Solomon Practice Paper

Core Mathematics 2A

Time allowed: 90 **minutes**

Centre: www.CasperYC.club

Name:

Teacher:

Question	Points	Score
1	5	
2	5	
3	6	
4	7	
5	7	
6	10	
7	11	
8	11	
9	13	
Total:	75	

How I can achieve better:

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Last updated: July 14, 2025

1.

$$\mathrm{f}(x) = 3x^3 - 2x^2 + kx + 9.$$

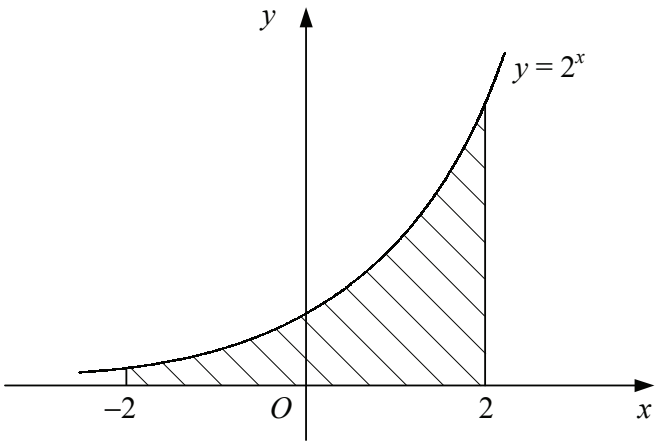
Given that when $\mathrm{f}(x)$ is divided by $(x + 2)$ there is a remainder of -35,

(a) find the value of the constant k, [2]

(b) find the remainder when $\mathrm{f}(x)$ is divided by $(3x - 2)$. [3]

Total: 5

2. Figure shows the curve with equation $y = 2^x$. [5]

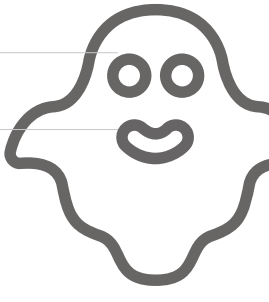


Use the trapezium rule with four intervals of equal width to estimate the area of the shaded region bounded by the curve, the x-axis and the lines $x = -2$ and $x = 2$.

3. Giving your answers in terms of π, solve the equation [6]

$$3\tan^2(\theta) - 1 = 0,$$

for θ in the interval $-\pi \leq \theta \leq \pi$.

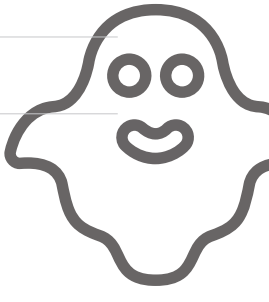


4. (a) Expand $(1+3x)^8$ in ascending powers of x up to and including the term in x^3. [4]

   You should simplify each coefficient in your expansion.

   (b) Use your series, together with a suitable value of x which you should state, to estimate the value of $(1.003)^8$, giving your answer to 8 significant figures. [3]

Total: 7



5. (a) Given that $t = \log_3(x)$, find expressions in terms of t for [4]

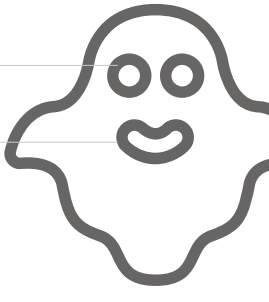
   i. $\log_3(x^2)$,

   ii. $\log_9(x)$.

   (b) Hence, or otherwise, find to 3 significant figures the value of x such that [3]

$$\log_3(x^2) - \log_9(x) = 4.$$

Total: 7



6. The circle C has centre $(-3, 2)$ and passes through the point $(2, 1)$.

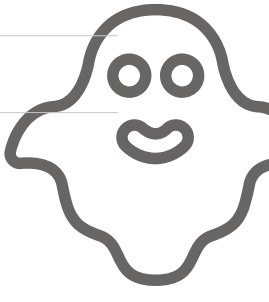
   (a) Find an equation for C. [4]

   (b) Show that the point with coordinates $(-4, 7)$ lies on C. [1]

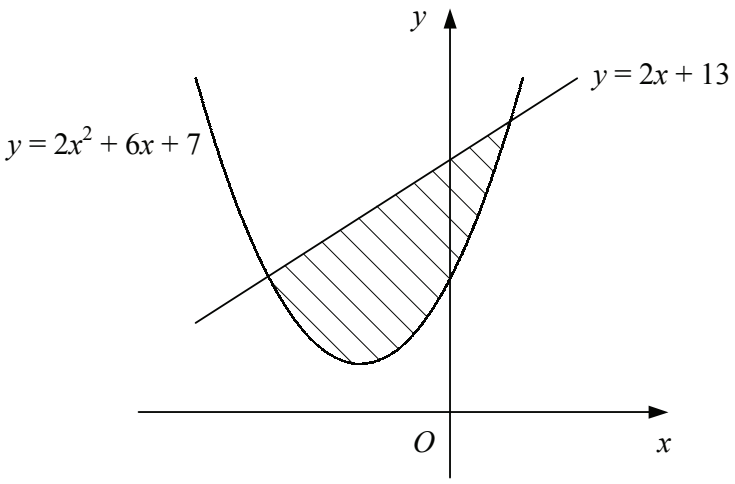
   (c) Find an equation for the tangent to C at the point $(-4, 7)$. [5]

   Give your answer in the form $ax + by + c = 0$, where a, b and c are integers.

Total: 10



7. Figure shows the curve $y = 2x^2 + 6x + 7$ and the straight line $y = 2x + 13$.



(a) Find the coordinates of the points where the curve and line intersect. [4]

(b) Find the area of the shaded region bounded by the curve and line. [7]

Total: 11

8. A geometric series has first term a and common ratio r where $r > 1$.

   The sum of the first n terms of the series is denoted by S_n.

   Given that $S_4 = 10 \times S_2$,

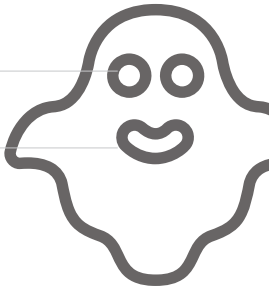
   (a) find the value of r. [6]

   Given also that $S_3 = 26$,

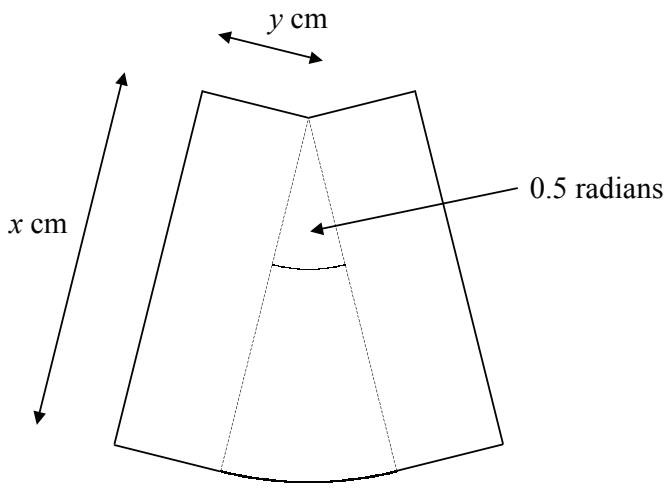
   (b) find the value of a, [3]

   (c) show that $S_6 = 728$. [2]

Total: 11



9. Figure shows a design consisting of two rectangles measuring x cm by y cm joined to a circular sector of radius x cm and angle 0.5 radians.



Given that the area of the design is 50 cm^2,

(a) show that the perimeter, P cm, of the design is given by [5]

$$P = 2x + \frac{100}{x}.$$

(b) Find the value of x for which P is a minimum. [4]

(c) Show that P is a minimum for this value of x. [2]

(d) Find the minimum value of P in the form $k\sqrt{2}$. [2]

Total: 13