

Year 12 Advanced Term 2 – Assignment 1

Section 1 – Multiple Choice

1. What is $\int \frac{3x}{x^2 - 4} dx$?

A. $\frac{2}{3} \ln |x^2 - 4| + c$

B. $\frac{3}{2} \ln |x^2 - 4| + c$

C. $2 \ln |x^2 - 4| + c$

D. $\frac{1}{3} \ln |x^3 - 4x| + c$

2. Which interval gives the range of the function $y = -(1 + 3 \sin 2x)$?

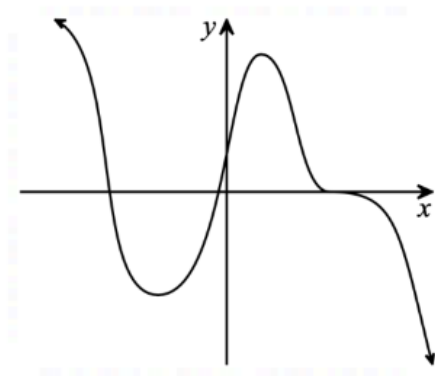
A. $-4 \leq y \leq -2$

B. $-5 \leq y \leq -1$

C. $-1 \leq y \leq 5$

D. $-4 \leq y \leq 2$

3. The graph of $y = f'(x)$ is shown.



How many inflection points does $y = f(x)$ have?

A. 0

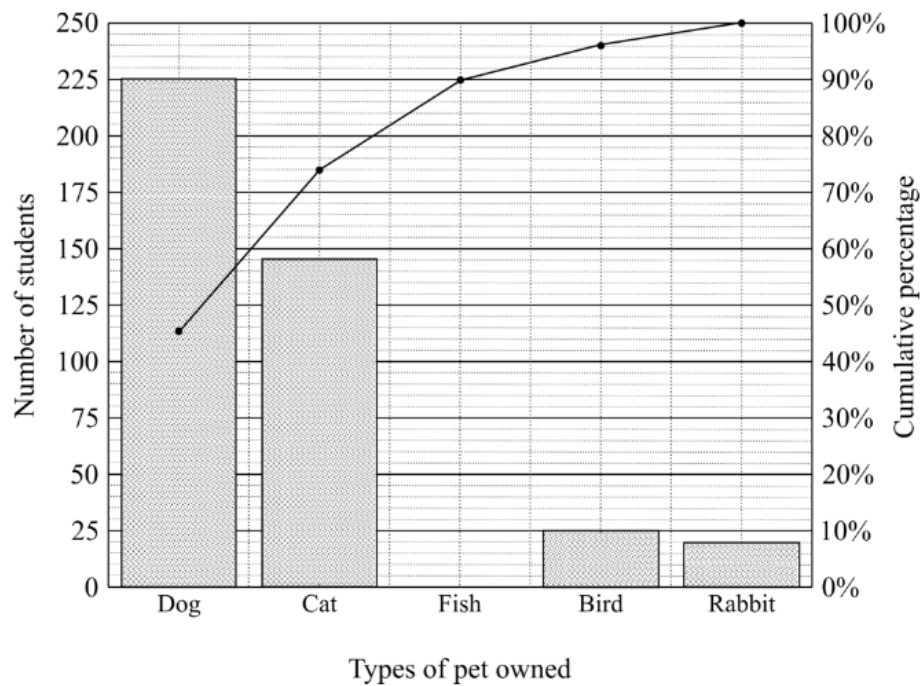
B. 1

C. 2

D. 3

Section 2 – Show full working!

1. A group of students was surveyed and data relating to the types of pets they owned was collected. The Pareto chart shows the data collected. The column representing the number of students owning pet fish has been removed.



- (a) How many students own a pet dog or cat?

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- (b) Complete the Pareto chart, showing the number of students who own a pet fish.

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2. Find $\int \frac{x}{\sqrt{9-x^2}} dx$.

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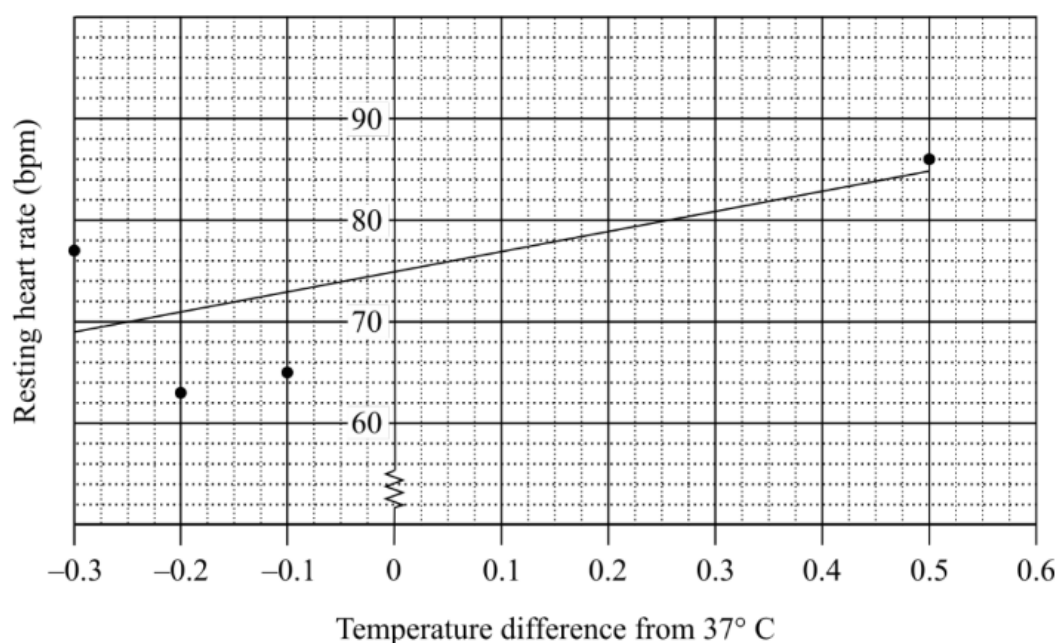
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3. A healthy human body temperature is 37.0°C .

Eight randomly selected people were examined by medical staff. The difference in their body temperature from 37.0°C (in degrees) and resting heart rate (in beats per minute) were recorded.

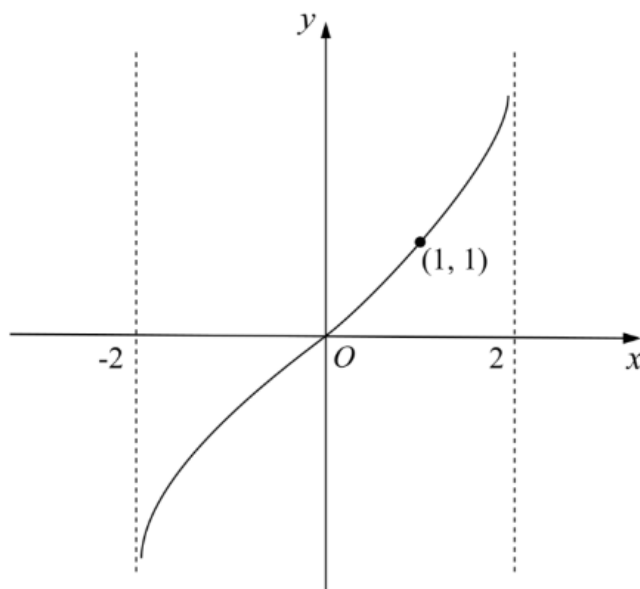
Temperature difference from 37°C (x)	-0.2	-0.3	-0.3	-0.2	-0.1	0	0.2	0.5
Heart rate (y)	63	77	70	74	65	78	79	86

- (a) Complete the scatterplot by adding the last four points from the table.



- (b) The least-squares regression line has been plotted in the graph in part (a). Find the equation of this line.
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- (c) By using the equation of the regression line, predict the resting heart rate of a person with a body temperature of 37.3°C . Give your answer correct to the nearest whole number.
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- (d) Explain why the least-squares regression line would not be reliable to predict the resting heart rate of a person with a body temperature of 37.6°C ?
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4. The graph of $y = a \tan bx$ is shown below for $-2 < x < 2$.



Find the values of a and b .

[illegible]

5. The point $A(8, 23)$ lies on the graph of $y = g(x)$.

It is known that the graph of $y = g(x)$ is obtained by transforming the graph of $y = f(x)$ such that $g(x) = -2f(4x) + 1$.

Find the coordinates of the point on the graph of $y = f(x)$ which is mapped to the point A.

[illegible]

6. The share price (\$P) of a renewable energy company is increasing such that

$$\frac{dP}{dt} = \frac{3}{t+1} ,$$

where t is the time in months.

If the initial price of the share price is \$2.00, find the price after 6 months.
Write your answer to the nearest cent.

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7. Let $f(x) = x^3 + x^2 + 3x + 3$.

(a) Show that the graph of $y = f(x)$ has no stationary points.

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(b) Find any points of inflexion.

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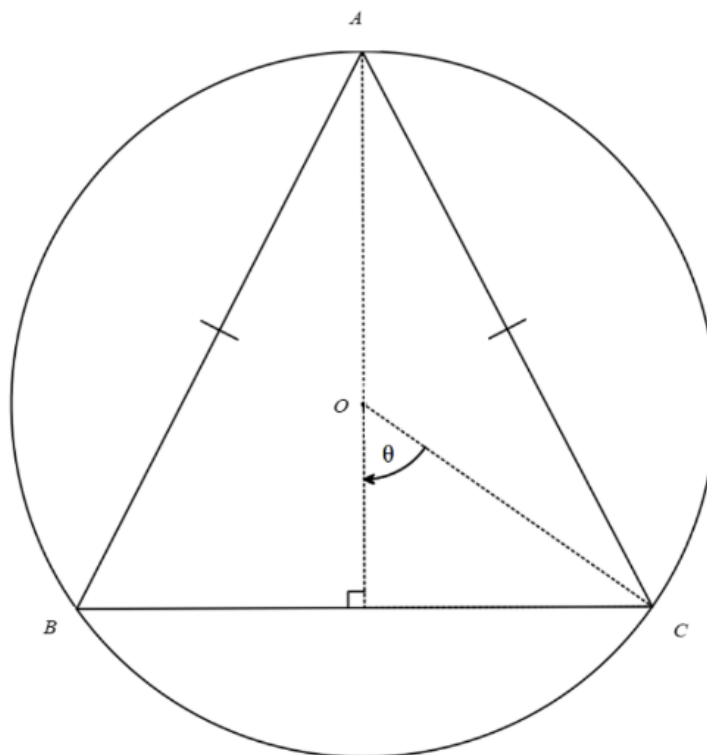
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8. An isosceles triangle $\triangle ABC$ is inscribed inside a circle of fixed radius 2 and centre O . Let θ be defined as in the diagram below.



- (a) Show that the area of the triangle $\triangle ABC$ is given by $A = 4\sin\theta(1 + \cos\theta)$.

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This image shows a full page of white paper with horizontal dotted lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.