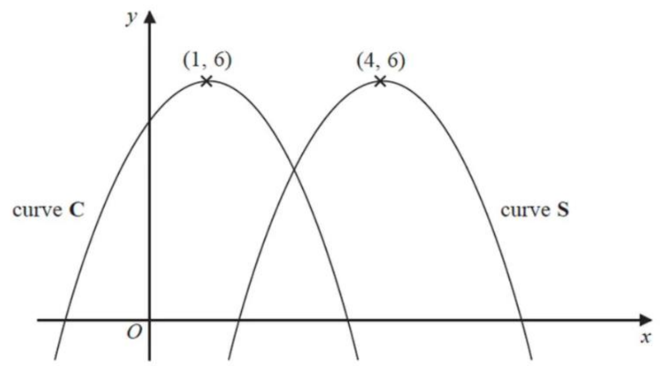
DIFFICULT ALGEBRA QUESTIONS 1



The curve C with equation $y = 5 + 2x - x^2$ is transformed by a translation to give the curve S such that the point $(1, 6)$ on C is mapped to the point $(4, 6)$ on S.

Find an equation for S.

2 marks

The profit made by a shop increases each year.

The profit made by the shop in year n is £P_n.

Given that the profit made by the shop in the next year is £P_{n+1} then

$$P_{n+1} = aP_n + 800$$

where a is a constant.

The table shows the profit made by the shop in 2018 and in 2019:

Year:	**2018**	**2019**
Profit:	£24,000	£29,600

Work out the profit predicted to be made by the shop in **2021**.

4 marks

The equation of a curve is $y = 4x^2 - 56x$.

The curve has one turning point.

By completing the square, show that the coordinates of the turning point are $(7, -196)$.
You must show all your working.

3 marks

The functions g and h are such that

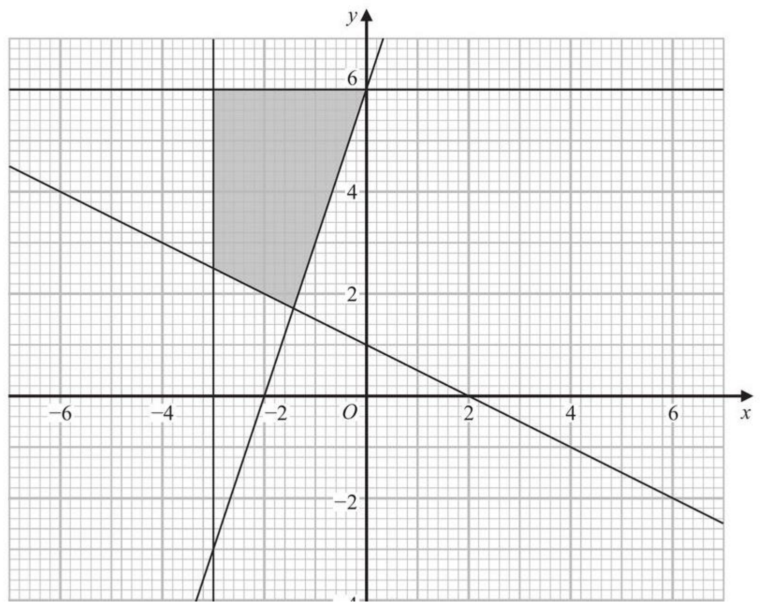
$$g(x) = \sqrt[3]{2x - 5} \text{ and } h(x) = \frac{1}{x}$$

(a) Find $g(16)$

(b) Find $hg^{-1}(x)$
Give your answer in terms of x in its simplest form.

4 marks

Find the four inequalities that define the shaded region.



4 marks

A circle has equation $x^2 + y^2 = 25$.

The point P with coordinates $(-3, 4)$ lies on the circle.

Alex says that the tangent to the circle at P crosses the x-axis at the point $(-8, 0)$.

Is Alex correct?
You must show how you get your answer.

4 marks

Find algebraically the set of values of x for which

$$x^2 - 49 > 0 \text{ and } 5x^2 - 31x - 72 > 0$$

5 marks

L is the straight line with equation $y = 2x - 5$.
C is a graph with equation $y^2 = 6x^2 - 25x - 8$.

Using algebra, find the coordinates of the points of intersection of L and C.
You must show all your working.

5 marks

Write

$$\frac{14}{3x - 21} + \left[(x + 4) \div \frac{2x^2 - 6x - 56}{2x + 3}\right]$$

in the form $\frac{ax+b}{cx+d}$ where a, b, c and d are integers.

5 marks

ANSWERS