| Name: _____ | Student No.: _____ |

?. If D is the set of divisors of 36 with partial order 'is a divisor of', which one of the following is an immediate predecessor of 36?

(A) 9 (B) 18 , (C) 6 , (D) 4.

Answer: $\boxed{B}$: Using the notation $x \mid y$ for x is a divisor of y, we have $9 \mid 18 \mid 36$, $6 \mid 18 \mid 36$ and $4 \mid 12 \mid 36$, while $18 \mid 36$ with no divisor between 18 and 36.

?. Suppose $A = \{a, b, c, d\}$, $B = \{x, y, z\}$ and R is the relation between A and B given by $R = \{(a, x), (b, x), (b, y), (c, y), (d, z)\}$. R is not a function. Removing which of the following pairs from R results in a function?

(A) (a, x),   (B) (b, y),   (C) (c, y),   (D) (d, z).

Answer: $\boxed{B}$: Removing either of (a, x), (c, y) or (d, z) will still leave two pairs with b as first element (and no pairs with a particular element of A as first element).

?. Suppose $S = \{0, 1, 2, 3, 4, 5\}$, $T = \{0, 2, 4\}$ and $f : S \to T$ is given by $f(k) = r$ where r is the remainder when $4k$ is divided by 6. Then f is

(A) Injective but not surjective   (B) Surjective but not injective   (C) Bijective   (D) Neither injective nor surjective.

Answer: $\boxed{B}$: $f(0) = 4(0)\mathrm{mod}6 = 0$, $f(1) = 4(1)\mathrm{mod}6 = 4$, $f(2) = 4(2)\mathrm{mod}6 = 2$, $f(3) = 4(3)\mathrm{mod}6 = 0$, $f(4) = 4(4)\mathrm{mod}6 = 4$, $f(5) = 4(5)\mathrm{mod}6 = 2$. Since $f(0) = f(3)$, f is not injective. f is surjective since $f(0) = 0$, $f(2) = 2$ and $f(1) = 4$..

?. The inverse of $f(x) = (3x + 2)/(5x - 3)$ is

(A) $g(y) = (3y + 2)/(6y - 3)$,   (B) $g(y) = (3y + 2)/(5y - 3)$,
(C) $g(y) = (3y + 2)/(5y - 2)$,   (D) $g(y) = (3y + 2)/(6y - 2)$,

Answer: $\boxed{B}$: $y = (3x + 2)/(5x - 3)$ implies $y(5x - 3) = 3x + 2$, which in turn implies $5xy - 3y = 3x + 2$ and hence $5xy - 3x = 3y + 2$ or $x(5y - 3) = 3y + 2$.