

1. Expand the brackets and simplify $(x + 1)^2 - (x - 2)$ [3]

2. Write $y = x^2 + 16x - 2$ in the form $y = (x + a)^2 - b$ [2]

3. Find the equation of the line which passes through the points (1,-2) and (4,4). [2]

4. Simplify:

$$\sqrt{\frac{18}{125}}$$

5. For what values of P does $x^2 + 3x - p = 0$ have real roots? [3]

6. (a) Show that the function $f(x) = 2x^2 - 16x + 7$ can be written in the form $f(x) = a(x + p)^2 + q$ and write down the values of a , p and q . [3]

(b) Hence state the minimum value of the function and the corresponding value of x . [2]

(c) Sketch the graph of $y = f(x)$ [2]

7. For what values of p does the equation $x^2 - 2x + p = 0$ have equal roots? [4]

8. The famous Gateway Arch in the United States is parabolic in shape.
Figure 2 shows a rough sketch of the arch relative to a set of rectangular axes.



Figure 1

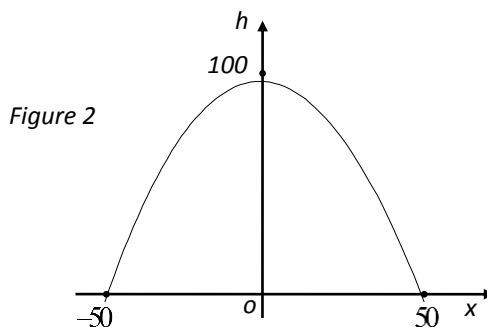


Figure 2

From *figure 2* establish the equation connecting h and x in the form $y = k(x-a)(x-b)$ [4]

9. Show that the line with equation $y = 2x + 1$ does not intersect the parabola with equation $y = x^2 + 3x + 4$ [5]

[END OF EXERCISE]

Total marks available [34]

Mathematical Literacy (main points):

- **Discriminant:** Tells you about the "**nature**" of the roots of a quadratic equation given that a , b and c are rational numbers
- **Equal roots:** When the discriminant equals zero this means roots are equal and we can say that there is only one root.
- **Intersect:** The point where the line and the curve meet.

