Exercise 5.4

Q. 1: If $A = \{a, b\}$, $B = \{c, d\}$, then find $A \times B$ and $B \times A$.

$A \times B = \{a, b\} \times \{c, d\}$

$= \{(a, c), (a, d), (b, c), (b, d)\}$

$B \times A = \{c, d\} \times \{a, b\}$

$= \{(c, a), (c, b), (d, a), (d, b)\}$

Q. 2: If $A = \{0, 2, 4\}$, $B = \{-1, 3\}$, then find $A \times B$, $B \times A$, $A \times A$, $B \times B$

$A \times B = \{0, 2, 4\} \times \{-1, 3\}$

$= \{(0, -1), (0, 3), (2, -1), (2, 3), (4, -1), (4, 3)\}$

$B \times A = \{-1, 3\} \times \{0, 2, 4\}$

$= \{(-1, 0), (-1, 2), (-1, 4), (3, 0), (3, 2), (3, 4)\}$

$A \times A = \{0, 2, 4\} \times \{0, 2, 4\}$

$= \{(0, 0), (0, 2), (0, 4), (2, 0), (2, 2), (2, 4), (4, 0), (4, 2), (4, 4)\}$

$B \times B = \{-1, 3\} \times \{-1, 3\}$

$= \{(-1, -1), (-1, 3), (3, -1), (3, 3)\}$

Q. 3: Find a and b, if

(i) $(a - 4, b - 2) = (2, 1)$

from above ordered pair we have

$a - 4 = 2$

$a = 6$

$b - 2 = 1$

$b = 3$

(ii) $(2a + 5, 3) = (7, b - 4)$

from above ordered pair we have

$2a + 5 = 7$

$2a = 2$

$a = 1$

$3 = b - 4$

$b - 4 = 3$

$b = 7$

(iii) $(3 - 2a, b - 1) = (a - 7, 2b + 5)$

from above ordered pair we have

$3 - 2a = a - 7$

$-2a - a = -7 - 3$

$-3a = -10$

$a = \frac{10}{3}$

$b - 1 = 2b + 5$

$b - 2b = 5 + 1$

$-b = 6$

$b = -6$

Q. 4: Find the sets X and Y, if $X \times Y = \{(a,a),(b,a),(c,a),(d,a)\}$

As we know first elements (domain) of ordered pairs are related to first set i.e. X and second elements (range) of ordered pairs are related to Y. So,

$X = \{a,b,c,d\}$

$Y = \{a\}$

Q. 5: If $X = \{a,b,c\}$ and $Y = \{d,e\}$, then find the number of elements in

(i) No. of Elements in $X = m = 3$

No. of Elements in $Y = n = 2$

So,

No. of Elements in $X \times Y = m \times n$

$= 3 \times 2$

$= 6$

(ii) No. of Elements in $X = m = 3$

No. of Elements in $Y = n = 2$

So,

No. of Elements in $Y \times X = n \times m$

$= 2 \times 3$

$= 6$

(iii) No. of Elements in $X = m = 3$

So,

No. of Elements in $X \times X = m \times m$

$= 3 \times 3$

$= 9$