

Chapter 6: Triangles

NCERT Exemplar · Class 7 · Maths

Questions

Question 1

The sides of a triangle have lengths (in cm) 10, 6.5 and a , where a is a whole number. The minimum value that a can take is

- (a) 6 (b) 5 (c) 3 (d) 4

Solution

Solution:-

- (d) 4

In the question two sides are given, 10 and 6.5.

We know that, the sum of the lengths of any two sides of a triangle is always greater than the length of the third side.

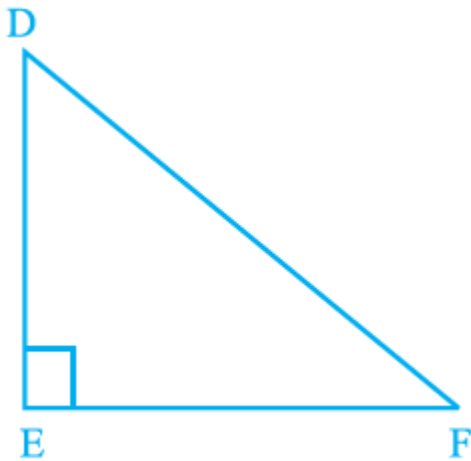
$$\text{So, } 6.5 + a = 10$$

$$a > 10 - 6.5$$

$$a > 3.5 \text{ i.e. } 4$$

Question 2

Triangle DEF of Fig. 6.6 is a right triangle with $\angle E = 90^\circ$. What type of angles are $\angle D$ and $\angle F$?

*Fig. 6.6*

- (a) They are equal angles
- (b) They form a pair of adjacent angles
- (c) They are complementary angles
- (d) They are supplementary angles

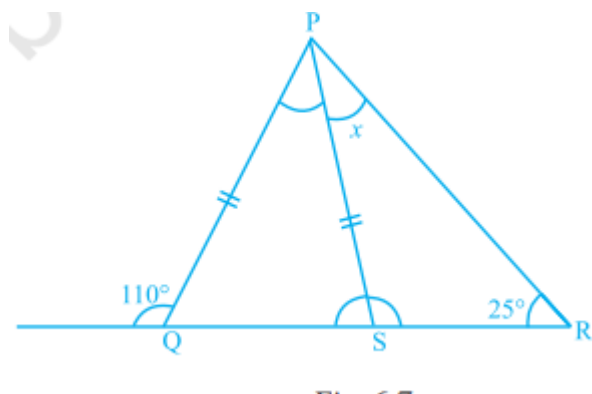
Solution**Solution: –**

- (c) They are complementary angles

Question 3

In Fig. 6.7, $PQ = PS$. The value of x is

- (a) 35° (b) 45° (c) 55° (d) 70°



Solution

Solution:-

(b) 45°

From the given figure,

In triangle PQS, $\angle PSQ + \angle QPS = 110^\circ$... [from exterior angle property of a triangle]

We know that, sum of all angles of the triangle is equal to 180° .

So, $\angle PSQ + \angle QPS + \angle PQS = 180^\circ$

$$\angle PQS = 180^\circ - 110^\circ$$

$$\angle PQS = 70^\circ$$

Now, consider the triangle PRS,

$\angle PSQ = x + 25^\circ$... [from the exterior angle property of a triangle]

$$x = 70^\circ - 25^\circ$$

$$x = 45^\circ$$

Question 4

In a right-angled triangle, the angles other than the right angle are

(a) obtuse (b) right (c) acute (d) straight

Solution

Solution:-

(c) acute

Question 5

In an isosceles triangle, one angle is 70° . The other two angles are of

(i) 55° and 55° (ii) 70° and 40° (iii) any measure

In the given option(s), which of the above statement(s) are true?

(a) (i) only (b) (ii) only (c) (iii) only (d) (i) and(ii)

Solution

Solution:-

(d) (i) and(ii)

From the question it is given that,

One angle of an isosceles triangle is 70° .

We know that, in an isosceles triangle 2 angles are equal corresponding with 2 equal sides,

If 70° is 3rd angle of triangle,

$$70^\circ + x + x = 180^\circ$$

$$2x + 70^\circ = 180^\circ$$

$$2x = 180^\circ - 70^\circ$$

$$x = (110^\circ/2)$$

$$x = 55^\circ$$

So, both angles are 55°

Consider the 70° as base angle of an isosceles triangle

$$\text{Then, } 70^\circ + 70^\circ + x = 180^\circ$$

$$x = 180^\circ - 140^\circ$$

$$x = 40^\circ$$

So, one angle is 40° and another is 70°

Question 6

In a triangle, one angle is of 90° . Then

(i) The other two angles are of 45° each

(ii) In the remaining two angles, one angle is 90° and other is 45°

(iii) Remaining two angles are complementary In the given option(s) which is true?

(a) (i) only (b) (ii) only (c) (iii) only (d) (i) and (ii)

Solution

Solution:-

(c) (iii) only

Question 7

Lengths of the sides of a triangle are 3 cm, 4 cm and 5 cm. The triangle is

- (a) Obtuse angled triangle (b) Acute-angled triangle
(c) Right-angled triangle (d) An Isosceles right triangle

Solution

Solution:-

(c) Right-angled triangle

Question 8

In Fig. 6.8, $PB = PD$. The value of x is

- (a) 85° (b) 90° (c) 25° (d) 35°

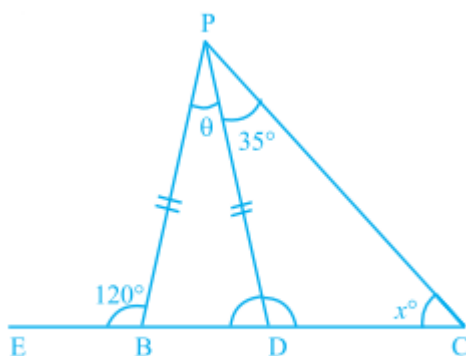


Fig. 6.8

Solution

Solution:-

(c) 25°

The exterior angle of a triangle is equal to the sum of 2 opposite interior angles.

As BC is a straight line

$$\angle PBD + 120^\circ = 180^\circ$$

$$\angle PBD = 180^\circ - 120^\circ$$

$$\angle PBD = 60^\circ$$

Given in an isosceles $\triangle PBD$, $PB = PD$

$$\therefore \angle PBD = \angle PDB$$

With exterior angle $\angle PSQ$ equal to the sum of opposite interior angles

$$\angle PDB = \angle DPC + \angle PCD \text{ [Exterior Angle Property]}$$

$$60^\circ = x + 35^\circ$$

$$x = 60^\circ - 35^\circ$$

$$x = 25^\circ$$

Question 9

In $\triangle PQR$,

(a) $PQ - QR > PR$

(b) $PQ + QR < PR$

(c) $PQ - QR < PR$

(d) $PQ + PR < QR$

Solution

Solution:-

(c) $PQ - QR < PR$

The difference between the lengths of any two sides of a triangle is always smaller than the length of the third side.

Question 10

In ΔABC ,

- (a) $AB + BC > AC$
- (b) $AB + BC < AC$
- (c) $AB + AC < BC$
- (d) $AC + BC < AB$

Solution

Solution:-

- (a) $AB + BC > AC$

The sum of the lengths of any two sides of a triangle is always greater than the length of the third side.

Question 11

The top of a broken tree touches the ground at a distance of 12 m from its base. If the tree is broken at a height of 5 m from the ground then the actual height of the tree is

- (a) 25 m (b) 13 m (c) 18 m (d) 17 m

Solution

Solution: –

- (c) 18 m

From the question it is given that,

The top of a broken tree touches the ground at a distance of 12 m from its base

The broken height of the tree = 5 m

By using Pythagoras theorem,

$$\text{Hypotenuse}^2 = \text{Base}^2 + \text{Height}^2$$

$$\text{Hypotenuse}^2 = 12^2 + 5^2$$

$$\text{Hypotenuse}^2 = 144 + 25$$

$$\text{Hypotenuse}^2 = 169$$

$$\text{Hypotenuse} = \sqrt{169}$$

$$\text{Hypotenuse} = 13$$

$$\text{So, the total height of tree} = 5 + 13 = 18 \text{ m}$$

Question 12

The triangle ABC formed by AB = 5 cm, BC = 8 cm, AC = 4 cm is

- (a) an isosceles triangle only (b) a scalene triangle only
(c) an isosceles right triangle (d) scalene as well as a right triangle

Solution

Solution: –

- (b) a scalene triangle only

A scalene triangle is a triangle that has three unequal sides.

Question 13

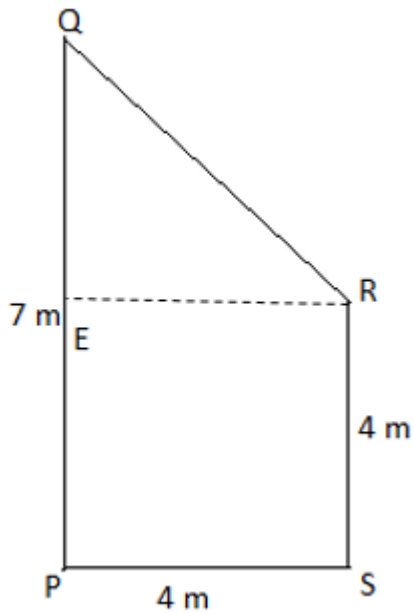
Two trees 7 m and 4 m high stand upright on a ground. If their bases (roots) are 4 m apart, then the distance between their tops is

- (a) 3 m (b) 5 m (c) 4 m (d) 11 m

Solution

Solution:-

- (b) 5 m



Consider PQ is the tree of height 7m and RS is the tree of height 4 m.

So, consider the triangle QRE, from the Pythagoras theorem,

$$QR^2 = QE^2 + ER^2$$

$$QR^2 = 3^2 + 4^2$$

$$QR^2 = 9 + 16$$

$$QR^2 = 25$$

$$QR = \sqrt{25}$$

$$QR = 5$$

Therefore, the distance between the top of the two trees is 5m.

Question 14

If in an isosceles triangle, each of the base angles is 40° , then the triangle is

- (a) Right-angled triangle (b) Acute angled triangle
(c) Obtuse angled triangle (d) Isosceles right-angled triangle

Solution

Solution: –

(c) Obtuse angled triangle

We know that, sum of interior angles of triangle is equal to 180° .

Let us assume the 3rd angle be Q,

$$\text{Then, } 40^\circ + 40^\circ + Q = 180^\circ$$

$$80^\circ + Q = 180^\circ$$

$$Q = 180 - 80$$

$$Q = 100^\circ$$

An obtuse triangle (or obtuse-angled triangle) is a triangle with one obtuse angle (greater than 90°) and two acute angles. Since a triangle's angles must sum to 180° .

Question 15

If two angles of a triangle are 60° each, then the triangle is

(a) Isosceles but not equilateral (b) Scalene

(c) Equilateral (d) Right-angled

Solution

Solution:-

(c) Equilateral

In an equilateral triangle, each angle has measure 60° .

Question 16

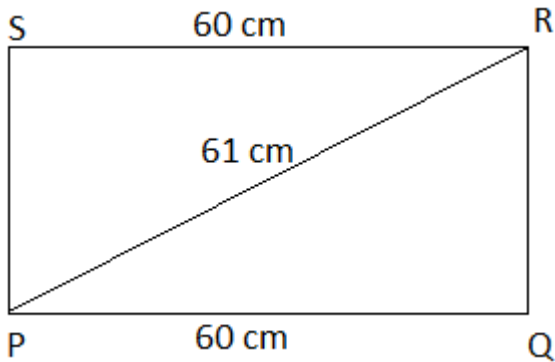
The perimeter of the rectangle whose length is 60 cm and a diagonal is 61 cm is

(a) 120 cm (b) 122 cm (c) 71 cm (d) 142 cm

Solution

Solution:-

(d) 142 cm



Consider the rectangle PQRS,

Given, length of rectangle PQ = 60 cm, Diagonal of the rectangle = 61 cm.

To find out the height of the rectangle, consider the right angled triangle PQR.

From the Pythagoras theorem, $PR^2 = PQ^2 + RQ^2$

$$61^2 = 60^2 + RQ^2$$

$$3721 = 3600 + RQ^2$$

$$RQ^2 = 3721 - 3600$$

$$RQ^2 = 121$$

$$RQ = \sqrt{121}$$

$$RQ = 11 \text{ cm}$$

Then, the perimeter of the rectangle PQRS = 2 (Length + Breadth)

$$= 2 (60 + 11)$$

$$= 2 (71)$$

$$= 142 \text{ cm}$$

Question 17

In ΔPQR , if $PQ = QR$ and $\angle Q = 100^\circ$, then $\angle R$ is equal to

(a) 40° (b) 80° (c) 120° (d) 50°

Solution

Solution: –

(a) 40°

Given, In $\triangle PQR$, $PQ = QR$ so it is an isosceles triangle.

Then, $\angle P = \angle R$

So, let us assume two angles be x

$$x + x + 100^\circ = 180^\circ$$

$$2x = 180^\circ - 100^\circ$$

$$2x = 80^\circ$$

$$x = 80^\circ/2$$

$$x = 40^\circ$$

Therefore, $x = \angle P = \angle R = 40^\circ$

Question 18

Which of the following statements is not correct?

A.

The sum of any two sides of a triangle is greater than the third side

B.

A triangle can have all its angles acute

C.

A right-angled triangle cannot be equilateral

D.

Difference of any two sides of a triangle is greater than the third side

Solution**Solution: –**

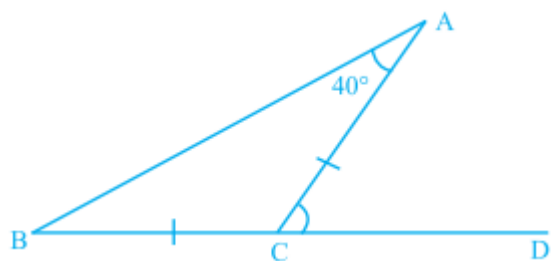
(d) Difference of any two sides of a triangle is greater than the third side.

The difference of the lengths of any two sides of a triangle is always smaller than the length of the third side.

Question 19

In Fig. 6.9, $BC = CA$ and $\angle A = 40^\circ$. Then, $\angle ACD$ is equal to

(a) 40° (b) 80° (c) 120° (d) 60°

**Solution****Solution:-**

(b) 80°

We know that, the exterior angle is equal to sum of opposite interior angles.

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

As $\triangle ACB$ is an isosceles triangle with $AC = BC$

Therefore, $\angle A$ must be equal to $\angle B$

$$\angle ACD = 40^\circ + 40^\circ$$

$$= 80^\circ$$

Question 20

The length of two sides of a triangle are 7 cm and 9 cm. The length of the third side may lie between

(a) 1 cm and 10 cm

(b) 2 cm and 8 cm

(c) 3 cm and 16 cm

(d) 1 cm and 16 cm

Solution

Solution: –

(c) 3 cm and 16 cm

From the question it is given that, the length of two sides of a triangle are 7 cm and 9 cm.

Let us assume the length of the third side of the triangle be 'P'.

We Know that, the sum of the two sides of the triangle is greater than the third side.

So, $7 + 9 > P$

$16 > P$

Now, difference between two sides = $9 - 7 = 2$

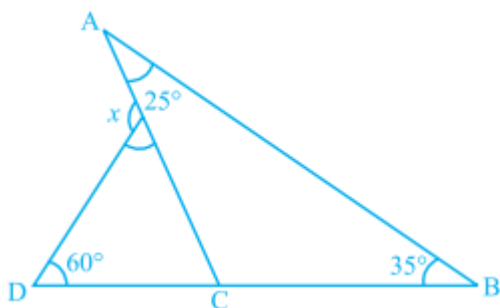
Therefore, the third side is greater than 2 and smaller than 16.

i.e. 3 cm and 16 cm

Question 21

From Fig. 6.10, the value of x is

(a) 75° (b) 90° (c) 120° (d) 60°



Solution

Solution:-

(c) 120°

We know that, exterior angle is equal to sum of opposite interior angles.

From the figure,

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

$$\angle ACD = 25^\circ + 35^\circ$$

$$= 60^\circ$$

Then, in another triangle

x is exterior angle

$$\therefore x = 60^\circ + \angle ACD$$

$$x = 60^\circ + 60^\circ$$

$$x = 120^\circ$$

Question 22

In Fig. 6.11, the value of $\angle A + \angle B + \angle C + \angle D + \angle E + \angle F$ is

(a) 190° (b) 540° (c) 360° (d) 180°

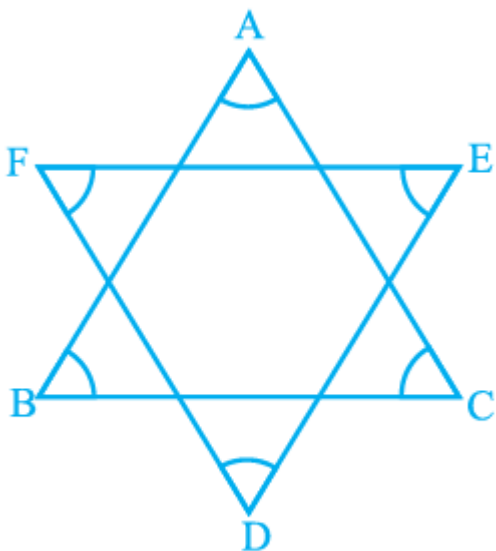


Fig. 6.11

Solution**Solution: –**(c) 360°

From the figure, we can find that there are two triangles.

So, consider the $\triangle ABC$,

We know that, sum of the interior angles of the triangle is equal to 180° .

Therefore, $\angle A + \angle B + \angle C = 180^\circ$

Now, consider the $\triangle DEF$,

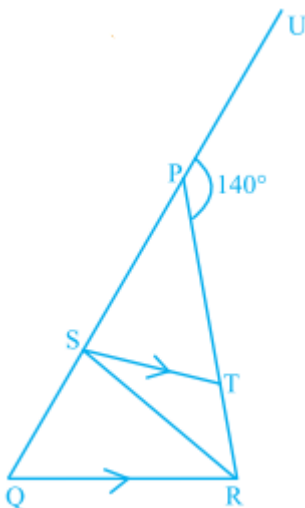
$$\angle D + \angle E + \angle F = 180^\circ$$

Then,

$$= \angle A + \angle B + \angle C + \angle D + \angle E + \angle F$$
$$= 180^\circ + 180^\circ$$
$$= 360^\circ$$
Question 23

In Fig. 6.12, $PQ = PR$, $RS = RQ$ and $ST \parallel QR$. If the exterior angle RPQ is 140° , then the measure of angle TSR is

(a) 55° (b) 40° (c) 50° (d) 45°



Solution

Solution:-

(b) 40°

Consider the ΔPQR .

From the exterior angle property

$$\angle RPU = \angle PRQ + \angle PQR$$

$$140^\circ = 2 \angle PQR \dots [\text{given } PQ = PR]$$

$$\angle PQR = 140/2$$

$$\angle PQR = 70^\circ$$

Given, $ST \parallel QR$ and QS is transversal.

From the property of corresponding angles, $\angle PST = \angle PQR = 70^\circ$

Now, consider the ΔQSR

$$RS = RQ \dots [\text{from the question}]$$

$$\text{So, } \angle SQR = \angle RSQ = 70^\circ$$

Then, PQ is a straight line.

$$\angle PST + \angle TSR + \angle RSQ = 180^\circ$$

$$70^\circ + \angle TSR + 70^\circ = 180^\circ$$

$$140^\circ + \angle TSR = 180^\circ$$

$$\angle TSR = 180^\circ - 140^\circ$$

$$\angle TSR = 40^\circ$$

Question 24

In Fig. 6.13, $\angle BAC = 90^\circ$, $AD \perp BC$ and $\angle BAD = 50^\circ$, then $\angle ACD$ is

(a) 50° (b) 40° (c) 70° (d) 60°

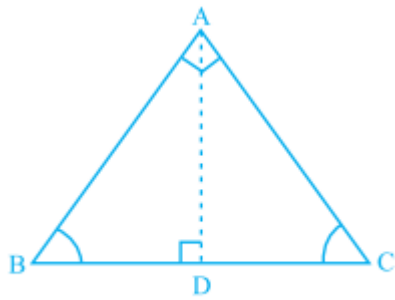


Fig. 6.13

Solution**Solution:-**(a) 50°

From the question it is given that, $\angle BAC = 90^\circ$ $AD \perp BC$ and $\angle BAD = 50^\circ$

So, $\angle DAC = \angle BAC - \angle BAD$

$$= 90^\circ - 50^\circ$$

$$= 40^\circ$$

The, consider the $\triangle ADC$

From the rule of exterior angle property $= \angle ADB = \angle DAC + \angle ACD$

$$90^\circ = 40^\circ + \angle ACD$$

$$\angle ACD = 90 - 40$$

$$\angle ACD = 50^\circ$$

Question 25

If one angle of a triangle is equal to the sum of the other two angles, the triangle is (a) obtuse (b) acute (c) right (d) equilateral

Solution**Solution:-**

(c) right

Question 26

If the exterior angle of a triangle is 130° and its interior opposite angles are equal, then measure of each interior opposite angle is

(a) 55° (b) 65° (c) 50° (d) 60°

Solution

Solution:-

(b) 65°

Let us assume the interior opposite angles are Q and Q.

Then, $130^\circ = Q + Q \dots$ [from exterior angle property]

$$2Q = 130^\circ$$

$$Q = 130^\circ/2$$

$$Q = 65^\circ$$

Therefore, the measure of each interior opposite angle is 65° .

Question 27

If one of the angles of a triangle is 110° , then the angle between the bisectors of the other two angles is

(a) 70° (b) 110° (c) 35° (d) 145°

Solution

Solution: –

(d) 145°

From the question it is given that, one of the angles of triangle is 110°

We know that, sum of all angles of triangle is equal to 180° .

$$\text{So, sum of other 2 angles is } 180^\circ - 110^\circ = 70^\circ$$

$$\text{Then, both angles get halved } 70^\circ/2 = 35^\circ$$

Sum of bisected angles will be half of sum of angles of triangle.

Then, the third angle will be $= 180^\circ - 35^\circ$

$$= 145^\circ$$

Question 28

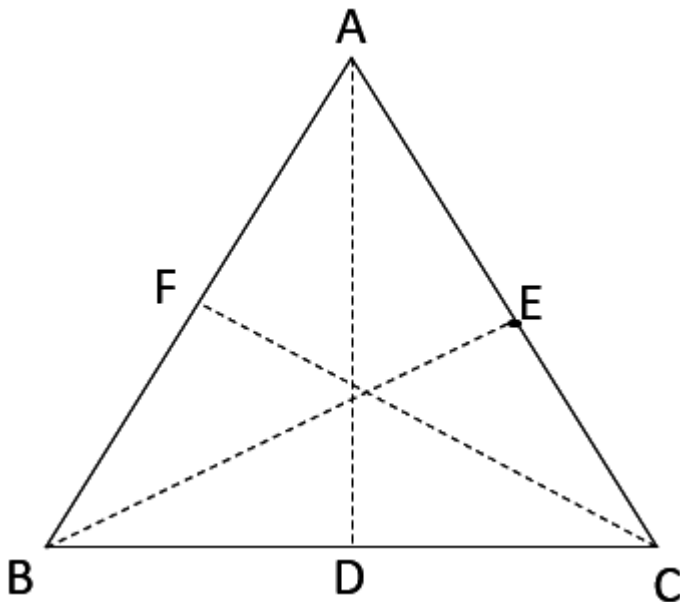
In $\triangle ABC$, AD is the bisector of $\angle A$ meeting BC at D, $CF \perp AB$ and E is the mid-point of AC. Then median of the triangle is

- (a) AD (b) BE (c) FC (d) DE

Solution

Solution: –

- (b) BE



We know that the median of triangle divides the opposite side into two equal parts.

Hence, BE is the median (as $AE = EC$).

Question 29

In $\triangle PQR$, if $\angle P = 60^\circ$, and $\angle Q = 40^\circ$, then the exterior angle formed by producing QR is equal to

- (a) 60° (b) 120° (c) 100° (d) 80°

Solution

Solution:-

(c) 100°

As we know that, exterior angle is sum of opposite interior angles.

Then, the exterior angle formed by producing QR

It has opposite interior angles $\angle P$ and $\angle Q$

Therefore, exterior angle = $\angle P + \angle Q$

$$= 60^\circ + 40^\circ$$

$$= 100^\circ$$

Question 30

Which of the following triplets cannot be the angles of a triangle?

(a) $67^\circ, 51^\circ, 62^\circ$ (b) $70^\circ, 83^\circ, 27^\circ$

(c) $90^\circ, 70^\circ, 20^\circ$ (d) $40^\circ, 132^\circ, 18^\circ$

Solution

Solution: –

(d) $40^\circ, 132^\circ, 18^\circ$

We know that, sum of angles of triangle is equal to 180° .

$$\text{But, } 40^\circ + 132^\circ + 18^\circ = 190$$

So, these triplets cannot be the angles of a triangle.

Question 31

Which of the following can be the length of the third side of a triangle whose two sides measure 18 cm and 14 cm?

(a) 4 cm (b) 3 cm (c) 5 cm (d) 32 cm

Solution

Solution:-

(c) 5 cm

We know that,

The sum of the lengths of any two sides of a triangle is always greater than the length of the third side.

So, $18 \text{ cm} + 14 \text{ cm} > 3^{\text{rd}} \text{ side}$

$3^{\text{rd}} \text{ side} < 32 \text{ cm}$

The difference of the lengths of any two sides of a triangle is always smaller than the length of the third side.

So, $18 - 14 < 3^{\text{rd}} \text{ side}$

$3^{\text{rd}} \text{ side} > 4 \text{ cm}$

Therefore, 5 cm is the length of the 3^{rd} side.

Question 32

How many altitudes does a triangle have?

(a) 1 (b) 3 (c) 6 (d) 9

Solution

Solution: –

(b) 3

The perpendicular line segment from a vertex of a triangle to its opposite side is called the altitude of the triangle. A triangle has 3 altitudes.

Question 33

If we join a vertex to a point on opposite side which divides that side in the ratio 1:1, then what is the special name of that line segment?

(a) Median (b) Angle bisector (c) Altitude (d) Hypotenuse

Solution

Solution:-

(a) Median

The line segment joining a vertex of a triangle to the mid point of its opposite side is called a median of the triangle.

Question 34

The measures of $\angle x$ and $\angle y$ in Fig. 6.14 are respectively

(a) 30° , 60° (b) 40° , 40°

(c) 70° , 70° (d) 70° , 60°

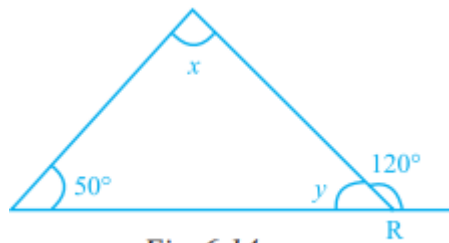


Fig. 6.14

Solution

Solution:-

(d) 70° , 60°

We know that, the exterior angle is sum of interior opposite angles of triangle.

$$\text{So, } x + 50^\circ = 120^\circ$$

$$x = 120^\circ - 50^\circ$$

$$x = 70^\circ$$

We also know that, sum of angles of triangle are equal to 180° .

$$\text{So, } 50^\circ + x + y = 180^\circ$$

$$50^\circ + 70^\circ + y = 180^\circ$$

$$120^\circ + y = 180^\circ$$

$$y = 180^\circ - 120^\circ$$

$$y = 60^\circ$$

Therefore, the measures of $\angle x$ and $\angle y$ is 70° and 60° , respectively.

Question 35

If the length of two sides of a triangle are 6 cm and 10 cm, then the length of the third side can be

(a) 3 cm (b) 4 cm (c) 2 cm (d) 6 cm

Solution

Solution: –

(d) 6 cm

We know that,

The sum of the lengths of any two sides of a triangle is always greater than the length of the third side.

So, $6 \text{ cm} + 10 \text{ cm} > 3^{\text{rd}} \text{ side}$

$3^{\text{rd}} \text{ side} < 16 \text{ cm}$

The difference of the lengths of any two sides of a triangle is always smaller than the length of the third side.

So, $10 - 6 < 3^{\text{rd}} \text{ side}$

$3^{\text{rd}} \text{ side} > 4 \text{ cm}$

Therefore, 6 cm is the length of the 3^{rd} side.

Question 36

In a right-angled triangle ABC, if angle B = 90° , BC = 3 cm and AC = 5 cm, then the length of side AB is

(a) 3 cm (b) 4 cm (c) 5 cm (d) 6 cm

Solution

Solution: –

(b) 4 cm

From Pythagoras theorem.

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

$$5^2 = AB^2 + 3^2$$

$$AB^2 = 25 - 9$$

$$AB^2 = 16$$

$$AB = \sqrt{16}$$

$$AB = 4 \text{ cm}$$

Question 37

In a right-angled triangle ABC, if angle B = 90° , then which of the following is true? (a) $AB^2 = BC^2 + AC^2$

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

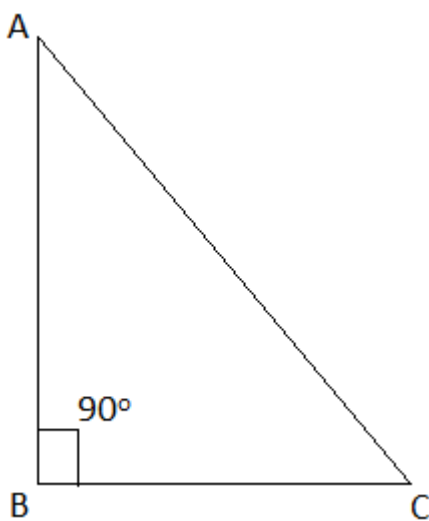
(c) $AB = BC + AC$

(d) $AC = AB + BC$

Solution

Solution:-

(b) $AC^2 = AB^2 + BC^2$... [from Pythagoras theorem]



Question 38

Which of the following figures will have its altitude outside the triangle?

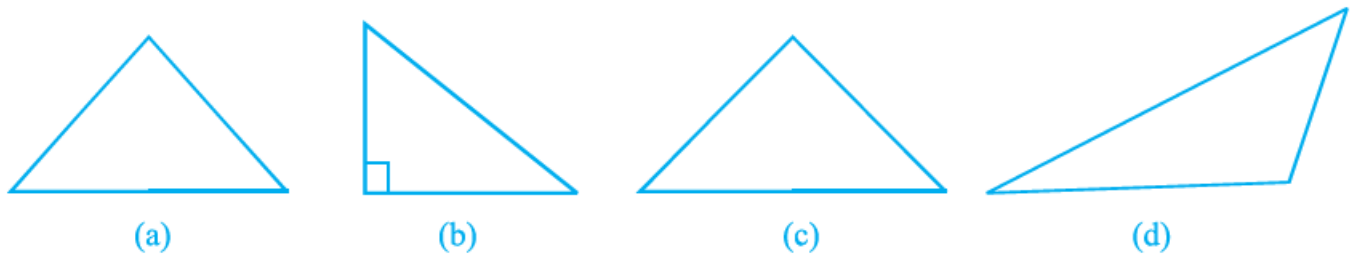


Fig. 6.15

Solution

Solution:-

Figure (d) has its altitude outside the triangle

Question 39

In Fig. 6.16, if $AB \parallel CD$, then,

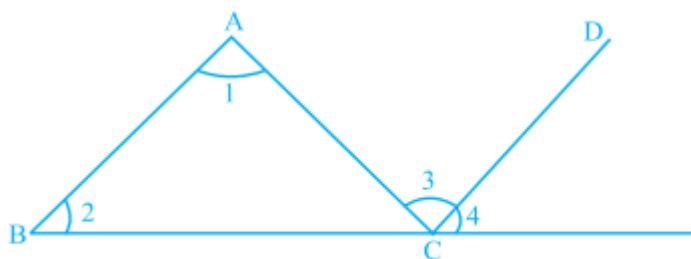


Fig. 6.16

(a) $\angle 2 = \angle 3$ (b) $\angle 1 = \angle 4$

(c) $\angle 4 = \angle 1 + \angle 2$ (d) $\angle 1 + \angle 2 = \angle 3 + \angle 4$

Solution

Solution:-

(d) $\angle 1 + \angle 2 = \angle 3 + \angle 4$

As we know that, exterior angle is equal to the sum of opposite interior angles

Consider, ΔABC

As BC is extended

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

Therefore, $\angle 1 + \angle 2 = \angle 3 + \angle 4$

Question 40

In $\triangle ABC$, $\angle A = 100^\circ$, AD bisects $\angle A$ and $AD \perp BC$. Then, $\angle B$ is equal to

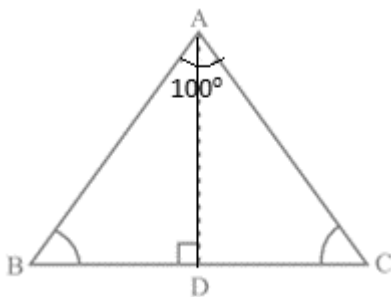
(a) 80° (b) 20° (c) 40° (d) 30°

Solution

Solution: –

(c) 40°

Consider the triangle ABC,



From the figure, AD bisects $\angle A$

Then, $\angle BAD = 50^\circ$

$$\angle DAC = 50^\circ$$

So, $AD \perp BC$

$$\angle ADC = 90^\circ$$

Consider the $\triangle ABD$,

From the rule of exterior angle property of triangle,

$$\angle ADC = \angle ABD + \angle BAD$$

$$90^\circ = \angle ABD + 50^\circ$$

$$\begin{aligned}\angle ABD &= 90^\circ - 50^\circ \\ &= 40^\circ\end{aligned}$$

Question 41

In $\triangle ABC$, $\angle A = 50^\circ$, $\angle B = 70^\circ$ and the bisector of $\angle C$ meets AB in D (Fig. 6.17). The measure of $\angle ADC$ is

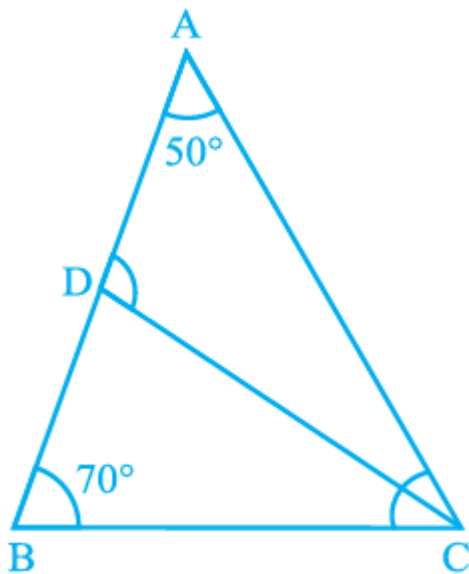


Fig. 6.17

- (a) 50° (b) 100° (c) 30° (d) 70°

Solution

Solution:-

- (b) 100°

From the figure,

Consider the $\triangle ABC$,

We know that, sum of angles of triangle is equal to 180° .

$$\text{So, } \angle A + \angle B + \angle C = 180^\circ$$

$$50^\circ + 70^\circ + \angle C = 180^\circ$$

$$\angle C + 120^\circ = 180^\circ$$

$$\angle C = 180^\circ - 120^\circ$$

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

Since CD bisects $\angle C$,

$$\text{So, } \angle DCB = \angle ACD = \frac{1}{2} \angle C$$

$$= 60^\circ / 2$$

$$= 30^\circ$$

Now, consider $\triangle BDC$

From exterior angle property, $\angle ADC = \angle DBC + \angle DCB$

$$\angle ADC = 70^\circ + 30^\circ$$

$$= 100^\circ$$

Question 42

If for $\triangle ABC$ and $\triangle DEF$, the correspondence $CAB \leftrightarrow EDF$ gives a congruence, then which of the following is not true?

(a) $AC = DE$ (b) $AB = EF$ (c) $\angle A = \angle D$ (d) $\angle C = \angle E$

Solution

Solution: –

(b) $AB = EF$

Because, for $\triangle ABC$ and $\triangle DEF$ $AB = DF$

Question 43

In Fig. 6.18, M is the mid-point of both AC and BD. Then

(a) $\angle 1 = \angle 2$ (b) $\angle 1 = \angle 4$ (c) $\angle 2 = \angle 4$ (d) $\angle 1 = \angle 3$

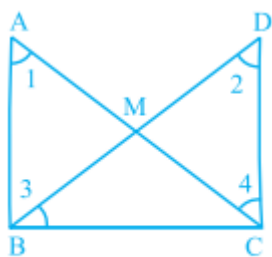


Fig. 6.18

Solution**Solution: –**

(b) $\angle 1 = \angle 4$

From the figure, M is the mid-point of both AC and BD.

By the corresponding parts of congruent triangles, $\angle 1 = \angle 4$.

Question 44

If D is the mid-point of the side BC in $\triangle ABC$ where $AB = AC$, then $\angle ADC$ is

- (a) 60° (b) 45° (c) 120° (d) 90°

Solution**Solution:-**

(d) 90°

We know that, in an isosceles triangle, altitude and median are the same.

From the question, if D is the mid-point of the side BC in $\triangle ABC$

Where, D is midpoint of BC joining from point A gives AD as median.

It possess 90° angle on BC

Therefore, $\angle ADC = 90^\circ$

Question 45

Two triangles are congruent, if two angles and the side included between them in one of the triangles are equal to the two angles and the side included between them of the other triangle. This is known as

the

(a) RHS congruence criterion

(b) ASA congruence criterion

(c) SAS congruence criterion

(d) AAA congruence criterion

Solution

Solution:-

(b) ASA congruence criterion

Question 46

By which congruency criterion, the two triangles in Fig. 6.19 are congruent?

(a) RHS (b) ASA (c) SSS (d) SAS

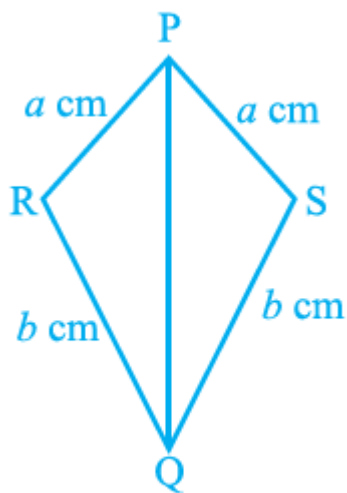


Fig. 6.19

Solution

Solution:-

(c) SSS

Under a given correspondence, two triangles are congruent, if the three sides of the one are equal to the three sides of the other.

Question 47

By which of the following criterion two triangles cannot be proved congruent?

(a) AAA (b) SSS (c) SAS (d) ASA

Solution

Solution: –

(a) AAA

In AAA criterion, two triangles cannot be proved congruent.

Question 48

If $\triangle PQR$ is congruent to $\triangle STU$ (Fig. 6.20), then what is the length of TU?

(a) 5 cm (b) 6 cm (c) 7 cm (d) cannot be determined

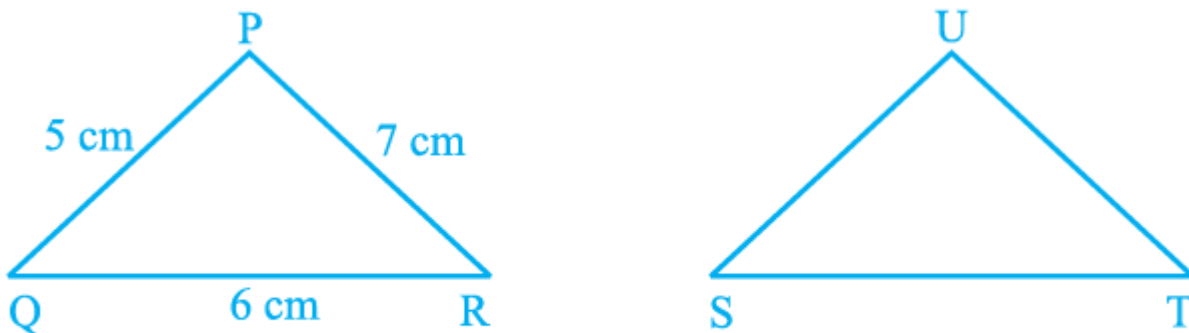


Fig. 6.20

Solution

Solution:-

(b) 6 cm

From the question it is given that,

$$\triangle PQR \cong \triangle STU$$

So,

$$PQR \leftrightarrow STU$$

$$\therefore QR = TU$$

$$TU = 6\text{cm}$$

Question 49

If $\triangle ABC$ and $\triangle DBC$ are on the same base BC , $AB = DC$ and $AC = DB$ (Fig. 6.21), then which of the following gives a congruence relationship?

- (a) $\triangle ABC \cong \triangle DBC$ (b) $\triangle ABC \cong \triangle CBD$
(c) $\triangle ABC \cong \triangle DCB$ (d) $\triangle ABC \cong \triangle BCD$

Solution

Solution:-

(c) $\triangle ABC \cong \triangle DCB$

Consider the $\triangle ABC$ and $\triangle DCB$,

From the question it is given that, $AB = DC$ and $AC = DB$

$BC = BC$... [because common side]

Therefore, $\triangle ABC \cong \triangle DCB$

In questions 50 to 69, fill in the blanks to make the statements true.

Question 50

The triangle always has altitude outside itself.

Solution

Solution:-

The Obtuse triangle always has altitude outside itself.

Question 51

The sum of an exterior angle of a triangle and its adjacent angle is always .

Solution

Solution:-

The sum of an exterior angle of a triangle and its adjacent angle is always 180^0 .

Question 52

The longest side of a right angled triangle is called its .

Solution

Solution: –

The longest side of a right angled triangle is called its hypotenuse.

Question 53

Median is also called in an equilateral triangle.

Solution

Solution:-

Median is also called altitude in an equilateral triangle

Question 54

Measures of each of the angles of an equilateral triangle is .

Solution

Solution: –

Measures of each of the angles of an equilateral triangle is 60^0 .

Question 55

In an isosceles triangle, two angles are always.

Solution

Solution: –

In an isosceles triangle, two angles are always equal.

Question 56

In an isosceles triangle, angles opposite to equal sides are .

Solution

Solution: –

In an isosceles triangle, angles opposite to equal sides are equal.

Question 57

If one angle of a triangle is equal to the sum of other two, then the measure of that angle is .

Solution

Solution: –

If one angle of a triangle is equal to the sum of other two, then the measure of that angle is 90° .

Question 58

Every triangle has at least acute angle (s).

Solution

Solution: –

Every triangle has at least two acute angle (s).

Question 59

Two line segments are congruent, if they are of lengths.

Solution

Solution: –

Two line segments are congruent, if they are of equal lengths.

Question 60

Two angles are said to be if they have equal measures.

Solution

Solution: –

Two angles are said to be congruent, if they have equal measures.

Question 61

Two rectangles are congruent, if they have same and .

Solution

Solution: –

Two rectangles are congruent, if they have same and length and breadth.

Question 62

Two squares are congruent, if they have same .

Solution

Solution:-

Two squares are congruent, if they have same side.

Question 63

If ΔPQR and ΔXYZ are congruent under the correspondence $QPR \leftrightarrow XYZ$, then

(i) $\angle R =$ (ii) $QR =$ (iii) $\angle P =$

(iv) $QP =$ (v) $\angle Q =$ (vi) $RP =$

Solution

Solution: –

If ΔPQR and ΔXYZ are congruent under the correspondence $QPR \leftrightarrow XYZ$, then

(i) $\angle R = \angle Z$ (ii) $QR = XZ$ (iii) $\angle P = \angle Y$

(iv) $QP = XY$ (v) $\angle Q = \angle X$ (vi) $RP = ZY$

Question 64

In Fig. 6.22, $\Delta PQR \cong \Delta$

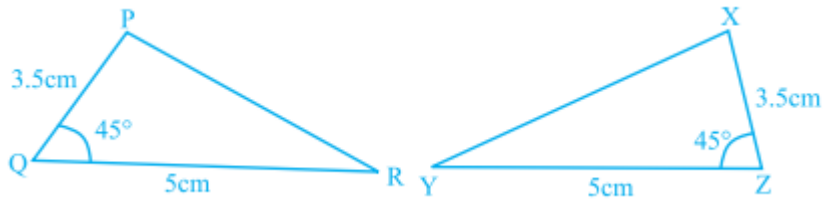


Fig. 6.22

Solution

Solution: –

In Fig. 6.22, $\Delta PQR \cong \Delta XZY$

From the figure, $PQ = XZ = 3.5 \text{ cm}$

$QR = ZY = 5 \text{ cm}$

$\angle PQR = \angle XZY = 45^\circ$

From SAS criterion, $\Delta PQR \cong \Delta XZY$

Question 65

In Fig. 6.23, $\Delta PQR \cong \Delta$

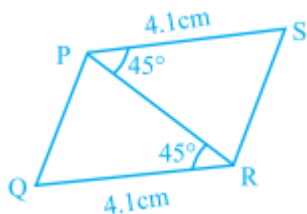


Fig. 6.23

Solution

Solution: –

In Fig. 6.23, $\Delta PQR \cong \Delta RSP$

From the figure, $PS = RQ = 4.1$ cm

$PR = PR$... [common side for both triangles]

$$\angle PRQ = \angle RPS = 45^\circ$$

From SAS criterion, $\Delta PQR \cong \Delta RSP$

Question 66

In Fig. 6.24, $\Delta \cong \Delta PQR$

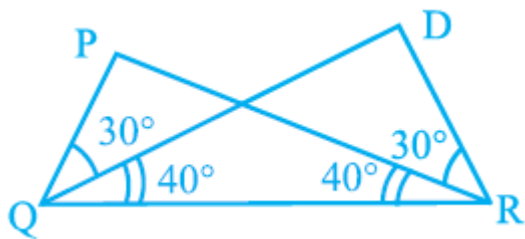


Fig. 6.24

Solution

Solution:-

In Fig. 6.24, $\Delta DRQ \cong \Delta PQR$

From the figure,

$QR = QR$... [common side for both triangles]

$$\angle PRQ = \angle DQR = 40^\circ$$

$$\angle PQR = \angle DRQ = 70^\circ$$

From ASA criterion, $\Delta DRQ \cong \Delta PQR$

Question 67

In Fig. 6.25, $\Delta ARO \cong \Delta$

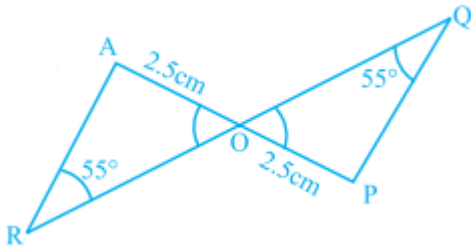


Fig. 6.25

Solution**Solution:-**

In Fig. 6.25, $\triangle ARO \cong \triangle PQO$

From the figure,

$$AO = PO = 2.5 \text{ cm}$$

$$\angle ARO = \angle PQO = 55^\circ$$

$$\angle AOR = \angle POQ \text{ [vertically opposite angles]}$$

From ASA criterion, $\triangle ARO \cong \triangle PQO$

Question 68

In Fig. 6.26, $AB = AD$ and $\angle BAC = \angle DAC$.

Then (i) $\triangle \cong \triangle ABC$.

(ii) $BC =$.

(iii) $\angle BCA =$.

(iv) Line segment AC bisects and .

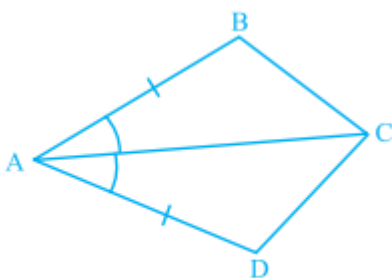


Fig. 6.26

Solution**Solution: –**

In Fig. 6.26, $AB = AD$ and $\angle BAC = \angle DAC$.

Then (i) $\triangle ADC \cong \triangle ABC$.

(ii) $BC = DC$.

(iii) $\angle BCA = \angle DCA$.

(iv) Line segment AC bisects $\angle BAD$ and $\angle BCD$.

Question 69

In Fig. 6.27,

(i) $\angle TPQ = \angle ______ + \angle ______$

(ii) $\angle UQR = \angle ______ + \angle ______$

(iii) $\angle PRS = \angle ______ + \angle ______$

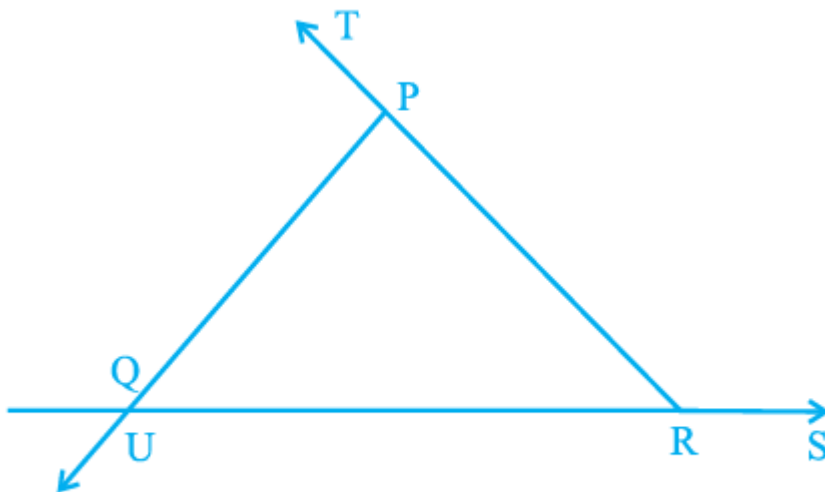


Fig. 6.27

Fig. 6.27

Solution**Solution: –**

In Fig. 6.27,

(i) $\angle TPQ = \angle PQR + \angle PRQ$... [from exterior angle property]

(ii) $\angle UQR = \angle QRP + \angle QPR$... [from exterior angle property]

(iii) $\angle PRS = \angle RPQ + \angle RQP$... [from exterior angle property]

In questions 70 to 80, state whether the statements are True or False.

Question 70

In a triangle, the sum of squares of two sides is equal to the square of the third side.

Solution

Solution: –

False

In a right angled triangle, sum of squares of two sides is equal to the square of the third side.

Question 71

Sum of two sides of a triangle is greater than or equal to the third side.

Solution

Solution: –

False

The sum of the lengths of any two sides of a triangle is always greater than the length of the third side.

Question 72

The difference between the lengths of any two sides of a triangle is smaller than the length of the third side.

Solution

Solution: –

True.

Question 73

In $\triangle ABC$, $AB = 3.5$ cm, $AC = 5$ cm, $BC = 6$ cm and in $\triangle PQR$, $PR = 3.5$ cm, $PQ = 5$ cm, $RQ = 6$ cm. Then $\triangle ABC \cong \triangle PQR$.

Solution

Solution: –

False

In $\triangle ABC$, $AB = 3.5$ cm, $AC = 5$ cm, $BC = 6$ cm and in $\triangle PQR$, $PR = 3.5$ cm, $PQ = 5$ cm, $RQ = 6$ cm. Then $\triangle ABC \cong \triangle PRQ$

Question 74

Sum of any two angles of a triangle is always greater than the third angle.

Solution

Solution: –

False

Sum of any two angles of a triangle is either greater than the third angle or smaller than the third angle.

Question 75

The sum of the measures of three angles of a triangle is greater than 180° .

Solution

Solution: –

False

The sum of the measures of three angles of a triangle is equal to 180° .

Question 76

It is possible to have a right-angled equilateral triangle.

Solution**Solution: –**

False

In a right angled triangle, sum of squares of two sides is equal to the square of the third side.

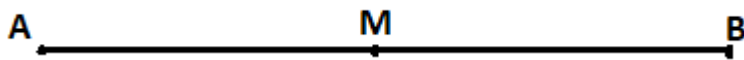
But, in equilateral triangle all sides are always equal.

Question 77

If M is the mid-point of a line segment AB, then we can say that AM and MB are congruent.

Solution**Solution: –**

True



In the figure, M is the midpoint,

So, $AM = MB$

Question 78

It is possible to have a triangle in which two of the angles are right angles.

Solution**Solution: –**

False.

It is not possible to have a triangle in which two of the angles are right angles.

Question 79

It is possible to have a triangle in which two of the angles are obtuse.

Solution**Solution: –**

False.

It is not possible to have a triangle in which two of the angles are obtuse

Question 80

It is possible to have a triangle in which two angles are acute.

Solution**Solution: –**

True.