Calderglen High School
Mathematics Department

Higher Mathematics

Unit 2 : Practice Assessment

Read carefully

1. **Calculators may be used in this paper.**
2. **Full credit will be given only where the solution contains appropriate working.**
3. **Answers obtained by readings from scale drawings will not receive any credit.**

Outcome 1 : Use the factor/remainder theorem and apply quadratic theory

1. (i) Show that $(x + 3)$ is a factor of $f(x) = x^3 - 19x - 30$.

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

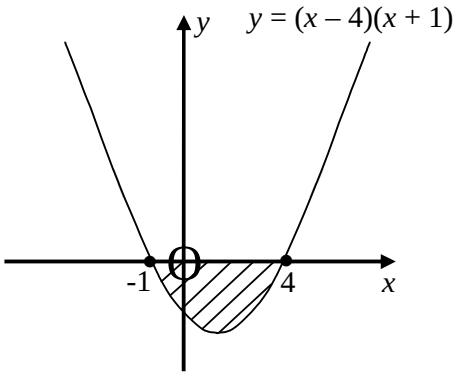
2. Determine the nature of the roots of the equation $5x^2 + 2x - 1 = 0$ using the discriminant. **3**

Outcome 2 : Use basic integration

3. Find $\int \frac{6}{x^2}\, dx$, $x \neq 0$ **3**

4. The diagram opposite shows the curve with the equation $y = (x - 4)(x + 1)$.

   Calculate the shaded area shown in the diagram opposite.



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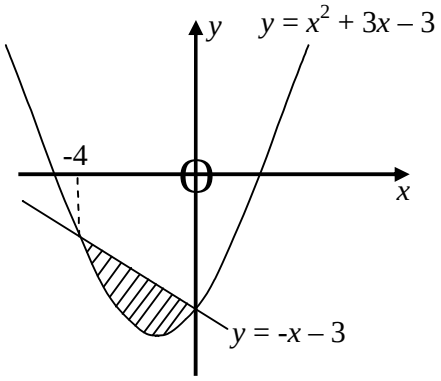
5. The diagram opposite shows the line with equation $y = -x - 3$ and the curve with equation $y = x^2 + 3x - 3$.

   The line and curve meet at the points where $x = 0$ and $x = -4$.

   Calculate the shaded area shown in the diagram opposite.



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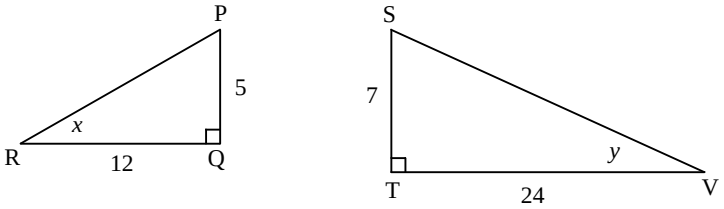
Outcome 3 : Solve trigonometric equations and apply trigonometric formulae

6. Solve the equation $\sin 2x = \frac{\sqrt{3}}{2}$ for $0 < x < \pi$ **2**

7. The diagram shows two right-angled triangles PQR and STV.



(a) Write down the values of sin x and cos y. **2**

(b) Show that the exact value of sin $(x - y)$ is $\frac{36}{325}$ **2**

8. (a) Express $\cos x^o \cos 50^o - \sin x^o \sin 50^o$ in the form $\cos (x + a)^o$ **1**

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

$$\cos x^o \cos 50^o - \sin x^o \sin 50^o = 0.5 \qquad 0 < x < 180$$ **4**

Outcome 4 : Use the equation of a circle

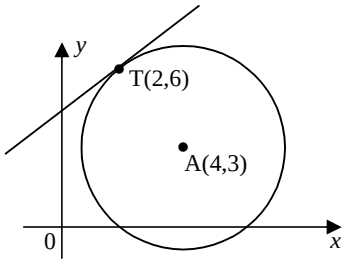
9. (a) A circle has a radius of 20 units and centre (-6,-2). Write down the equation of the circle. **2**

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

10. Show that the line with equation $y = x - 6$ is a tangent to the circle with equation $x^2 + y^2 = 18$. **5**

11. The point T(2,6) lies on the circle with centre A(4,3), as shown in the diagram.

Find the equation of the tangent at T.



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End of Question Paper