Higher Maths – Homework 8

Non-calculator section:

1. The angle between the line $\sqrt{3}y + x = 0$ and the positive direction of the x-axis is

A 30^0 B 60^0 C 120^0 D 150^0

2. Given tan x = $\frac{1}{3}$ and x is an acute angle, then sin 2x will be equal to

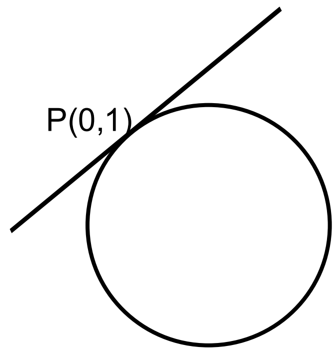
A $\frac{3}{5}$ B $\frac{4}{5}$ C $\frac{6}{\sqrt{10}}$ D $\frac{3}{10}$

3. $3x^2 + 18x + 11$ expressed in the form $a(x + b)^2 + c$ is

A $3(x + 3)^2 + 2$ B $3(x + 3)^2 – 16$ C $3(x + 6)^2 + 2$ D $3(x + 6)^2 – 16$

4. (a) Show that $–2$ is a root of $x^3 – 5x^2 – 8x + 12 = 0$.
(b) Hence solve fully the equation $x^3 – 5x^2 – 8x + 12 = 0$.

5. Find the equation of the tangent to the circle $x^2 + y^2 – 4x + 6y – 7 = 0$ at the point P(0,1).



6. Given $f(x) = 2x^3 - \frac{4x^2}{\sqrt{x}}$, find the value of $f'(4)$.

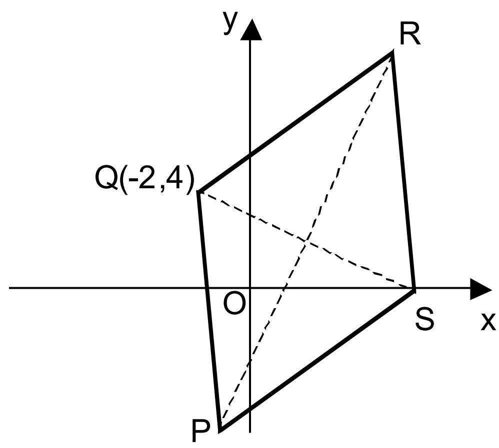
7. Show that the function $f(x) = \frac{2}{3}x^3 + 4x^2 + 8x – 1$ is never decreasing.

Calculator section:

8. The roots of $x^2 - (k + 3)x + 3k + 1 = 0$ are equal. Find k.

9. The diagram shows a rhombus PQRS with diagonals PR and QS. PR has equation $y - 2x + 2 = 0$.

   (a) Find the equation of the diagonal QS.
   (b) Find the point of intersection of the diagonals PR and QS.



10. Solve the equation $3\cos 2x - \cos x = 2$ for $0 \leq x \leq 360$.

11. $\frac{dy}{dx} = 9x^2 - 4x + 5$ and $y = 20$ when $x = 2$. Find a formula for y.

12. (a) Show that the equation of the tangent to the curve $y = x^3 - 10x + 15$ at the point where $x = 2$ is $y = 2x - 1$.

    (b) Show that this tangent is also a tangent to the circle $x^2 + y^2 - 10x - 8y + 36 = 0$ and find the point of contact.

13. (a) Find the equation of the parabola, f(x), shown opposite.
    (b) Find the coordinates of P.
    (c) Hence calculate the shaded area.