NCERT Solutions for 7th Class Maths: Chapter 6-The Triangle and its Properties

Class 7: Maths Chapter 6 solutions. Complete Class 7 Maths Chapter 6 Notes.

NCERT Solutions for 7th Class Maths: Chapter 6-The Triangle and its Properties
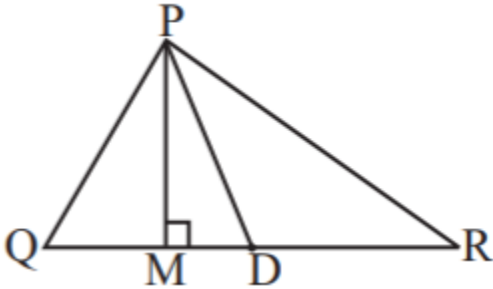
NCERT 7th Maths Chapter 6, class 7 Maths Chapter 6 solutions

1. In APQR, D is the midpoint of $\overline{QR}$

$\overline{PM}$ is _____

PD is_____

Is QM = MR?

Answer

QD = DR

∴ $\overline{PM}$ is altitude.

PD is median.

No, QM (eq) MR as D is the mid-point of QR.

2. Draw rough sketches for the following:
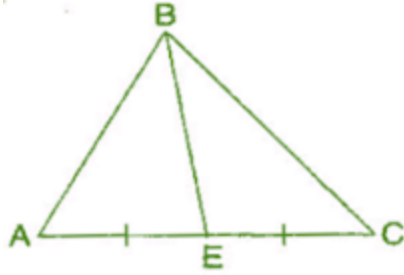
(a) In ΔABC, BE is a median.

(b) In ΔPQR, PQ and PR are altitudes of the triangle.

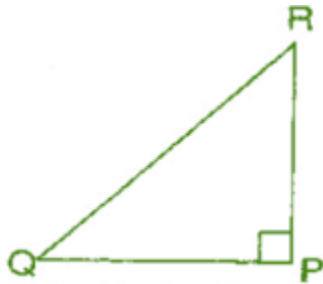**(c) In ΔXYZ, YL is an altitude in the exterior of the triangle.**

Answer

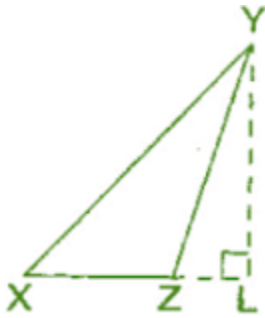(a) Here, BE is a median in ΔABC and AE = EC.

(b) Here, PQ and PR are the altitudes of the ΔPQR and RP ⊥ QP.

(c) YL is an altitude in the exterior of ΔXYZ.

3. Verify by drawing a diagram if the median and altitude of a isosceles triangle can be same.
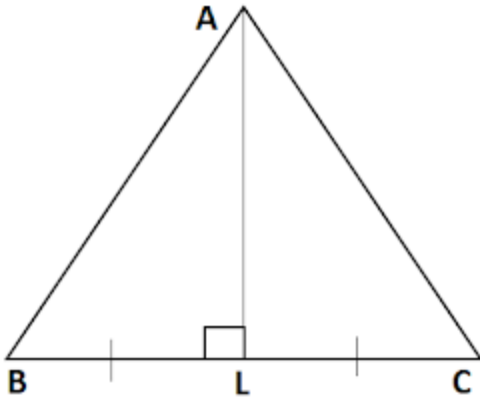
Answer

Isosceles triangle means any two sides are same.

Take ΔABC and draw the median when AB = AC.

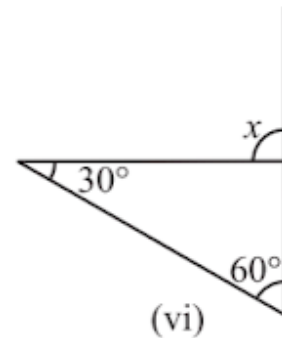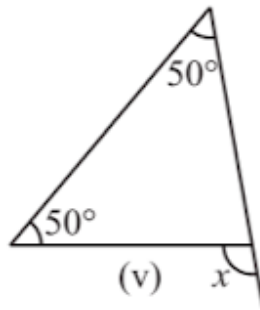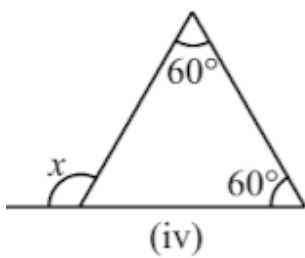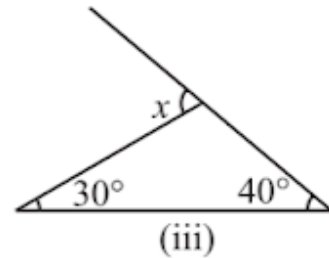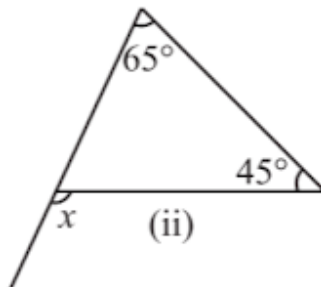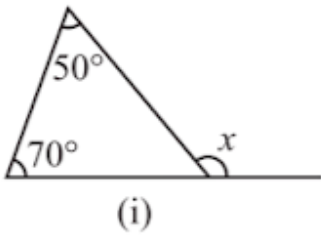AL is the median and altitude of the given triangle.

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Exercise 6.2

1. Find the value of the unknown exterior angle x in the following diagrams:

Answer

(i) x = 50° + 70° = 120°

(ii) x = 65° + 45° = 110°

(iii) x = 30° + 40° = 70°

(iv) x = 60°+60° = 120°

(v) x = 50° + 50° = 100°

(vi) x = 60° + 30° = 90°

2. Find the value of the unknown interior angle x in the following figures:
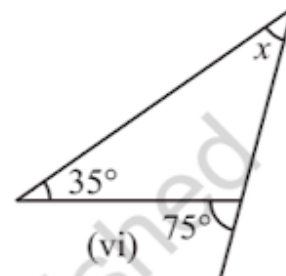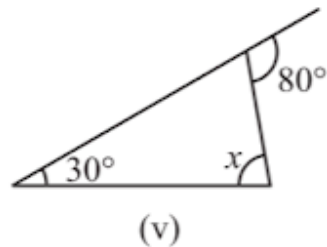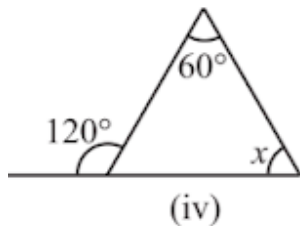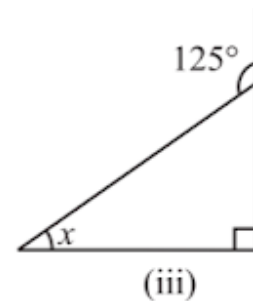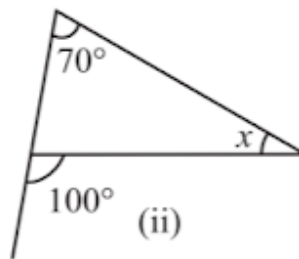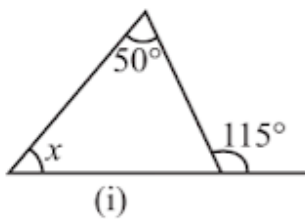
Answer

(i) x + 50° = 115°   ⇒   x = 115° - 50° = 65°

(ii) 70°+ x = 100°   ⇒   x = 100°- 70° = 30°

(iii) x + 90° = 125° ⇒ x = 120°- 90° = 35°

(iv) 60°+ x = 120°   ⇒ x = 120°- 60° = 60°

(v)   30° + x = 80°   ⇒   x = 80°- 30° = 50°

(vi) x + 35°= 75°   ⇒ x = 75°- 35° = 40°

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Exercise 6.3

1. Find the value of unknown x in the following diagrams:
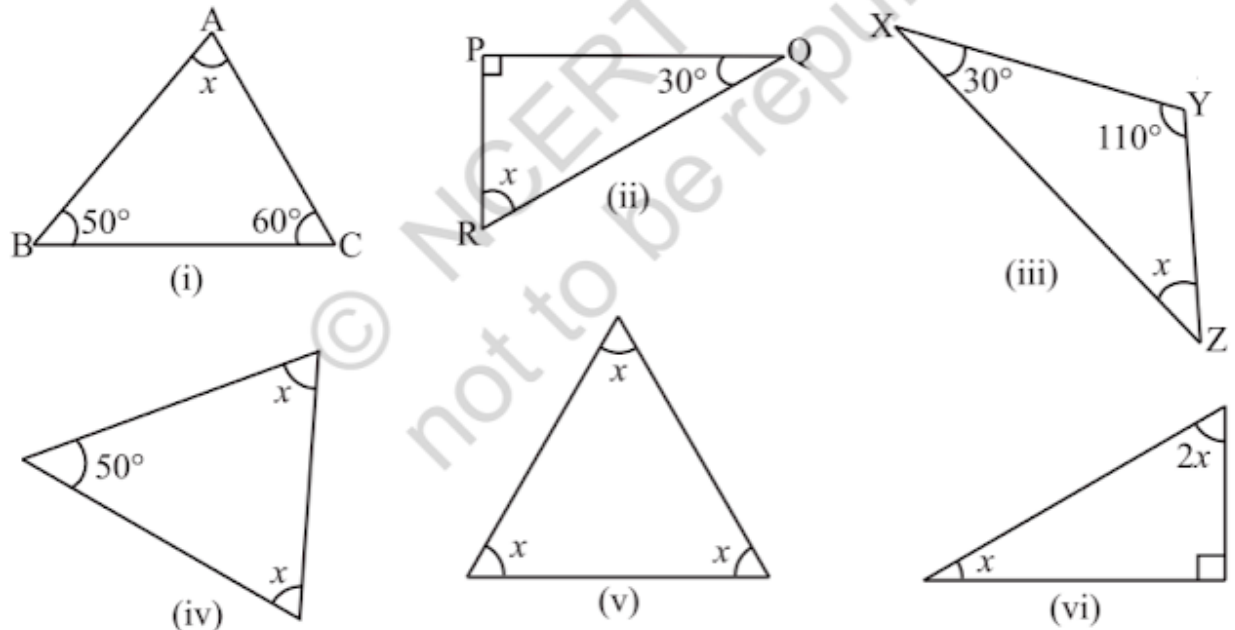
Answer

(i) In ∆ABC,

∠ BAC + ∠ ACB + ∠ ABC = 180° [By angle sum property of a triangle]

⇒ x + 50°+ 60° = 180°

⇒ x + 110° = 180°

⇒ x = 180°-110° = 70°

(ii) In ∆PQR,

∠ RPQ + ∠ PQR + ∠ RPQ = 180° [By angle sum property of a triangle]

⇒ 90°+30°+ x = 180°

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⇒ x+ 120° = 180°

⇒ x= 180°-120°= 60°

(iii) In ΔXYZ,

∠ ZXY + ∠ XYZ + ∠ YZX = 180° [By angle sum property of a triangle]

⇒ 30° + 110° + x = 180°

⇒ x + 140° = 180°

⇒ x = 180°-140° = 40°

(iv) In the given isosceles triangle,

x+x + 50° = 180°   [By angle sum property of a triangle]

⇒ 2x+50°= 180°

⇒ 2x = 180°- 50°

⇒ 2x = 130°

⇒ x = 130°/2 = 65°

(v) In the given equilateral triangle,

x +x+x = 180° [By angle sum property of a triangle]

⇒ 3x = 180°

⇒ x = 180°/3 = 60°

(vi) In the given right angled triangle,

x + 2x+90° = 180°   [By angle sum property of a triangle)

⇒ 3x+90° = 180°

⇒ 3* = 180°- 90°

⇒ 3x = 90°

⇒ x = 90°/3 = 30°

2. Find the values of the unknowns x and y in the following diagrams:

(i)

(ii)

(iii)

(iv)

(v)

(vi)
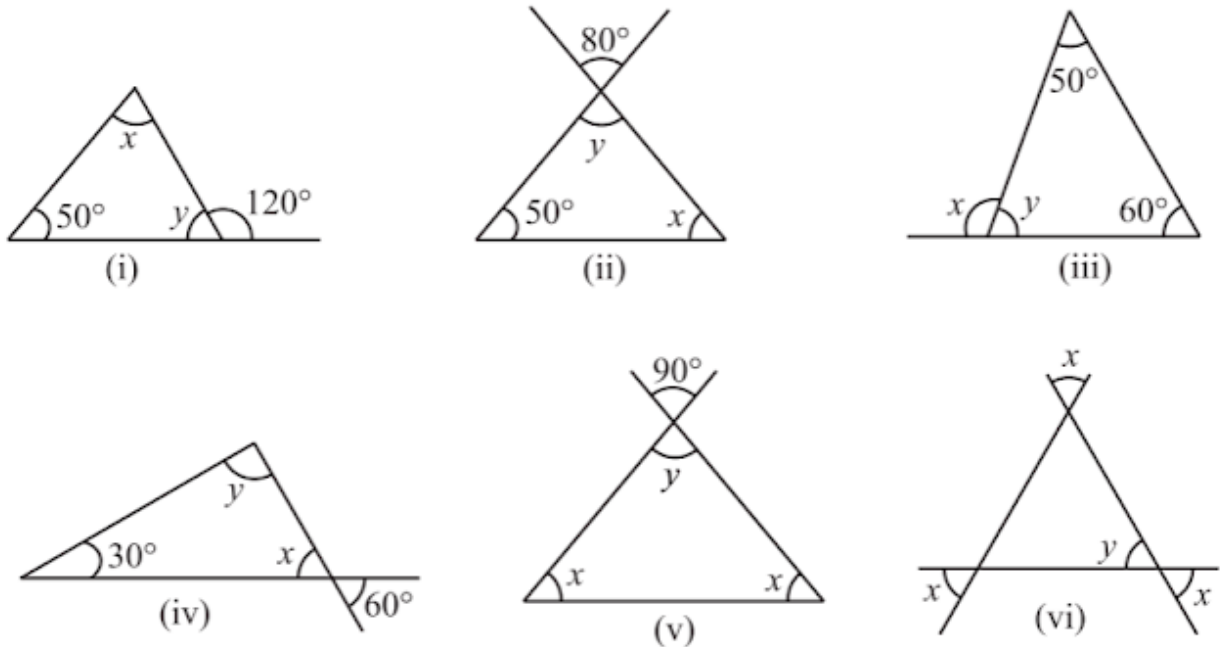
Answer

(i) 50° + x = 120°   [Exterior angle property of a Δ]

⇒   x = 120°-50° = 70°

Now, 50° + x + y =180°   [Angle sum property of a Δ]

⇒ 50° + 70° + y = 180°

⇒ 120° + y= 180°

⇒ y = 180° -120° = 60°

(ii) y = 80° ..... (i)   [Vertically opposite angle]

Now, 50° + x + y =180°   [Angle sum property of a Δ]

⇒ 50° + 80°+y = 180°   [From equation (i)]

⇒ 130° + y = 180°

⇒ y = 180° -130° = 50°

(iii) 50°+ 60° = x   (Exterior angle property of a Δ]

x = 110°

Now 50° + 60°+ y = 180°   [Angle sum property of a Δ]

⇒ 110° + y = 180°

⇒ y = 180° - 110°

⇒ y = 70°

(iv) x = 60° ..... (i) [Vertically opposite angle]

Now, 30° + x + y = 180°   [Angle sum property of a Δ]

⇒ 50° + 60° + y = 180°   [From equation (i)]

⇒ 90° + y = 180°

⇒ y = 180° - 90° = 90°

(v) y = 90°   ....(i)   [Vertically opposite angle]

Now, y + x + x = 180°   [Angle sum property of a Δ]

⇒ 90° + 2x = 180°   [From equation (i)]

⇒ 2x = 180°- 90°

⇒ 2x = 90°

⇒ x = 90°/2 = 45°

(vi) x = y ...(i)   [Vertically opposite angle]

Now, x + x + y = 180°   [Angle sum property of a Δ]
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⇒ 2x+x = 180°   [From equation (i)]

⇒ 3x = 180°

⇒ x = 180°/3 = 60°

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Exercise 6.4

1. Is it possible to have a triangle with the following sides?

(i) 2 cm, 3 cm, 5 cm

(ii) 3 cm, 6 cm, 7 cm

(iii) 6 cm, 3 cm, 2 cm

Answer

(i) 2 cm, 3 cm, 5 cm

2 + 3 > 5 No

2 + 5 > 3 Yes

3 + 5 > 2 Yes

This triangle is not possible.

(ii) 3 cm, 6 cm, 7 cm

3 + 6 > 7 Yes

6 + 7 > 3 Yes

3 + 7 > 6 Yes

This triangle is possible.

(iii) 6 cm, 3 cm, 2 cm

6 + 3 > 2 Yes

6 + 2 > 3 Yes

2 + 3 > 6 No

This triangle is not possible.

2. Take any point O in the interior of a triangle PQR. Is:
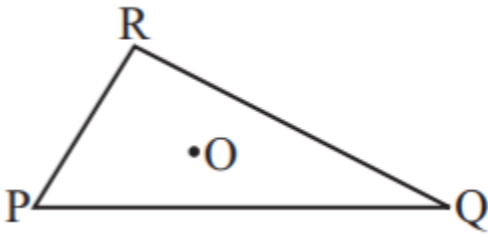
(i) OP + OQ > PQ ?

(ii) OQ + OR > QR?

(iii) OR + OP > RP?

Answer

Join OR, OQ and OP.

(i) Is OP + OQ > PQ ?

Yes, POQ form a triangle.

(ii) Is OQ + OR > QR ?

Yes, RQO form a triangle.

(iii) Is OR + OP > RP ?

Yes, ROP form a triangle.
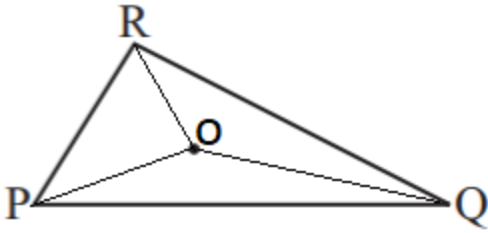
3. AM is a median of a triangle ABC. Is AB + BC + CA > 2 AM? (Consider the sides of triangles ΔABM and ΔAMC.)
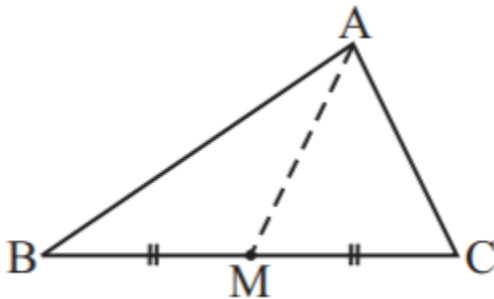
Answer

Since, the sum of lengths of any two sides in a triangle should be greater titan the length of third side.

Therefore, In ΔABM, AB + BM > AM ... (i)

In ΔAMC, AC + MC > AM ... (ii)

Adding eq. (i) and (ii),

AB + BM + AC + MC > AM + AM

⇒ AB + AC + (BM + MC) > 2AM

⇒ AB + AC + BC > 2AM

Hence, it is true.

4. ABCD is a quadrilateral. Is AB + BC + CD + DA > AC + BD?
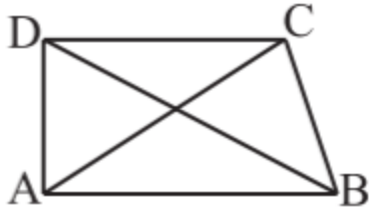
Answer

Since, the sum of lengths of any two sides in a triangle should be greater than the length of third side.

Therefore, In Δ ABC, AB + BC > AC ....(i)

In Δ ADC, AD + DC > AC (ii)

In ΔDCB, DC + CB > DB (iii)

In ΔADB, AD + AB > DB   (iv)

Adding equations (i), (ii), (iii) and (iv), we get

AB + BC + AD + DC + DC + CB + AD + AB > AC + AC + DB + DB

⇒ (AB + AB) + (BC + BC) + (AD + AD) + (DC + DC) > 2AC + 2DB

⇒ 2AB + 2BC +2AD + 2DC > 2(AC+DB)

⇒ 2(AB +BC + AD +DC) > 2(AC +DB)

⇒ AB + BC + AD + DC > AC + DB

⇒ AB + BC + CD + DA > AC + DB

5. ABCD is quadrilateral. Is AB + BC + CD + DA < 2 (AC + BD)?

Answer

Since, the sum of lengths of any two sides in a triangle should be greater than the length of third side.
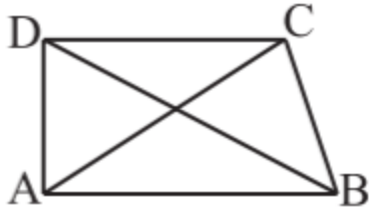
Therefore, In A AOB, AB < OA + OB .... (i)

In A BOC, BC < OB + OC (ii)

In A COD, CD<OC + OD (iii)

InAAOD, DA < OD + OA ....(iv)

Adding equations (i), (ii), (iii) and (iv), we get

AB + BC + CD + DA < OA + OB + OB + OC + OC + OD + OD + OA

⇒ AB + BC + CD + DA < 2OA + 20B + 2OC + 2OD

⇒ AB + BC + CD + DA < 2[(AO + OC) + (DO + OB)]

⇒ AB + BC + CD + DA < 2(AC + BD)

Hence, it is proved.

6. The lengths of two sides of a triangle are 12 cm and 15 cm. Between what two measures should the length of the third side fall?

Answer

Since, the sum of lengths of any two sides in a triangle should be greater than the length of third side.

It is given that two sides of triangle are 12 cm and 15 cm.

Therefore, the third side should be less than 12 + 15 = 27 cm.

Also the third side cannot be less than the difference of the two sides.

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Therefore, the third side has to be more than 15 – 12 = 3 cm. Hence, the third side could be the length more than 3 cm and less than 27 cm.

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Exercise 6.5

1. PQR is a triangle, right angled at P. If PQ = 10 cm and PR = 24 cm, find QR.

Answer
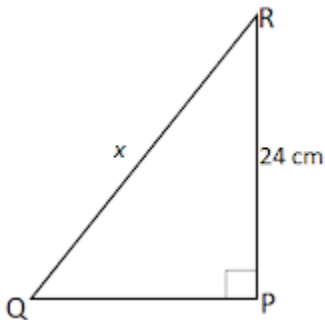
Given: PQ = 10 cm, PR = 24 cm

Let QR be x cm.

In right angled triangle QPR,

[Hypotenuse)^2 = (Base)^2 + (Perpendicular)^2 [By Pythagoras theorem]

⇒ (QR)^2 = (PQ)^2 + (PR]^2

⇒ x^2 = (10)^2 +(24)^2

⇒ x^2 = 100 + 576 = 676

$$\Rightarrow x = \sqrt{576}$$

= 26 cm

Thus, the length of QR is 26 cm.

2. ABC is a triangle, right angled at C. If AB = 25 cm and AC = 7 cm, find BC.

Answer

Given: AB = 25 cm, AC = 7 cm

Let BC be x cm.

In right angled triangle ACB,

(Hypotenuse)2 = (Base)2 + (Perpendicular)2   [By Pythagoras theorem]

⇒ (AB)2 = (AC)2 + (BC)2

⇒ (25)2 = (7)2+x2

⇒ 625 = 49 + x2

⇒ x2 = 625 - 49 = 576

$$\Rightarrow x = \sqrt{576}$$

= 24 cm

Thus, the length of BC is 24 cm.

3. A 15 m long ladder reached a window 12 m high from the ground on placing it against a wall at a distance a. Find the distance of the foot of the ladder from the wall.

15m   12m

a
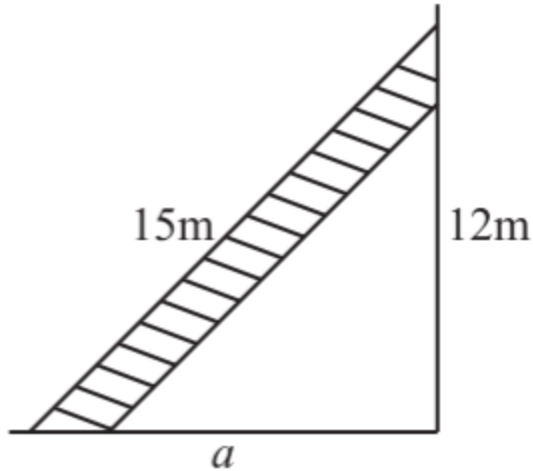
Answer
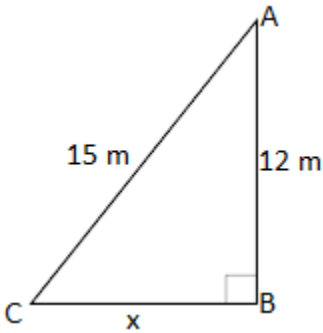
Let AC be the ladder and A be the window.

Given: AC = 15 m, AB = 12 m, CB = a m

In right angled triangle ACB,

(Hypotenuse)^2 = (Base)^2 + (Perpendicular)^2 [By Pythagoras theorem]

⇒ (AC)^2 = (CB)^2 + (AB)^2

⇒ (15)^2 + (a)^2 = (12)^2

⇒ 225 = a^2 + 144

⇒ a^2 = 225 - 144 = 81

$\Rightarrow a = \sqrt{81}$

= 9 m

Thus, the distance of the foot of the ladder from the wall is 9 m.

4. Which of the following can be the sides of a right triangle?

(i) 2.5 cm, 6.5 cm, 6 cm

(ii) 2 cm, 2 cm, 5 cm

(iii) 1.5 cm, 2 cm, 2.5 cm

In the case of right angled triangles, identify the right angles.

Answer

Let us consider, the larger side be the hypotenuse and also using Pythagoras theorem,

(Hypotenuse)^2 = (Base)^2 + (Perpendicular)^2
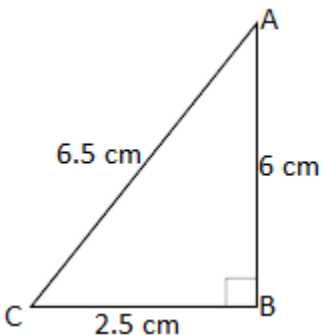
(i) 2.5 cm, 6.5 cm, 6 cm

In AABC, (AC)^2 = (AB)^2 + (BC)^2

L.H.S. = (6.5)^2 = 42.25 cm

R.H.S. = (6)^2 + (2.5)^2 = 36 + 6.25 = 42.25 cm

Since, L.H.S. = R.H.S.

Therefore, the given sides are of the right angled triangle.

Right angle lies on the opposite to the greater side 6.5 cm, i.e., at B.

(ii) 2 cm, 2 cm, 5 cm

In the given triangle, $(5)^2 = (2)^2 + (2)^2$

L.H.S. = $(5)^2$ = 25

R.H.S. = $(2)^2 + (2)^2$ = 4 + 4 = 8

Since, L.H.S. ≠ R.H.S.

Therefore, the given sides are not of the right angled triangle.

(iii) 1.5 cm, 2 cm, 2.5 cm

In ΔPQR, $(PR)^2 = (PQ)^2 + (RQ)^2$
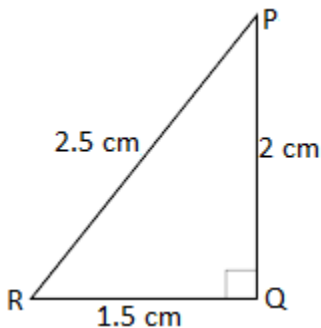
L.H.S. = $(2 5)^2$ = 6.25 cm

R.H.S. = $(1.5)^2 + (2)^2$ = 2.25 + 4 = 6.25 cm

Since, L.H.S. = R.H.S.

Therefore, the given sides are of the right angled triangle.

Right angle lies on the opposite to the greater side 2.5 cm, i.e., at Q.

5. A tree is broken at a height of 5 m from the ground and its top touches the ground at a distance of 12 m from the base of the tree. Find the original height of the tree.

Answer

Let A'CB represents the tree before it broken at the point C and let the top A' touches the ground at A after it broke. Then ΔABC is a right angled triangle, right angled at B.
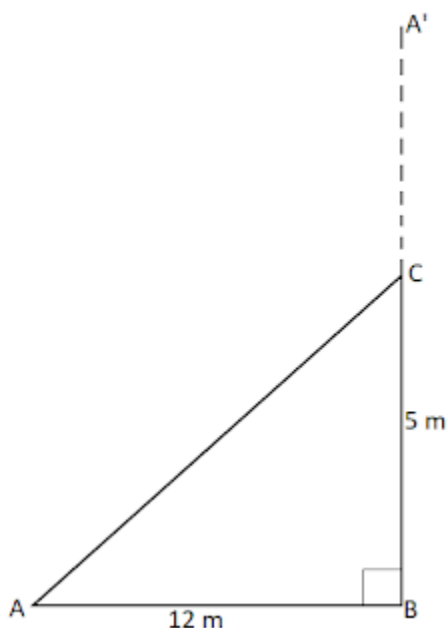
AB = 12 m and BC = 5 m

Using Pythagoras theorem, In ΔABC

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

$\Rightarrow (AC)^2 = (12)^2 + (5)^2$

$\Rightarrow (AC)^2 = 144 + 25$

$\Rightarrow (AC)^2 = 169$

$\Rightarrow AC = 13$ m

Hence, the total height o f the tree = AC + CB 13 + 5 = 18 m.

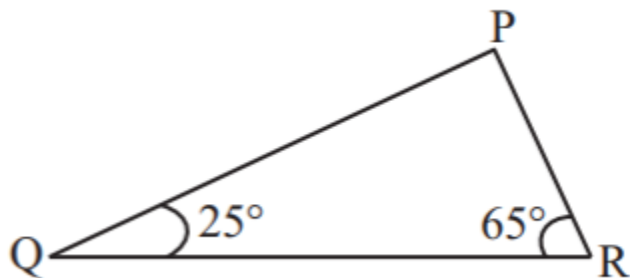https://www.indcareer.com/schools/ncert-solutions-for-7th-class-maths-chapter-6-the-triangle-and-its-properties/

6. Angles Q and R of a ΔPQR are 25° and 65°

Write which of the following is true:

(i) PQ² + QR² = RP²

(ii) PQ² + RP² = QR²

(iii) RP² + QR² = PQ²

Answer

In ΔPQR, ∠PQR + ∠QRP + ∠RPQ = 180°   [By Angle sum property of a Δ]

⇒ 25° + 65° + ∠RPQ = 180°

⇒ 90° + ∠RPQ = 180°

⇒ ∠RPQ = 180°- 90° = 90°

Thus, ΔPQR is a right angled triangle, right angled at P.

∴ (Hypotenuse)² = (Base)² + (Perpendicular)²   [By Pythagoras theorem]

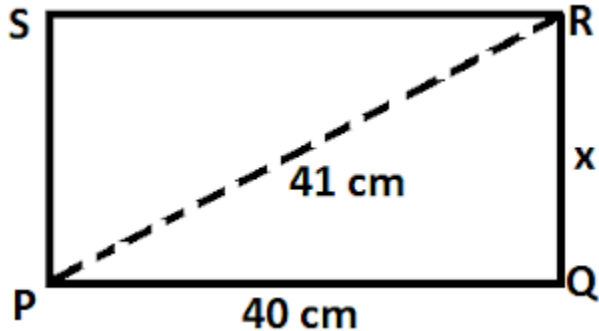⇒ (QR)² = (PR)² + (QP)²

Hence, Option (ii) is correct.

7. Find the perimeter of the rectangle whose length is 40 cm and a diagonal is 41 cm.

Answer

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Given diagonal (PR) = 41 cm, length (PQ) = 40 cm

Let breadth (QR) be x cm.

Now, in right angled triangle PQR,

$(PR)^2 = (RQ)^2 + (PQ)^2$ [By Pythagoras theorem]

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

$\Rightarrow 1681 = x^2 + 1600$

$\Rightarrow x^2 = 1681 - 1600$

$\Rightarrow x^2 = 81$

$\Rightarrow x = \sqrt{81}$

= 9 cm

Therefore the breadth of the rectangle is 9 cm,

Perimeter of rectangle - 2(length + breadth)

= 2 [9 + 49)

= 2 × 49 = 98 cm

Hence, the perimeter of the rectangle is 98 cm.

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8. The diagonals of a rhombus measure 16 cm and 30 cm. Find its perimeter.
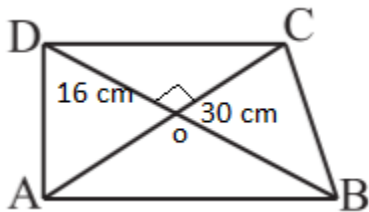
Answer

Given: Diagonals AC = 30 cm and DB = 16 cm.

Since the diagonals of the rhombus bisect at right angle to each other.

Therefore, OD = DB/2 = 16/2 = 8 cm

And OC = AC/2 = 30/2 = 15 cm

Now , In right angle triangle DOC,

$(DC)^2 = (OD)^2 + (OC)^2$ [By Pythagoras dieorem]

⇒ $(DC)^2 = (8)^2 + (15)^2$

⇒ $(DC)^2 = 64 + 225 = 289$

$$\Rightarrow DC = \sqrt{289}$$

= 17 cm

Perimeter of rhombus = 4 x side = 4 x 17 = 68 cm

Thus, die perimeter of rhombus is 68 cm.

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Chapterwise NCERT Solutions for Class 7 Maths :

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