

Outcome 1

1. A line passes through the points $(1, -4)$ and $(3, -6)$.

Find the equation of this line.

2

2. A line makes an angle of 112° with the positive direction of the x-axis, as shown in Diagram 1.

The scales on the axes are equal.

Find the gradient of the line giving your answer correct to 3 significant figures.

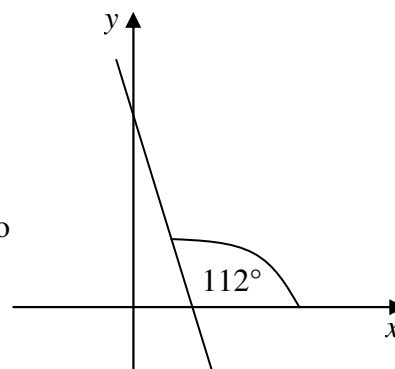


Diagram 1

2

3. A line L has equation $y = 3x - 1$.
Write down the gradient of a line which is:

(a) parallel to L

1

(b) perpendicular to L.

1

Outcome 2

4. The graph of a cubic $y = f(x)$ is shown in Diagram 2.

On separate diagrams sketch the graphs of:

- (a) $y = -f(x)$
 (b) $y = f(x - 3)$

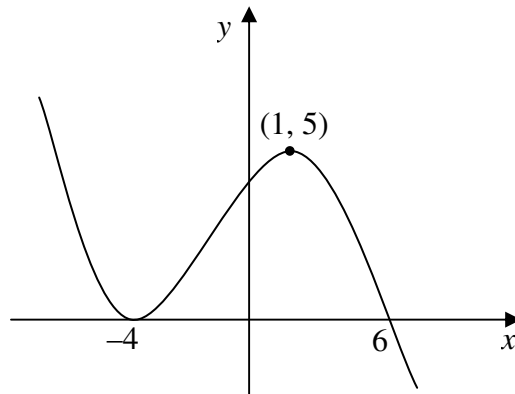


Diagram 2

2

2

5. The graphs with equations $y = 4^x$ and $y = a^x$ are shown in Diagram 3.

If the graph with equation $y = a^x$ passes through the point $(3, 27)$, find the value of a .

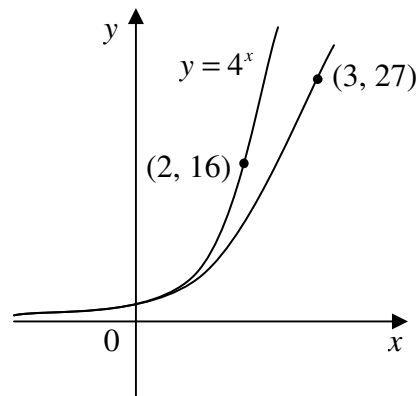


Diagram 3

1

6. The graphs of $y = 6^x$ and its inverse function are shown in Diagram 4.

Write down the equation of the inverse function.

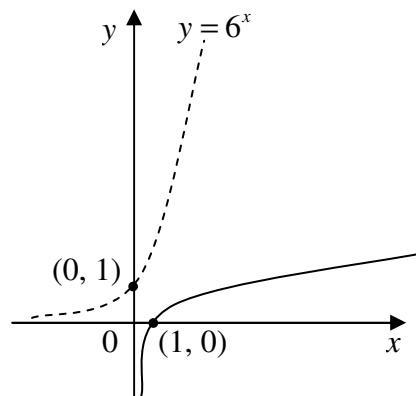


Diagram 4

1

7. Functions f and g are defined on suitable domains by $f(x) = 3x - 4$ and $g(x) = x^2$.

Obtain an expression for $f(g(x))$.

2

Outcome 3

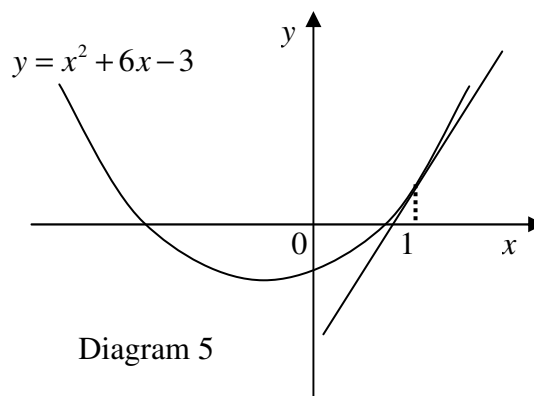
8. Given $y = \frac{7}{x^4}$ $x \neq 0$, find $\frac{dy}{dx}$

2

9. A sketch of the curve with equation $y = x^2 + 6x - 3$ is shown in Diagram 5.

A tangent has been drawn at $P(1, 4)$

Find the gradient of the tangent at P.

**3**

10. A curve has equation $y = \frac{1}{3}x^3 - x^2 - 8x + 2$

Using differentiation, find the coordinates of the stationary points on this curve and determine their nature.

6

Outcome 4

11. Every morning four fifths of the mushrooms in a bed are picked.
By the next morning another 300 are ready for picking.

There are u_n mushrooms at the start of a particular day.

- (a) Write down a recurrence relation for u_{n+1} the number of mushrooms at the start of the next day. **1**
- (b) In order to be successful the grower needs at least 400 mushrooms a day.
- (i) Find the limit of the sequence generated by this recurrence relation as $n \rightarrow \infty$.
- (ii) In the long term, can the grower sustain the number of mushrooms needed? **3**

End of assessment