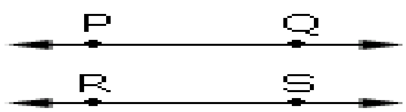
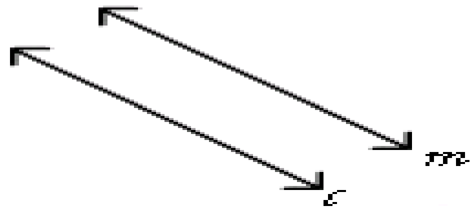
Q. Define parallel lines?

Sol: [Two lines are said to be in parallel if they dont intersect each other and maintain a equal distance through out.





Q. Find the measure of an angle which is three times its supplement

Sol: Let the measure of the angle be *x*.

Supplement of the angle *x* = $180^0 - x$.

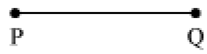
$$\text{Given, Measure of the angle} = 3 \times \text{Supplement of the angle}$$
$$\Rightarrow x = 3(180^\circ - x)$$
$$\Rightarrow x = 540^\circ - 3x$$
$$\Rightarrow x + 3x = 540^\circ$$
$$\Rightarrow 4x = 540^\circ$$
$$\Rightarrow x = \frac{540^\circ}{4} = 135^\circ$$

Thus, the measure of the angle is 135^0.

Q. Define Line Segment & Ray angle?

Ans:

A line segment is a part of a line that has two end points. It has a definite length.
A line segment corresponds to the shortest distance between two points. The line segment joining the points P and Q is denoted as $\overline{PQ}$

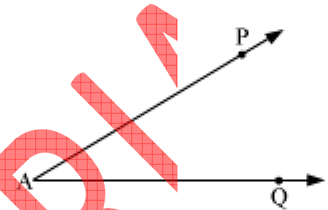


A ray has a beginning point but no end point. The beginning point is called the vertex of the ray

Here, $\overrightarrow{AP}$ is a ray. A is the vertex of ray $\overrightarrow{AP}$.

An angle is formed from two rays that have the same beginning point. The common point is called the vertex and the two rays are called the sides of the angle.

Here, the $\angle PAQ$ formed by the rays $\overrightarrow{AP}$ and $\overrightarrow{AQ}$.



Q. Find the supplement of the each of the following angle:35^0

Ans: Two angles are said to be supplementary if the sum of the measures of the angles is 180^0.

So, the supplement of the angle of measure $35^0 = 180^0 – 35^0 = 145^0$

Q. the difference between the measures two complementary angles is 18.what are the measures of the two angles

Sol: Let measure of one angle be x^0 Thus, the complementary angle of this angle is $(90 – x)^0$

Given; $x^0 – (90 – x)^0 = 18^0$ $\Rightarrow x – 90 + x = 18$ $\Rightarrow 2x – 90 = 18$

$\Rightarrow 2x = 18 + 90 = 108$

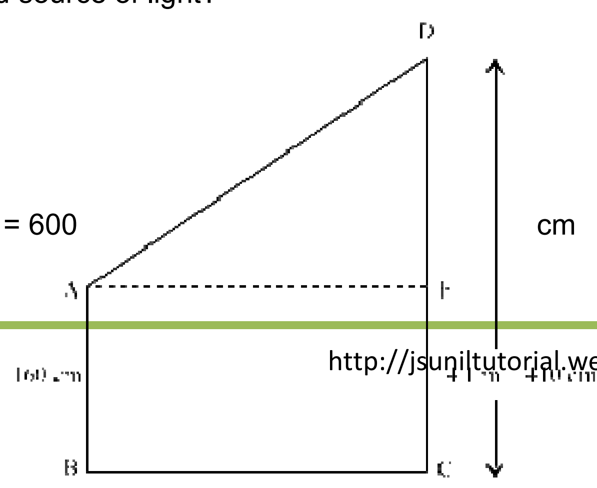
Thus, measure of one angle is 54^0 and the measure of remaining angle is $(90 – 54)^0 = 36^0$

Q. A man 160cm tall is at a distance of 600cm from foot of a light source situated at top of pole of height 4.1m high. Find distance between top of a man and source of light?

Sol: Let the height of man be AB = 160 cm

Let the height of pole be DC = 4.1 m = 410 cm

Let the distance between the man and pole be DC = 600 cm



DC = DE + EC

∴ 410 cm = DE + 160 cm

∴ DE = 410 cm – 160 cm

= 250 cm

In ΔAED, right angled at E, applying Pythagoras theorem,

$AD^2 = DE^2 + AE^2$

∴ $AD^2 = (250)^2 + (600)^2$

⇒ $AD^2 = 62500 + 360000$

⇒ $AD^2 = 422500$

⇒ AD = 650 cm

Thus, the distance between the top of man and source of light is 650 cm.

Q. Each of the two angles of a triangle is 3/4th of the third angle. Find all the angles.

Ans: Let the third angle be x. Then other angles will be 3x /4

By angle sum property we have, 3x/4+3x/4+x = 180

5x/2 = 180 ⇒ 5x = 360 ⇒ x = 72

Other angles 3x 72/4 = 54

So the angles of the triangle are 72,54 and 54

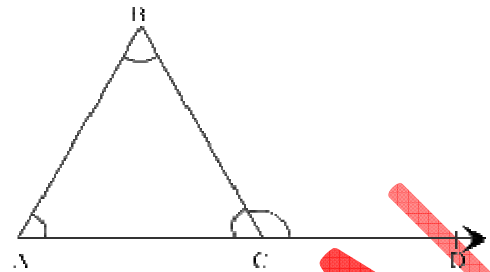
Q. To verify that the interior angle of a triangle is equal to the sum of the two interior opposite angles.

Sol: In ΔABC

∠A + ∠B + ∠C = 180^0 [Angle sum property] .....(1)

Also

$\angle C + \angle BCD = 180^0$ [Linear Pair] .... (2)



Equating (1) and (2)

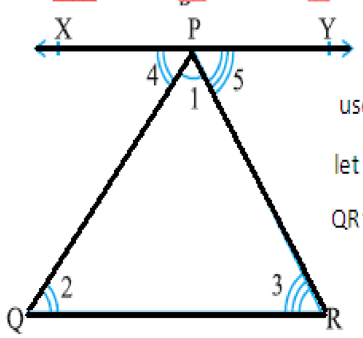
$\angle C + \angle BCD = \angle A + \angle B + \angle C$

$\angle BCD = \angle A + \angle B$

Hence, exterior angle of a triangle is equal to sum of two interior opposite angles.

Q. Prove that the sum of the interior angles of a triangle is 180^0.

Sol: XPY is a line.



use the properties related to parallel lines

let us draw a line XPY parallel

QR through the opposite vertex P

$\therefore \angle 4 + \angle 1 + \angle 5 = 180^0$ … (1)

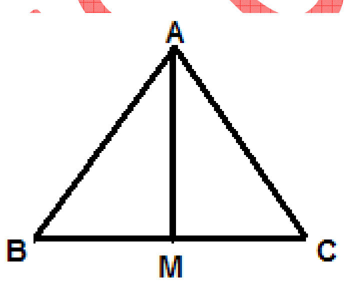
But XPY || QR and PQ, PR are transversals.

So, $\angle 4 = \angle 2$ and $\angle 5 = \angle 3$ (Pairs of alternate angles)

Substituting $\angle 4$ and $\angle 5$ in (1), we get

$\angle 2 + \angle 1 + \angle 3 = 180^0$ $\therefore \angle 1 + \angle 2 + \angle 3 = 180^0$

Q. In Given gig. Prove that AB + BC + AC > 2 AM



In a triangle, the sum of the lengths of either two sides is always greater than the third side.

In ΔABM,

$AB + BM > AM$ (i)

Similarly, in ΔACM,

$AC + CM > AM$ (ii)

Adding equation (i) and (ii),

$AB + BM + MC + AC > AM + AM$

$AB + BC + AC > 2AM$

Q. The hypotenuse of a right triangle is 2 cm more than the longer side of the triangle. The shorter side of the triangle is 7 cm less that the longer side. Find the length of the hypotenuse.

Sol: Hypotenuse = Longer side + 2 cm Shorter side = Longer side – 7 cm

Let the longer side be x cm. $\therefore$ Hypotenuse = (x + 2) cm and Shorter side = (x – 7) cm

In a right triangle,

$(\text{Hypotenuse})^2 = (\text{Longer side})^2 + (\text{Shorter side})^2$ [from Pythagoras theorem]

$\therefore (x + 2)^2 = (x)^2 + (x - 7)^2$

$\Rightarrow x^2 + 4x + 4 = x^2 + x 2 - 14x + 49$

$\Rightarrow x^2 + 4x + 4 = 2x^2 - 14x + 49$

$\Rightarrow 2x^2 - x^2 - 14x - 4x + 49 - 4 = 0$

$\Rightarrow x^2 - 18x + 45 = 0$

$\Rightarrow x 2 - 15x - 3x + 45 = 0$

$\Rightarrow x (x - 15) - 3 (x - 15) = 0$

⇒ (x – 15) (x – 3) = 0

⇒ x – 15 = 0 or x – 3 = 0

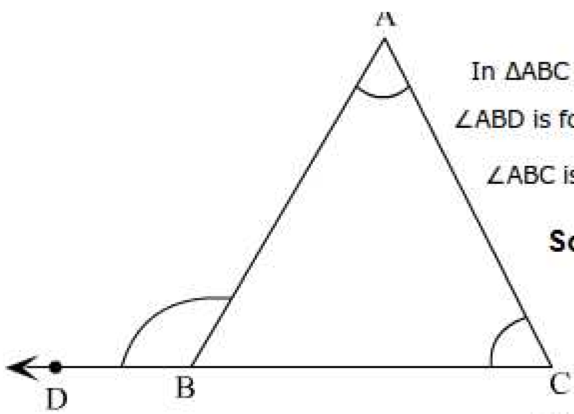
⇒ x = 15 or x = 3

∴ x = 15 (When x = 3, length of shorter side is negative which is not possible)

Length of hypotenuse of the triangle = (x + 2) cm = (15 + 2) cm = 17 cm

Q. Prove that An exterior angle of a triangle is equal to the sum of its opposite interior angles?

Sol:



In ΔABC

∠ABD is formed at the point B. This angle lies in the exterior of the ΔABC.

∠ABC is an adjacent angle to ∠ABD.

So, <ABC + < ABD = 180

Also,<ABC + <ACB + <BAC =180

So, $<\cancel{ABC}$ + <ACB + <BAC = $<\cancel{ABC}$ + < ABD

<ACB + <BAC = < ABD

The remaining two angles ∠BAC and ∠BCA are the two interior opposite angles of ∠ABD.

So, ∠ABD is the exterior angle and ∠BAC and ∠BCA are the two interior opposite angles of ∠ABD.

Q. if the angles of a triangle are in the ratio of 3:4:5 determine the three angles

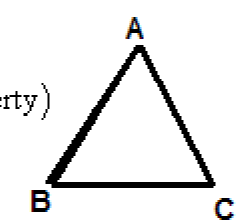
Given, $\angle A : \angle B : \angle C = 3 : 4 : 5$

$\therefore \angle A = 3x, \angle B = 4x$ and $\angle C = 5x$, where x is some constant.

In ΔABC, $\angle A + \angle B + \angle C = 180°$ (Angle Sum Property)

$\Rightarrow 3x + 4x + 5x = 180°$ $\Rightarrow 12x = 180°$ $\Rightarrow x = \dfrac{180°}{12} = 15°$

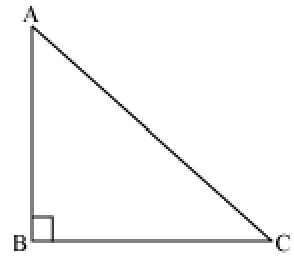
$\therefore \angle A = 3 \times 15° = 45°$ $\angle B = 4 \times 15° = 60°$ $\angle C = 5 \times 15° = 75°$



Q. ΔABC is a right triangle right angled at B. If AC = 25 cm and AB = 15 cm, then find the side BC.

ΔABC is a right-angled triangle, right-angled at B.

$\therefore AC^2 = AB^2 + BC^2$ (Pythagoras theorem)



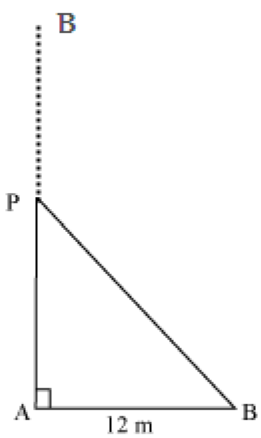
$\Rightarrow 15^2 + BC^2 = 25^2$ $\Rightarrow BC^2 = 252 - 152$

$\Rightarrow BC^2 = 625 - 225$ $\Rightarrow BC^2 = 400$

$\Rightarrow BC = \sqrt{400}$ $\therefore BC = 20$ cm

Q. A tree of height 36m broke at a point P, but it did not separate. The top of the tree touched the ground at a distance of 12m from the base. find the distance of the point P from the base of the tree.

Ans:



Height of the tree = 36 m
AP + PB = 36 m
PB = 36 – AP
DAPB is a right-angled triangle, so by Pythagoras theorem
PB2 = AP2 + AB2
(36 – AP)2 = AP2 + (12)2
1296 + AP2 – 72AP = AP2 + 144
1296 + AP2 – 72AP – AP2 – 144 = 0
1152 – 72AP = 0 $\quad AP = \dfrac{-1152}{-72} \quad AP = 16$
–72AP = –1152
Distance of point P from the base = 16 m

Q. In a right angled isosceles triangle , find the ratio of their sides.

Sol: We have AB = BC

By Pythagorean Theorem

$AC2 = AB^2 + BC^2$ $\quad AC2 = AB2 + AB^2$ $\quad AC2 = 2AB^2$ $\quad AC2 = 2AB^2$

$AC = \sqrt{2} : AB$ $\quad AC = AB\sqrt{2}$

$AB : BC : AC = AB : AB : AB\sqrt{2} = 1 : 1 : \sqrt{2}$