



Year 12 Maths Murder Mystery

WHO? In the questions below, the murderer has made 3 errors and the victim has made none.

Mason:

- $\int 6x^2 dx = 2x^3 + c$
- $\sin 60 = \frac{1}{2}$
- ${}^8C_3 = 56$

Isla:

- $x^4 \div x^{-7} = x^{-3}$
- $(x+3)^2 = x^2 + 9$
- $f(x-2)$ represents a translation by vector $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$

Theo:

- $\sqrt{24} = 4\sqrt{6}$
- $\frac{d}{dx}(4x^2 - 2x) = 8x + 2$
- $\log 6 - \log 4 = \log 2$

Amara:

- $3i - 4j = \begin{pmatrix} 3 \\ -4 \end{pmatrix}$
- $2x^2 - 4x + 5 = 2(x-1)^2 + 3$
- $\sin^2 x - \cos^2 x = 1$

Roan:

- $(a^6)^5 = a^{11}$
- Cubic graphs have at most two turning points
- $\tan 30 = \frac{\sqrt{3}}{3}$

Olivia:

- $|5i + 12j| = 13$
- $6! = 720$
- $\frac{5\sqrt{2}}{\sqrt{10}} = \sqrt{5}$

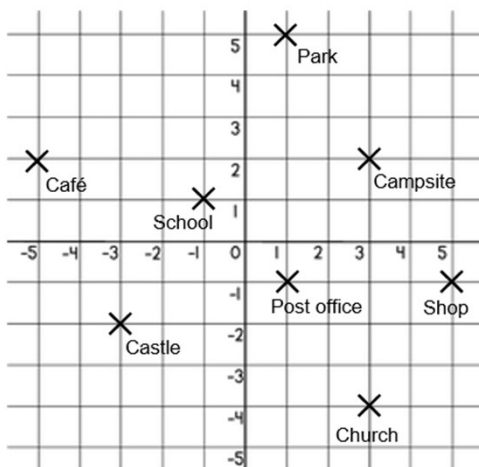
WHERE? Use the two clues and the coordinate map to identify the location of the murder!

For the x -coordinate:

The curve C has equation
 $y = (x+4)(x-2) + 12$
Find the y -coordinate of the stationary point

For the y -coordinate:

Find the area bounded by the x -axis, $x = 1$,
 $x = 3$ and $y = \frac{3}{x^2}$



WHEN?

Hour:
 $\frac{d}{dx}(14x - 9)$

Minutes:
Coefficient of x^2 in
 $(2x+1)^5$

Month:
 $\log_3 81$

Day:
 $\int_1^2 (3x^2) dx$

WHY? Calculate each of the following and sort into ascending order.

A:

The circle C , with centre A , passes through the point P with coordinates $(-9, 8)$ and the point Q with coordinates $(15, -10)$. PQ is a diameter of the circle C . A point R also lies on the circle C . Given that the length of the chord PR is 20 units, find the length of the shortest distance from A to the chord PR .

B:

Solve, for $0^\circ < x < 90^\circ$,
 $5 \sin 2x = 2 \cos 2x$

C:

Solve
 $f(x) = 2x^3 - 6x^2 + x - 3$

D:

Find the coefficient of the
 x^5 term in the expansion of
 $\left(1 + \frac{x}{2}\right)(2-x)^5$

Correct order	Reason
A D B C	She thought $x^2 + x^3 = x^5$
C D B A	She simplified $\frac{x+2}{x+3}$ to $\frac{2}{3}$
B A C D	She thought $\log(a+b) = \log a + \log b$
D B A C	She kept losing negative signs in her working out
C B A D	She multiplied 1 by 1 and got 2

FINAL ACCUSATION

_____ murdered _____

on (when) _____ at (where) _____

Because (why) _____



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WHO? In the questions below, the murderer has made 3 errors and the victim has made none.

Mason:

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- $\sin 60 = \frac{1}{2}$ ✗
- ${}^8C_3 = 56$ ✓

Isla:

- $x^4 \div x^{-7} = x^{-3}$ ✗
- $(x+3)^2 = x^2 + 9$ ✗
- $f(x-2)$ represents a translation by vector $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$ ✓

Theo:

- $\sqrt{24} = 4\sqrt{6}$ ✗
- $\frac{d}{dx}(4x^2 - 2x) = 8x + 2$ ✗
- $\log 6 - \log 4 = \log 2$ ✗

Amara:

- $3i - 4j = \begin{pmatrix} 3 \\ -4 \end{pmatrix}$ ✓
- $2x^2 - 4x + 5 = 2(x-1)^2 + 3$ ✓
- $\sin^2 x - \cos^2 x = 1$ ✗

Roan:

- $(a^6)^5 = a^{11}$ ✗
- Cubic graphs have at most two turning points ✓
- $\tan 30 = \frac{\sqrt{3}}{3}$ ✓

Olivia:

- $|5i + 12j| = 13$ ✓
- $6! = 720$ ✓
- $\frac{5\sqrt{2}}{\sqrt{10}} = \sqrt{5}$ ✓

WHERE? Use the two clues and the coordinate map to identify the location of the murder!

For the x -coordinate:

$$y = x^2 + 2x + 4$$

$$\frac{dy}{dx} = 2x + 2 = 0$$

$$x = -1$$

$$y = 3$$

The curve C has equation

$$y = (x+4)(x-2) + 12$$

Find the y -coordinate of the stationary point

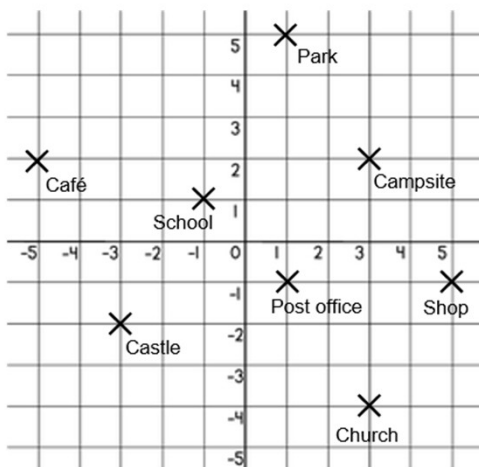
For the y -coordinate:

Find the area bounded by the x -axis, $x = 1$,

$$x = 3 \text{ and } y = \frac{3}{x^2}$$

$$\int_1^3 3x^{-2} dx = \left[-\frac{3}{x} \right]_1^3 = -1 - (-3) = 2$$

(3, 2)



WHEN?

$$10 \times (2x)^2 \times 1^3$$

Hour:

$$\frac{d}{dx}(14x - 9) = 14$$

Minutes:

$$\text{Coefficient of } x^2 \text{ in } (2x+1)^5 = 40$$

Month:

$$\log_3 81 = 4$$

Day:

$$\int_1^2 (3x^2) dx = [x^3]_1^2 = 8 - 1 = 7$$

WHY? Calculate each of the following and sort into ascending order.

A:

The circle C , with centre A , passes through the point P with coordinates $(-9, 8)$ and the point Q with coordinates $(15, -10)$. PQ is a diameter of the circle C . A point R also lies on the circle C . Given that the length of the chord PR is 20 units, find the length of the shortest distance from A to the chord PR . $r = 15$ $\sqrt{15^2 - 10^2} = 11.2$

B:

Solve, for $0^\circ < x < 90^\circ$,
 $5 \sin 2x = 2 \cos 2x$

$$\tan 2x = \frac{2}{5}$$

$$x = 10.9$$

C:

Solve

$$f(x) = 2x^3 - 6x^2 + x - 6$$

$$x = 3 \text{ only}$$

D:

Find the coefficient of the x^5 term in the expansion of

$$\left(1 + \frac{x}{2}\right)(2-x)^5$$

$$4$$

Correct order	Reason
A D B C	She thought $x^2 + x^3 = x^5$
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FINAL ACCUSATION

Theo murdered Olivia

on (when) 7th April at 14:40 at (where) Campsite

Because (why) She simplified $\frac{x+2}{x+3}$ to $\frac{2}{3}$