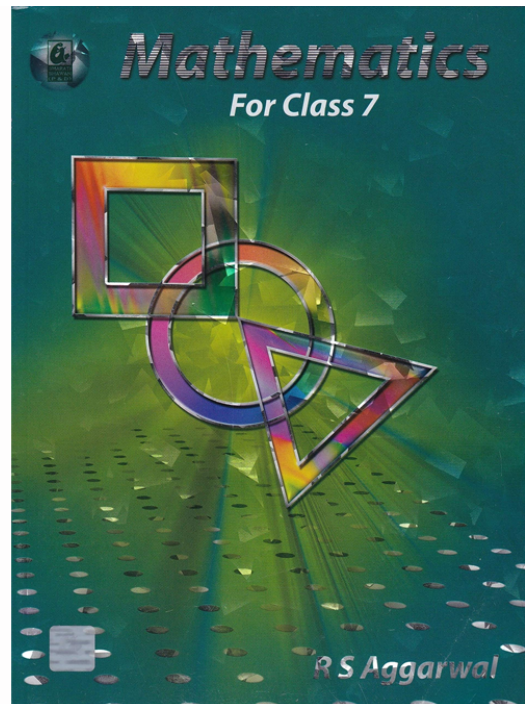


RS Aggarwal Solutions for Class 7 Maths Chapter 15–Properties of Triangles

Class 7 - Chapter 15 Properties of Triangles



For any clarifications or questions you can write to info@indcareer.com

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RS Aggarwal Solutions for Class 7 Maths Chapter 15–Properties of Triangles

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RS Aggarwal Solutions for Class 7 Maths Chapter 15–Properties of Triangles

RS Aggarwal 7th Maths Chapter 15, Class 7 Maths Chapter 15 solutions

Ex 15A

Question 1.

Solution:

In $\triangle ABC$,

$$\angle A = 72^\circ, \angle B = 63^\circ$$

But $\angle A + \angle B + \angle C = 180^\circ$ (Sum of angles of a triangle)

$$\Rightarrow 72^\circ + 63^\circ + \angle C = 180^\circ$$

$$\Rightarrow 135^\circ + \angle C = 180^\circ$$

$$\Rightarrow \angle C = 180^\circ - 135^\circ = 45^\circ$$

Question 2.

Solution:

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In $\triangle PQR$,

$$\angle E = 105^\circ, \text{ and } \angle F = 40^\circ$$

But $\angle D + \angle E + \angle F = 180^\circ$ (sum of angles of a triangle)

$$\Rightarrow \angle D + 105^\circ + 40^\circ = 180^\circ$$

$$\Rightarrow \angle D + 145^\circ = 180^\circ$$

$$\Rightarrow \angle D = 180^\circ - 145^\circ$$

$$\Rightarrow \angle D = 35^\circ$$

Question 3.

Solution:

In $\triangle XYZ$,

$$\angle X = 90^\circ, \angle Z = 48^\circ$$

But $\angle X + \angle Y + \angle Z = 180^\circ$ (Sum of angles of a triangle)

$$\Rightarrow 90^\circ + \angle Y + 48^\circ = 180^\circ$$

$$\Rightarrow 138^\circ + \angle Y = 180^\circ$$

$$\Rightarrow \angle Y = 180^\circ - 138^\circ = 42^\circ$$

$$\Rightarrow \angle Y = 42^\circ$$

Question 4.

Solution:

Sum of angles of a triangle = 180°

and ratio in the three angles = 4 : 3 : 2

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$$\therefore \text{First angle} = \frac{180^\circ \times 4}{4+3+2} = \frac{180^\circ \times 4}{9} = 80^\circ$$

$$\text{Second angle} = \frac{180^\circ \times 3}{9} = 60^\circ$$

$$\text{and third angle} = \frac{180^\circ \times 2}{9} = 40^\circ$$

Question 5.**Solution:**

In a right triangle

Sum of the two acute angles = 90°

One angle = 30°

Second angle = $90^\circ - 36^\circ = 54^\circ$

Question 6.**Solution:**

In a right triangle

Sum of two acute angles = 90°

and ratio of these two angles = 2 : 1

Let first angle = $2x$

Then second angle = x

$$2x + x = 90^\circ$$

$$\Rightarrow 3x = 90^\circ$$

$$\Rightarrow x = 90 \div 3 = 30^\circ$$

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$$\text{First angle} = 2x = 2 \times 30^\circ = 60^\circ$$

$$\text{and second angle} = x = 1 \times 30^\circ = 30^\circ$$

Question 7.**Solution:**

In a triangle,

$$\text{Measure of one angle} = 100^\circ$$

$$\text{Sum of other two angles} = 180^\circ - 100^\circ = 80^\circ$$

(Sum of angles of a triangles)

But, these two angles are equal.

$$\text{Measure of each angle} = 80 \div 2 = 40^\circ$$

Question 8.**Solution:**

$$\text{Sum of angles of a triangle} = 180^\circ$$

$$\text{Let third angle} = x$$

$$\text{then, each equal angles} = 2x$$

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

$$\Rightarrow 5x = 180^\circ$$

$$\Rightarrow x = 180 \div 5 = 36^\circ$$

$$\text{Each equal angle} = 2x = 2 \times 36^\circ = 72^\circ$$

$$\text{and third angle} = 36^\circ$$

Question 9.

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Solution:

In a triangle ABC,

$$\text{Let } \angle A = \angle B + \angle C$$

But $\angle A + \angle B + \angle C = 180^\circ$ (Sum of angles of a triangle)

$$\Rightarrow \angle A + \angle A = 180^\circ \quad (\angle B + \angle C = \angle A)$$

$$\Rightarrow 2A = 180^\circ$$

$$\Rightarrow \angle A = \frac{180}{2} = 90^\circ$$

$$\angle A = 90^\circ$$

Hence, $\triangle ABC$ is a right triangle.

Question 10.**Solution:**

In a $\triangle ABC$,

$$2 \angle A = 3 \angle B = 6 \angle C = 1 \text{ (suppose)}$$

$$\therefore \angle A = \frac{1}{2}, \angle B = \frac{1}{3} \text{ and } \angle C = \frac{1}{6}$$

$$\therefore \angle A : \angle B : \angle C = \frac{1}{2} : \frac{1}{3} : \frac{1}{6}$$

$$= \frac{3:2:1}{6}$$

$$\therefore \text{ But } \angle A + \angle B + \angle C = 180^\circ$$

(Sum of angles of a triangle)

$$\therefore \angle A = \frac{3 \times 180^\circ}{3+2+1} = \frac{3 \times 180^\circ}{6} = 90^\circ$$

$$\angle B = \frac{2 \times 180^\circ}{6} = 60^\circ$$

$$\angle C = \frac{1 \times 180^\circ}{6} = 30^\circ$$

Question 11.

Solution:

In an equilateral triangle,

All sides are equal.

All angles are also equal.

Each angle = $180^\circ / 3 = 60^\circ$

(Sum of angles of a triangle = 180°)

Question 12.

Solution:

In the given figure,

ABC is a triangle in which $DE \parallel BC$,

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$$\angle A = 65^\circ \text{ and } \angle B = 55^\circ$$

DE || BC and ADB is the transversal

$$\Rightarrow \angle ADE = \angle B \text{ (corresponding angles)} = 55^\circ \text{ (} \angle B = 55^\circ \text{)}$$

In $\triangle ADE$,

$$\angle A + \angle ADE + \angle AED = 180^\circ \text{ (sum of angles of a triangle)}$$

$$\Rightarrow 65^\circ + 55^\circ + \angle AED = 180^\circ$$

$$\Rightarrow \angle 120^\circ + \angle AED = 180^\circ$$

$$\Rightarrow \angle AED = 180^\circ - 120^\circ = 60^\circ$$

$$\angle AED = 60^\circ$$

D || BC and AEC is the transversal

$$\angle C = \angle AED \text{ (A corresponding angles)}$$

$$\angle C = 60^\circ$$

Hence $\angle ADE = 55^\circ$, $\angle AED = 60^\circ$ and $\angle C = 60^\circ$

Question 13.

Solution:

(i) No. In a triangle, only one right angle is possible as if there are two right angles, then The third angle will be $\angle$ ero which is not possible.

(ii) No. In a triangle only one obtuse angle is possible as if there are two obtuse angles, then the sum of these two angles will be greater than 180° which is not possible.

(iii) Yes. two acute can arc possible.

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(iv) No. The sum of these three angles will be greater than 180° which is not possible in a triangle.

(v) No. The sum of these angles will be less than 180° which is not possible.

(vi) Yes. The sum of these three angles will be 180° which is possible.

Question 14.

Solution:

(i) Yes, it can be a right triangle also

(ii) Yes, if right triangle has its sides different then it is possible.

(iii) No, a right triangle cannot be an equilateral triangle as an equilateral triangle has each side 60° .

(iv) Yes, it is possible, if its sides opposite to acute angles are equal.

Question 15.

Solution:

(i) A right triangle cannot have an obtuse angle.

(ii) The acute angles of a right triangle are complementary.

(iii) Each acute angle of an isosceles right triangle measures 45° .

(iv) Each angle of an equilateral triangle measures 60° .

(v) The side opposite the right angle of the right triangle is called the hypotenuse.

(vi) The sum of the lengths of the sides of a triangle is called its perimeter.

Ex 15B

Question 1.

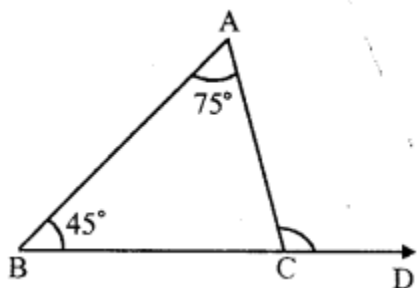
Solution:

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In $\triangle ABC$,

$$\angle A = 75^\circ, \angle B = 45^\circ$$

side BC is produced to D



forming exterior $\angle ACD$

Exterior $\angle ACD = \angle A + \angle B$ (Exterior angle is equal to sum of its interior opposite angles)

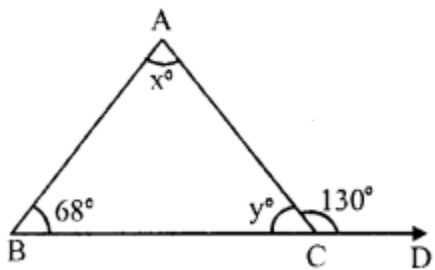
$$= 75^\circ + 45^\circ = 120^\circ$$

Question 2.

Solution:

In $\triangle ABC$, BC is produced to D forming an exterior angle ACD

$$\angle B = 68^\circ, \angle A = x^\circ, \angle ACB = y^\circ \text{ and } \angle ACD = 130^\circ$$



In triangle,

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Exterior angles is equal to sum of its interior opposite angles

$$\angle ACD = \angle A + \angle B$$

$$\Rightarrow 130^\circ = x + 68^\circ$$

$$\Rightarrow x = 130^\circ - 68^\circ = 62^\circ$$

But $\angle ACB + \angle ACD = 180^\circ$ (Linear pair)

$$\Rightarrow y + 130^\circ = 180^\circ$$

$$\Rightarrow y = 180^\circ - 130^\circ = 50^\circ$$

Hence $x = 62^\circ$ and $y = 50^\circ$

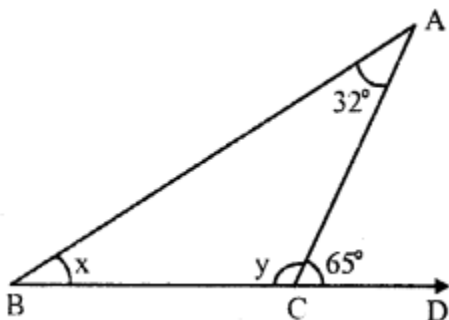
Question 3.

Solution:

In $\triangle ABC$, side BC is produced to D forming exterior angle ACD.

$$\angle ACD = 65^\circ, \angle A = 32^\circ$$

$$\angle B = x, \angle ACB = y$$



In a triangle, the exterior angles is equal to the sum of its interior opposite angles

$$\angle ACD = \angle A + \angle B$$

$$\Rightarrow 65^\circ = 32^\circ + x$$

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$$\Rightarrow x = 65^\circ - 32^\circ = 33^\circ$$

But $\angle ACD + \angle ACB = 180^\circ$ (Linear pair)

$$\Rightarrow 65^\circ + y = 180^\circ$$

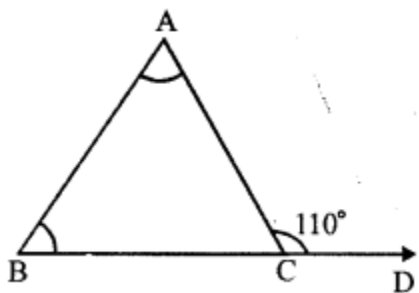
$$\Rightarrow y = 180^\circ - 65^\circ = 115^\circ$$

$$x = 33^\circ \text{ and } y = 115^\circ$$

Question 4.

Solution:

In $\triangle ABC$, side BC is produced to D forming exterior $\angle ACD$



$$\angle ACD = 110^\circ, \text{ and } \angle A : \angle B = 2 : 3$$

In a triangle, exterior angles is equal to the sum of its interior opposite angles

$$\Rightarrow \angle ACD = \angle A + \angle B$$

$$\Rightarrow \angle A + \angle B = 110^\circ$$

$$\text{But } \angle A : \angle B = 2 : 3$$

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$$\begin{aligned}\therefore \angle A &= \frac{2}{2+3} \times 110^\circ = \frac{2}{5} \times 110^\circ \\ &= 2 \times 22^\circ = 44^\circ\end{aligned}$$

$$\begin{aligned}\text{and } \angle B &= \frac{3}{2+3} \times 110^\circ = \frac{3}{5} \times 110^\circ \\ &= 3 \times 22 = 66^\circ\end{aligned}$$

But $\angle A + \angle B + \angle C = 180^\circ$ (sum of angles of a triangle)

$$\Rightarrow 44^\circ + 66^\circ + \angle C = 180^\circ$$

$$\Rightarrow 110^\circ + \angle C = 180^\circ$$

$$\Rightarrow \angle C = 180^\circ - 110^\circ = 70^\circ$$

Hence $\angle A = 44^\circ$, $\angle B = 66^\circ$ and $\angle C = 70^\circ$

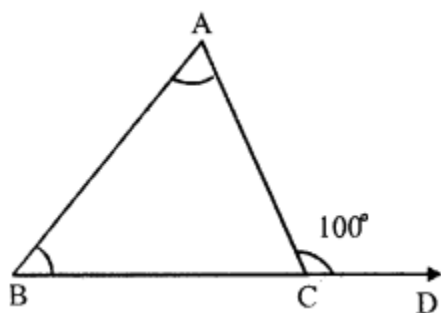
Question 5.

Solution:

In $\triangle ABC$, side BC is produced to forming exterior angle ACD.

$$\angle ACD = 100^\circ \text{ and } \angle A = \angle B$$

Exterior angle of a triangle is equal to the sum of its interior opposite angles.



$$\angle ACD = \angle A + \angle B \text{ But } \angle A = \angle B$$

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$$\angle A + \angle A = \angle ACD = 100^\circ$$

$$\Rightarrow 2 \angle A = 100^\circ$$

$$\Rightarrow \angle A = 50^\circ$$

$$\angle B = \angle A = 50^\circ$$

But $\angle A + \angle B + \angle ACB = 180^\circ$ (sum of angles of a triangle)

$$\Rightarrow 50^\circ + 50^\circ + \angle ACB = 180^\circ$$

$$\Rightarrow 100^\circ + \angle ACB = 180^\circ$$

$$\Rightarrow \angle ACB = 180^\circ - 100^\circ = 80^\circ$$

Hence $\angle A = 50^\circ$, $\angle B = 50^\circ$ and $\angle C = 80^\circ$

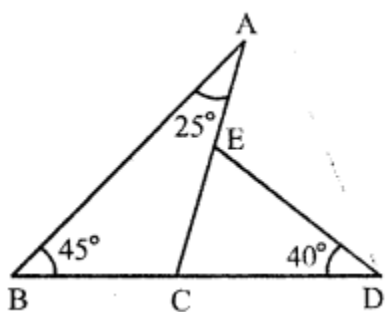
Question 6.

Solution:

In $\triangle ABC$, side BC is produced to D. From D, draw a line meeting AC at E so that $\angle D = 40^\circ$

$$\angle A = 25^\circ, \angle B = 45^\circ$$

In $\triangle ABC$,



$$\text{Exterior } \angle ACD = \angle A + \angle B = 25^\circ + 45^\circ = 70^\circ$$

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Again, in $\triangle CDE$,

$$\text{Exterior } \angle AED = \angle ECD + \angle D = \angle ACD + \angle D = 70^\circ + 40^\circ = 110^\circ$$

Hence $\angle ACD = 70^\circ$ and $\angle AED = 110^\circ$

Question 7.

Solution:

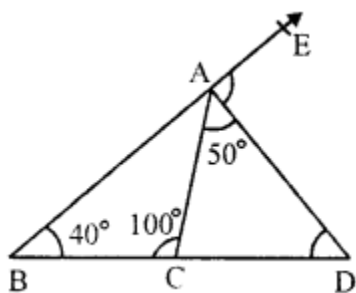
In $\triangle ABC$, sides BC is produced to D and BA to E

$$\angle CAD = 50^\circ, \angle B = 40^\circ \text{ and } \angle ACB = 100^\circ$$

$$\angle ACB + \angle ACD = 180^\circ \text{ (Linear pair)}$$

$$\Rightarrow 100^\circ + \angle ACD = 180^\circ$$

$$\Rightarrow \angle ACD = 180^\circ - 100^\circ = 80^\circ$$



In $\triangle ACD$,

$$\angle CAD + \angle ACD + \angle ADC = 180^\circ \text{ (sum of angles of a triangle)}$$

$$\Rightarrow 50^\circ + 80^\circ + \angle ADC = 180^\circ$$

$$\Rightarrow 130^\circ + \angle ADC = 180^\circ$$

$$\Rightarrow \angle ADC = 180^\circ - 130^\circ = 50^\circ$$

Now, in $\triangle ABD$, BA is produced to E

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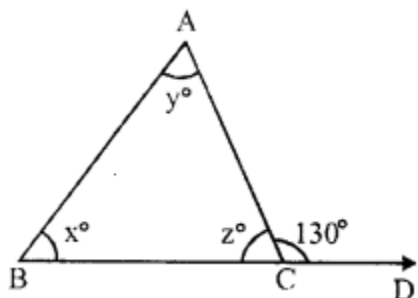
$$\text{Exterior } \angle DAE = \angle ACD + \angle ADC = 80^\circ + 50^\circ = 130^\circ$$

Hence $\angle ACD = 80^\circ$, $\angle ADC = 50^\circ$ and $\angle DAE = 130^\circ$

Question 8.

Solution:

In $\triangle ABC$, BC is produced to D forming exterior $\angle ACD$

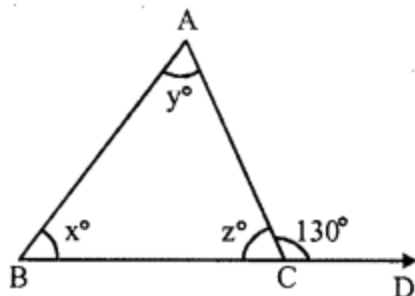


$\angle ACD = 130^\circ$, $\angle A = y^\circ$, $\angle B = x^\circ$ and $\angle ACB = z^\circ$.

$$x : y = 2 : 3$$

Now, in $\triangle ABC$,

$$\text{Exterior } \angle ACD = \angle A + \angle B$$



$$\Rightarrow \angle A + \angle B = 130^\circ$$

But $\angle A : \angle B = 2 : 3$

$$\therefore \angle B = \frac{130^\circ \times 2}{2+3} = \frac{130^\circ \times 2}{5} = 26^\circ \times 2 \\ = 52^\circ$$

$$\text{and } \angle A = \frac{130^\circ \times 3}{2+3} = \frac{130^\circ \times 3}{5} = 26^\circ \times 3 \\ = 78^\circ$$

But $\angle A + \angle B + \angle ACB = 180^\circ$ (sum of angles of a triangle)

$$\Rightarrow 78^\circ + 52^\circ + \angle ACB = 180^\circ$$

$$\Rightarrow 130^\circ + \angle ACB = 180^\circ$$

$$\Rightarrow \angle ACB = 180^\circ - 130^\circ$$

$$\Rightarrow \angle ACB = 50^\circ$$

$$\Rightarrow \angle C = 50^\circ$$

Hence $x = 52^\circ$, $y = 78^\circ$ and $z = 50^\circ$

Ex 15C

Question 1.

Solution:

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We know that in a triangle, sum of any two sides is greater than the third side. Therefore :

(i) 1cm, 1cm, 1cm

It is possible to draw a triangle

$(1 + 1) \text{ cm} > 1 \text{ cm}$ (sum of two sides is greater than the third)

(ii) 2cm, 3cm, 4cm

It is also possible to draw the triangle

$(2 + 3) \text{ cm} > 4 \text{ cm}$ (sum of two sides is greater than third side)

(iii) 7cm, 8cm, 15cm

It is not possible to draw the triangle

$(7 + 8) \text{ cm not} > 15 \text{ cm}$

But $(7 + 8) \text{ cm} = 15 \text{ cm}$

(iv) 3.4 cm, 2.1 cm, 5.3 cm

It is possible to draw the triangle

$(3.4 + 2.1) \text{ cm} > 5.3 \text{ cm}$

$\Rightarrow 5.5 \text{ cm} > 5.3 \text{ cm}$

(v) 6cm, 7cm, 14cm

It is not possible to draw

$(6 + 7) \text{ cm not} > 14 \text{ cm}$

i.e. $13 \text{ cm not} > 14 \text{ cm}$ ($13 \text{ cm} < 14 \text{ cm}$)

Question 2.

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Solution:

Two sides of a triangle are 5 cm and 9 cm long

Then the third side will be less than $(5 + 9)$ or less than 14 cm

Question 3.**Solution:**

(i) In $\triangle APB$,

$PA + PB > AB$ (sum of two sides is greater than its third side)

(ii) In $\triangle PBC$,

$PB + PC > BC$ (sum of two sides is greater than its third side)

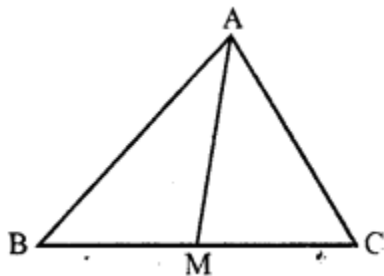
(iii) In $\triangle PAC$,

$AC < PA + PC$ ($PA + PC > AC$)

Question 4.**Solution:**

Proof: AM is the median of $\triangle ABC$

M is mid-point of BC



In $\triangle ABM$,

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$$AB + BM > AM \dots(i)$$

(Sum of any two sides of a triangle is greater than its third side)

Similarly in $\triangle ACM$,

$$AC + MC > AM \dots(ii)$$

Adding (i) and (ii)

$$AB + BM + AC + MC > 2AM$$

$$\Rightarrow AB + AC + BM + MC > 2AM$$

$$\Rightarrow AB + AC + BC > 2AM$$

Hence proved.

Question 5.

Solution:

Given: In $\triangle ABC$, P is a point on BC.

AP is joined.

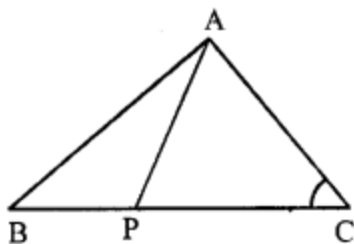
To prove :

$$(AB + BC + AC) > 2AP$$

Proof : In $\triangle ABP$,

$$AB + BP > AP \dots(i) \text{ (Sum of two sides is greater than third)}$$

Similarly in $\triangle ACP$,



$$AC + PC > AP \dots(ii)$$

Adding (i) and (ii)

$$AB + BP + AC + PC > AP + AP$$

$$\Rightarrow AB + BP + PC + CA > 2AP$$

$$\Rightarrow AB + BC + CA > 2AP$$

Hence proved.

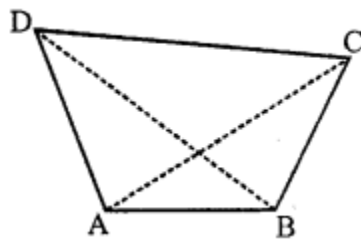
Question 6.

Solution:

ABCD is a quadrilateral AC and BD are joined.

Proof: Now in $\triangle ABC$

$$AB + BC > AC \dots(i)$$



(Sum of any two sides of a triangle is greater than its third side)

Similarly in $\triangle ADC$,

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$$AD + CD > AC \dots(ii)$$

In $\triangle ABD$,

$$AB + AD > BD \dots(iii)$$

and in $\triangle BCD$,

$$BC + CD > BD \dots(iv)$$

Adding (i), (ii), (iii) and (iv)

$$AB + BC + CD + AD + AB + AD + BC + CD > AC + AC + BD + BD$$

$$\Rightarrow 2(AB + BC + CD + AD) > 2(AC + BD)$$

$$\Rightarrow AB + BC + CD + AD > AC + BD$$

Hence proved.

Question 7.

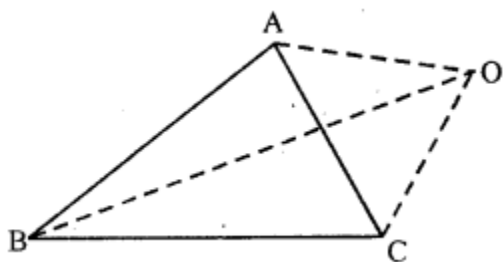
Solution:

Given : O is any point outside of the $\triangle ABC$

To prove : $2(OA + OB + OC) > (AB + BC + CA)$

Construction : Join OA, OB and OC.

Proof: In $\triangle AOB$,



$OA + OB > AB \dots(i)$ (Sum of two sides of a triangle is greater than its third side)

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Similarly in $\triangle BOC$,

$$OB + OC > BC \dots(ii)$$

and in $\triangle COA$

$$OC + OA > CA \dots(iii)$$

Adding (i), (ii) and (iii), we get:

$$OA + OB + OB + OC + OC + OA > AB + BC + CA$$

$$2(OA + OB + OC) > (AB + BC + CA)$$

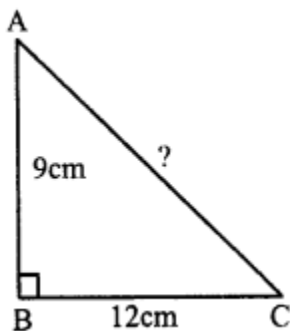
Hence proved.

Ex 15D

Question 1.

Solution:

In right triangle ABC, $\angle B = 90^\circ$ AB = 9cm, BC = 12cm



By Pythagoras Theorem,

$$AC^2 = AB^2 + BC^2 = (9)^2 + (12)^2 = 81 + 144 = 225$$

$$AC = \sqrt{225} = 15 \text{ cm}$$

Question 2.

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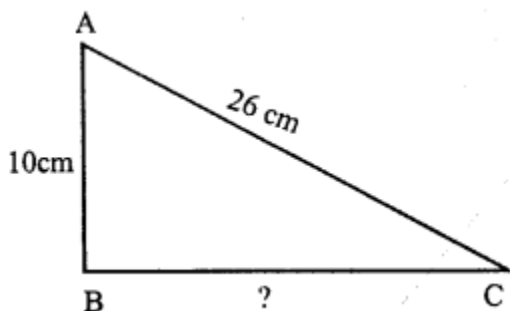
Solution:

In right $\triangle ABC$, $\angle B = 90^\circ$

$AC = 26\text{cm}$, $AB = 10\text{cm}$

By Pythagoras Theorem

$$AC^2 = AB^2 + BC^2$$



$$\Rightarrow (26)^2 = (10)^2 + BC^2$$

$$\Rightarrow 676 = 100 + BC^2$$

$$\Rightarrow BC^2 = 676 - 100 = 576 = (24)^2$$

$$\Rightarrow BC = 24 \text{ cm}$$

Question 3.**Solution:**

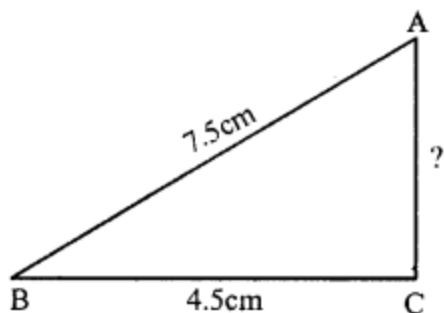
In right $\triangle ABC$, $\angle C = 90^\circ$,

$AB = 7.5\text{cm}$, $BC = 4.5\text{cm}$

By Pythagoras Theorem

$$AB^2 = BC^2 + AC^2$$

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$$\Rightarrow (7.5)^2 = (4.5)^2 + AC^2$$

$$\Rightarrow 56.25 = 20.25 + AC^2$$

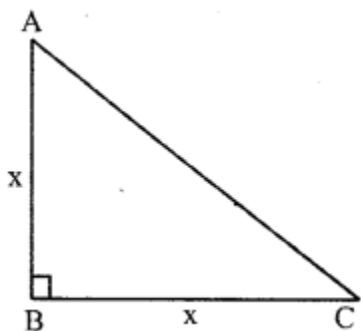
$$\Rightarrow AC^2 = 56.25 - 20.25 = 36.00 = (6)^2$$

$$\Rightarrow AC = 6\text{cm}$$

Question 4.**Solution:**

In $\triangle ABC$, $\angle B = 90^\circ$

Let each leg = x cm



By Pythagoras Theorem,

$$x^2 + x^2 = AC^2$$

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

$$\Rightarrow x^2 = 25 = (5)^2$$

$$\Rightarrow x = 5$$

Length of each equal leg = 5cm

Question 5.

Solution:

A triangle is a right-angled,

If (Hypotenuse)² = sum of squares of other two sides

If $(39)^2 = (15)^2 + (36)^2$ (Hypotenuse is the longest side)

If $1521 = 225 + 1296$

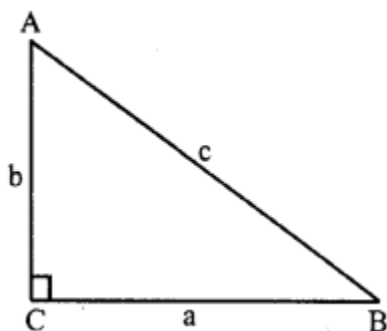
If $1521 = 1521$ Which is true.

It is a right-angled triangle.

Question 6.

Solution:

In $\triangle ABC$, $\angle C = 90^\circ$



$a = 6\text{cm}$, $b = 4.5\text{cm}$.

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By Pythagoras Theorem

$$c^2 = a^2 + b^2 = (6)^2 + (4.5)^2 = 36.00 + 20.25 = 56.25 = (7.5)^2$$

$$c = 7.5 \text{ cm}$$

Question 7.

Solution:

A triangle will be a right angled

if (longest side)² = Sum of squares of other two sides

(i) $a = 15\text{cm}$, $b = 20\text{cm}$, $c = 25\text{cm}$.

Here, longest side = c ,

The triangle will be right angled

$$\text{if } c^2 = a^2 + b^2$$

$$\text{if } (25)^2 = (15)^2 + (20)^2$$

$$\text{if } 625 = 225 + 400 = 625 \text{ Which is true.}$$

It is a right angled triangle.

(ii) $a = 9\text{cm}$, $b = 12\text{cm}$, $c = 16\text{cm}$

$\triangle ABC$ is a right angled triangle if

$$c^2 = a^2 + b^2$$

$$\text{if } (16)^2 = (9)^2 + (12)^2$$

$$\text{if } 256 = 81 + 144 = 225$$

$$\Rightarrow 256 \neq 225$$

Which is not true

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Triangle is not a right angled triangle.

(iii) $a = 10\text{cm}$, $b = 24\text{cm}$, $c = 26\text{cm}$

The triangle ABC is a right angled triangle

if $c^2 = a^2 + b^2$

if $(26)^2 = (10)^2 + (24)^2$

if $676 = 100 + 576$

if $676 = 676$ Which is true.

The triangle is a right angled triangle.

Question 8.

Solution:

In $\triangle ABC$,

$\angle B = 35^\circ$ and $\angle C = 55^\circ$

$\angle A = 180^\circ - (\angle B + \angle C) = 180^\circ - (35^\circ + 55^\circ) = 180^\circ - 90^\circ = 90^\circ$

$\triangle ABC$ is a right angled triangle

By Pythagoras Theorem,

$BC^2 = AB^2 + AC^2$

(iii) is true

Question 9.

Solution:

AB is a ladder and it is 15 m long B is window and $BC = 12\text{ m}$

In right $\triangle ABC$

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$AB^2 = AC^2 + BC^2$ (By Pythagoras Theorem)

$$\Rightarrow (15)^2 = x^2 + (12)^2$$

$$\Rightarrow (15)^2 = x^2 + (12)^2$$

$$\Rightarrow 225 = x^2 + 144$$

$$\Rightarrow x^2 = 225 - 144$$

$$\Rightarrow x^2 = 81 = (9)^2$$

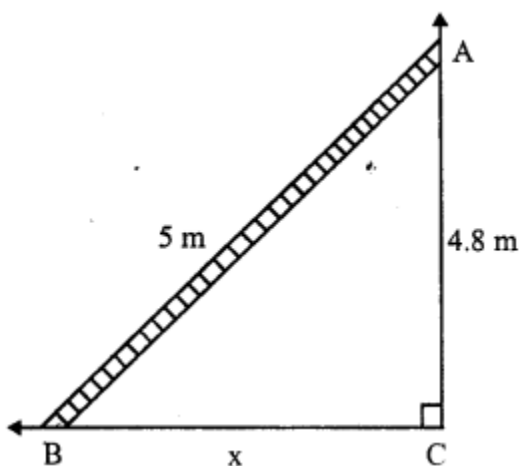
$$x = 9 \text{ m}$$

Distance of the foot of ladder from the wall = 9 m

Question 10.

Solution:

Let AB be the ladder and AC be the height.



Length of ladder AB = 5m

and height CA = 4.8m

Let distance of the ladder from the wall BC = x

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Now in right angled $\triangle ABC$, $\angle C = 90^\circ$

$AB^2 = AC^2 + BC^2$ (By Pythagoras Theorem)

$$\Rightarrow (5)^2 = (4.8)^2 + x^2$$

$$\Rightarrow 25 = 23.04 + x^2$$

$$\Rightarrow x^2 = 25.00 - 23.04 = 1.96 = (1.4)^2$$

$$\Rightarrow x = 1.4$$

The foot of ladder are 1.4m away from the wall.

Question 11.

Solution:

Let AB be the tree which broke at D and its top A touches the ground at C

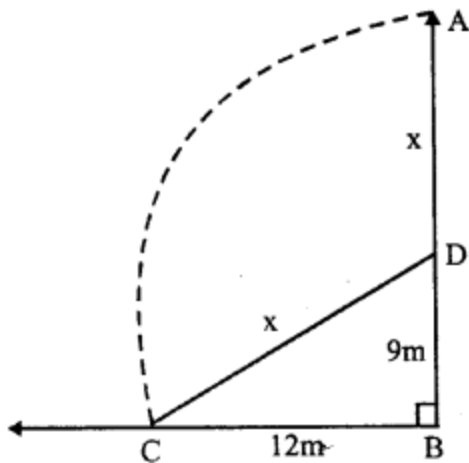
their $BD = 5\text{m}$, $BC = 12\text{m}$,

Let $AD = x\text{ m}$, then $CD = x\text{ m}$

Now, in right $\triangle ABC$,

$$CD^2 = BD^2 + BC^2$$

(By Pythagoras Theorem)



$$CD^2 = (9)^2 + (12)^2 = 81 + 144 = 225 = (15)^2$$

$$CD = 15\text{m},$$

$$AD = x = 15\text{m}$$

$$\text{Height of the tree } AB = AD + BD = 15 + 9 = 24\text{m}$$

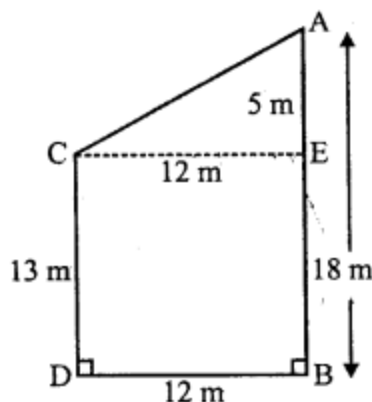
Question 12.

Solution:

AB and CD are two poles and they are 12,m apart

$$AB = 18 \text{ m}, CD = 13\text{m and } BD = 12 \text{ m}$$

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From C, draw $CE \parallel BD$ Then

$$CE = BD = 12 \text{ m}$$

$$\text{and } AE = AB - EB = AB - CD = 18 - 13 = 5 \text{ m}$$

Join AC

Now in right $\triangle ACE$

$$AC^2 = CE^2 + AE^2$$

(By Pythagoras Theorem)

$$AC^2 = (12)^2 + (5)^2 = 144 + 25 = 169 = (13)^2$$

$$AC = 13 \text{ m}$$

Distance between their tops = 13 m

Question 13.

Solution:

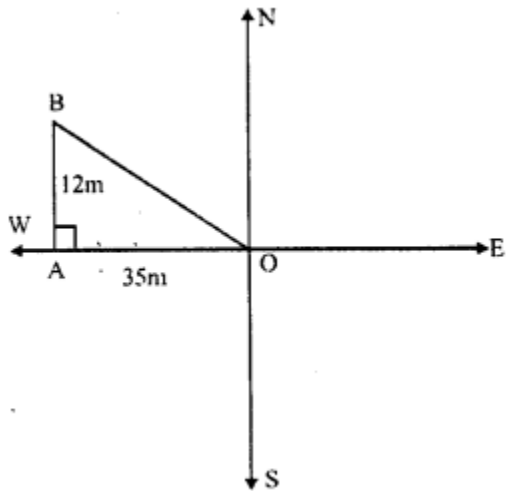
A man starts from O and goes 35m due west and then 12m due north, then

In rights $\triangle OAB$,

$$OA = 35 \text{ m}$$

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AB = 12 m



$OB^2 = OA^2 + AB^2$ (By Pythagoras Theorem)

$$= (35)^2 + (12)^2 = 1225 + 144 = 1369 = (37)^2$$

OB = 37

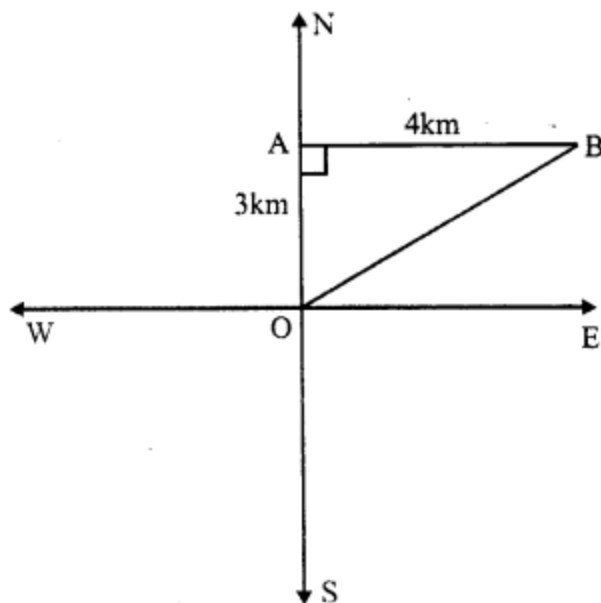
Hence he is 37m away from the starting point

Question 14.

Solution:

A man goes 3km due north and then 4km east.

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In right angled $\triangle OAB$,

$OA = 3\text{km}$.

$AB = 4\text{km}$.

$OB^2 = OA^2 + AB^2$ (By Pythagoras Theorem)

$$= (3)^2 + (4)^2 = 9 + 16 = 25 = (5)^2$$

$OB = 5\text{km}$

Hence he is 5km from the initial position.

Question 15.

Solution:

ABCD is a rectangle whose sides

$AB = 16\text{cm}$ and $BC = 12\text{cm}$.

AC is its diagonal

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In right angled $\triangle ABC$

$$AC^2 = AB^2 + BC^2$$

(By Pythagoras Theorem)

$$= (16)^2 + (12)^2 = 256 + 144 = 400 = (20)^2$$

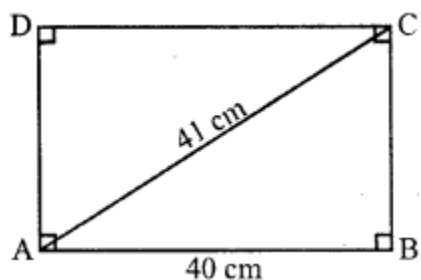
$$AC = 20\text{cm}$$

Hence length of diagonal $AC = 20\text{ cm}$

Question 16.

Solution:

ABCD is a rectangle and AC is its diagonal



$AB = 40\text{ cm}$ and $AC = 41\text{ cm}$

Now in right $\triangle ABC$

$$AC^2 = AB^2 + BC^2 \text{ (By Pythagoras Theorem)}$$

$$\Rightarrow (41)^2 = (40)^2 + BC^2$$

$$\Rightarrow 1681 = 1600 + BC^2$$

$$\Rightarrow BC^2 = 1681 - 1600 = 81 = (9)^2$$

$$\Rightarrow BC = 9\text{ cm}$$

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Now perimeter of rectangle ABCD = 2 (AB + BC)

$$= 2 (40 + 9) = 2 \times 49 = 98 \text{ cm}$$

Question 17.

Solution:

Perimeter of rhombus ABCD = 4 x Side

Diagonal AC = 30 cm and BD = 16 cm

The diagonals of rhombus bisect each other at right angles

$$AO = OC = \frac{30}{2} = 15 \text{ cm}$$

$$\text{and } BO = OD = \frac{16}{2} = 8 \text{ cm}$$

Now in right $\triangle AOB$,

$$AB^2 = AO^2 + BO^2 = (15)^2 + (8)^2 = 225 + 64 = 289 = (17)^2$$

$$AB = 17 \text{ cm}$$

$$\text{Now perimeter} = 4 \times \text{side} = 4 \times 17 = 68 \text{ cm}$$

Question 18.

Solution:

(i) In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

(ii) If the square of one side of a triangle is equal to the sum of the squares of the other two sides, then the triangle is a right angled.

(iii) Of all the line segments that can be drawn to a given line from a given point outside it, the perpendicular is the shortest.

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