Ong Ci Hui Minh Ngoc Yr 5 Kelvin Grove State College, Brisbane,
Continuing to explore four consecutive numbers

Q1:

a	b	c	d
n-1	n	n+1	n+2

Let Odd be O and let Even be E

Why can't bd - ac be even?

if n is odd

a	b	c	d
E	O	E	O
n-1	n	n+1	n+2

b×d is O×O is ODD
a×c is E×E is EVEN

∴ bd - ac is Odd minus Even which is odd.
Result: bd - ac can never be even

if n is even

a	b	c	d
O	E	O	E
n-1	n	n+1	n+2

b×d is E×E is EVEN
a×c is O×O is ODD

∴ bd - ac is Even minus Odd which is odd.
Result: bd - ac can never be even

Q2

~~Ex~~Example

a	b	c	d
1	2	3	4

$b \times c = 2 \times 3$
$= 6$
$a \times d = 1 \times 4$
$= 4$
$6 - 4 = 2$
(bc) - (ad)

Example 2

a	b	c	d
10	11	12	13

$b \times c = 11 \times 12$
$= 132$
$a \times d = 10 \times 13$
$= 130$
$132 - 130 = 2$
(bc) (ad)

Proof

a	b	c	d
n-1	n	(n+1)	n+2

$b \times c = (n) \times (n+1)$
$= n^2 + n$
$a \times d = (n-1) \times (n+2)$
$= (n-1) \times n + (n-1) \times 2$
$= n^2 - n + 2n - 2$
$= n^2 + n - 2$
$bc - ad = (n^2 + n) - (n^2 + n - 2)$
$= 2$

Q3

a	b	c	d
10	11	12	13

$a+b+c+d = 10+11+12+13$
$= 46$
$= 2 \times 23$ odd

Proof

n-1	n	n+1	n+2
a	b	c	d

$a+b+c+d$
$= (n-1)+n+(n+1)+(n+2)$
$= n-1+n+n+1+n+2$
$= 4n+2$
$= 2 \times 2n+2$
$= 2(2n+1)$ ∵ $2n+1$ is odd,
$2 \times (2n+1)$
is $2 \times$ odd factor

Q4

(refer to **Q3**) $a+b+c+d = 4n+2$ is not a multiple of 4
it cannot be written as $4 \times (n+1)$
∵ 2 is less than 4
not 4

Q5

(refer to **Q3**) $a+b+c+d = 4n+2$

$= \underbrace{2 \times (2n+1)}$

Try $4n+2 = 3$ ✗
Try $4n+2 = 6$
$n=1$ The four consecutive nos is

0	1	2	3

Try 15
$4n+2 = 15$ ✗
Try 26
$4n+2 = 26$
$n = 6$

5	6	7	8

For this to be a multiple of 3,
$2n+1$ must be a multiple of 3
then it can be divided exactly by 3

$(2n+1) = 3y$ *
$n = \frac{3y-1}{2}$

* y is an positive or negative integer
y is not 0

The consecutive numbers are:

$n-1$	n	$n+1$	$n+2$
$\frac{3y-1}{2}-1$	$\frac{3y-1}{2}$	$\frac{3y-1}{2}+1$	$\frac{3y-1}{2}+2$

There is an infinite choices of four consecutive nos