General Algebra Difficulty: Medium

Question Paper 5

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	General Algebra
Paper	Paper 4
Difficulty	Medium
Booklet	Question Paper 5

Time allowed: **94 minutes**

Score: **/82**

Percentage: **/100**

Grade Boundaries:

CIE IGCSE Maths (0580)

A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980)

| 9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%

(a) A train completed a journey of 850 kilometres with an average speed of 80 kilometres per hour.
Calculate, giving **exact** answers, the time taken for this journey in

   (i)   hours, [2]

   (ii)   hours, minutes and seconds. [1]

(b) Another train took 10 hours 48 minutes to complete the same 850 km journey.

   (i) It departed at 19 20.
     At what time, on the next day, did this train complete the journey? [1]

   (ii) Calculate the average speed, in kilometres per hour, for the journey. [2]

(c)
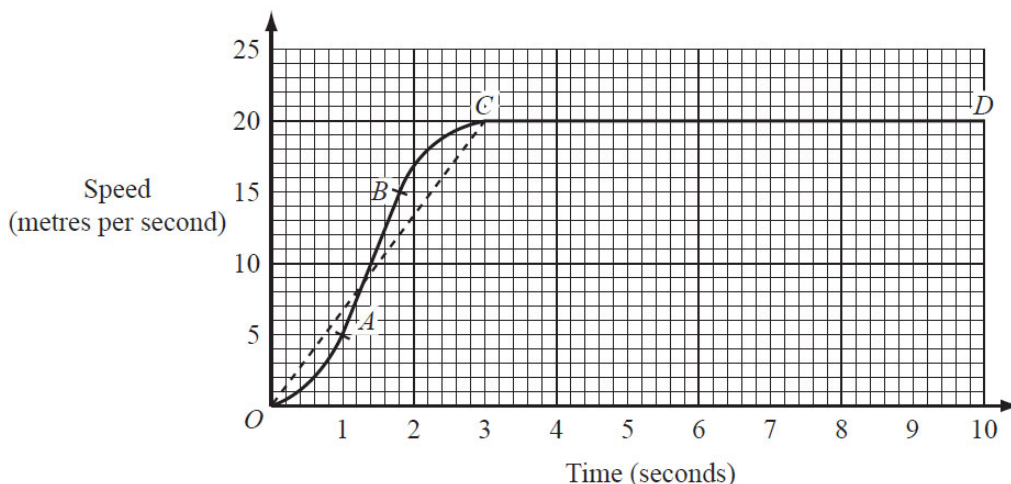
The **solid** line *OABCD* on the grid shows the first 10 seconds of a car journey.

   (i) Describe briefly what happens to the **speed** of the car between *B* and *C*. [1]

   (ii)   Describe briefly what happens to the **acceleration** of the car between *B* and *C*. [1]

   (iii)   Calculate the acceleration between *A* and *B*. [2]

   (iv)   Using the **broken** straight line *OC*, estimate the total distance travelled by the car in the whole 10 seconds. [3]

   (v) Explain briefly why, in this case, using the broken line makes the answer to part (iv) a good estimate of the distance travelled. [1]

   (vi)   Calculate the average speed of the car during the 10 seconds.
       Give your answer in kilometres per hour. [2]

The length, y, of a solid is inversely proportional to the square of its height, x.

(a) Write down a general equation for x and y.
Show that when $x = 5$ and $y = 4.8$ the equation becomes $x^2 y = 120$. [2]

(b) Find y when $x = 2$. [1]

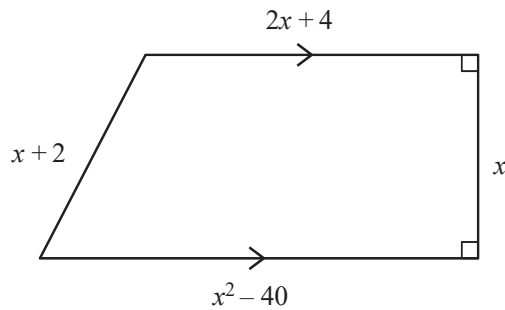(c) Find x when $y = 10$. [2]

(d) Find x when $y = x$. [2]

(e) Describe exactly what happens to y when x is doubled. [2]

(f) Describe exactly what happens to x when y is decreased by 36%. [2]

(g) Make x the subject of the formula $x^2 y = 120$. [2]

(a)

$2x + 4$

$x + 2$

x

NOT TO
SCALE

$x^2 - 40$
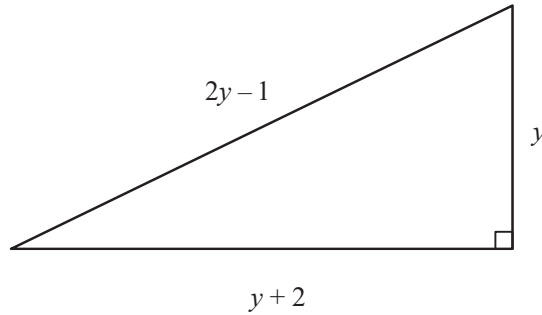
The diagram shows a trapezium.
Two of its angles are 90°.
The lengths of the sides are given in terms of x.
The perimeter is 62 units.

(i)   Write down a quadratic equation in x to show this information. Simplify your equation.   [2]

(ii)   Solve your quadratic equation.   [2]

(iii)   Write down the only possible value of x.   [1]

(iv)   Calculate the area of the trapezium.   [2]

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(b)

The diagram shows a right-angled triangle.
The lengths of the sides are given in terms of y.
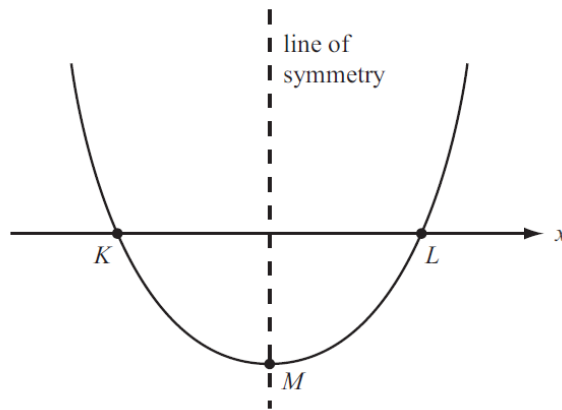
(i)   Show that $2y^2 - 8y - 3 = 0$.   [3]

(ii) Solve the equation $2y^2 - 8y - 3 = 0$, giving your answers to 2 decimal places.   [4]

(iii) Calculate the area of the triangle.   [2]

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A sketch of the graph of the quadratic function $y = px^2 + qx + r$ is shown in the diagram.

The graph cuts the x-axis at K and L.
The point M lies on the graph and on the line of symmetry.

(a) When $p = 1$, $q = -2, r = -3$, find

   (i) the y-coordinate of the point where $x = 4$,   [1]

   (ii) the coordinates of K and L,   [3]

   (iii) the coordinates of M.   [2]

(b) Describe how the above sketch of the graph would change in each of the following cases.

   (i) p is negative.   [1]

   (ii) $p = 1, q = r = 0$.   [1]

(c) Another quadratic function is $y = ax^2 + bx + c$.

   (i) Its graph passes through the origin.
       Write down the value of c.   [1]

   (ii) The graph also passes through the points (3, 0) and (4, 8).
       Find the values of a and b.   [4]

Maria walks 10 kilometres to a waterfall at an average speed of x kilometres per hour.

(a) Write down, in terms of x, the time taken in hours. [1]

(b) Maria returns from the waterfall but this time she walks the 10 kilometres at an average speed of $(x + 1)$ kilometres per hour. The time of the return journey is 30 minutes less than the time of the first journey. Write down an equation in x and show that it simplifies to $x^2 + x - 20 = 0$. [4]

(c) Solve the equation $x^2 + x - 20 = 0$. [2]

(d) Find the time Maria takes to walk **to** the waterfall. [2]

(a) On 1 st January 2000, Ashraf was x years old.
Bukki was 5 years older than Ashraf and Claude was twice as old as Ashraf.

(i) Write down in terms of x, the ages of Bukki and Claude on 1st January 2000. [2]

[1]

(ii) Write down in terms of x, the ages of Ashraf, Bukki and Claude on 1st January 2002.

(iii) The product of Claude's age and Ashraf's age on 1st January **2002** is the same as the square of Bukki's age on 1st January **2000**.

Write down an equation in x and show that it simplifies to $x^2 - 4x - 21 = 0$.

[4]

[2]

(iv) Solve the equation $x^2 - 4x - 21 = 0$.

[1]

(v) How old was Claude on 1st January 2002?

(b) Claude's height, h metres, is one of the solutions of $h^2 + 8h - 17 = 0$.

(i) Solve the equation $h^2 + 8h - 17 = 0$. [4]

Show all your working and give your answers correct to 2 decimal places.

[1]

(ii) Write down Claude's height, to the nearest centimetre.