NEW-FRA PUBLIC SCHOOL

CLASS :- 7th SUB :- MATHEMATICS

SESSION :- 2021

SOLVED ASSIGNMENT OF TERM-I

CHAPTER :- ALGEBRIC EXPRESSIONS

LESSON NO :- 12

Ex : 12.1

Q1 :→ Write algebric expression for each of the following, using variables, constants & signs of arithmetical operations:

a) The difference of $2x$ and y $(y > 2x)$

Sol: $y - 2x$

c) The sum of x and y subtracted from 10.

Sol:- $10 - (x + y)$

c) The sum of 5 and the product of 8 and p.

Sol: $5 + 8p$

g) The product of a and b subtracted from their sum

Sol) $(a+b) - ab$

Q2 :→ Find the number of terms in each of the following algebric expressions:

a) $3x^2 + 2y$

Sol) 2 Terms

b) $2x^4$

Sol) one Term

c) $4x^2yz$

Sol) one term

d) $9x^2y^2z - 4$

Sol) Two Terms

Q3:→ Write the coefficient of the following:

a) x in $7x$

Sol) 7

c) y in $-2x^2y$

Sol) $-2x^2$

e) p^2 in $2p^2q$

Sol) $2q$

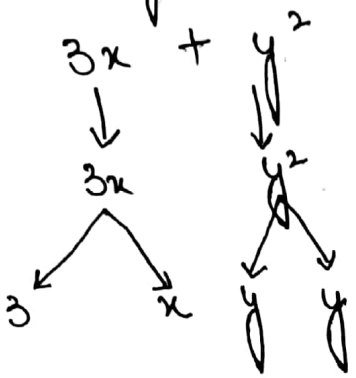
f) xy^2 in $7xy^2$

Sol) 7.

Q4:→ Identify the terms & their factors in the following expressions. Show the terms & factors by a tree diagram

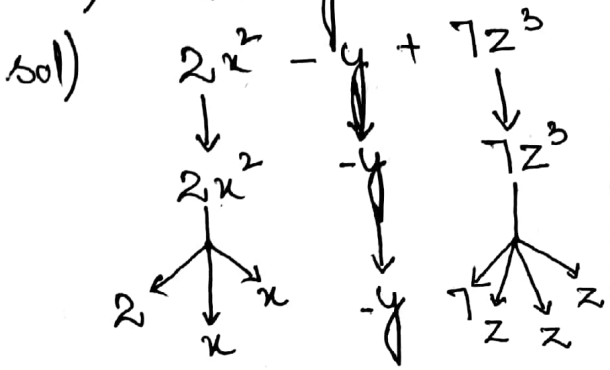
a) $3x + y^2$

Sol)



c) $2x^2 - y + 7z^3$

Sol)



Q6:→ State, which of the following expressions are monomials, binomials and trinomials:

a) $x + y$

Sol) Binomial

c) $5 - x$

Sol) Binomial

e) $4p^2q - 5pq^2 + pq$

Sol) Trinomial

g) $\frac{5}{4}pq^4$

Sol) Monomial

h) 6

Sol) Monomial

i) $\frac{2}{7}ab^2c^3 - 1$

Sol) Binomial.

Q7:→ Are the two terms given in each of the following expressions like terms? Answer in 'yes' or 'no'

a) $2x, -7x$

Sol) yes

c) pq^2, p^2q

Sol) no

e) $4x^2y, \frac{1}{4}x^2y$

Sol) yes

g) $9xy, -9y$

Sol) no

Q8:⇒ When $x = -3$ and $y = 2$, find the value of the following expressions:

a) $8x^2 - 7x + 3$

Sol) $8x^2 - 7x + 3$

$\Rightarrow 8(-3)^2 - 7(-3) + 3$

$\Rightarrow 8(9) + 21 + 3$

$\Rightarrow 72 + 21 + 3$

$\Rightarrow 96$

b) $xy - y^2 + 2x - 3$

Sol) $xy - y^2 + 2x - 3$

$\Rightarrow (-3)(2) - (2)^2 + 2(-3) - 3$

$\Rightarrow -6 - 4 - 6 - 3$

$\Rightarrow -19$

Ex : 12.2

Q1:⇒ Add

a) 3ab, -ab, and 7ab

Sol) $3ab + (-ab) + 7ab$

$\Rightarrow 3ab + 7ab - ab$

$\Rightarrow 10ab - ab$

$\Rightarrow 9ab$

c) $4x^2y$, $2x^2y$ and $-9x^2y$

Sol) $4x^2y + 2x^2y + (-9x^2y)$

$\Rightarrow 4x^2y + 2x^2y - 9x^2y$

$\Rightarrow 6x^2y - 9x^2y$

$\Rightarrow -3x^2y.$

Q2:⇒ Add

a) $a-b$ and $a+b$

Sol) $(a-b) + (a+b)$

$\Rightarrow a - b + a + b$

$\Rightarrow 2a$

c) $z - 8tz$ and $3tz - z$

Sol) $(z - 8tz) + (3tz - z)$

$\Rightarrow z - 8tz + 3tz - z$

$\Rightarrow -5tz$

e) $14x + 10y - 12xy$, $-7x - 10y + 8xy$ and xy

Sol) $(14x + 10y - 12xy) + (-7x - 10y + 8xy) + xy$

$\Rightarrow 14x + 10y - 12xy - 7x - 10y + 8xy + xy$

$\Rightarrow 14x - 7x + 10y - 10y - 12xy + 8xy + xy$

$\Rightarrow 7x - 3xy.$

Q3:→ Add:

a) x^2-y^2-1, y^2-1-x^2 and $1-x^2-y^2$

Sol) $x^2-y^2-1+y^2-1-x^2+1-x^2-y^2$

$\Rightarrow x^2-x^2-x^2-y^2+y^2-y^2-1-1+1$

$\Rightarrow -x^2-y^2-1$

c) $3x^2+5y^2$ and $2x^2-2xy+5y^2$

Sol) $3x^2+5y^2+2x^2-2xy+5y^2$

$\Rightarrow 3x^2+2x^2+5y^2+5y^2-2xy$

$\Rightarrow 5x^2+10y^2-2xy.$

e) $4x^2y-xy+5x$ and $3xy^2-4xy-2x+y$

Sol) $4x^2y-xy+5x+3xy^2-4xy-2x+y$

$\Rightarrow 4x^2y+3xy^2-xy-4xy+5x-2x+y$

$\Rightarrow 4x^2y+3xy^2-5xy+3x+y.$

Q4:→ The side of a square is $(4x+3)$ cm. find its perimeter:

Sol) side of square $= (4x+3)$ cm

$\therefore$ perimeter of square $= 4 \times$ side

$= 4(4x+3)$ cm

$= 4(4x)+4(3)$ cm

$= 16x+12$ cm

Q5:→ Hannam purchased a book for ₹$(7x-9)$ and a pen for ₹$(x+16)$. How much did he spend in buying these two items:

Sol) cost of book = ₹$(7x-9)$

cost of pen = ₹$(x+16)$

∴ Total cost = $(7x-9) + (x+16)$

$= 7x - 9 + x + 16$

$= 7x + x - 9 + 16$

$= 8x + 7$

Q6:→ A tank has $7a - 3b$ litres of water. $2a - 5b + 2$ litres of water is added to the tank. How much water will the tank have:

Sol) Total amount of water $= (7a - 3b) + (2a - 5b + 2)$

$= 7a - 3b + 2a - 5b + 2$

$= 7a + 2a - 3b - 5b + 2$

$= 9a - 8b + 2.$

Ex: 12.3

Q1:→ Subtract:

a) $3x$ from x

Sol) $x - 3x$

$\Rightarrow -2x$

c) $-3mn$ from $-2mn$

Sol) $-2mn - (-3mn)$

$\Rightarrow -2mn + 3mn$

$\Rightarrow mn$

e) $(a-b)$ from $(a+b)$

Sol) $(a+b) - (a-b)$

$\Rightarrow a + b - a + b$

$\Rightarrow 2b$

f) $a(b-5)$ from $b(5-a)$

Sol) $b(5-a) - a(b-5)$

$\Rightarrow 5b - ab - ab + 5a$

$\Rightarrow 5b - 2ab + 5a.$

Q2:→ Subtract:

a) $-x^2 + 10x - 5$ from $5x - 10$

Sol) $(5x - 10) - (-x^2 + 10x - 5)$

$\Rightarrow 5x - 10 + x^2 - 10x + 5$

$\Rightarrow x^2 + 5x - 10x - 10 + 5$

$\Rightarrow x^2 - 5x - 5$

c) $-y^2 + 3yz$ from $4y^2 - 3yz + 2$

Sol) $(4y^2 - 3yz + 2) - (-y^2 + 3yz)$

$\Rightarrow 4y^2 - 3yz + 2 + y^2 - 3yz$

$\Rightarrow 4y^2 + y^2 - 3yz - 3yz + 2$

$\Rightarrow 5y^2 - 6yz + 2$

e) $x - 3y - 4z$ from $2x - 7y + 4z + 9$

Sol) $(2x - 7y + 4z + 9) - (x - 3y - 4z)$

$\Rightarrow 2x - 7y + 4z + 9 - x + 3y + 4z$

$\Rightarrow 2x - x - 7y + 3y + 4z + 4z + 9$

$\Rightarrow x - 4y + 8z + 9.$

Q5 Subtract :→

a) $7pq - 11p^2q^2 - 6$ from $9p^2q^2 - 4pq^2 + 8p$

Sol) $(9p^2q^2 - 4pq^2 + 8p) - (7pq - 11p^2q^2 - 6)$

$\Rightarrow 9p^2q^2 - 4pq^2 + 8p - 7pq + 11p^2q^2 + 6$

$\Rightarrow 9p^2q^2 + 11p^2q^2 - 4pq^2 - 7pq + 8p + 6$

$\Rightarrow 20p^2q^2 - 4pq^2 - 7pq + 8p + 6.$

c) $-4a^2b - 3ab^2 + b^2$ from $a^3 + 2a^2b + 6ab^2 - b^2$

Sol) $(a^3 + 2a^2b + 6ab^2 - b^2) - (-4a^2b - 3ab^2 + b^2)$

$\Rightarrow a^3 + 2a^2b + 6ab^2 - b^2 + 4a^2b + 3ab^2 - b^2$

$\Rightarrow a^3 + 2a^2b + 4a^2b + 6ab^2 + 3ab^2 - b^2 - b^2$

$\Rightarrow a^3 + 6a^2b + 9ab^2 - 2b^2$

Q5:→ How much does $x^3 - 2x^2 + 4x - 1$ exceed $3x^3 - 2x^2 + 5x + 1$?

Sol) $(x^3 - 2x^2 + 4x - 1) - (3x^3 - 2x^2 + 5x + 1)$

$\Rightarrow x^3 - 2x^2 + 4x - 1 - 3x^3 + 2x^2 - 5x - 1$

$\Rightarrow x^3 - 3x^3 - 2x^2 + 2x^2 + 4x - 5x - 1 - 1$

$\rightarrow -2x^3 - x - 2.$

Q6:→ What should be subtracted from $3ab - 2a^2 - 2b^2$ to get $5a^2 - 7ab + 5b^2$?

Sol):→ $(3ab - 2a^2 - 2b^2) - (5a^2 - 7ab + 5b^2)$

$\Rightarrow 3ab - 2a^2 - 2b^2 - 5a^2 + 7ab - 5b^2$

$\Rightarrow 3ab + 7ab - 2a^2 - 5a^2 - 2b^2 - 5b^2$

$\Rightarrow 10ab - 7a^2 - 7b^2$

Q8:→ The perimeter of a Triangle is $(17x - 2)$cm. If two sides are $(x - 5)$cm and $(7x + 5)$cm long. what is the length of its third side.

Sol):→ Two sides are $(7x + 5)$cm & $(x - 5)$cm.

Let the third side be p.

Now perimeter of Triangle = Sum of all three sides

$\Rightarrow 17x - 2 = (x - 5) + (7x + 5) + p$

$\Rightarrow 17x - 2 = (x - 5 + 7x + 5) + p$

$\Rightarrow 17x - 2 = 8x + p$

$\Rightarrow p = 17x - 2 - 8x$

$\Rightarrow p = 9x - 2$ cm.

$\therefore$ Third side is $(9x - 2)$cm.

Ex: 12.4

Q1:⇒ Multiply the following:

a) $4a$ by $3a$

Sol) $4a \times 3a$

$\Rightarrow 12a^2$

e) $-4x^2yz$ by $3yz$

Sol) $-4x^2yz \times 3yz$

$\Rightarrow -12x^2y^2z^2$

c) $3xy$ by $2y$

Sol) $3xy \times 2y$

$\Rightarrow 6xy^2$

f) x^2y by xy^2

Sol) $x^2y \times xy^2$

$\Rightarrow x^3y^3$

Q2:⇒ Multiply the following

a) $2x+5$ by $8x$

Sol) $(2x+5) \times 8x$

$\Rightarrow 2x \times 8x + 5 \times 8x$

$\Rightarrow 16x^2 + 40x$

e) $2a-8b$ by $-4b$

Sol) $(2a-8b) \times -4b$

$\Rightarrow 2a \times (-4b) - 8b \times (-4b)$

$\Rightarrow -8ab + 32b^2$

c) $2p-3q$ by $2pq$

Sol) $(2p-3q) \times 2pq$

$\Rightarrow 2p \times 2pq - 3q \times 2pq$

$\Rightarrow 4p^2q - 6pq^2$

f) $-3x-9y$ by xyz

Sol) $(-3x-9y) \times xyz$

$\Rightarrow (-3x) \times xyz - 9y \times xyz$

$\Rightarrow -3x^2yz - 9xy^2z$

Q3:- Multiply the following:

a) $3a+5b$ by $a-b$

Sol) $(3a+5b) \times (a-b)$

$\Rightarrow 3a(a) + 5b(a) - 3a(b) + 5b(-b)$

$\Rightarrow 3a^2 + 5ab - 3ab - 5b^2$

$\Rightarrow 3a^2 + 2ab - 5b^2$

c) $4p-q$ by $p-2q$

Sol) $(4p-q) \times (p-2q)$

$\Rightarrow 4p(p-2q) - q(p-2q)$

$\Rightarrow 4p(p) - 4p(2q) - q(p) + q(2q)$

$\Rightarrow 4p^2 - 8pq - pq + 2q^2$

$\Rightarrow 4p^2 - 9pq + 2q^2$

e) $x + 9y$ by $4 - y$

Sol) $(x + 9y) \times (4 - y)$

$\Rightarrow x(4-y) + 9y(4-y)$

$\Rightarrow 4x - xy + 9y(4) - 9y(y)$

$\Rightarrow 4x - xy + 36y - 9y^2$

Q4:- Multiply the following:

a) $2x + 3y + 4z$ by $9x$

Sol) $(2x + 3y + 4z) \times 9x$

$\Rightarrow 2x(9x) + 3y(9x) + 4z(9x)$

$\Rightarrow 18x^2 + 27xy + 36xz.$

c) $8p + 3q - 5x$ by $8q$

Sol) $(8p + 3q - 5x) \times 8q$

$\Rightarrow 8p(8q) + 3q(8q) - 5x(8q)$

$\Rightarrow 64pq + 24q^2 - 40xq$

e) $xyz + yz + z$ by $2xyz$

Sol) $(xyz + yz + z) \times 2xyz$

$\Rightarrow xyz(2xyz) + yz(2xyz) + z(2xyz)$

$\Rightarrow 2x^2y^2z^2 + 2xy^2z^2 + 2xyz^2.$

Ex: 12.5

formula:

$(a+b)^2 = a^2 + b^2 + 2ab$

$(a-b)^2 = a^2 + b^2 - 2ab$

$(a+b)(a-b) = a^2 - b^2$

Q1:→ Find the Square of the following:

a) $p + 5q$

Sol) $(p + 5q)^2$

Here $a = p$

$b = 5q$

$(a+b)^2 = a^2 + b^2 + 2ab$

$(p+5q)^2 = p^2 + (5q)^2 + 2p(5q)$

$= p^2 + 25q^2 + 10pq$

e) $-2a + 5b$.

Sol) $(-2a + 5b)^2$

Here $a = -2a$

$b = 5b$

$(a+b)^2 = a^2 + b^2 + 2ab$

$(-2a+5b)^2 = (-2a)^2 + (5b)^2 + 2(-2a)(5b)$

$= 4a^2 + 25b^2 - 20ab$.

g) $4z - 3p$

Sol) $(4z - 3p)^2$

Here $a = 4z$

$b = 3p$

$(a-b)^2 = a^2 + b^2 - 2ab$

$(4z-3p)^2 = (4z)^2 + (3p)^2 - 2(4z)(3p)$

$= 16z^2 + 9p^2 - 24pz$

l) $\frac{3}{4}a - \frac{1}{5}b$

sol) $\left(\frac{3}{4}a - \frac{1}{5}b\right)^2$

Here $a = \frac{3}{4}a$, $b = \frac{1}{5}b$

$(a-b)^2 = a^2 + b^2 - 2ab$

$\left(\frac{3}{4}a - \frac{1}{5}b\right)^2 = \left(\frac{3}{4}a\right)^2 + \left(\frac{1}{5}b\right)^2 - \cancel{2}^{1}\left(\frac{3}{4_2}a\right)\left(\frac{1}{5}b\right)$

$= 9/16a^2 + 1/25b^2 - \frac{3}{10}ab$.

Q2:→ Find the product of the following:

a) $(1+q)$ and $(1-q)$

Sol) $(1+q) \times (1-q)$

Here $a = 1$

$b = q$

$(a+b)(a-b) = a^2 - b^2$

$= (1)^2 - (q)^2$

$= 1 - q^2$

f) $(7x - 2a)$ and $(7x + 2a)$

Sol) $(7x - 2a) \times (7x + 2a)$

Here $a = 7x$

$b = 2a$

$\therefore (a+b)(a-b) = a^2 - b^2$

$= (7x)^2 - (2a)^2$

$= 49x^2 - 4a^2$

c) $(2a + 3b)$ and $(2a - 3b)$

Sol) $(2a + 3b) \times (2a - 3b)$

Here $a = 2a$

$b = 3b$

$(a+b)(a-b) = a^2 - b^2$

$= (2a)^2 - (3b)^2$

$= 4a^2 - 9b^2$

j) $\left(\frac{2}{5}p - q\right)$ and $\left(\frac{2}{5}p + q\right)$

Sol) $\left(\frac{2}{5}p - q\right) \times \left(\frac{2}{5}p - q\right)$

Here $a = \frac{2}{5}p$

$b = q$

$\therefore (a+b)(a-b) = a^2 - b^2$

$= \left(\frac{2}{5}p\right)^2 - (q)^2$

$= \frac{4}{25}p^2 - q^2$

Q3:→ Find the value of the following:

a) $(201)^2$

Sol) $(200 + 1)^2$

Here $a = 200$

$b = 1$

using $(a+b)^2 = a^2 + b^2 + 2ab$

$= (200)^2 + (1)^2 + 2(200)(1)$

$= 40000 + 1 + 400$

$= 40401$

c) $(95)^2$

Sol) $(100 - 5)^2$

Here $a = 100$

$b = 5$

using $(a-b)^2 = a^2 + b^2 - 2ab$

$= (100)^2 + (5)^2 - 2(100)(5)$
$= 10000 + 25 - 1000$
$= 9000 + 25$
$= 9025.$

Ex : 12.6

Q1:→ Factorize the following :

a) $8a^2 - 32a^4$

Sol) $8a^2 - 32a^4$
$\Rightarrow 8a^2(1 - 4a^2)$
$\Rightarrow 8a^2[(1)^2 - (2a)^2]$ — using $a^2 - b^2 = (a+b)(a-b)$
$\Rightarrow 8a^2(1+2a)(1-2a)$

c) $4ab - b^2$

Sol) $4ab - b^2$
$\Rightarrow b^2(4a - b)$

e) $21a^4b^4 - 33a^5b^6$

Sol) $21a^4b^4 - 33a^5b^6$
$\Rightarrow 3a^4b^4(7 - 11ab^2)$

Q2:→ Factorize the following :

a) $5a^3 - 15x^2 + 10a^2$

Sol) $5a^3 - 15x^2 + 10a^2$
$\Rightarrow 5(a^3 - 3x^2 + 2a^2)$

e) $3p^3 - 6p^2 - 9p$

Sol) $3p^3 - 6p^2 - 9p$
$\Rightarrow 3p(p^2 - 2p - 3)$

c) $12a^3y^2 - 14a^2y^3 + 28ay^4$

Sol) $12a^3y^2 - 14a^2y^3 + 28ay^4$
$\Rightarrow 2ay^2(6a^2 - 7ay + 14y^2)$

f) $p^6 - p^4 - p^2$

Sol) $p^6 - p^4 - p^2$
$\Rightarrow p^2(p^4 - p^2 - 1)$

Q3:→ Factorize the following :

a) $p(x+y) - q(x+y)$

Sol) $p(x+y) - q(x+y)$
$\Rightarrow (x+y)(p-q)$

e) $4(p-2q)^2 - 5(p-2q)$

Sol) $4(p-2q)^2 - 5(p-2q)$
$\Rightarrow (p-2q)[4(p-2q) - 5].$
$\Rightarrow (p-2q)[4p - 8q - 5].$

c) $4p + 4q - px - qx$

Sol) $4p + 4q - px - qx$
$\Rightarrow 4(p+q) - x(p+q)$
$\Rightarrow (p+q)(4-x)$

Q4:→ Factorize the following:

a) $9x^2 - 25y^2$

Sol) $9x^2 - 25y^2$

$(3x)^2 - (5y)^2$

Here $a = 3x$

$b = 5y$

using $a^2 - b^2 = (a+b)(a-b)$

$= (3x+5y)(3x-5y)$

c) $16z^2 - 4p^2$

Sol) $16z^2 - 4p^2$

$(4z)^2 - (2p)^2$

Here $a = 4z$

$b = 2p$

using $a^2 - b^2 = (a+b)(a-b)$

$= (4z+2p)(4z-2p)$

$= 2(2z+p) \times 2(2z-p)$

$= 4(2z+p)(2z-p)$.

Q5:→ Factorize the following:

a) $4a^2 + 25b^2 - 20ab$

Sol) $4a^2 + 25b^2 - 20ab$

$\Rightarrow (2a)^2 + (5b)^2 - 2(2a)(5b)$

using $a^2 + b^2 - 2ab = (a-b)^2$

$\Rightarrow (2a + 5b)^2$

$\Rightarrow (2a + 5b)(2a - 5b)$

b) $36x^2 + 16y^2 + 48xy$

Sol) $36x^2 + 16y^2 + 48xy$

$(6x)^2 + (4y)^2 + 2(6x)(4y)$

using $a^2 + b^2 + 2ab = (a+b)^2$

$= (6x + 4y)^2$

$= (6x + 4y)(6x + 4y)$

$= 2(3x + 2y) \times 2(3x + 2y)$

$= 4(3x + 2y)(3x + 2y)$.

Q6:→ Factorize the following:

a) $4p^2 - 16$

Sol) $4p^2 - 16$

$4[p^2 - 4]$

$= 4[p^2 - (2)^2]$

$= 4[p+2][p-2]$ — using $a^2 - b^2 = (a+b)(a-b)$

c) $18x^4 - 72y^4$

Sol) $18x^4 - 72y^4$

$\Rightarrow 18[x^4 - 4y^4]$

$\Rightarrow 18[(x^2)^2 - (2y^2)^2]$

$\Rightarrow 18(x^2 + 2y^2)(x^2 - 2y^2)$ — using $a^2 - b^2 = (a+b)(a-b)$

e) $9 - (p+q)^2$

Sol) $(3)^2 - (p+q)^2$ — using $a^2 - b^2 = (a+b)(a-b)$

$\Rightarrow (3+p+q)[3-(p+q)]$

$\Rightarrow (3+p+q)(3-p-q)$.

NOTE :→

Do remaining parts and Questions of each and every exercise by yourself. & practice thoroughly.

CHAPTER :- PRACTICAL GEOMENTRY

LESSON NO :- 10

Ex : 10.1

Q1 :→ Draw a line parallel to a given line AB.

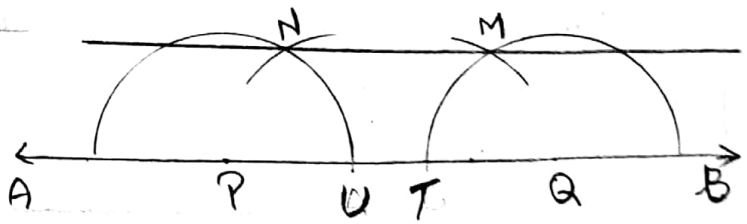
Sol :→ 1) Draw a line AB of any length.

2) Mark two points P & Q on the line & with P & Q as centres draw arcs of same radius. Let these cut the line AB at U & T.

3) With U and T as centres draw arcs of same radius cutting previous arcs at M & N respo.

4) Join M & N and extend the line. Name the line as l.

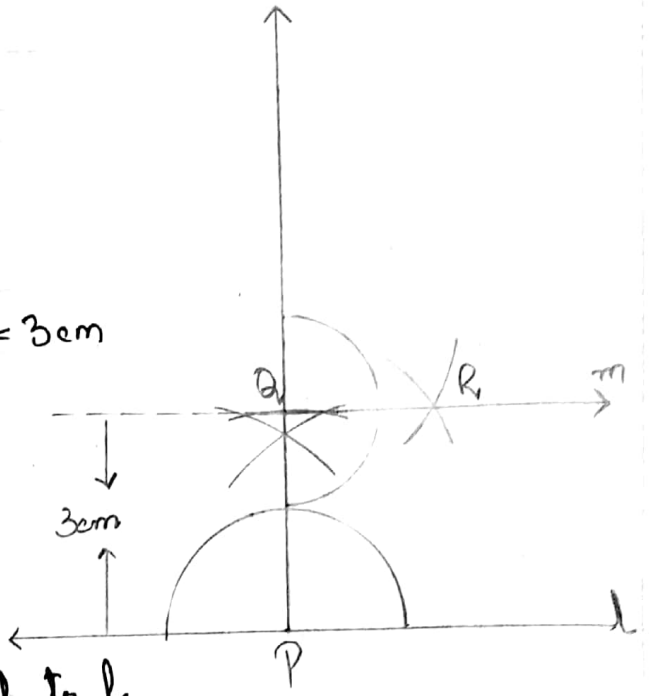
∴ l is the reqd. line // To AB.



Q3:→ Draw two parallel lines at a distance of 3cm.

Sol) 1) Draw a line l and mark at point P on the line l.
2) Draw a perpendicular on P.
3) With P as centre & radius = 3cm draw an arc cutting Px at point Q.
4) With Q draw another perpendicular.
5) Name it as m.

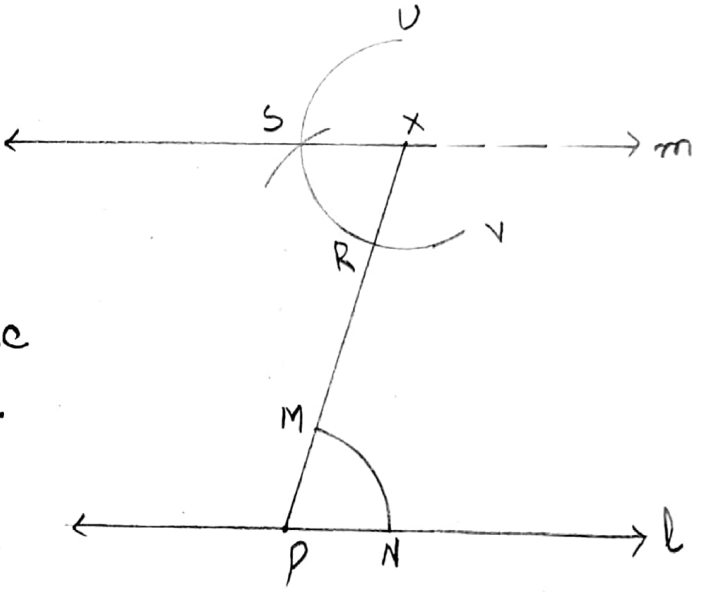
∴ m is the reqd. line parallel to l.



Q4) Draw a line, say l, and take a point X lying outside it. Through X, construct a line parallel to the line l.

Sol) 1 Draw a line l and take a point P on the line and take a point X outside it. Join Px.
2) With P as centre draw an arc cutting l at N and Px at M.
3) With X as centre and with same radius as in Step-2 draw an arc UV cutting Px at R.
4) With R as centre & radius equal to MN draw an arc cutting UV at point S. Join X and S and extend it. Name the line as m.

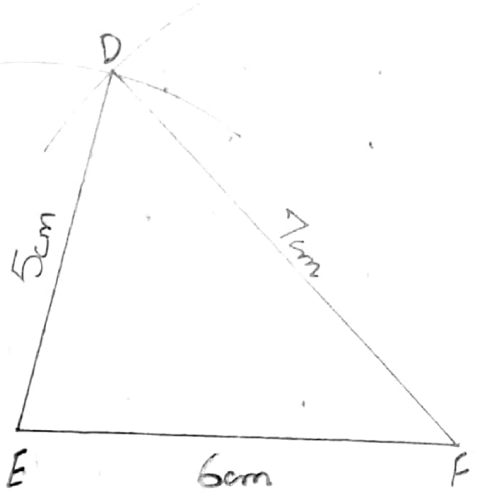
Thus, m is the reqd. line parallel to l.



Ex : 10.2

Q1 :→ Construct a Triangle DEF in which DE = 5cm, EF = 6cm & FD = 7cm

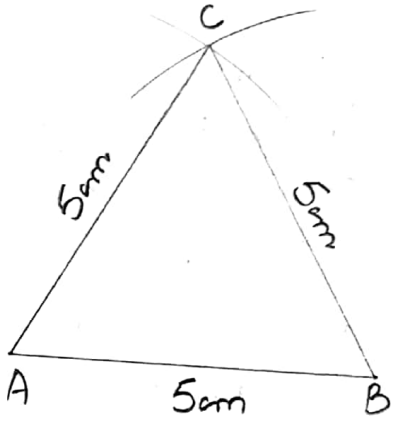
Sol) 1) Draw a line segment EF = 6cm
2) with E as centre & radius = 5cm draw an arc.
3) with F as centre & radius = 7cm draw another arc, cutting the previous arc at point D.
4) Join ED and FD.
Thus △ DEF is the reqd. Triangle.



Q3 :→ Construct an equilateral Triangle having perimeter 15cm.

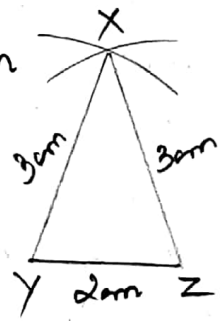
Sol) We know.
perimeter of eq. △ = 3 sides
15cm = 3 sides
⇒ side = $\frac{15}{3_1}$ 5
⇒ side = 5cm.

1) Draw a line segment AB = 5cm.
2) with A and B as centres & radius equal to 5cm draw arcs cutting each other at point C. Join AC and BC.
Thus △ ABC is the reqd. equilateral Triangle.



Q5 :→ Construct an isosceles Triangle XYZ in which ZX = YX = 3cm and YZ = 2cm

Sol) 1 Draw a line segment YZ = 2cm
2) with Y as centre & radius = 3cm
3) with Z as centre & radius = 3cm draw another arc cutting the previous arc at point X. Join XY and XZ
Thus, △ XYZ is the reqd. isosceles Triangle.



Ex : 10.3

Q1 :→ Construct a Triangle ABC with BC = 6cm CA = 4cm & ∠BCA = 60°

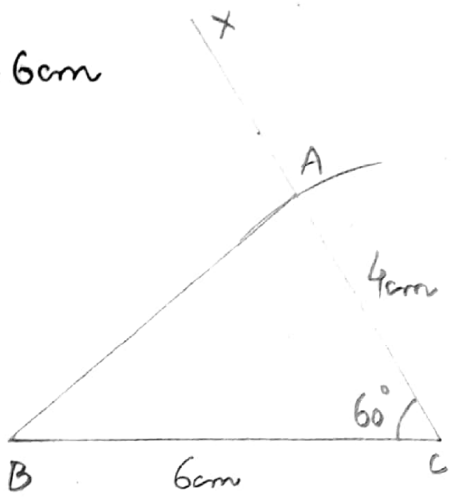
Sol) 1 Draw a line segment BC = 6cm

2) Draw ∠BCX = 60° with the help of protector.

3) With C as centre & radius = 4cm draw an arc cutting CX at A

4) Join AB.

Thus △ ABC is the reqd. △



Q2 :→ Construct a Triangle PQR with PQ = 5cm, PR = 3cm & ∠QPR = 100°

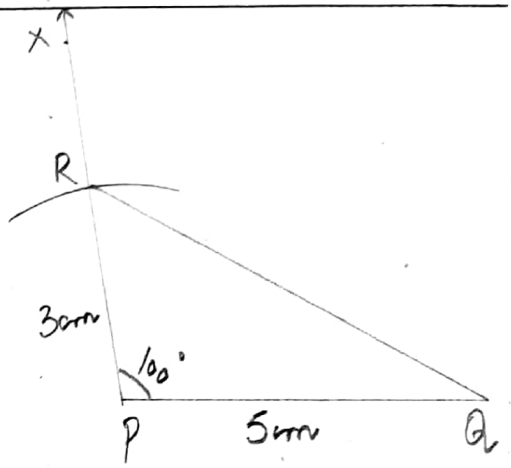
Sol) 1 Draw a line segment PQ = 5cm

2) Draw ∠QPX = 100°

3) With P as centre & radius = 3cm draw an arc cutting Px at point R.

4) Join QR.

Thus, △ PQR is the reqd. Triangle



Q3 :→ Construct an isosceles triangle XYZ in which lengths of each its equal sides is 6cm & the included angle between is 40 ?

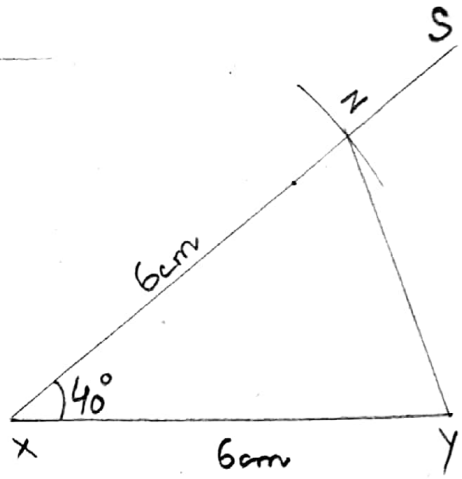
Sol) 1 Draw a line segment XY = 6cm

2) Draw ∠SXY = 40°

3) With X as centre & radius = 6cm draw an arc cutting Sx at point Z.

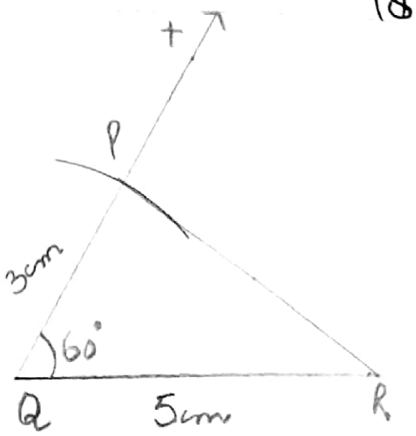
4) Join ZY

Thus, △ XYZ is a reqd. isosceles Triangle



Q5 :→ Construct a Triangle PQR in which PQ = 3cm, QR = 5cm & ∠PQR = 60°

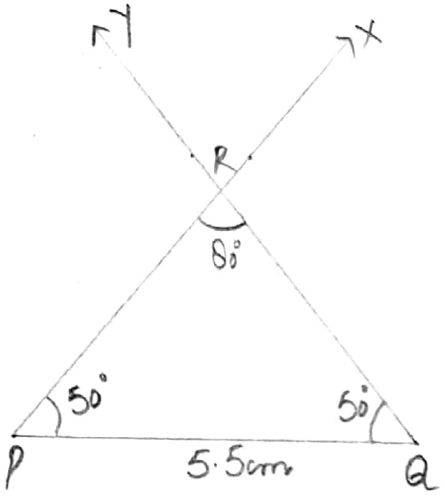
Sol) 1) Draw a line segment QR = 5cm
2) Draw ∠XQR = 60°
3) With Q as centre & radius = 3cm draw an arc cutting QX at point P.
4) join PR.
Thus, △ PQR is a Reqd. Triangle.



Ex : 10.4

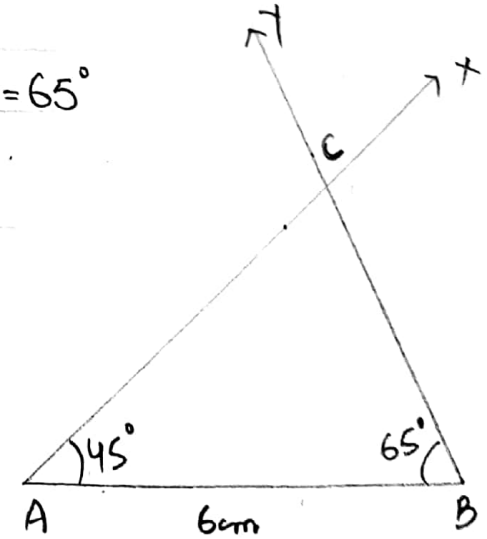
Q1 :→ Construct a Triangle PQR, with PQ = 5.5cm, ∠RPQ = ∠RQP = 50°
Measure the Third angle. what kind of a triangle is it.

Sol) 1) Draw a line segment PQ = 5.5cm
2) Draw ∠QPX = 50°
3) Draw ∠PQY = 50°
4) let the two arms PX and QY at point R.
Thus, △ PQR is the Reqd. △
∴ ∠PRQ = 80°
∴ △ PQR is an isosceles Triangle.



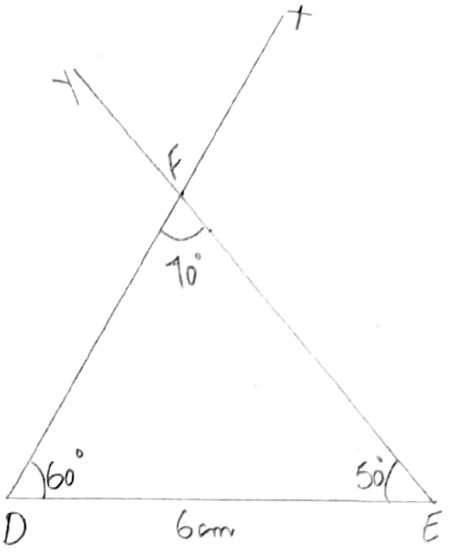
Q2 :→ Construct a Triangle ABC, with AB = 6cm, ∠BAC = 45° & ∠ABC = 65°

Sol) 1) Draw a line segment AB = 6cm.
2) Draw ∠BAX = 45°
3) Draw ∠ABY = 65°
4) let the two arms AX and BY intersect each other at point C.
Thus △, ABC is the Reqd. Triangle.



Q3:→ Construct a Triangle DEF with
a) DE = 6cm, ∠D = 60° & ∠F = 70°

Sol) In △ DEF
∠D + ∠E + ∠F = 180° — ASP
60° + ∠E + 70° = 180°
130° + ∠E = 180°
∠E = 180° − 130°
∠E = 50°

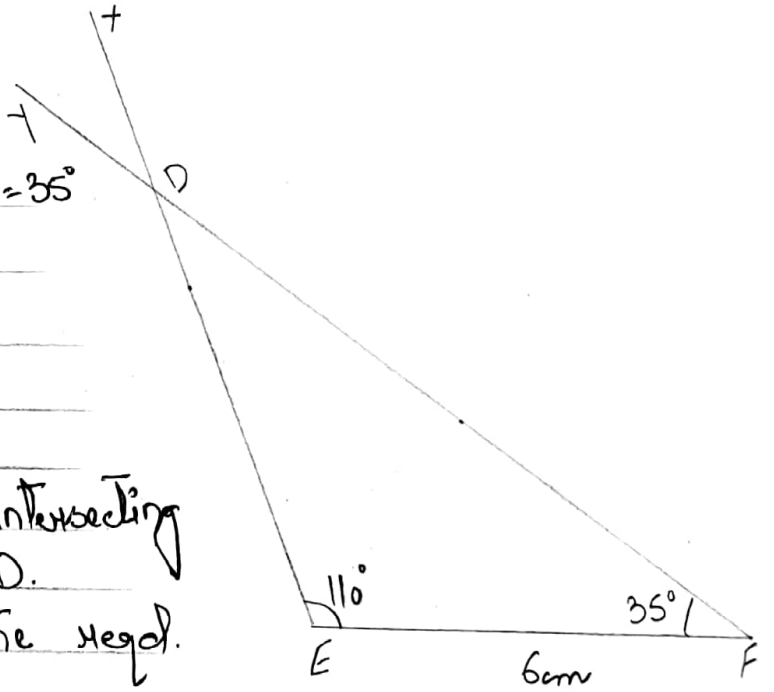


1) Draw a line segment DE = 6cm
2) Draw ∠EDX = 60°
3) Draw ∠DEY = 50°
4) Let the two arms DX and EY intersect at point F.
Thus △ DEF is the Regd. Triangle.

Q3b)

b) EF = 6cm, ∠E = 110° & ∠F = 35°

Sol) 1 Draw a line segment
EF = 6cm
2) Draw ∠FEX = 110°
3) Draw ∠EFY = 35°
4) Let the two arms intersecting each other at point D.
Thus, the △ DEF is the Regd. Triangle.

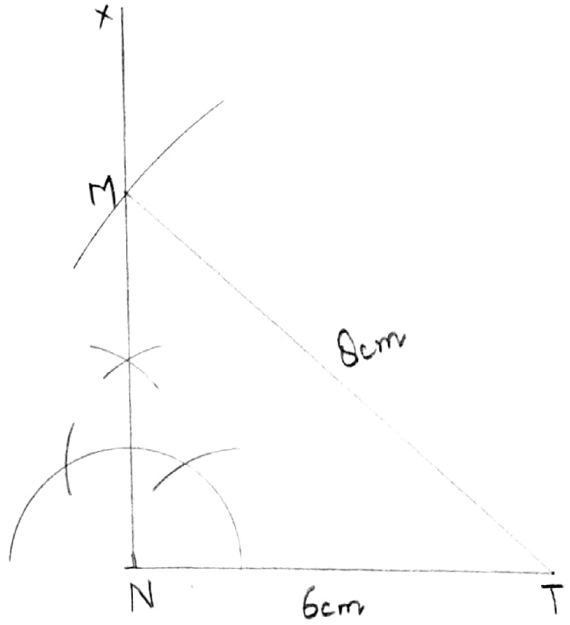


Ex : 10.5

Q1:→ Construct a right-angled Triangle MNT with ∠N = 90°, NT = 6cm & MT = 8cm.

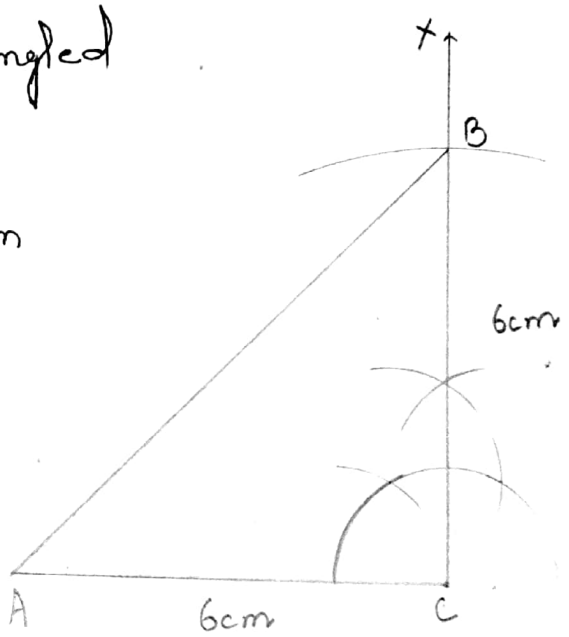
Sol) 1 Draw a line segment NT = 6cm.

2) Draw $\angle TNX = 90^\circ$ with the help of compass.
3) With T as Centre & radius = 8cm draw an arc, cutting NX at point M.
4) Join MT.
Thus, $\triangle MNT$ is a reqd. right-angled Triangle.



Q2:→ Construct an isosceles right-angled Triangle ABC, with $\angle ACB = 90^\circ$ & AC = 6cm.

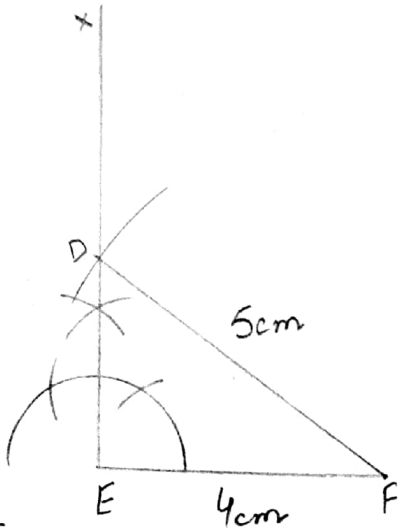
Sol) 1 Draw a line segment AC = 6cm
2) Draw $\angle ACX = 90^\circ$
3) With C as Centre & radius = 6cm draw an arc cutting CX at point B.
4) Join AB
Thus, $\triangle ABC$ is the reqd. isosceles right-angled Triangle.



Q4:→ Construct a right-angled Triangle DEF in which hypotenuse DF = 5cm, EF = 4cm & $\angle E = 90^\circ$.

Sol) 1 Draw a line segment EF = 4cm
2) Draw $\angle FEX = 90^\circ$
3) With F as Centre & radius = 5cm draw an arc cutting EX at D.
4) Join DF, Thus, $\triangle DEF$ is reqd. $\triangle$

NOTE :→ Do Remaining Questions of each & every exercise by yourself.



CHAPTER :→ THE TRIANGLES AND ITS PROPERTIES

LESSON NO :→ 06

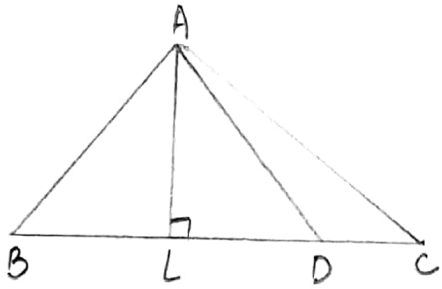
Ex : 6.1

NOTE :→ Check out the definitions of medians, altitudes, centroid, orthocentre from the book.

Q1 :→ Key

a) three b) three c) median d) medians
e) altitudes f) perpendicular g) exterior h) interior
i) AC j) PR and QR.

Q2 :→ In △ ABC, D is the mid-point of BC. Name the line segment AL and AD.



Sol) AL = Altitude
AD = Median

Q3 :→ deleted

Q4 :→ ABC is a right angled at C. locate its orthocentre without drawing any altitude.

Sol) point C is the ~~other~~ orthocentre of △ ABC.

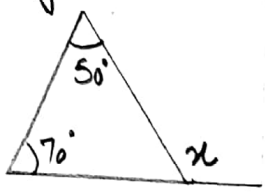
Ex : 6.2

Exterior angle property :→ An exterior angle of a triangle is equal to the sum of two opposite interior angles.

Q1 :→ find the value of x in each figure:

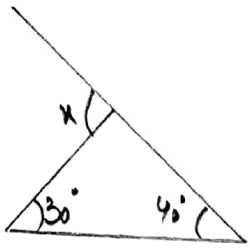
a) $x = 50 + 70^\circ$ — ext. angle property

$\Rightarrow x = 120$



b) $x = 30^\circ + 40$ — ext. angle property

$= 70^\circ$



Q2 :→ Can an exterior angle of a triangle be of 180°. Comment.

Sol) No, by external angle property, the sum of only two interior angles can not be equal to 180°.

Q3:→ One angle of an isosceles Triangle is 110°. find the measure of the remaining two angles.

Sol) In an isosceles Triangle, two angles are equal.
Let the measure of equal angles be x.

Ac. to Q

$x + x + 110^\circ = 180^\circ$ — Asp

$\Rightarrow 2x + 110^\circ = 180^\circ$

$\Rightarrow 2x = 180^\circ - 110^\circ$

$\Rightarrow 2x = 70^\circ$

$\Rightarrow x = \frac{70}{2} = 35^\circ$

$\Rightarrow x = 35^\circ$

∴ The remaining two angles are 35° each.

Q6:→ The angles of a Triangle are in the ratio 2:3:4. Determine the three angles. what Type of Triangle is it according to (a) angles and (b) sides?

Sol) Let the measure of angles be 2x, 3x and 4x.

Ac. to Q

$2x + 3x + 4x = 180^\circ$ — Asp

$\Rightarrow 9x = 180$

$\Rightarrow x = \frac{180}{9} = 20$

$\Rightarrow x = 20^\circ$

Thus, the angles are: $2x \Rightarrow 2 \times 20 = 40^\circ$
$3x \Rightarrow 3 \times 20 = 60^\circ$
$4x \Rightarrow 4 \times 20 = 80^\circ$

a) As per angles it is an acute angled Triangle
b) As per sides it is a scalene Triangle.

Q7:→ In each of the given figure, find the values of x & y:

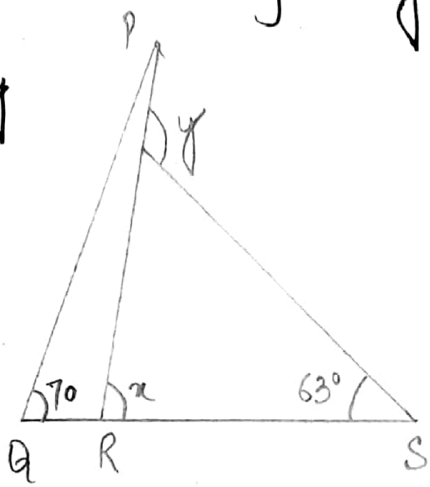
a)

Sol) In △ PQR.

$x = \angle P + \angle Q$ — ext. angle property

$\Rightarrow x = 10 + 70^\circ$

$\Rightarrow x = 80^\circ$



also $y = \angle x + \angle s$ — ext. angle px.

$\Rightarrow y = 80^\circ + 63^\circ$

$\Rightarrow y = 143^\circ$

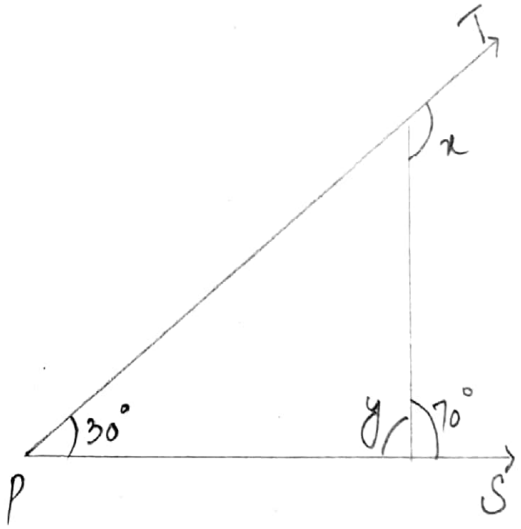
$\Rightarrow x = 80^\circ$ and $y = 143^\circ$

b) We know

$70^\circ + y = 180^\circ$ — linear pair

$\Rightarrow y = 180^\circ - 70^\circ$

$\Rightarrow y = 110^\circ$



also $x = 30^\circ + y$ — ext. angle

$\Rightarrow x = 30^\circ + 110^\circ$

$\Rightarrow x = 140^\circ$

$\Rightarrow x = 140^\circ$ and $y = 110^\circ$

Q9:→ Answer the following in 'yes' or 'no':

Sol) Key a) No b) Yes c) No d) No e) No.

Q11:→ In a triangle △ ABC, if $3\angle A = 4\angle B = 6\angle C$ Determine the measures of its three angles:

Sol) In △ ABC

$3\angle A = 4\angle B = 6\angle C$

Taking $3\angle A = 4\angle B$

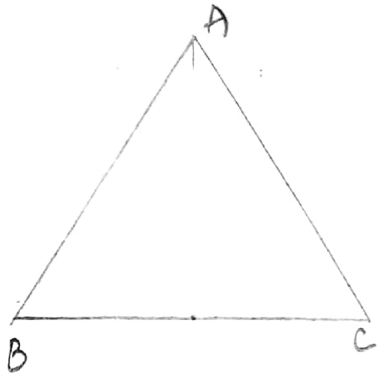
$\Rightarrow \angle B = \frac{3}{4}\angle A$

→ converting all angles in A.

also $6\angle C = 3\angle A$

$\Rightarrow \angle C = \frac{3^1}{6_2}\angle A$

$\Rightarrow \angle C = \frac{1}{2}\angle A$.



Now $\angle A + \angle B + \angle C = 180^\circ$ — Asp.

$\angle A + \frac{3}{4}\angle A + \frac{1}{2}\angle A = 180^\circ$

→ lcm of 4 and 2 = 4

$\Rightarrow \frac{4\angle A + 3\angle A + 2\angle A}{4} = 180^\circ$

$\Rightarrow \frac{9}{4}\angle A = 180^\circ$

$\Rightarrow \angle A = 180^\circ \div \frac{9}{4}$ → reciprocal of 9/4

$\Rightarrow \angle A = \overset{20}{\cancel{180}} \times \frac{4}{\cancel{9}_1}$

$\Rightarrow \angle A = 20 \times 4$

$\Rightarrow \angle A = 80^\circ$

also $\angle B = \frac{3}{4}\angle A$

$= \frac{3}{\cancel{4}_1} \times \overset{20}{\cancel{80}}^\circ$

$= 3 \times 20^\circ$

$= 60^\circ$

$\angle C = \frac{1}{2}\angle A$

$= \frac{1}{\cancel{2}_1} \times \overset{40}{\cancel{80}}^\circ$

$= 40^\circ$

$\Rightarrow \angle A = 80^\circ$, $\angle B = 60^\circ$ and $\angle C = 40^\circ$

Q12:→ In the given figure, Show that

$\angle CBX + \angle ACY + \angle BAZ = 360^\circ$

Sol) In $\triangle ABC$

$\angle CBX = \angle 1 + 3$ — i ext. angle property

$\Rightarrow \angle ACY = \angle 1 + \angle 2$ — ii

also $\angle BAZ = \angle 2 + \angle 3$ — iii

On adding (i) ii and (iii) we get

$\angle CBX + \angle ACY + \angle BAZ = \angle 1 + \angle 3 + \angle 1 + \angle 2 + \angle 2 + \angle 3$

$= \angle 1 + \angle 1 + \angle 2 + \angle 2 + \angle 3 + \angle 3$

$= 2\angle 1 + 2\angle 2 + 2\angle 3$

$= 2(\angle 1 + \angle 2 + \angle 3)$ → Asp.

$= 2(180^\circ)$ $[\because \angle 1 + \angle 2 + \angle 3 = 180^\circ]$

$= 360^\circ$

Ex : 6.3

Triangle inequality property :→ It states that the sum of two sides of a triangle must be greater than the third side.

Q1 :→ Find the value of x in each figure:

a) $x = 30^\circ$ - equal sides have equal angles opp. to it.

b) $45^\circ + 45^\circ + x = 180^\circ$

$90^\circ + x = 180^\circ$

$x = 180^\circ - 90^\circ$

$x = 90^\circ$

c) $x = 50$ — equal sides

d) $x + x + 100 = 180^\circ$ — Asp

$2x + 100 = 180^\circ$

$2x = 180 - 100$

$2x = 80$

$x = \frac{80}{2_1}\ 40$

$x = 40.$

Q2 :→ Which of the following can be the possible lengths of a △?

a) 3cm, 5cm, 3cm.

Sol) $3cm + 5cm \geq 3cm$

$5cm + 3cm > 3cm$

3 + 3cm > 5cm

∴ these lengths of a triangle are possible.

c) 8cm, 5cm, 3cm

Sol) 8cm + 5cm > 3cm

5cm + 3cm = 8cm

8cm + 3cm > 5cm

∴ these lengths of a triangle are not possible.

Q3:→ In the given figure, S is a point on the side QR of triangle PQR. Prove that

PQ + QR + PR > 2PS

Sol) In △ PQS

PQ + QS > PS —i Triangle ineq. property

also In △ PSR

PR + SR > PS —ii

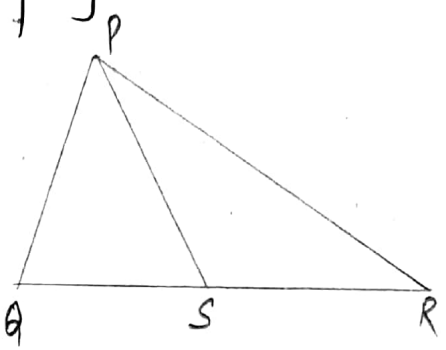
Adding (i) and ii we get

PQ + QS + PR + SR > PS + PS

PQ + (QS + SR) + PR > 2PS

PQ + QR + PR > 2PS

Hence proved.



Q4:→ Can you draw a triangle ABC, if A, B and C are collinear pts.

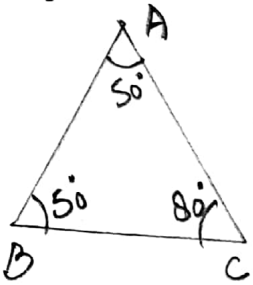
Sol) No, because collinear points form a straight line.

Q5:→ In the given triangle ABC, which two sides of the triangle are equal?

Sol) In △ ABC.

∠A = ∠B

⇒ AC = BC — equal angles have equal sides opp. to it



Q6:→ In the given figure, △PQR and △SQR are isosceles triangles. The equal sides have been shown with similar markings:

a) Find ∠PQR and ∠PRQ.

Sol) In △ PQR

PQ = PR — Given

⇒ ∠PQR = ∠PRQ — ∵ equal sides have equal angles opp. to it.

Now $\angle QPR + \angle PQR + \angle PRQ = 180^\circ$ — Asp.

$30^\circ + \angle PQR + \angle PQR = 180^\circ$ → [$\angle PQR = \angle PRQ$]

$30^\circ + 2\angle PQR = 180^\circ$

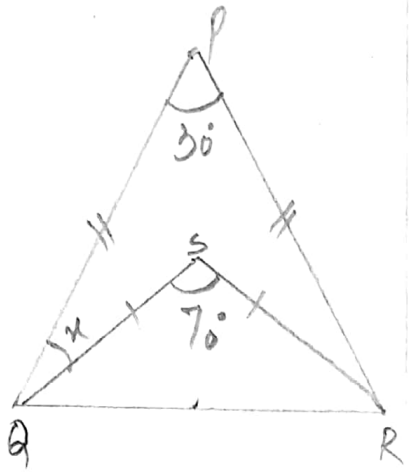
$2\angle PQR = 180^\circ - 30^\circ$

$2\angle PQR = 150^\circ$

$\angle PQR = \frac{150}{2}^{75^\circ}$

$\Rightarrow \angle PQR = 75^\circ$

$\Rightarrow \angle PQR = \angle PRQ = 75^\circ$



b) Find $\angle SQR$ and $\angle SRQ$.

Sol) In $\triangle SQR$

$SQ = SR$ — Given

$\Rightarrow \angle SQR = \angle SRQ$ — ∵ equal sides have equal angles opp. to it.

Now $\angle QSR + \angle SQR + \angle SRQ = 180^\circ$ — Asp

$\Rightarrow 70^\circ + \angle SQR + \angle SQR = 180^\circ$

$\Rightarrow 70^\circ + 2\angle SQR = 180^\circ$

$\Rightarrow 2\angle SQR = 180^\circ - 70^\circ$

$\Rightarrow 2\angle SQR = 110^\circ$

$\Rightarrow \angle SQR = \frac{110}{2}^{55}$

$\Rightarrow \angle SQR = 55^\circ$

$\Rightarrow \angle SQR = \angle SRQ = 55^\circ$

c) Find the value of x.

Sol) $\angle PQR = \angle PQS + \angle SQR$.

$\Rightarrow 75^\circ = x + 55^\circ$

$\Rightarrow x = 75^\circ - 55^\circ$

$\Rightarrow x = 20^\circ$

Ex: 6.4

Pythagorean theorem :- The square of the length of the hypotenuse of a rt. triangle is equal to the sum of the squares of the lengths of the other two sides.

i.e $(\text{Hypotenuse})^2 = (\text{Perpendicular})^2 + (\text{Base})^2$.

Q1:→ The lengths of sides of two Triangles are given below. check, if the Triangles are right-angled Triangles.

a) 6cm, 8cm, 10cm.

Sol) Here $(6cm)^2 = 6cm \times 6cm = 36cm^2$

$(8cm)^2 = 8cm \times 8cm = 64cm^2$

$(10cm)^2 = 10cm \times 10cm = 100cm^2$

$\Rightarrow 36cm^2 + 64cm^2 = 100cm^2$

∴ The Triangle is a rt. angled Triangle.

b) 5cm, 8cm, 11cm.

Sol) Here $(5cm)^2 = 5cm \times 5cm = 25cm^2$

$(8cm)^2 = 8cm \times 8cm = 64cm^2$

$(11cm)^2 = 11cm \times 11cm = 121cm^2$

but $25cm^2 + 64cm^2 = 89cm^2 \neq 121cm^2$

∴ The Triangle is not a rt. angled Triangle.

Q2:→ The lengths of two sides of a rt. angled triangle are 12cm and 16cm. Find the length of hypotenuse.

Sol) let the perpendicular & base of the rt. angled Triangle be 12cm & 16cm.

By pythagorean theoream.

$(Hyp)^2 = (per)^2 + (base)^2$

$(Hyp)^2 = (12cm)^2 + (16cm^2)$

$(Hyp)^2 = (12cm \times 12cm) + (16cm \times 16cm)$

$(Hyp)^2 = 144cm^2 + 256cm^2$

$(Hyp)^2 = 400cm^2$

$(Hyp)^2 = \underline{2 \times 2 \times 2 \times 2 \times 5 \times 5}\ cm^2$ → find factors of 400.

$(Hyp)^2 = (2 \times 2 \times 5\ cm)^2$

$(Hyp)^2 = (20cm)^2$

$Hyp = 20cm.$

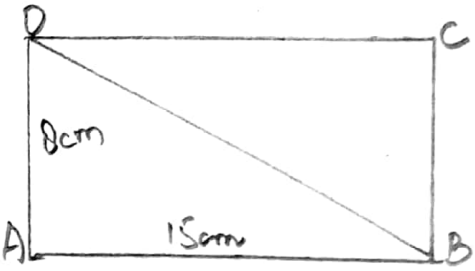
∴ The length of hypotenuse is 20cm

Q3:→ Find the length of the diagonal of a rectangle whose sides are 8cm & 15cm.

Sol) We know that all angles of a rectangle are 90°

So, the diagonal of the rectangle = Hypotenuse.

Now, In △ ABD.



By pythagorean theorem

$(Hyp)^2 = (per)^2 + (Base)^2$

$\Rightarrow (BD)^2 = (DA)^2 + (AB)^2$

$\Rightarrow (BD)^2 = (8cm)^2 + (15cm)^2$

$\Rightarrow (BD)^2 = (8cm \times 8cm) + (15cm \times 15cm)$

$\Rightarrow (BD)^2 = 64cm^2 + 225cm^2$

$\Rightarrow (BD)^2 = 289cm^2$

$\Rightarrow (BD)^2 = (17cm \times 17cm)$

$\Rightarrow (BD)^2 = (17cm)^2$

$\Rightarrow BD = 17cm.$

∴ The diagonal of rectangle is 17cm.

Q4:→ A rt. angled triangle is isosceles. If the square of the hypotenuse is $50cm^2$. What is the the length of equal sides?

Sol) Let the measure of equal sides be x.

By pythagorean theorem

$(Hyp)^2 = (per)^2 + (base)^2$

$\Rightarrow 50cm^2 = x^2 + x^2$

$\Rightarrow 50cm^2 = 2x^2$

or $2x^2 = 50cm^2$

$\Rightarrow x^2 = \frac{25\,\cancel{50}}{\cancel{2}_1}\,cm^2$

5	25
5	5
	1

$\Rightarrow x^2 = 25cm^2$

$\Rightarrow x^2 = (5cm \times 5cm)$

$\Rightarrow x^2 = (5cm)^2$

$\Rightarrow \quad x = 5cm.$

$\therefore$ length of each equal side $= 5cm$

Q7:→ ΔABC is an isosceles triangle. right angled at C. Prove That $(AB)^2 = 2(AC)^2$

Sol) In ΔABC

$AC = BC$

By pythagoras theorem

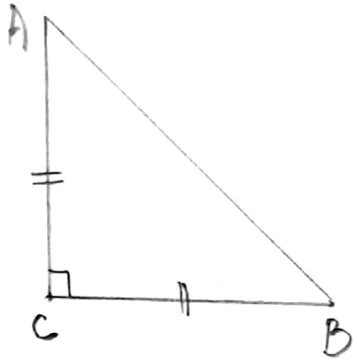
$(Hyp)^2 = (per)^2 + (base)^2$

$\Rightarrow \quad (AB)^2 = (AC)^2 + (BC)^2$

$\Rightarrow \quad (AB)^2 = (AC)^2 + (AC)^2$

$\Rightarrow \quad (AB)^2 = 2(AC)^2.$

Hence proved.



NOTE:→ Do remaining Questions of this chapter by your-self and practice whole Term-I Thoroughly.

Good-Luck