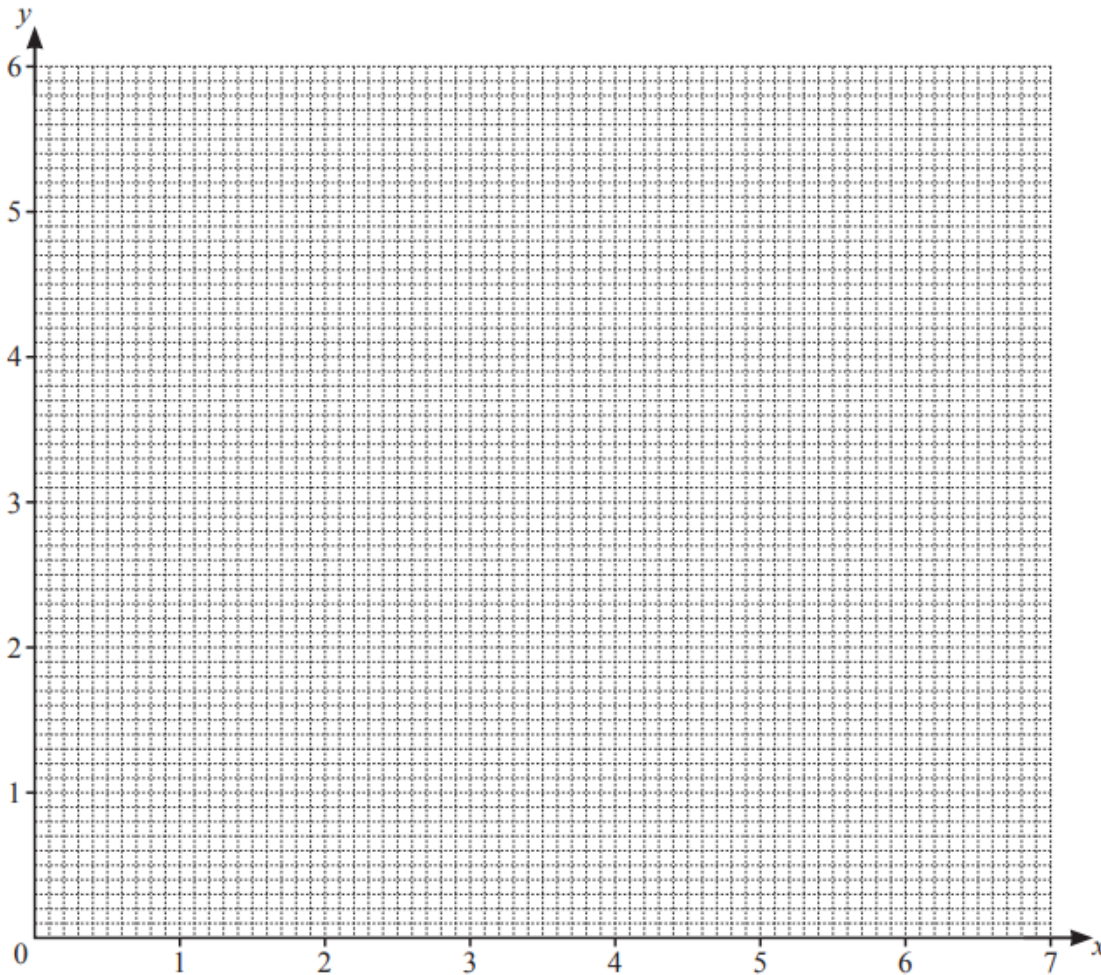
(a) Complete the table for $y = \frac{x}{4} + \frac{2}{x}$.

The values of y are given correct to 2 decimal places where appropriate.

x	0.5	1	1.5	2	3	4	5	6	7
y	4.13	2.25	1.71	1.5	1.42	1.5	1.65	1.83	

[1]

(b) On the grid, draw the graph of $y = \frac{x}{4} + \frac{2}{x}$ for $0.5 \leq x \leq 7$.



[3]

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(c) By drawing a tangent, estimate the gradient of $y = \frac{x}{4} + \frac{2}{x}$ when $x = 1$.

..... [2]

(d) (i) On the grid, draw the graph of $2y + x = 6$.

[2]

(ii) Write down the x -coordinates of the points of intersection of the graphs of $2y + x = 6$ and $y = \frac{x}{4} + \frac{2}{x}$.

$x = \dots\dots\dots$ and $x = \dots\dots\dots$ [2]

(iii) These x -coordinates are the solutions of the equation $3x^2 + Ax + B = 0$.

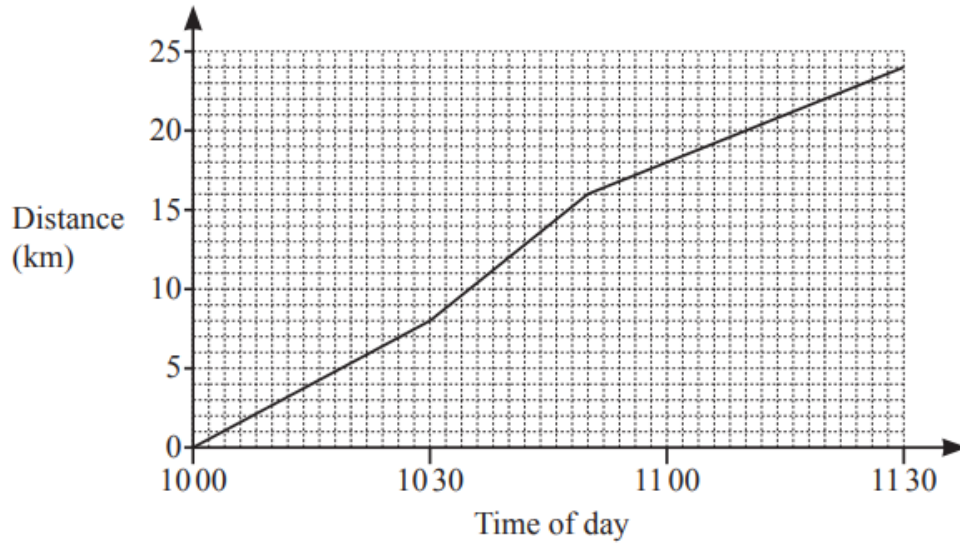
Use $2y + x = 6$ and $y = \frac{x}{4} + \frac{2}{x}$ to find the value of A and the value of B .

$A = \dots\dots\dots$

$B = \dots\dots\dots$ [3]

37. 4024/12/M/J/21 Q12

- (a) Lara goes for a cycle ride.
The distance–time graph shows her journey.

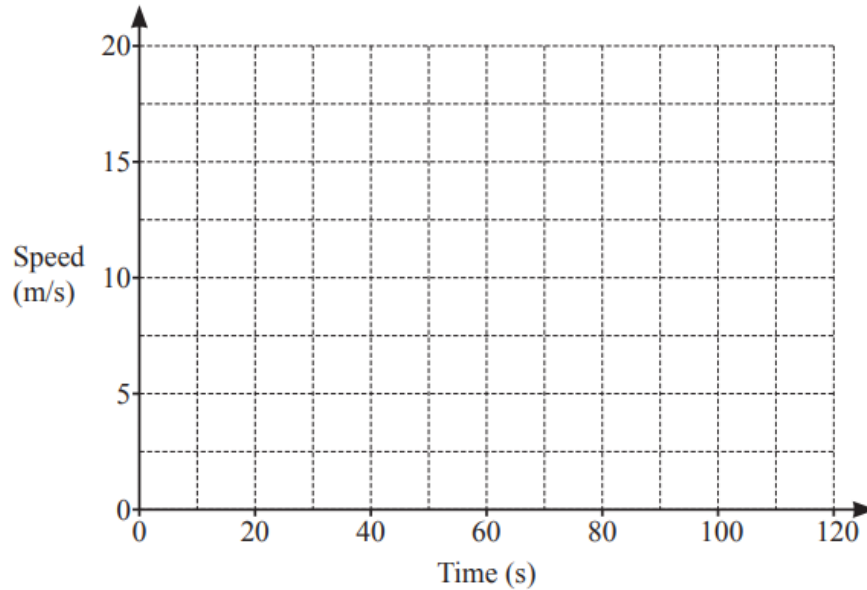


Calculate Lara's average speed, in kilometres per hour, for the whole journey.

..... km/h [3]

- (b) A car travels at a constant speed of 10 m/s for 80 seconds. It then decelerates at a constant rate of 0.5 m/s^2 until it stops.

On the grid, draw the speed–time graph for this journey.



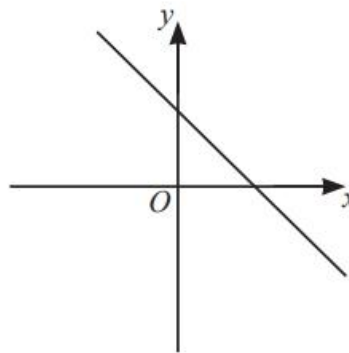
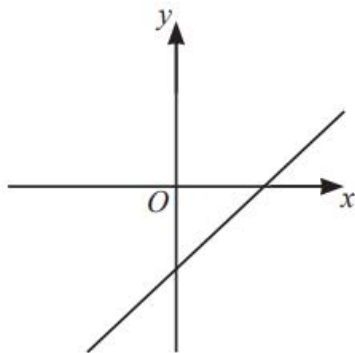
[2]

38. 4024/21/M/J/21 Q7

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

The diagrams below show sketches of two of these lines.

Write the correct equation below each diagram.

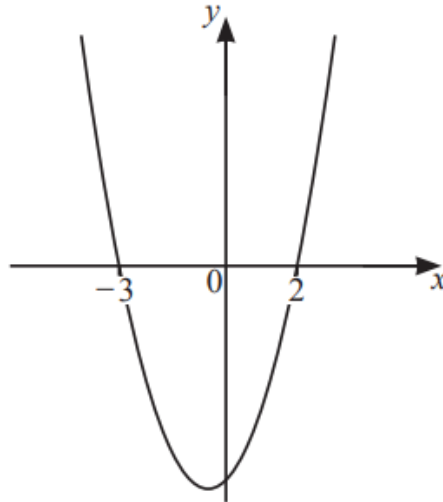


.....

.....

[2]

(b)

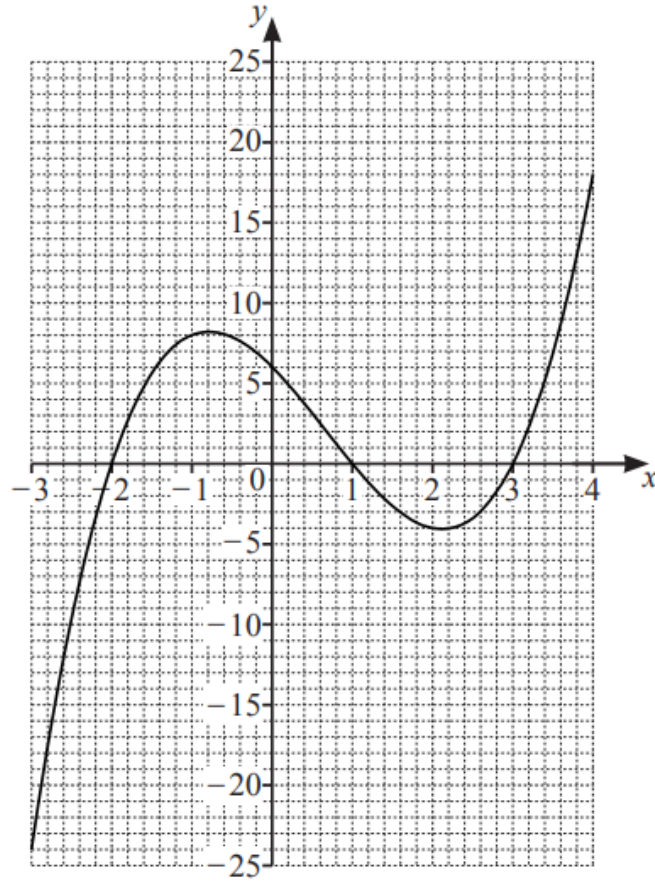


This diagram shows a sketch of the graph of $y = x^2 + ax + b$.

Find the value of a and the value of b .

$a = \dots\dots\dots b = \dots\dots\dots$ [2]

(c)



The grid shows the graph of $y = x^3 - 2x^2 - 5x + 6$.

(i) $x^3 - 2x^2 - 5x + 6 = k$ has exactly 2 solutions.

Use the graph to find the possible values of k .

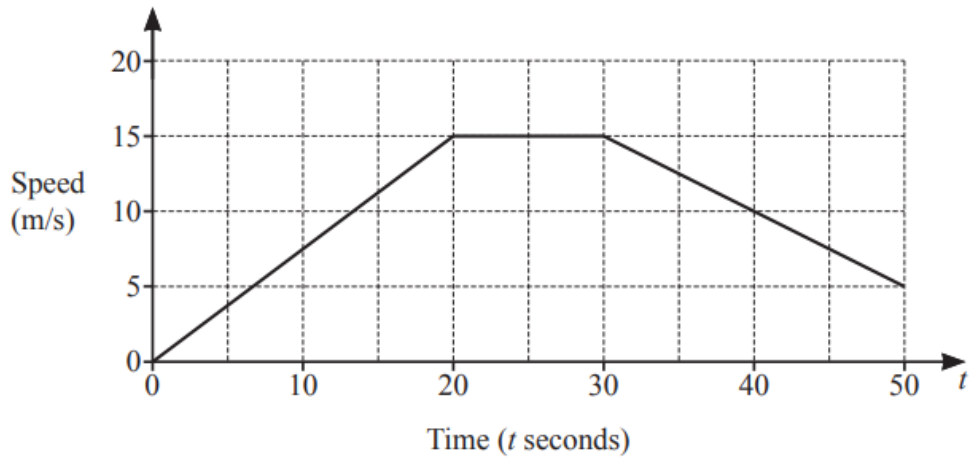
..... [2]

(ii) By drawing a suitable line on the grid, find the solutions of $x^3 - 2x^2 - 7x + 5 = 0$.

$x = \dots\dots\dots$, $x = \dots\dots\dots$, $x = \dots\dots\dots$ [4]

39. 4024/12/O/N/21 Q14

The diagram shows the speed-time graph for the start of a cyclist's journey.



(a) Find the acceleration during the first 20 seconds.

$\dots\dots\dots$ m/s^2 [1]

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(b) Describe the motion of the cyclist between $t = 20$ and $t = 30$.

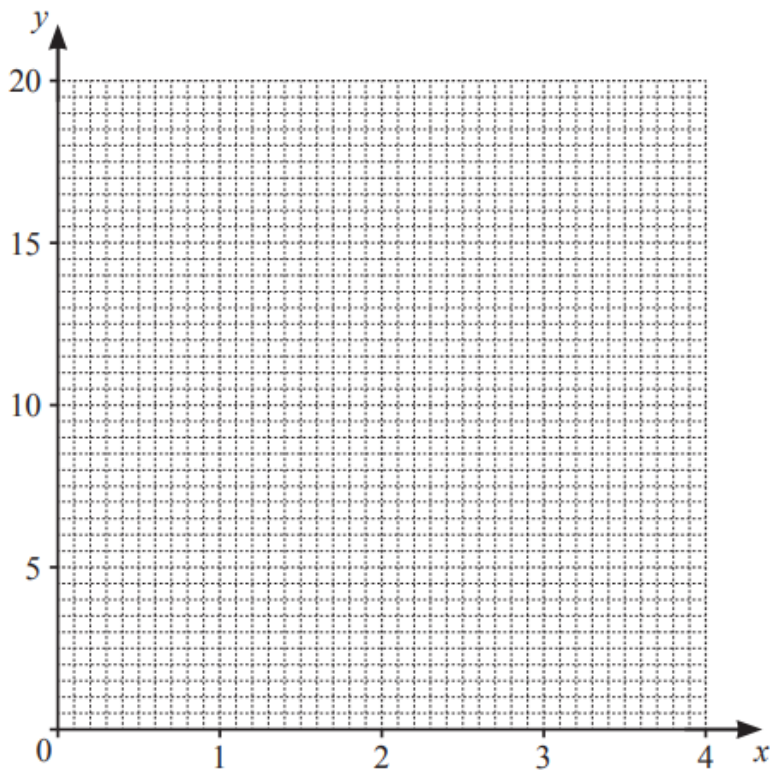
..... [1]

(c) Find the total distance travelled in the 50 seconds.

..... m [3]

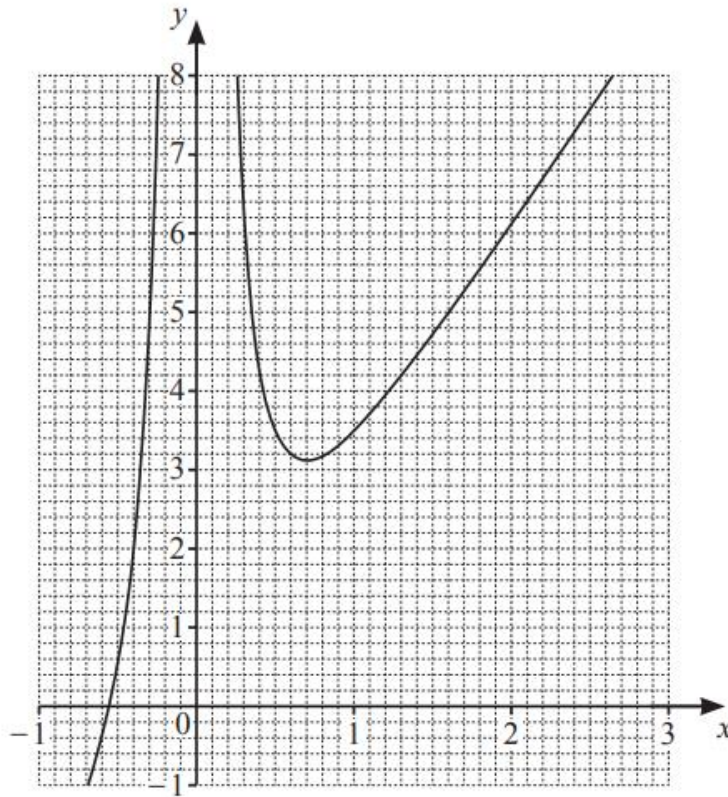
40. 4024/21/O/N/21 Q7

(a) On the grid below, draw the graph of $y = 2^x$ for $0 \leq x \leq 4$.



[4]

(b)



The diagram shows the graph of $y = \frac{1}{2x^2} + 3x$ for $-1 \leq x \leq 3$.

(i) By drawing a tangent, estimate the gradient of the curve at $x = 0.5$.

..... [2]

(ii) Use the graph to estimate the solution of the equation $\frac{1}{2x^2} + 3x = 2$.

$x =$ [1]

(iii) By drawing a suitable line on the grid, estimate the solutions of the equation $\frac{1}{2x^2} = 7 - 4x$.

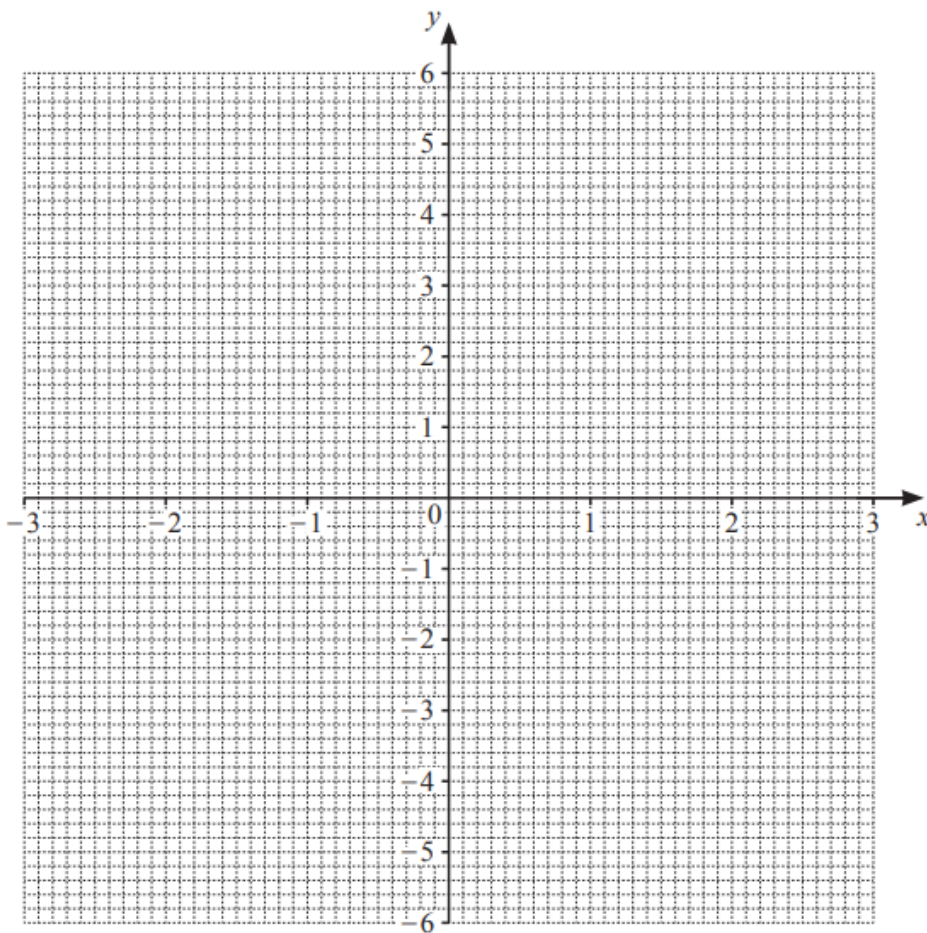
$x = \dots\dots\dots$, $x = \dots\dots\dots$, $x = \dots\dots\dots$ [4]

41. 4024/22/0/N/21 Q3

(a) Complete the table for $y = \frac{x^3}{2} - 3x - 1$.

x	-3	-2	-1	0	1	2	3
y		1	1.5	-1	-3.5	-3	3.5

[1]



[3]

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(c) Use your graph to explain why $x^3 - 6x - 2 = 6$ has only one solution.

..... [2]

(d) Line L passes through the points $(1, 1)$ and $(-2, -1)$.

(i) On the grid, draw line L . [1]

(ii) Work out the gradient of line L .

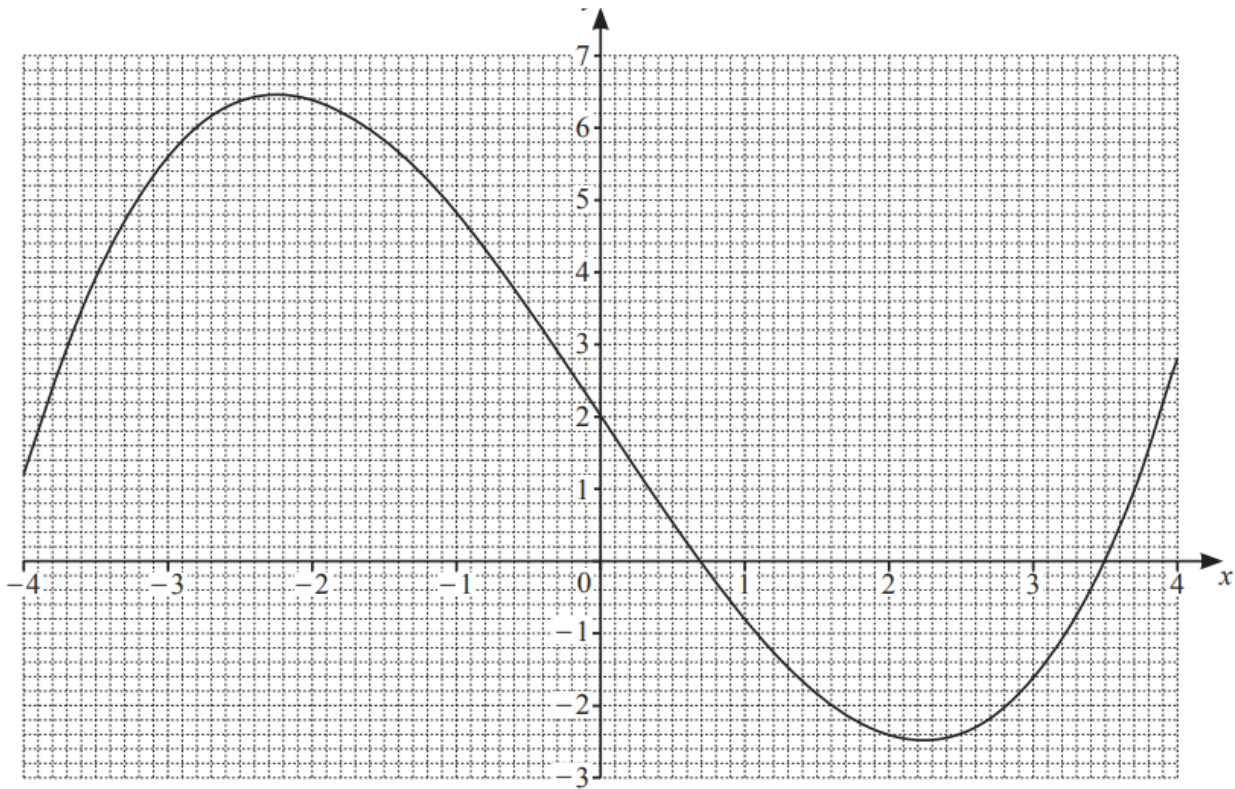
..... [2]

(iii) Find the x -coordinates of the points where line L intersects the curve $y = \frac{x^3}{2} - 3x - 1$.

$x = \dots\dots\dots$, $x = \dots\dots\dots$, $x = \dots\dots\dots$ [2]

42. 4024/12/M/J/22 Q16

The graph of $y = \frac{x^3}{5} - 3x + 2$ is drawn on the grid.



(a) By drawing a tangent, estimate the gradient of the curve at $x = -1$.

..... [2]

(b) By drawing a suitable straight line on the graph, find the solutions of the equation $\frac{x^3}{5} - 3x = 0$.

..... [3]

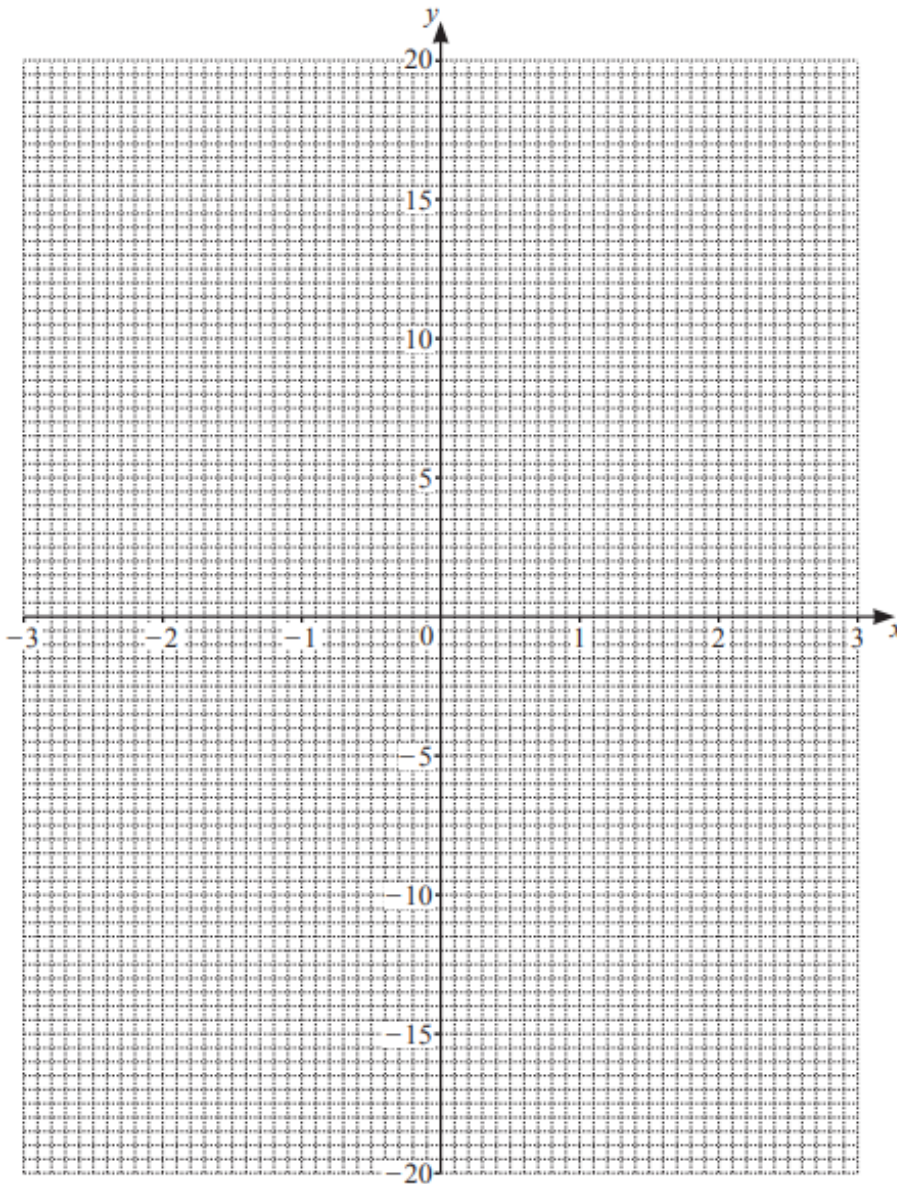
43. 4024/21/M/J/22 Q5

(a) Complete the table of values for $y = x^3 - 4x + 3$.

x	-3	-2	-1	0	1	2	3
y		3	6	3	0	3	18

[1]

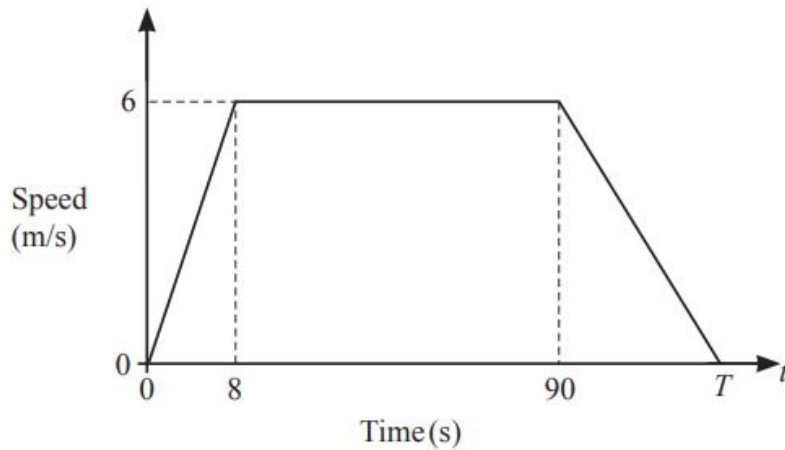
(b) Draw the graph of $y = x^3 - 4x + 3$ for $-3 \leq x \leq 3$.



[3]

44. 4024/22/M/J/22 Q7

(a)



NOT TO SCALE

The diagram shows the speed–time graph for a cyclist’s journey.

(i) Calculate the acceleration of the cyclist during the first 8 seconds.

..... m/s^2 [1]

(ii) Describe the motion of the cyclist between $t = 8$ and $t = 90$.

..... [1]

(iii) The total distance travelled by the cyclist during the journey is 558 m.

Find the value of T .

$T =$ [3]

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(iv) Convert 6 m/s into km/h.

..... km/h [2]

(b) A car travels 352 km, correct to the nearest kilometre.

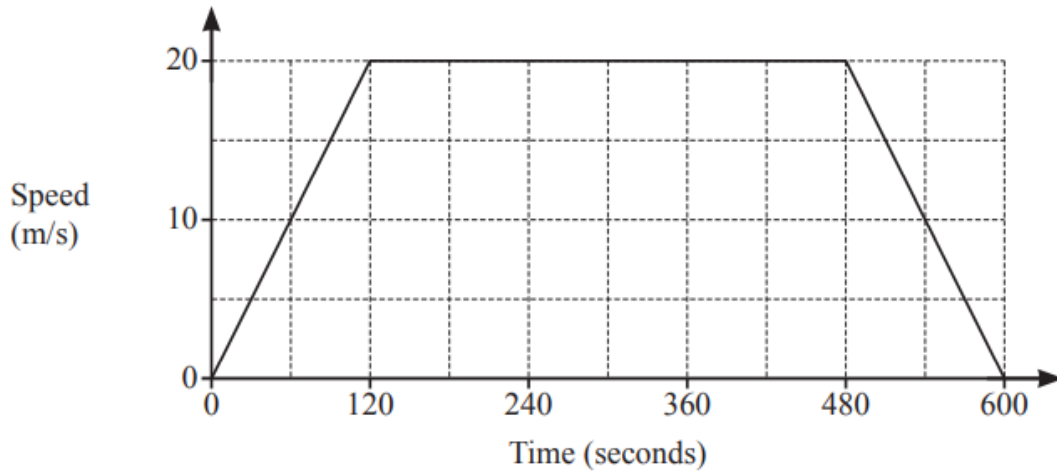
The time taken to travel this distance is 4.2 hours, correct to the nearest 0.1 hour.

Calculate the upper bound for the average speed of the car.

..... km/h [3]

45. 4024/11/O/N/22 Q17

The diagram shows the speed–time graph of Sam’s journey from home to work.



(a) Calculate the acceleration, in m/s^2 , for the first 2 minutes of Sam’s journey.

..... m/s^2 [1]

(b) Calculate Sam’s average speed, in m/s , for the whole journey.

..... m/s [3]

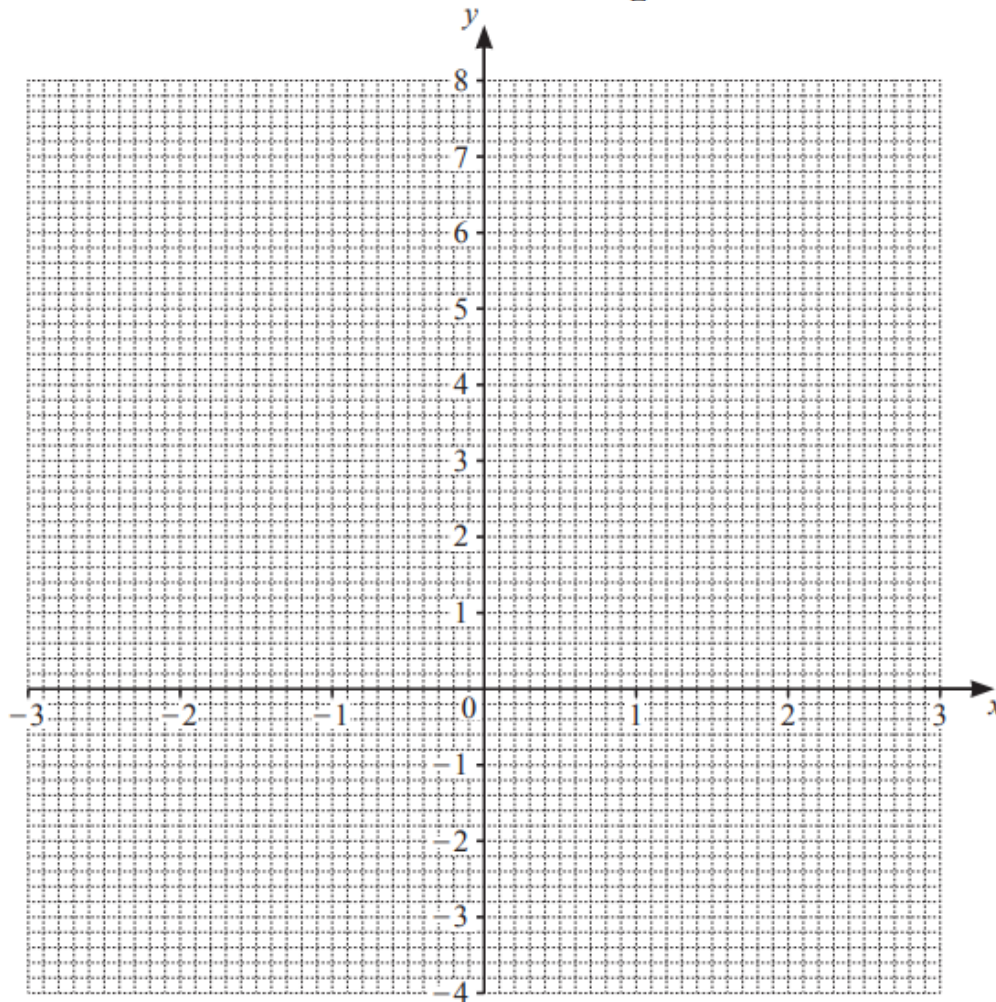
46. 4024/21/0/N/22 Q 3

(a) Complete the table for $y = \frac{x^3}{2} - 3x + 2$.

x	-3	-2	-1	0	1	2	3
y	-2.5	4	4.5	2	-0.5	0	

[1]

(b) On the grid, draw the graph of $y = \frac{x^3}{2} - 3x + 2$ for $-3 \leq x \leq 3$.



[3]

(c) Write down the coordinates of the minimum point of your graph for $x > 0$.

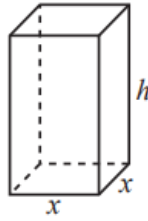
(.....,)

[2]

(d) Use your graph to solve the equation $\frac{x^3}{2} - 3x + 2 = 0$.

$x = \dots\dots\dots, x = \dots\dots\dots, x = \dots\dots\dots$ [2]

47. 4024/22/O/N/22 Q3



A cuboid has height h cm and a square base of edge x cm.
The volume of the cuboid is 60 cm^3 .

(a) Show that the surface area, $A \text{ cm}^2$, of the cuboid is given by $A = 2x^2 + \frac{240}{x}$.

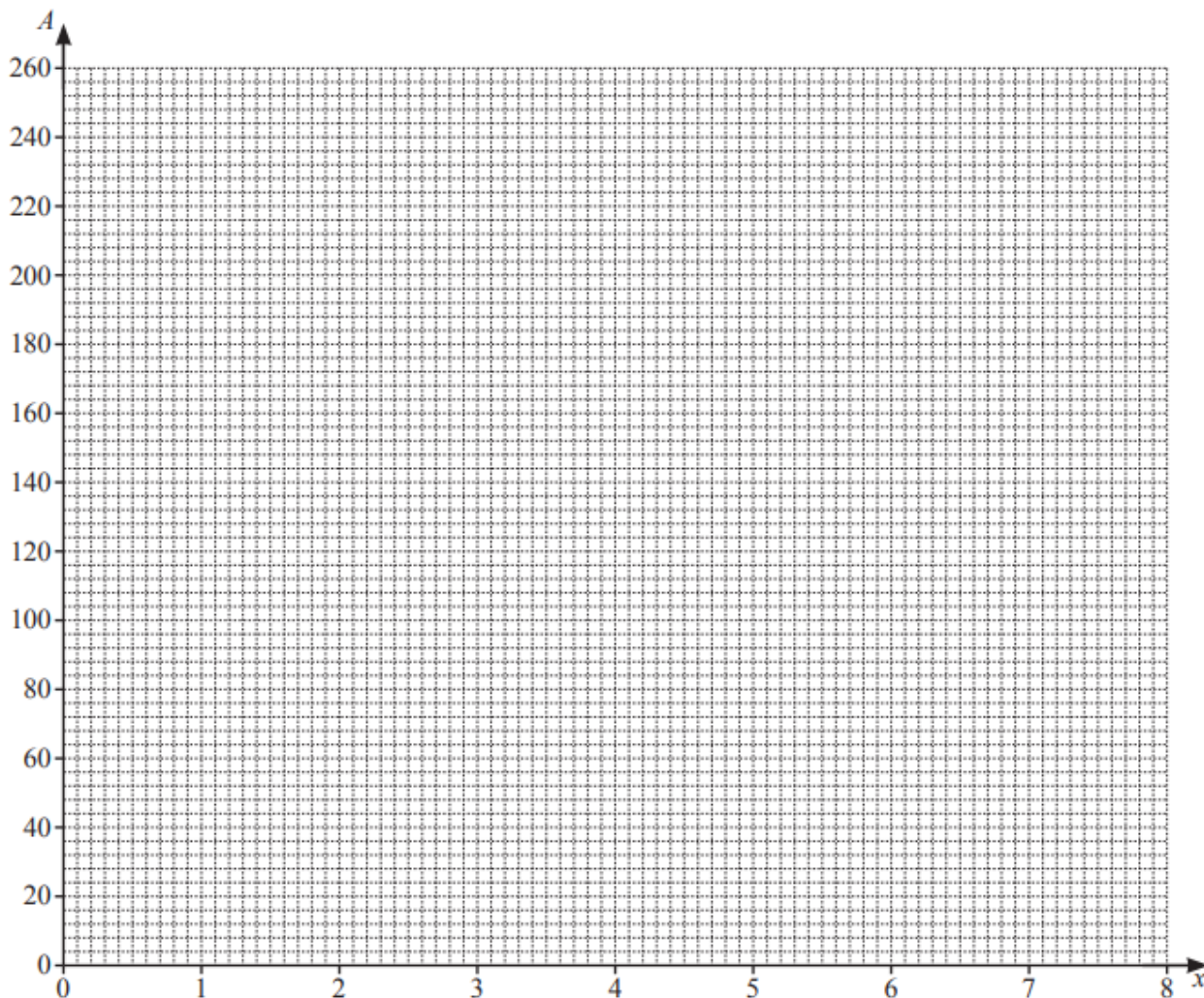
[2]

(b) Complete the table for $A = 2x^2 + \frac{240}{x}$.

x	1	2	3	4	5	6	7	8
A	242	128	98	92			132	158

[2]

(c) On the grid, draw the graph of $A = 2x^2 + \frac{240}{x}$ for $1 \leq x \leq 8$.



[3]

(d) Find the minimum possible surface area of the cuboid.

..... cm² [1]

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- (e) The cuboid has a surface area of 120 cm^2 .
The height of the cuboid is greater than the length of the edge of its base.

Find the dimensions of the cuboid.

..... cm by cm by cm [3]