Questions

Algebra and Statistics

General Exercise on Equations

(1) Solving two equations of first degree of two variables algebraically and graphically:

First: Complete the following:

1) The two equations : x = 4 y, -3 = 0 represent two straight lines intersect at the point ……..

2) The two equations x = -1 , y + 1 = 0 represent two straight lines intersect at a point lies on …… quadrant.

3) The solution set of two equations : x + 1 = 0 , y + 2 = 0 is ……

4) The solution set of the two equations: x + y = 0 , y – 5 = 0 is……..

5) The solution set of the two equations : x + 3y = 4, 3y + x = 1 is …….

6) The solution set of the two equations : 4x + y = 6 , 8x + 2y = 12 is ……..

7) If the two equations : x + 3y = 4, x + ay= 7 represent two parallel straight lines, then a = ……

8) If the two equations : x + 2y = 1 , 2x + ky = 2 has one and one solution then k ≠…….

Second : Choose:

1) The point of intersection of the two straight lines y = 2 and x + y = 6 is…….

a) (2 , 6) b) (2 , 4) c) (4 , 2) d) (6 , 2)

2) The point of intersection of the two straight lines 2x – y = 3 and 2x + y = 5 lies on the …….. quadrant.

a) first b) second c) third d) fourth

3) If the point of intersection of the two straight lines x = 1 and y = 5a lies on the fourth quadrant, then a may equal ……

a) -5 b) zero c) 1 d) 5

4) The two straight lines x + 5y = 1 , x + 5y – 8 = 0 are ……

a) parallel b) coincide

c) intersect and non perpendicular d) perpendicular

5) The two straight lines 3x + 4y = 1 , 6x + 8y = 2 are ……

a) parallel b) coincide

c) intersect and non perpendicular d) perpendicular

6) The two straight lines 3x = 7 , 2y = 9 are ……

a) parallel b) coincide

c) intersect and non perpendicular d) perpendicular

7) The two straight lines x -1 = 0 x + y = 5 are ……

a) parallel b) coincide

c) intersect and non perpendicular d) perpendicular

8) The solution set of the two equations x + y = 0 and y – 1 = 0 is ….

a) (-1 , 1) b) – 1 , 1 c) {-1 , 1} d) {(-1, 1)}

9) The solution set of the two equations x + 1 = 0 and y -2= 0 is ….

a) {(1 , 2)} b) {(1 , -2)} c) {(-1, 2)} d) {(-1, -2)}

10) The number of solutions of the two equations x + y = 2 and x + y=0 is ……..

a) zero b) one

c) two d) infinite numbers

11) The number of solutions of the two equations x + y = 2 and x + y -3 = 0 is ……

a) zero b) one

c) two d) infinite numbers

12) If the two equations x + 4y = 7 and 3x + ky = 21 has infinite numbers of solution then k = ……

a) 4 b) 7 c) 12 d) 21

Third : find the solution set for each pair of the following equations graphically:

1) x = 1 , $\frac{1}{3}$ y = = -1

2) $\frac{1}{2}$ x = 2 , $\frac{6}{y}$ = 3

3) y = 3 , 2x + y = 7

4) x -2 = 0 , x + y = 5

5) y = x + 5 , y = x

6) y + x = 7 , y = 2x + 1

7) 2x + y = 1 , x + 2y = 5

8) 3x – y + 9 = 0 , y -2x- 7 = 0

9) 3x – 2y – 14 = 0 , 2x + 3y + 8 =0

10) 2y = 8y + 7 , 4x – 6y – 14 = 0

Fourth : Find the solution set for each pair of the following equations graphically:

1) y = 3 , y = 2x-4

2) x = 2 , y = 3x + 1

3) y = x + 1 , y = 2x -1

4) x + y = 4 , 2x – y =2

5) x + 5y = 4 , 2x – 5y = 11

6) y =3x + 4 , y = 2x + 3

7) 3x + 4y = 7 , 2x-y=1

8) y = $\frac{1}{2}$x , y + x =9

9) 2x + y = 5 , x – 2y = 5

10) $\frac{x}{2} + \frac{3y}{2} = 1$, $\frac{x}{4} + \frac{y}{3} = \frac{1}{2}$

Fifth : Find the solution set for each pair of the following equations graphically and algebraically :

1) $y = 2x + 7$, $x + 2y = 4$

2) $3x - y + 4 = 2$, $y = 2x + 3$

3) $y = x + 4$, $x + y = 4$

4) $x - y = 4$, $3x + 2y = 7$

5) $2x + y = 1$, $x + 2y = 5$

Sixth: Answer the following questions:-

1) The sum of two rational numbers is 63, and the difference between them is 12, find the two numbers.

2) If three times a number is added to twice a second number the sum is 19, and if the first number is added to three times the second number the sum is 16, find the two numbers.

3) The sum of two rational numbers is 12, and three times the smallest number exceeds than twice the greatest number by one, find the two numbers.

4) A rational number in the simplest form, if 3 is subtracted from both numerator and denominator it became $\frac{5}{6}$ and if 5 is added to both numberator and denominator it became $\frac{13}{14}$ find this number.

5) Find the number which formed from two digits if their sum is 11, and twice the units digit exceeds than three times the tens digit by 2.

6) Find the number which formed from two digit, if their sum is 5 and if the two digits are exchanged then the resulting number decreases than the original number by 9.

7) Since 6 years ago the age of a man was six times his son's age, after ten years the age of this man will be double his son's age. Find the age of both of them.

8) The length of a rectangle exceeds 3 cm. than its width, if twice the length decrease 2 cm, than four times its width. Find the length and the width of the rectangle.

9) A rectangle of perimeter 32cm. if its length decreases 1cm. and its width increases 3cm, it will be a square. Find the area of the square.

10) Two complementary angles, if the measure of one of them is 30° more than the measure of the other, find the measure of each of them.

Exercises on solving second degree equation:

First : Choose the correct answer from the given ones:

1) The curve of the function f such that $f(x) = x^2 - 3x + 2$ cuts x-axis at the two points …….

a) (2, 0) , (3 , 0) b) (2 , 0) , (1 , 0)

c) (-2 , 0) , (-1 , 0) d) (2, 0) , (-1 , 0)

2) The solution set of the equation $2x^2 + 5x = 0$ is ……..

a) {0 , 5} b) $\{0 , \frac{-5}{2}\}$ c) {2 , 5} d) ∅

3) The solution set of the equation $x^2 - 4x + 4 = 0$ is ……

a) {(-2 , 2)} b) {(4, 1)} c) {2} d) φ

4) The solution set of the equation $x^2 + 5 = 0$ is ……

a) $\{\sqrt{5}, -\sqrt{5}\}$ b) $\{-\sqrt{5}\}$ c) $\{\sqrt{5}\}$ d) φ

5) In the equation : $ax^2 + bx + c = 0$, if $b^2 - 4a\,c > 0$, then the number of roots equals ……

a) 1 b) 2 c) 0 d) undetermined

Second: find the solution set for each pair of the following equations by using the formula:

1) $x^2 - 2x - 4 = 0$ knowing that $\sqrt{5} \simeq 2.24$

2) $x^2 = 2(x + 6)$ knowing that $\sqrt{52} \simeq 7.2$

3) $(x - 1)^2 = 10$ knowing that $\sqrt{10} \simeq 3.16$

4) $x^2 - 2(x + 3) = 0$ knowing that $\sqrt{7} \simeq 2.65$

5) $(x - 3)^2 - 3(x - 3) + 1 = 0$ knowing that $\sqrt{5} \simeq 2.24$

6) $1 - \frac{2}{x} = \frac{2}{x^2}$ (where $x \neq 0$) knowing that $\sqrt{3} \simeq 1.73$

7) $9x^2 - 24x + 16 = 0$

8) $x^2 = 2(x - 6)$

9) $x + \frac{4}{x} + 1 = 0$ (where $x \neq 0$)

10) If $x^4 + 2x^2 - 1 = 0$

Then use the formula to prove that : $x^2 = \sqrt{2} - 1$

Third : Answer the following questions:

1) Graph the function f where $f(x) = x^2 - 3x + 2$, $x \in [-1, 4]$, then from the graph find.

(a) The vertex point of the curve.

(b) The maximum or minimum value of the function f.

(c) The solution set of the equation $x^2 - 3x + 2 = 0$

2) Graph the function f where $f(x) = x^2 – 4x - 2$, $x \in [-1 , 5]$, then from the graph find.

(a) The maximum or minimum value of the function f.

(b) The solution set of the equation $f(x) = 0$

3) Graph the function f where $f(x) = 3 – 2x – x^2$, $x \in [-4 , 2]$, then from the graph find.

(a) The vertex point of the curve.

(b) The two roots of the equation $x^2 + 2x - 3 = 0$

4) Graph the function f where $f(x) = x^2 + 2x + 3$, $x \in [-3 , 1]$, then from the graph find.

(a) The vertex point of the curve.

(b) The minimum value of the function f.

(c) The solution set of the equation $x^2 + 2x + 3 = 0$

5) Graph the function f where $f(x) = x^2 - 5x + 3$, $x \in [0 , 5]$, then from the graph find.

(a) The vertex point of the curve.

(b) The minimum value of the function f.

(c) The two roots of the equation $x^2 - 5x + 3 = 0$

6) Graph the function f where $f(x) = x^2 + x - 2$, $x \in [-3 , 2]$, then from the graph find.

(a) The vertex point of the curve.

(b) The symmetric axis.

(c) The two roots of the equation $x^2 + x - 2 = 0$

7) Graph the function f where $f(x) = -2(x + 1)^2$, $x \in [-5 , 3]$, then from the graph solve the equation $x^2 + 2x + 1 = 0$.

8) Graph the function f where $f(x) = x^2 - 2x$, $x \in [-2 , 4]$, then from the graph find :

(a) The vertex point of the curve.

(b) The maximum or minimum value of the function f.

(c) The equation of the symmetric axis.

(d) The solution set of the equation $f(x) = 0$

9) Graph the function f where $f(x) = x^2 - 1$, $x \in [-3 , 3]$, then from the graph find :

(a) The vertex point of the curve.

(b) The maximum or minimum value of the function f.

(c) The equation of the symmetric axis.

(d) The solution set of the equation $f(x) = 0$

10) Graph the function f where $f(x) = 4 - x^2$, $x \in [-3 , 3]$, then from the graph find :

(a) The vertex point of the curve.

(b) The maximum or minimum value of the function f.

(c) The equation of the symmetric axis.

(d) The two roots of the equation $x^2 = 4$

(3) Exercise on solving two equations in two variables one of first degree and the other of second degree.

First : complete the following:

1) The equation $xy = 3$ of …….. degree.

2) The solution set of the two equations : $x = 1$, $x^2 + y^2 = 10$ is …….

3) If $x – y = 3$, $x^2 – y^2 = 6$, then $x + y$ = ……..

4) The solution set of the two equations : $x = 1$, $x^2 + y^2 = 1$ is …….

5) The solution set of the two equations : x = 2 , xy = 6 is ……

6) If the sum of two positive numbers is 3, and the sum of their squares is 5, then the two numbers are ……. , …….

7) If the sum of two positive numbers is 5, and their product is 6, then the two numbers are ……. , …….

8) If the ratio between the perimeters of two squares is 1 : 2 , then the ratios between their areas is ……. : …….

9) The area of the rectangle whose length is 3 cm. and its perimeter is 10cm. equals …….

10) A square of side length 4cm, if this length increases by 3cm,than its area increases by ……. cm^2.

Second : Choose the correct answer from given ones:

1- The degree of the equation 3x + 4y + xy = 5 is ……

a) zero b) first c) second d) third

2- One solution of the equation $x^2 - y^2 = 3$ in R may be ……

a) (1 , -2) b) (-2 , 1) c) (1, 2) d) (-1 , -2)

3- The ordered pair that satisfies both of the two equations xy = 2 , x – y = 1 is ……..

a) (1 , 2) b) (2, 1) c) (1 , 1) d) (2 , -1)

4) The solution set of the two equations : x= y, xy = 1 is …….

a) {(1, 1)} b) {(-1 , -1)}

c) {(1 , -1)} d) {(-1 , -1), (1,1)}

5) The solution set of the two equations: x – y = 0, xy= 9 is ……..

a) {(0 , 0)} b) {(-3, -3)}

c) {(3 , 3)} d) {(-3 , -3), (3 , 3)}

6) One solution of the equation $x - y = 2$, $x^2 + y^2 = 20$ in R may be …….

a) (-4 , 2) b) (2, -4) c) (3 , 1) d) (4 , 2)

7) If $x = y + 1$, $(x - y)^2 + y = 3$, then y equals……

a) zero b) 1 c) 2 d) 3

8) If $x = 1$, $x^2 + y^2 = 10$, then y equals……..

a) -3 b) ± 3 c) 2 d) 3

9) If a b = 3 , $ab^2 = 12$, then b equals…….

a) 4 b) 2 c) -2 d) ± 2

10) If the difference between two numbers is 1 and the square of their sum is 25, then the two numbers are……..

a) 1 , 2 b) 2 , 3 c) 3 , 4 d) 4, 5

Third: Find the solution set for each pair of the following equations:

1) $x + 1 = 0$, $x^2 + y^2 = 17$

2) $x - 2 = 0$, $x^2 + xy + y^2 = 7$

3) $x - y = 0$, $xy = 1$

4) $x + y = 0$, $2x^2 - y^2 = 4$

5) $x - 2y = 0$, $x^2 - y^2 = 3$

6) $x - y = 1$, $x^2 + y^2 = 25$

7) $y = x - 5$, $x^2 - 2xy = 16$

8) $y - x = 2$, $x^2 + xy - 4 = 0$

9) $x - 2y - 1 = 0$, $x^2 - xy = 0$

10) $Y + 2x = 7$, $2x^2 + x + 3y = 19$

Fourth : Applications:

1) If the sum of integer numbers is 3, and the sum of their squares is 5, find the two numbers.
2) Two numbers one of them is the additive inverse of the other, and the sum of their squares is 2, find the numbers.
3) If the difference between two numbers is 5, and their product is 36, then find the two numbers.
4) If the sum of two positive numbers is 9 and the difference between their squares is 27 find the two numbers.
5) Find the number which is formed from two digits, if the units digit is twice the tens digit, and if the product of the two digits equals half the original number.
6) The length of a rectangle is 3 more than its width, and its area is 28 cm^2. Find its perimeter.
7) Find the two dimensions of a rectangle if its perimeter is 24 cm. and its area is 35cm^2.
8) Find the two dimensions of a rectangle if its diagonal of length 5 cm, and its perimeter is 14cm.
9) The hypotenuse of a right angled triangle is 13cm, and its perimeter is 30cm. find the lengths of the other two sides.
10) The difference between the lengths of the two rhombus's diagonals is 4cm. and its perimeter is 40 cm, find the length of each diagonal.

Model Answers

(1) First complete :

1) (4,3) 2) 3rd 3) {(-1 , -2)}

4) {(-5 , 5)} 5) ∅ 6) {(x , y) , y= 6-4x , (x , y) ∈ R x R}

7) a = 3 8) K ≠ 4

Second: choose:

1) c 2) a 3) a 4) a 5) b 6) d

7) d 8) d 9) c 10) a 11) a 12) c

Third: Find the S.S.

1) {(1 , -3)} 2) {(4 , 2)}

3) {(2 , 3)} 4){(2, 3)}

5) ∅ 6) {(2 , 5)}

7) {(-1 , 3)} 8) {(-2 , 3)}

9) {(2, -4)} 10) {(x, y), $x= \frac{3}{2}y + \frac{7}{2}$}

Fouth : Find the S.S.

1) {(3.5 , 3)} 2) {(2 , 7)}

3) {(2 , 3)} 4) {(2 , 2)}

5) {(5 , -0.2)} 6){(-1 , 1)}

7) {(1 , 1)} 8) {(6 , 3)}

9) {(3 , -1)} 10) {(2, 0)}

Fifth : Find the S.S.

1) {(-2 , 3)} 2) {(1 , 5)}

3) {(0 , 4)} 4) {(3 , -1)} 5){(-1 , 3)}

Sixth : Answer the questions :

1) x + y = 63 (1) , x – y = 12 (2) by adding (1) and (2)

2x = 75 ⟶ x = 37.5 ⟶ y = 25.5

2) 3x +2y = 19 (1)

X + 3y = 16 (2) (x – 3)

-3x – 4y= - 48 (3)

By adding (1) and (3)

-7y = -29 ⟶ $y = \frac{29}{7}$

$X= 16 – 3y = 16 – 3 \times \frac{29}{7} = \frac{25}{7}$

3) big no = x , mall no = y

X + Y = 12 (1) , 3y – 2x = 1 (2)

X= 12 – y by substituting into (2)

3y – 2 (12 – y) = 1

3y – 24 + 2y = 1 ⟶ 5y = 25 ⟶ y = 5

X= 12 – 5 = 7

4) Let the rational no = $\frac{x}{y}$

$\frac{x-3}{y-3} = \frac{5}{6}$

6x – 18 = 5y – 15

6x – 5y = 3 (1) (x 13)

$\frac{x+5}{y+5} = \frac{13}{14}$

13y + 65 = 14x + 70

14x – 13y = -5 (2) (x 5)

78x – 65y – 39

70x – 65y = -25 } By subtracting

$8x = 64 \longrightarrow x = 8$

$6 \times 8 - 5y = 3$

$48 - 5y = 3 \longrightarrow -5y = -45$

$\longrightarrow y = 9$

The no. is $\frac{8}{9}$

5) let the unit digit = x

the tens digit = y

$x + y = 11$ (1) $(x - 2)$

$2x - 3y = 2$ (2)

$-2x - 2y = -22$ by adding

$-5y = -20 \longrightarrow y = 4$

$X = 11 - 4 = 7$ the no. is 47

6) x= unit , y = tens.

$x + y = 5$ (1)

The original No. = $x + 10y$

The no. after exchanging = $y + 10x$

$(x + 10y) - (y + 10x) = 9$

$X + 10y - y - 10x = 9$

$-9x + 9y = 9 \longrightarrow -x + y = 1$ (2)

By adding (1) and (2)

$2y = 6 \longrightarrow y = 3$

$X = 5 - 3 = 2$

The original no. 32

1) man's age = x , son's ago = y

6 years ago : x – 6 , y – 6

X – 6 = 6(y – 6) = 6y – 36

x- 6y = -30 (1)

after 10 years

x + 10 , y + 10

x + 10 = 2 (y – 10)= 2y + 20

x – 2y = 10 (2)

by subtracting (2) from (1)

- 4y = - 40 ⟶ y = 10

X = 10 + 2y = 10 + 20 = 30

The man's age = 30 son's ago = 10

8) L = x , w = y

X – y = 3 (1) ⟶ x = y + 3

4y – 2x = 2 (2)

4y – 2 (y + 3) = 2 ⟶ 4y – 2y – 6 = 2

2y = 8 ⟶ = y = 4 cm .

9) L + w = $\frac{p}{2}$ = $\frac{32}{2}$ = 16

x + y = 16 (1)

L – 1 , w + 3

x – 1 = y + 3 ⟶ x = y + 4 (2)

y + 4 + y = 16 ⟶ 2y = 12 ⟶ y = 6 cm

x = 16 – 6 = 10 cm

area of square = $S^2 = 9^2 = 81\ cm^2$

10) x + y = 90° (1)

x – y = 30° (2) by adding

$2x = 120° \longrightarrow x = 60°$

$y = 90° - 60° = 30°$

11) Exercise on solving and degree equations .

1) b 2)b 3) c 4) d 5) b

Second: formula

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

$$X = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-4)}}{2(1)}$$

$$X = \frac{2 \pm \sqrt{20}}{2} = \frac{2 \pm \sqrt{4 \times 5}}{2}$$

$$X = \frac{2 \pm 2\sqrt{5}}{2} = 1 \pm \sqrt{5}$$

$1 + \sqrt{5}$, $1 - \sqrt{5}$

S.S. = {3.24 , - 1.24}

(2) $x^2 = 2x + 12 \rightarrow x^2 - 2x - 12 = 0$

S.S. = {4.6 , -2.6}

(3) $x^2 - 2x + 1 - 10 = 0$

$x^2 - 2x - 9 = 0$

S.S. = {3. 16 , -2.16}

(4) $x^2 - 2x - 6 = 0 \rightarrow$

S.S. = {3.65 , -1.65}

(5) $x^2 - 6x + 9 - 3x + 9 + 1 = 0$

$x^2 - 9x + 19 = 0$

S.S. = {5.62 , 3.38}

(6) $1 - \frac{2}{x} = \frac{2}{x^2}$ $(x\ x^2)$

$x^2 - 2x = 2 \rightarrow x^2 - 2x - 2 = 0$

S.S. = {2.73 , - 0.73}

(7) S.S. = {1.33}

(8) S.S. = ∅

(9) $x + \frac{4}{x} + 1 = 0$ (x X)

$x^2 + 4 + x = 0 \rightarrow x^2 + x + 4 = 0$

S.S. = ∅

(10) let 1 $y^2 = y$

$y^2 + 2y - 100 = 0$

$y = \frac{-b \pm \sqrt{4ac}}{2a}$

$= \frac{-2 \pm \sqrt{4-(4X\ 1X-1)}}{2x1}$

$= \frac{-2 \pm \sqrt{8}}{2}$

$= \frac{-2 \pm 2\sqrt{2}}{2}$

$= -1 \pm \sqrt{2}$

$\Rightarrow Y = -1 \pm \sqrt{2}$

$\Rightarrow x^2 = -1 + \sqrt{2}$ or x2 = -1 - $\sqrt{2}$ refused

$\therefore x^2 = \sqrt{2} - 1$

Third Answer the following questions:

Draw by yourself

Exercises on solving two equations (1st and 2nd degree)

First: Complete :

(1) 2nd (2) {(1 , 3) , (1 , -3)} (3) 2

(4) {(1 , 0)} (5) {(2 , 3)} (6) 1 , 2

(7) 2 , 3 (8) $P_1 : P_2 = S_1 : S_2 = 1 : 2$ areas $S_1^2 : S_2^2 = 1 : 4$

(9) $L+W = \frac{P}{2} \rightarrow$ $3 + w = 5 \rightarrow w = 2$ area = $2x3 = 6cm^2$

(10) area = $4 \times 4 = 16\ cm^2$

area = $(4 + 3)^2 = 7^2 = 49\ cm^2$

$49 - 16 = 33$

area increases by $33\ cm^2$.

Second choose:

(1) c (2) b (3) b (4) d (5) d

(6) d (7) c (8) b (9) a (10) b 2,3

Third: Find the S.S.:

(1) $x = -1 \rightarrow (-1)^2 + y^2 = 17$

$y^2 = 16 \rightarrow y = \pm \sqrt{16} = \pm 4$

S.S. = {(-1 , 4) , (-1 , -4)}

(2) S.S. = {(2 , 1) , (2, -3)}

(3) $x = y \rightarrow x^2 = 1 \rightarrow x = \pm \sqrt{1} = \pm 1 \rightarrow y = \pm 1$

S.S. = {(1 , 1) , (-1 , -1)}

(4) $x = -y \rightarrow 2(-y)^2 - y^2 - 4$

$2y^2 - y^2 = 4 \rightarrow y^2 = 4 \rightarrow y = \pm 2$

At $y = 2 \rightarrow x = -2$, at $y = -2 \rightarrow x = 2$

S.S.{(2, -2) , (-2 , 2)}

(5) S.S. = {(2 , 1), (-2 , -1)}

(6) S.S. = {(4 , 3), (-3 , -4)}

(7) S.S. = {(2 , -3), (8 , 3)}

(8) S.S. = {(-2 , 0), (1 , 3)}

(9) S.S. = {(0 , $-\frac{1}{2}$), (-1 , -1)}

(10) S.S. = {($\frac{1}{2}$, 6), (2 , 3)}

Fourth : Applications:

(1) $x + y = 3$ (1)

$x^2 + y^2 = 5$ (2)

$x = 3 - y$

$(3 - y)^2 + y^2 = 5$

$9 - 6y + y^2 + y^2 = 5$

$2y^2 - 6y + 4 = 0$ (÷2)

$y^2 - 3y + 2 = 0$

$(y - 2)(y - 1) = 0$

$y - 2 = 0 \rightarrow y = 2$

$x = 3 - 2 = 1$

or $y - 1 = 0 \rightarrow y = 1$

$x = 3 - 1 = 2$ the two no. are 1 and 2

(2) first no. = x , 2^{nd} = -x

Or 1^{st} = x , 2^{nd} = y

Then $x = -y$ (1)

$x^2 + (-y)^2 = 2$

$x^2 + y^2 = 2$ (2)

$(-y)^2 + y^2 = 2$

$2y^2 = 2 \rightarrow y^2 = 1 \rightarrow y = \pm 1$

X = 1 when y = -1

X = -1 when y = 1

the two nos. are 1 and -1

(3) x- y = 5 (1) $\rightarrow$ x = y + 5

xy = 36 (2)

y (y + 5) = 36

$y^2 + 5y - 36 = 0$

(y – 4) (y + 9) = 0

y = 4 $\rightarrow$ x = 9

Or y = -9 $\rightarrow$ x = -4

the two numbers are 4 , 9 or - 4 , -9

(4) x + y = 9 (1)

$x^2 - y^2 = 27$ (2)

x = 9 – y

$(9 - y)^2 - y^2 = 27$

$81 - 18y + y^2 - y^2 - 27 = 0$

54 – 18y = 0

y = 3 $\rightarrow$ x = 9 – 3 = 6

the two nos. are 3 and 6

(5) Original no. x + 10 y

x $\rightarrow$ units , y $\rightarrow$ tens

x = 2y (1)

$x \times y = \frac{(x+10y)}{2}$

2 x y = x + 10y

X + 10y – 2 x y = 0 (2)

$2y + 10y - 2y(2y) = 0$

$12y - 4y^2 = 0 \quad \rightarrow -4y^2 + 12y = 0$

$-4y(y - 3) = 0$

$y = 0$ or $y = 3$

$X = 0$ refused $x = 6$

The no. is 36

(6) $L = x$, $w = y$

$X - y = 3 \quad (1) \rightarrow \quad x = y + 3$

$Xy = 28$

$y(y + 3) = 28$

$y^2 + 3y - 28 = 0$

$(y + 7)(y - 4) = 0$

$y = -7$ or $y = 4$

Refused $x = 4 + 3 = 7$

$P = 2(L + w) = 2(7 + 4) = 22$ cm.

(7) $L = x$, $y = w$

$\because \quad x + y = \frac{p}{2} = 12 \quad (1)$

$Xy = 35$

$X = 12 - y$

$Y(12 - y) = 35$

$12y - y^2 - 35 = 0$

$-y^2 + 12y - 35 = 0 \quad (\div -1)$

$y^2 - 12y + 35 = 0$

$(y - 7)(y - 5) = 0$

$y = 7$ or $y = 5$

$x = 12 - 7 = 5$ $x = 12 - 5 = 7$

the two dimensions are 7 , 5

(8) $L = x$, $w = y$

$\because$ the p. = 14

$\therefore x + y = \frac{14}{2} = 7$ (1)

$\because$ Δ ABC is right angled at B

$\therefore x^2 + y^2 = (5)^2$ (Pythagoras)

$x^2 + y^2 = 25$ (2)

$x = 7 - y$

$(7 - y)^2 + y^2 = 25$

$49 - 14y + y^2 + y^2 - 25 = 0$

$2y^2 - 14y + 24 = 0$ (÷ 2)

$y^2 - 7y + 12 = 0$

$(y - 3)(y - 4) = 0$

$y = 3$ or $y = 4$

the two dimensions are 3 and 4

(9) $x^2 + y^2 = 169$ (1)

$x + y + 13 = 30$

$x + y = 17$ (2)

$x = 17 - y$

$(17 - y)^2 + y^2 - 169 = 0$

$y^2 + 289 - 34y + y^2 - 169 = 0$

$2y^2 - 34y + 120 = 0$ (÷ 2)

$y^2 - 17y + 60 = 0$

$(y - 12)(y - 5) = 0$

$y = 12 \quad \rightarrow \quad x = 5$

Or $y = 5 \quad \rightarrow x = 12$

The other two sides are of length 12 cm and 5cm

(10) let one of the two diagonals of = x and the other = y

- Half the diagonals will be $\frac{x}{2}$ and $\frac{y}{2}$

$\because$ the p. of Rhombus = 40 cm then each S= 40 ÷ 4 = 10cm

$\because$ the two diagonals are peroendicular

$\therefore (\frac{x}{2})^2 + (\frac{y}{2})^2 = (10)^2$

$\frac{x^2}{4} + \frac{y^2}{4} = 100 \quad$ (x 4)

$x^2 + y^2 = 400 \quad$ (1)

$x - y = 4 \quad$ (2) $\quad \rightarrow \quad x = y + 4$

$(y + 4)^2 + y^2 - 400 = 0$

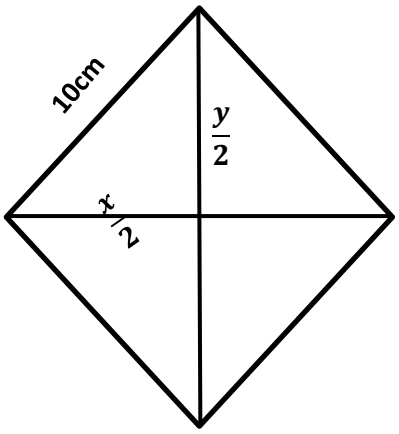
$y^2 + 8y + 16 + y^2 - 400 = 0$

$2y^2 + 8y - 384 = 0 \quad$ (÷ 2)

$y^2 + 4y - 192 = 0$

$(y - 16)(y + 12) = 0$

$y = 16$cm $(x = 16 + 4 = 20$cm) or $y = -12$ (refused)



The algebraic fractions and operations