Higher Maths
Unit 2 Specimen NAB
Number 1

Outcome 1

Marks

1. (i) Show that (x + 4) is a factor of $f(x) = 2x^3 + 7x^2 - 7x - 12$

   (ii) Hence factorise $f(x)$ fully. 5

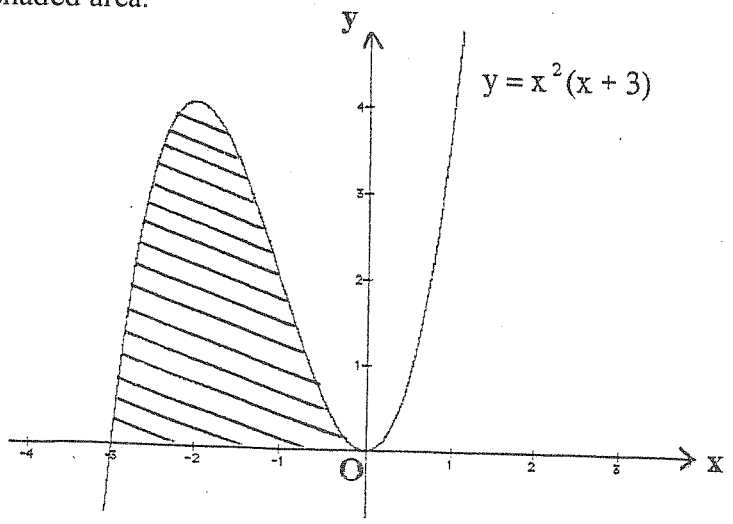
2. Determine the nature of the roots of the equation $3x^2 + 2x - 4 = 0$ using the discriminant. 3

Outcome 2

3. Find $\int \frac{3}{x^4} dx \quad , x \neq 0$ 3

4. The curve with equation $y = x^2(x+3)$ is shown in the diagram.

   Calculate the shaded area.

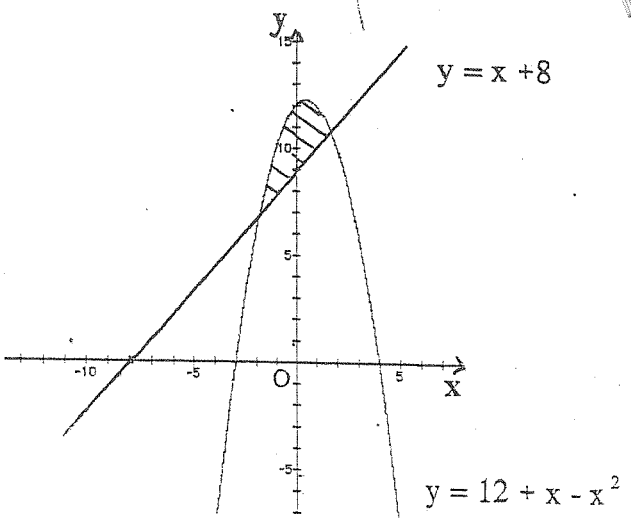


5

5. The line with equation y = x + 8 and the curve with equation $y = 12 + x - x^2$ are shown in the diagram.

The line and the curve meet at the points where x = -2 and x = 2.

Calculate the shaded area.



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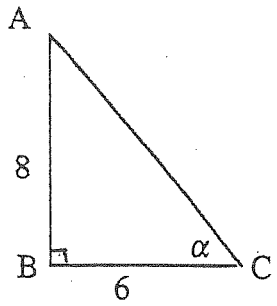
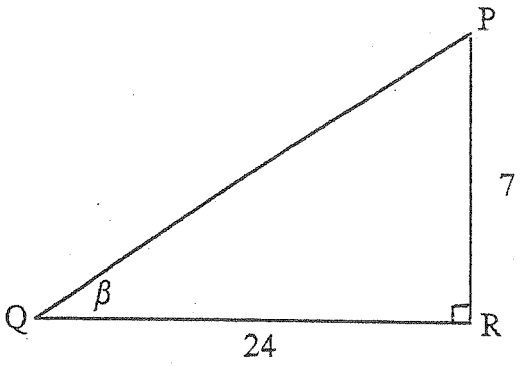
Outcome 3

6. Solve the equation $\sin 2\theta = \frac{1}{\sqrt{2}}$ for $0 < x < \pi$. 2

7. The diagram shows two right angled triangles.





(a) Write down the values of $\sin\alpha$ and $\cos\beta$ 2

(b) Show that the exact value of $\sin(\alpha + \beta)$ is $\frac{117}{125}$ 2

8. (a) Express $\cos x^0 \cos 25^0 + \sin x^0 \sin 25^0$ in the form $\cos(x - a)$ 1

(b) Using the result from (a) solve 4

$$\cos x^0 \cos 25^0 + \sin x^0 \sin 25^0 = \frac{3}{4} \quad \text{for} \quad 0 < x < 180$$

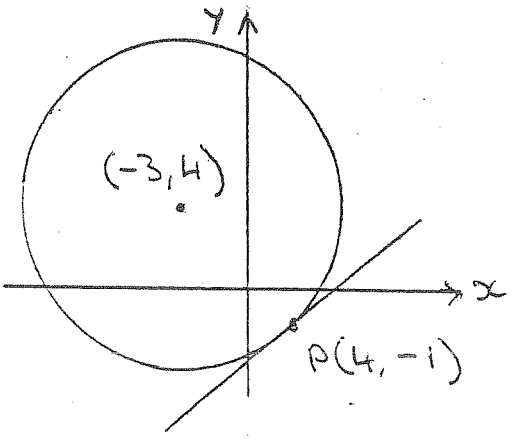
Outcome 4

9. (a) A circle has radius 7 units and centre (4 , -6) . Write down the equation of the circle. 2

(b) A circle has equation $x^2 + y^2 - 2x + 12y + 21 = 0$. Write down the coordinates of its centre and the length of its radius. 2

10. Show that the line with equation $y = 3x + 10$ is a tangent to the circle with equation $x^2 + y^2 - 8x - 4y - 20 = 0$. 5

11. The point P(4, -1) lies on the circle with centre (-3, 4) as shown in the diagram.



Find the equation of the tangent at P. 3