1

The diagram shows information about the final 70 seconds of a car journey.

(a) Find the deceleration of the car between 60 and 70 seconds.

.... m/s² [1]

(b) Find the distance travelled by the car during the 70 seconds.

.... m [3]

[Total: 4]

2 The table shows some values for $y = x^3 + 3x^2 + 2$.

x	−3.5	−3	−2.5	−2	−1.5	−1	−0.5	0	1.5	1	1.5
y	−4.1		5.1	6	5.4	4	2.6		2.9		12.1

(a) Complete the table.

[3]

(b) On the grid, draw the graph of $y = x^3 + 3x^2 + 2$ for $-3.5 \leqslant x \leqslant 1.5$.
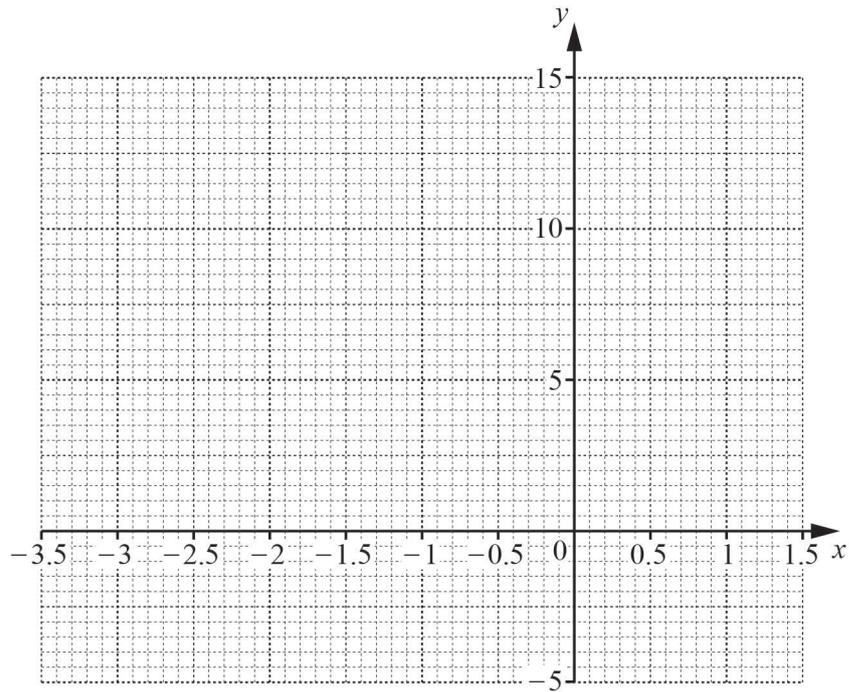
[4]

(c) Use your graph to solve the equation $x^3 + 3x^2 + 2 = 0$ for $-3.5 \leqslant x \leqslant 1.5$.

$x =$ .... [1]

(d) By drawing a suitable straight line, solve the equation $x^3 + 3x^2 + 2x + 2 = 0$ for $-3.5 \leqslant x \leqslant 1.5$.

$x =$ .... [2]

(e) For $-3.5 \leqslant x \leqslant 1.5$, the equation $x^3 + 3x^2 + 2 = k$ has three solutions and k is an integer.

Write down a possible value of k.

$k =$ .... [1]

[Total: 11]

3
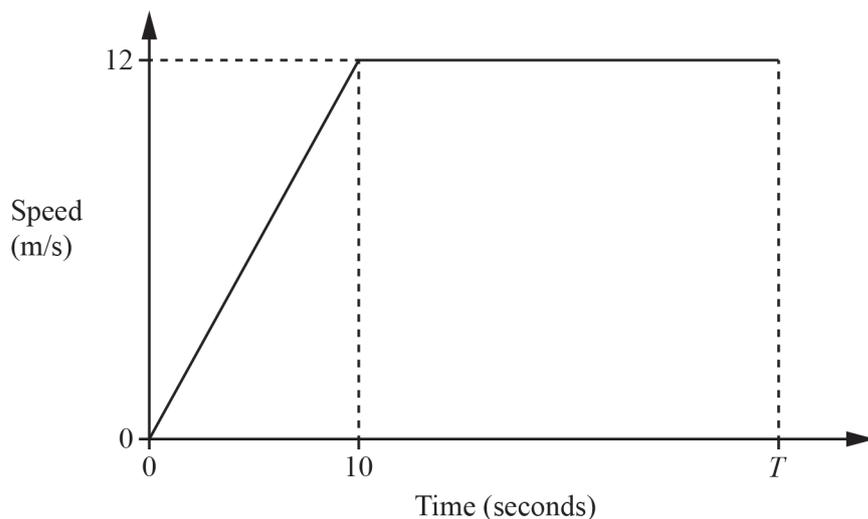
The diagram shows the speed–time graph for the first T seconds of a car journey.

(a) Find the acceleration during the first 10 seconds.

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

(b) The total distance travelled during the T seconds is 480 m.

Find the value of T.

$T =$ .... [3]

[Total: 4]

4 The table shows some values of $y = x^3 - 3x - 1$.

x	−3	−2.5	−2	−1.5	−1	0	1	1.5	2	2.5	3
y	−19	−9.1		0.1	1	−1	−3	−2.1	1	7.1	

(a) Complete the table of values.

[2]

(b) Draw the graph of $y = x^3 - 3x - 1$ for $-3 \leqslant x \leqslant 3$.
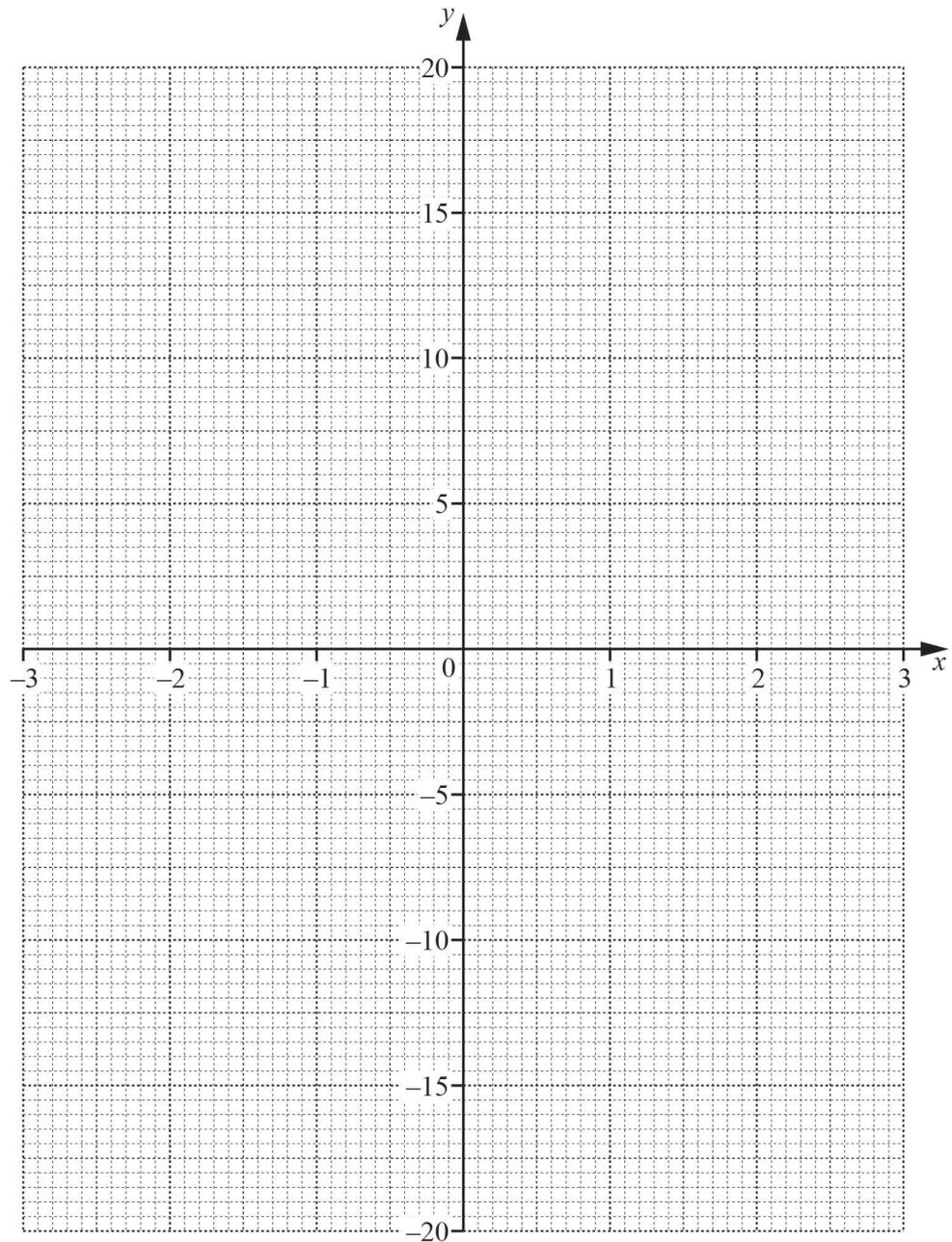

[4]

(c) A straight line through $(0, -17)$ is a tangent to the graph of $y = x^3 - 3x - 1$.

    (i) On the grid, draw this tangent.

[1]

(ii) Find the co-ordinates of the point where the tangent meets your graph.

(..................... , ...) [1]

(iii) Find the equation of the tangent.
Give your answer in the form $y = mx + c$.

$y =$ .... [3]

(d) By drawing a suitable straight line on the grid, solve the equation $x^3 - 6x - 3 = 0$.

$x =$ .... or $x =$ .... or $x =$ .... [4]

[Total: 15]

5 The diagram shows the speed–time graph for part of a journey for two people, a runner and a walker.
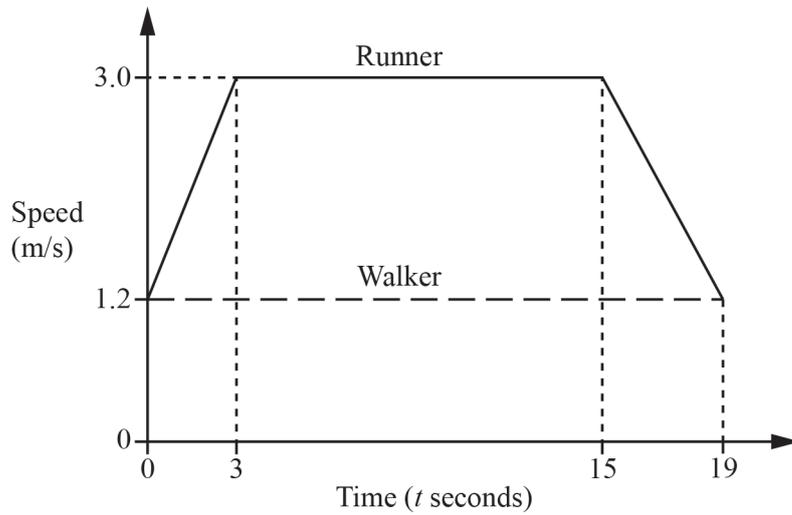
(a) Calculate the acceleration of the runner for the first 3 seconds.

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

(b) Calculate the total distance travelled by the runner in the 19 seconds.

.. m [3]

(c) The runner and the walker are travelling in the same direction along the same path.
When $t = 0$, the runner is 10 metres behind the walker.

Find how far the runner is ahead of the walker when $t = 19$.

.... m [3]

[Total: 7]

6 The diagram shows information about the first 8 seconds of a car journey.
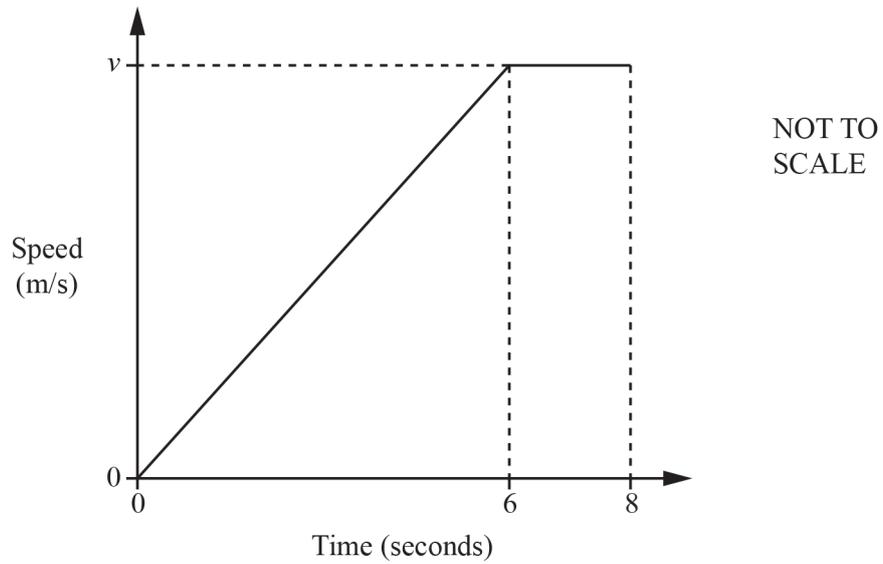
The car travels with constant acceleration reaching a speed of v m/s after 6 seconds.
The car then travels at a constant speed of v m/s for a further 2 seconds.
The car travels a total distance of 150 metres.

Work out the value of v.

$v =$ .... [3]

[Total: 3]

7
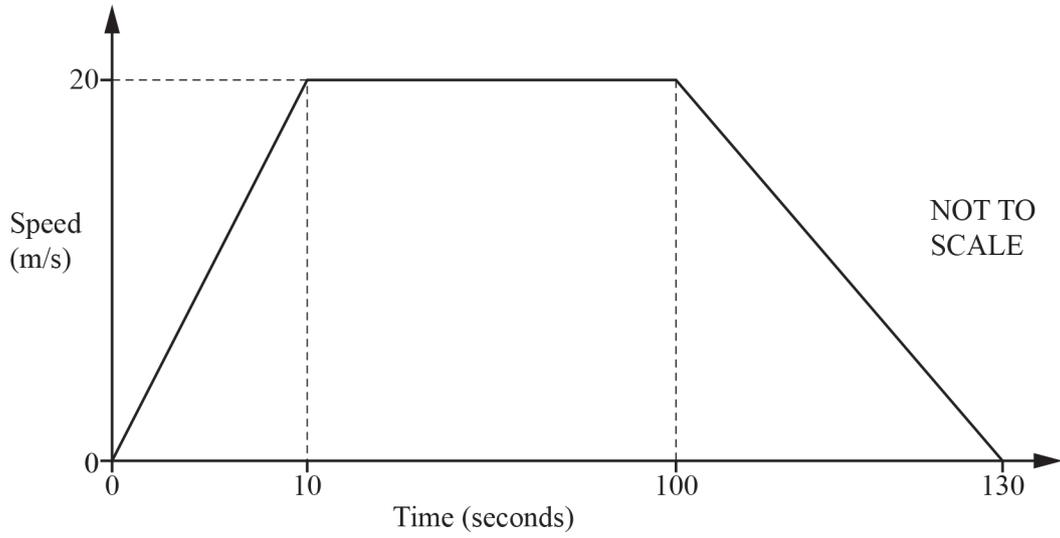
The speed–time graph shows information about the journey of a tram between two stations.

(a) Calculate the distance between the two stations.

....m [3]

(b) Calculate the average speed of the tram for the whole journey.

....m/s [1]

[Total: 4]

8 $y = x^2 + 7x - 5$ can be written in the form $y = (x + a)^2 + b$

Find the value of a and the value of b.

$a =$ ....

$b =$ ....   [3]

[Total: 3]