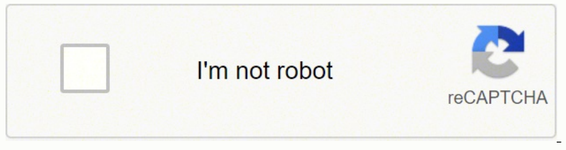

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7 | TRIANGLES

EXERCISE 7.2

Q.1. *In an isosceles triangle ABC, with AB = AC, the bisectors of ∠B and ∠C intersect each other at O. Join A to O. Show that :*
(i) OB = OC (ii) AO bisects ∠A.

Sol. (i) AB = AC ⇒ ∠ABC = ∠ACB [Angles opposite to equal sides are equal]

$\frac{1}{2}\angle ABC = \frac{1}{2}\angle ACB$

⇒ ∠CBO = ∠BCO
[OB and OC are bisectors of ∠B and ∠C respectively]

⇒ OB = OC [Sides opposite to equal angles are equal]

Agsin, $\angle\frac{1}{2}ABC = \frac{1}{2}\angle ACB$

⇒∠ABO = ∠ACO [∵ OB and OC are bisectors of ∠B and ∠C respectively]

In ΔABO and ΔACO, we have

AB = AC	[Given]
OB = OC	[Proved above]
∠ABO = ∠ACO	[Proved above]
∴ ΔABO ≅ ΔACO	[SAS congruence]
⇒ ΔABO = ∠CAO	[CPCT]

⇒ AO bisects ∠A. **Proved.**

Q.2. *In ΔABC, AD is the perpendicular bisector of BC (see Fig.). Show that ΔABC is an isosceles triangle in which AB = AC.*

Sol. In ΔABD and ΔACD, we have

∠ADB = ∠ADC	[Each = 90°]
BD = CD	[Q AD bisects BC]
AD = AD	[Common]
∴ ΔABD ≅ ΔACD	[SAS]
∴ AB = AC	[CPCT]

Hence, ΔABC is an isosceles triangle. **Proved.**

Q.3. *ABC is an isosceles triangle in which altitudes BE and CF are drawn to equal sides AC and AB respectively (see Fig.). Show that these altitudes are equal.*

Sol. In ΔABC,

AB = AC [Given]

⇒ ∠B = ∠C [Angles opposite to equal sides of a triangle are equal]

Now, in right triangles BFC and CEB,

To prove:
BE = CF
Proof:
Triangles ΔAEB and ΔAFC are similar by AAS congruency since
∠A = ∠A (It is the common arm)
∠AEB = ∠AFC (They are right angles)
AB = AC (Given in the question)
∴ ΔAEB ≅ ΔAFC and so, BE = CF (by CPCT).

4. ABC is a triangle in which altitudes BE and CF to sides AC and AB are equal (see Fig. 7.32). Show that
(i) ΔABE ≅ ΔACF
(ii) AB = AC, i.e., ABC is an isosceles triangle.

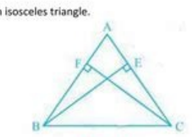


Fig. 7.32

Solution:
It is given that BE = CF

(i) In ΔABE and ΔACF,
∠A = ∠A (It is the common angle)
∠AEB = ∠AFC (They are right angles)
BE = CF (Given in the question)
∴ ΔABE ≅ ΔACF by **AAS congruency condition**.

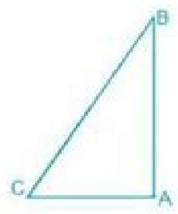
(ii) AB = AC by CPCT and so, ABC is an isosceles triangle.

5. ABC and DBC are two isosceles triangles on the same base BC (see Fig. 7.33). Show that ∠ABD = ∠ACD.

It is given that AB = AC and AD = AB
We will have to now prove ∠BCD is a right angle.
Proof:
Consider ΔABC,
AB = AC (It is given in the question)
Also, ∠ACB = ∠ABC (They are angles opposite to the equal sides and so, they are equal)
Now, consider ΔACD,
AD = AB
Also, ∠ADC = ∠ACD (They are angles opposite to the equal sides and so, they are equal)
Now,
In ΔABC,
∠CAB + ∠ACB + ∠ABC = 180°
So, ∠CAB + 2∠ACB = 180°
⇒ ∠CAB = 180° - 2∠ACB --- (i)
Similarly, in ΔADC,
∠CAD = 180° - 2∠ACD --- (ii)
also,
∠CAB + ∠CAD = 180° (BD is a straight line.)
Adding (i) and (ii) we get,
∠CAB + ∠CAD = 180° - 2∠ACB+180° - 2∠ACD
⇒ 180° = 360° - 2∠ACB-2∠ACD
⇒ 2(∠ACB+∠ACD) = 180°
⇒ ∠BCD = 90°

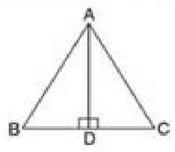
7. ABC is a right-angled triangle in which ∠A = 90° and AB = AC. Find ∠B and ∠C.

Solution:



In the question, it is given that

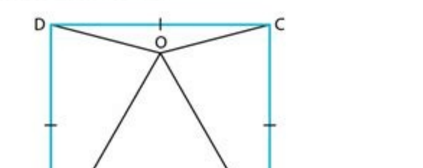
Sol. Consider triangles ABD and ACD,



We have AB = AC [Given]
AD = AD [Common]
∠ADB = ∠ADC [90° each]
∴ ΔABD ≅ ΔACD [RHS rule]
(*i*) ∴ BD = CD [CPCT]
⇒ AD bisects BC.
(*ii*) and ∠BAD = ∠CAD [CPCT]
AD bisects ∠BAC, *i.e.*, ∠A.

3. *Two sides AB and BC and median AM of one triangle ABC are respectively equal to sides PQ and QR and median PN of ΔPQR (see figure). Show that:*

(*i*) *ΔABM ≅ ΔPQN* (*ii*) *ΔABC ≅ ΔPQR.*



Sol. (*i*) M and N are mid-points of BC and QR respectively, as AM and PN are medians.

$$\therefore \quad BM = \frac{1}{2}BC \text{ and } QN = \frac{1}{2}QR \qquad ...(i)$$

Also, BC = QR [Given]

$$\Rightarrow \quad \frac{1}{2}BC = \frac{1}{2}QR \quad \Rightarrow \quad BM = QN \qquad ...(ii) \quad [\text{From } (i)]$$

Consider triangles ABM and PQN,

We have AB = PQ [Given]
AM = PN [Given]
and BM = QN [From (*ii*)]
∴ Δ ABM ≅ Δ PQN [SSS rule]

(*ii*) From result (*i*),

$$\angle ABM = \angle PQN \quad \Rightarrow \quad \angle ABC = \angle PQR \qquad ...(iii)$$

According to the question,
It is given that: A square ABCD and OA = OB = AB.

To prove: Δ OCD is an isosceles triangle.
Proof:
In square ABCD,
Since ∠1 and ∠2 is equal to 90°
∠1 = ∠2 ...(1)
Now, in Δ OAB , we have
Since ∠3 and ∠4 is equal to 60°
∠3 = ∠4 ...(2)
Subtracting equations (2) from (1),
We get
∠1−∠3 = ∠2 −∠4
⇒ ∠5 = ∠6
Now,
In Δ DAO and Δ CBO,
AD = BC [Given]
∠5 = ∠6 [Proved above]
OA = OB [Given]
By SAS criterion of congruence,
We have
Δ DAO ≅ Δ CBO
OD = OC
⇒ Δ OCD is an isosceles triangle.
Hence, proved.

8. ABC and DBC are two triangles on the same base BC such that A and D lie on the opposite sides of BC, AB = AC and DB = DC. Show that AD is the perpendicular bisector of BC.
Solution:

Show that ΔABC is an isosceles triangle in which AB = AC.(Image Will Be Updated Soon)Ans: $\because $ AD is perpendicular bisector of BC,$\therefore $$BD = DC$& $\angle ADB = \angle ADC$ ${\text{[Each 90°]}}$Now, inΔABD and ΔACD,$AD = AD$ (Common)$\angle ADB = \angle ADC$ ${\text{[Proved above]}}$ $BD = CD$ ${\text{[Proved above]}}$$\therefore \Delta ADB \cong \Delta ACD$ ${\text{[by SAS]}}$$\therefore AB = AC$ (CPCT)So, ΔABC is an isosceles triangle with \[AB = AC\]3. Many students don't get quite enough practice in applying math, and they may feel like they cannot succeed at it.Navigate the Math World With EaseFortunately, there are many cool math games available online for free, and they are so appealing that people who don't like math may just change their mind about that. Let's start by talking about what congruent triangles areThe intersection of three lines forms a triangle, which is one of the most basic two-dimensional geometric shapes. Show that CD bisects AB.(Image Will Be Updated Soon)Ans: Given: AD and BC are equal perpendiculars to a line segment AB To prove: CD bisects AB.In \[\Delta BOC{\text{ , }}\Delta AOD\],\[\angle BOC{\text{ }} = \angle AOD\] (Vertically opposite angles)\[\angle CBO{\text{ }} = \angle DAO\] (Each right angle)BC = AD (Given)\[\therefore \Delta BOC{\text{ }} \cong \Delta AOD\] (AAS congruence rule)\[\therefore BO{\text{ }} = {\text{ }}AO\] (By CPCT)\[\Rightarrow \]CD bisects AB.4. l and m are two parallel lines intersected by another pair of parallel lines p and q (see the given figure). Which, of course, leads to the name–learning is cool when it's designed to be the right kind of challenge.Cool Math offers free online math lessons, math games and math activities. BE and CF are two equal altitudes of a triangle ABC. These games are not only free, but they come in a variety of genres suited to different age groups, from elementary to high school. Games are organized according to types of skill, including logic, strategy, number and mobile. Each time they answer a question correctly on the website, a green checkmark appears. The ASS and SSA test is not a valid test for congruency because the angle is not included between the pairs of the equal sides.The AAA test is also not valid even though the two triangles can have all the three same angles. As a result, I is the point that is equidistant from all of ΔABC's sides.3. In a huge park people are concentrated at three points (see the given figure)(Image Will Be Updated Soon)A: where there are different slides and swings for children, B: near which a man-made lake is situated, C: which is near to a large parking and exit. Where should an ice-cream parlour be set up so that maximum number of persons can approach it? (Hint: The parlor should be equidistant from A, B and C)Ans: If the ice cream parlour is equidistant from A, B, and C, the maximum number of people can approach it. Show that ∠A > ∠C and ∠B > ∠D.(Image Will Be Updated Soon)Ans:(Image Will Be Updated Soon)Let us connect ACIn ΔADC,$AD < DC$ ${\text{[DC is largest side]}}$$\therefore \angle 4 < \angle 3$ ${\text{[Angles opposite to smaller side are smaller]}}$ ... (1)Similarly, In ΔABC\[AB < BC\] ${\text{[AB is smallest side]}}$$\therefore \angle 2 < \angle 3$ ${\text{[Angles opposite to smaller side are smaller]}}$ ... (2)Comparing equation 1 and 2, we can say that$\angle 2 + \angle 4 < \angle 1 + \angle 3$$ \Rightarrow \angle C < \angle A$$\therefore \angle A > \angle C$Now let us join BD.(Image Will Be Updated Soon)In $\Delta BDC$$BC < DC$ ${\text{[DC is largest side]}}$$\therefore \angle 7 < \angle 6$ ${\text{[Angles opposite to smaller side are smaller]}}$ ... (3)Similarly, in $\Delta ABD$$AB < AD$ ${\text{[AB is smallest side]}}$$\therefore \angle 8 < \angle 5$ ${\text{[Angles opposite to smaller side are smaller]}}$ ... (4)Adding equations 3 and 4 we get that,$\angle 7 + \angle 8 < \angle 6 + \angle 5$$ \Rightarrow \angle D < \angle B$$\therefore \angle B > \angle D$Hence proved5. Also, if all the sides of the triangle are the same, then their corresponding angles should also be the same.SAS Criteria for CongruenceThis is an important criterion that is required for writing NCERT solutions for class 9 maths triangles. AB and CD are respectively the smallest and longest sides of a quadrilateral ABCD (see the given figure). C is joined to M and produced to a point D such that DM = CM. According to this criterion, the two triangles are congruent if the two sides and the included angle on the triangle are equal to the corresponding sides. Show that \[\Delta ABC{\text{ }} \cong \Delta ABD\]. Because of the success of those apps, the site is ranked a Top 20 Publisher in the iOS App Store's Education Category and a Top 25 Publisher in its Kids Category. They boast that users won't even know they're getting a mental workout when they're using one of the hundreds of games on the site. Show that of all line segments drawn from a given point not on it, the perpendicular line segment is the shortest.Ans:(Image Will Be Updated Soon)Let us take a line l and from point P (i.e., not on line l), draw two line segments PN and PM. I is the point at which these angle bisectors cross each other. D and E are points on the same side of AB such that \[\angle BAD{\text{ }} = \angle ABE\] and \[\angle EPA{\text{ }} = \angle DPB\]To prove: (i) \[\Delta DAP \cong \Delta EBP\](ii) AD = BEIt is given that \[\angle EPA{\text{ }} = \angle DPB\]\[\angle EPA{\text{ }} + \angle DPE{\text{ }} = \angle DPB{\text{ }} + \angle DPE\]\[\therefore \angle DPA{\text{ }} = \angle EPB\]In \[\Delta DAP{\text{ , }}\Delta EBP\],\[\angle DAP{\text{ }} = \angle EBP\] (Given)AP = BP (P is mid-point of AB)\[\angle DPA{\text{ }} = \angle EPB\] (From above)\[\therefore \Delta DAP \cong \Delta EBP\] (ASA congruence rule)\[\therefore AD{\text{ }} = {\text{ }}BE\] (By CPCT)8. Let PN be perpendicular to line l and PM is drawn at some other angle.Now, ΔPNM is a right-angle triangle, right angled at $\angle N$$ \Rightarrow PM$ is hypotenuse And we know that hypotenuse is the largest side of right-angled triangle$\therefore PM > PN$Similarly, any line segment drawn from P to line l, except for PN will be larger than PN.Therefore, we can say that perpendicular line segment drawn from a given point is the shortest.Exercise 7.51. This means that the two triangles are completely congruent. They can learn how to assemble a machine, to shop for clothes or to build a bridge, for example.Users choose from grade level and category, including logic, geometry and physics, and then choose the match subject, such as addition, subtraction, multiplication, division, fractions, integers and algebra. In an isosceles triangle ABC, with AB = AC, the bisectors of ∠B and ∠C intersect each other at O. In the given figure, ∠B < ∠A and ∠C < ∠D. It can also become a test for similarity (AA).(Image will be updated soon)RHS Criteria for CongruenceIf in two right triangles, the hypotenuse and the one side of one triangle are equal to the one side of the other triangle and the hypotenuse, then the two triangles are congruent. In the given figure, \[AC{\text{ }} = {\text{ }}AE,{\text{ }}AB{\text{ }} = {\text{ }}AD\] and \[\angle BAD{\text{ }} = \angle EAC\]. BP and BQ are $$perpendiculars from B to the arms of \[\angle A\] (see the given figure). Each of the games has separate categories with groupings by grade, making the site easy to navigate based on the child's interest, age and needs. Show that(Image Will Be Updated Soon)(i) \[\Delta DAP \cong \Delta EBP\](ii) AD = BEAns: Given: AB is a line segment and P is its mid-point. The sides can be of various lengths. Like other sites, the students interacting with the games can engage with them to learn more about mathematics in creative ways. Games are organized by subject categories such as numbers, letters and holidays, and into grade levels from pre-kindergarten through fifth grade. DM = CM(i) In \[\Delta AMC{\text{ }},{\text{ }}\Delta BMD\],AM = BM (M is the mid-point of AB)\[\angle AMC{\text{ }} = \angle BMD\] (Vertically opposite angles)CM = DM (Given)\[\therefore \Delta AMC \cong \Delta BMD\] (By SAS congruence rule)\[\therefore AC{\text{ }} = {\text{ }}BD\] (By CPCT)And, \[\angle ACM{\text{ }} = \angle BDM\](By CPCT)(ii) \[\angle ACM{\text{ }} = \angle BDM\]However, \[\angle ACM{\text{ , }}\angle BDM\] are alternate interior angles.Since alternate angles are equal,It can be said that \[DB{\text{ }}||{\text{ }}AC\](Co-interior angles)(iii) In \[\Delta DBC{\text{ , }}\Delta ACB\],DB = AC (Already proved)\[\angle DBC{\text{ }} = \angle ACB\] (Each \[{90^o}\])BC = CB (Common)\[\therefore \Delta DBC \cong \Delta ACB\] (SAS congruence rule)(iv) \[\therefore \Delta DBC \cong \Delta ACB\]AB = DC (By CPCT)AB = 2 CM\[CM{\text{ }} = {\text{ }}\dfrac{1}{2}{\text{ }}AB\]Exercise (7.2)1. For official purposes, teachers, schools and district administrators can receive comprehensive reports from Explore Learning that make it simple to monitor each student's progress and usage. Show that:(i)\[\Delta ABM \cong \Delta PQN\](ii)\[\Delta ABC \cong \Delta PQR\](Image Will Be Updated Soon)Ans: (i) We know that $BC = QR$ ... (1)Now, Since AM is median of ΔABC,$ \Rightarrow BM = \dfrac{1}{2}BC$ ... (2)Similarly, PN is median of ΔPQR,$ \Rightarrow QN = \dfrac{1}{2}QR$ ... (3)From equations 1, 2 and 3, we can say that,$BM = QN$ ... (4)Now in ΔABM and ΔPQN\[AB = PQ\] (Given)\[BM = QN\] ${\text{[From 4]}}$AM=PN (Given)$\therefore \Delta ABM \cong \Delta PQN$ ${\text{[By SSS]}}$$ \Rightarrow \angle ABM = \angle AQN$ (CPCT)$ \Rightarrow \angle ABC = \angle PQR$ ... (5)(ii) Now in ΔABC and ΔPQR,$AB = PQ$ (Given)$\angle ABC = \angle PQR$ ${\text{[From 5]}}$$BC = QR$ (Given)\[\Delta ABC \cong \Delta PQR\] ${\text{[By SAS]}}$4. Show that ∠BCD is a right angle.(Image Will Be Updated Soon)Ans: In $\Delta ABC$$\angle ABC = \angle ACB$ ${\text{[angles opposite to equal sides of a triangle]}}$ ... (1)Similarly, in $\Delta ADC$$\angle ADC = \angle ACD$ ${\text{[angles opposite to equal sides of a triangle]}}$ ... (2)Now since BD is a straight line,$\angle BAC + \angle CAD = 180^\circ $ ... (3)And we know,$\angle BAC = \angle ADC + \angle ACD$ ${\text{[Exterior angle of a triangle = sum of opposite interior angles]}}$$ \Rightarrow \angle BAC = 2\angle ACD$ ${\text{[From 2]}}$ ... (4)Similarly,$\angle CAD = \angle ABC + \angle ACB$$ \Rightarrow \angle CAD = 2\angle ACB$ ${\text{[From 1]}}$ ... (5)$\therefore 2\angle ACB + 2\angle ACD = 180^\circ $ ${\text{[From 3, 4 and 5]}}$$ \Rightarrow \angle ACB + \angle ACD = 90^\circ $$ \Rightarrow \angle BCD = 90^\circ $Hence proved.7. ABC is a right-angled triangle in which ∠A = 90° and AB = AC. The site is an excellent resource for homeschooling parents and educators who want to supplement their curriculum with fun activities. The reality is that math problems can help students learn how to navigate the world around them in some really practical ways, strengthening rationale thought, problem-solving skills and abstract thinking. In exercise 7.2, there are eight questions. The included angle of the other triangle is also equal.ASA Criteria for CongruenceThe two triangles are congruent if the two angles and the included side of the one triangle is equal to the corresponding two angles and the included side of the other triangle.(Image will be updated soon)AAS Criteria for CongruenceThe two triangles are congruent to one another if the two angles and one side of one triangle are equal to the side of the other triangle and the two angles.The Reason why AAA and SSA Congruence Rules are not ValidStudents should know about the reason why AAA and SSA congruence rules are not valid for writing NCERT solutions for class 9 chapter 7. Also, in exercise 7.1, there are eight questions. Show that these altitudes are equal.(Image Will Be Updated Soon)Ans: In $\Delta ABE$and ΔACF,$\angle AEB = \angle AFE$ ${\text{[Each 90°]}}$$\angle BAE = \angle CAF$ (Common)$AB = AC$ [Given]$\therefore \Delta ABE \cong \Delta ACF$ ${\text{[By AAS]}}$$\therefore BE = CF$ (CPCT)4. Think about going to the grocery store and needing to calculate the price for a pound of bulk food, for example. Parents and students can access them easily to sharpen up math skills. Show that AD < BC.(Image Will Be Updated Soon)Ans: Since $\angle B < \angle A$,In ΔOAB , $OB > OA$ ${\text{[Sides opposite to larger angle of triangle are larger]}}$ ... (1)Similarly, in ΔODC , $\angle D > \angle C$$ \Rightarrow OC > OD$ ... (2)Adding equation 1 and 2, we get$ OB + OC > OA + OD$$ \Rightarrow BC > AD $$\therefore AD < BC$4. In quadrilateral ACBD, AC = AD and AB bisects \[\angle A\] (See the given figure). Those criteria are mentioned below.SSS Criteria for CongruenceThis criterion stands true if all the three sides of one triangle are equal to the three sides of the other triangle. The site is like an amusement park for math learning, and that is very cool indeed.ABCya Games for Online Math EducationABCya math games is another popular way to help students sharpen up their math skills. As a result, O is the point that is equidistant from all of ΔABC's vertices.2. In a triangle locate a point in its interior which is equidistant from all the sides of the triangle.Ans: The incentre of a triangle is the point that is equidistant from all the triangle's sides. Which has more triangles?(Image Will Be Updated Soon)Ans: We can see that hexagonal shaped rangoli has total of 6 equilateral triangles of side 5 cm in it.(Image Will Be Updated Soon)Whereas starshaped rangoli also has 6 equilateral triangles of side 5cm and a hexagon in middle.Therefore, star-shaped rangoli will be filled with more equilateral triangles of side 1 cm in it.NCERT Solutions for Class 9 Maths Chapter 7 Triangles - PDF DownloadLearn More about Class 9 Maths Chapter 7Before we talk about chapter 7 maths class 9 NCERT solutions, there are some important concepts related to this chapter that students should know about. @ABCyaGames/Twitter Starfall Since its inception in 2002, Starfall has continued to bring a broad range of learning activities to young learners, and that includes a robust collection of math games. With sites like coolmathgames.com featuring a wide variety of games that focus on numbers, strategy, logic and other general or specific skills, it's possible for students all the way up through high school to find fun math games online to improve their pre-algebra and algebra skills. ABC is a triangle in which altitudes BE and CF to sides AC and AB are equal (see the given figure). Count the number of triangles in each case. The site offers more than 500 web-based games and more than 50 mobile games that can be accessed safely through any browser and from any device.Explore Free Online Math ResourcesThere's literally an endless supply of free math resources online for parents and students who need a bit of a math brush-up or who just want to have fun. @DuckstersKids/Twitter MORE FROM QUESTIONSANSWERED.NET Exercise-7.11. The activities even include pre-calculus help! @TheRealCoolmath/Twitter Girl Go Games When girls want to find fun ways to improve their math skills, it's possible to do so by playing interactive math games online. The website offers a variety of educational games and activities for school-aged children. Show that:(Image Will Be Updated Soon)i) \[\Delta AMC \cong \Delta BMD\]ii) \[\angle DBC\] is a right angle.iii) \[\Delta DBC \cong \Delta ACB\]iv) \[CM{\text{ }} = {\text{ }}\dfrac{1}{2}{\text{ }}AB\]Ans: Given: M is the mid-point of hypotenuse AB. D and E are points on the same side of AB such that \[\angle BAD{\text{ }} = \angle ABE\] and \[\angle EPA{\text{ }} = \angle DPB\] (See the given figure). ABCya has created a number of apps for on-the-go math practice and learning. AD and BC are equal perpendiculars to a line segment AB (See the given figure). The triangles can be written as CPCT (Corresponding part of the congruent triangle).The Criteria for CongruenceThere are several criteria for congruence that students should know about. Show that in a right-angled triangle, the hypotenuse is the longest side.Ans:(Image Will Be Updated Soon)Let us assume a right-angled triangle ABC with $\angle ABC = 90^\circ $.Now, in $\Delta ABC$$\angle BAC + \angle ABC + \angle ACB = 180^\circ $ ${\text{[Angle sum property]}}$$ \Rightarrow \angle BAC + 90^\circ + \angle ACB = 180^\circ $$ \Rightarrow \angle BAC + \angle ACB = 90^\circ $So, clearly both $\angle BAC$ and $\angle ACB$ are smaller than $\angle ABC$$ \Rightarrow $AB and BC are smaller than AC.$\therefore $AC is the largest side in ΔABC.And since AC is the hypotenuse of ΔABC,Therefore, hypotenuse of any triangle is the largest side of that triangle.2. In the given figure sides AB and AC of ΔABC are extended to points P and Q respectively. In exercise 7.4, there are six questions, and in exercise 7.5, there are four questions.Weightage Marks for CBSE Class 9 Maths Chapter 7 TrianglesTopicsMCQsShort QuestionsLong QuestionsIntroduction to Euclid's Geometry, Areas, Circles, Constructions, Lines and Angles, Triangles, Quadrilaterals,1 mark for 4 questions 3 marks for 2 question6 marks for 2 questionsTotal Marks4 Marks6 Marks12 MarksWhy Should You Download NCERT Class 9 Maths Chapter 7 Solutions from Vedantu?There are many reasons why you should download NCERT solutions maths class 9 chapter 7 from Vedantu. Show that: (i) OB = OC (ii) AO bisects ∠A(Image Will Be Updated Soon)Ans: We know, $\angle ABC = \angle ACB$ ${\text{[Equal angles of isosceles triangle]}}$$ \Rightarrow \dfrac{1}{2}\angle ABC = \dfrac{1}{2}ACB$$ \Rightarrow \angle OBC = \angle OCB$$\therefore OB = OC$ ${\text{[Sides opposite to equal angles of Isosceles triangle are equal]}}$$\Now, In ΔABO and ΔACO,$AB = AC$ ${\text{[Equal sides of Isosceles triangle]}}$$OB = OC$ ${\text{[Proved above]}}$AO=AO [Common]$\therefore \Delta ABO \cong \Delta ACO$ ${\text{[By SSS]}}$$\therefore \angle BAO = \angle CAO$ ${\text{[CPCT]}}$$\therefore $ AO bisects angle A.2. In ΔABC, AD is the perpendicular bisector of BC (see the given figure). Show that(i) AD bisects BC(ii) AD bisects $\angle A$Ans:(Image Will Be Updated Soon)In ΔADB and $\Delta ADC$$AB = AC$ (Given)$AD = AD$ (Common)$\angle ADB = \angle ADC$ ${\text{[Each 90°]}}$$\therefore \Delta ADB \cong \Delta ADC$ ${\text{[By RHS]}}$$ \Rightarrow BD = DC$ (CPCT)Therefore, AD is bisector of BCSimilarly, $\angle BAD = \angle CAD$ (CPCT)Therefore, AD bisects $\angle A$as well.3. Two sides AB and BC and median AM of one triangle ABC are respectively equal to sides PQ and QR and median PN of ΔPQR (see the given figure). Side BA is produced to D such that AD = AB (see the given figure). Show that:(Image Will Be Updated Soon)(i) \[\Delta APB \cong \Delta AQB\](ii) BP = BQ or B is equidistant from the arms of ∠A.Ans: Given: Line l is the bisector of an angle \[\angle A\] and B is any point on l.To prove: (i) \[\Delta APB \cong \Delta AQB\](ii) \[BP{\text{ }} = {\text{ }}BQ\] or B is equidistant from the arms of \[\angle A\].In \[\Delta APB{\text{ , }}\Delta AQB\],\[\angle APB{\text{ }} = \angle AQB\] (Each right angle)\[\angle PAB{\text{ }} = \angle QAB\] (l is the angle bisector of \[\angle A\])AB = AB (Common)\[\therefore \Delta APB \cong \Delta AQB\] (By AAS congruence rule)\[\therefore BP{\text{ }} = {\text{ }}BQ\] (By CPCT)Or, it can be said that B is equidistant from the arms of \[\angle A\].6. This explanation section help students to understand the reasoning behind arriving at the answerThe answers are written by the best subject matter experts in IndiaThe NCERT solutions for class 9th maths chapter 7 are available for freeConclusionThe properties of triangles, rules of congruence, and criteria for inequalities, as well as some facts and theorems related to the sum of the angles and length of their sides, are the main takeaways for students from the class 9 maths NCERT solutions chapter 7 triangle. You can narrow down the games by interest or focus on the specific types of math skills you need to develop. In congruent triangles, the angles should also be equal or congruent.(Image will be updated soon)In congruent triangles, all the corresponding parts are equal. The site takes an approach of fun in learning and presents challenges at multiple levels. Show that BC = DE.Ans:(Image Will Be Updated Soon)Given: \[\angle BAD{\text{ }} = \angle EAC\]To prove: BC = DEIt is given that \[\angle BAD{\text{ }} = \angle EAC\]\[\angle BAD{\text{ }} + \angle DAC{\text{ }} = \angle EAC{\text{ }} + \angle DAC\]\[\angle BAC{\text{ }} = \angle DAE\]In \[\Delta BAC{\text{ , }}\Delta DAE\],AB = AD (Given)\[\angle BAC{\text{ }} = \angle DAE\] (Proved above)AC = AE (Given)\[\therefore \Delta BAC{\text{ }} \cong \Delta DAE\] (By SAS congruence rule)\[\therefore BC{\text{ }} = {\text{ }}DE\] (By CPCT)7. The NCERT solutions for class 9 maths chapter 7 Triangles discuss triangle congruence, rules of congruence, and other properties, as well as triangle inequalities. Plus, the name is clever and easy to remember. And some of those reasons are mentioned below.All answers are written according to the guidelines set by CBSEStudents can learn answers quickly and easilyAll answers are provided with an explanation section. Locate a point in the interior of ΔABC which is equidistant from all the vertices of ΔABC.Ans: The circumcentre of a triangle is always equidistant from all of its vertices.The circumcentre is the point where the perpendicular bisectors of all the triangle's sides meet.(Image Will Be Updated Soon)By sketching the perpendicular bisectors of the triangle's sides AB, BC, and CA, we may determine the circumcentre inΔABC. These solutions are written by the most talented experts in India. ΔABC and ΔDBC are two isosceles triangles on the same base BC and vertices A and D are on the same side of BC (see the given figure). This chapter begins with a brief introduction to the basic elements of a triangle so that students can understand triangles, their types, and properties. In exercise 7.3, there are five questions. Show that ∠ABD = ∠ACD.(Image Will Be Updated Soon)Ans: Since AB=AC, and DB=DC,$\therefore $ABDC is a quadrilateral with adjacent sides being equal.$ \Rightarrow $ABDC is a kite.We know that one pair of opposite (obtuse) angles of kite are equal.Hence, $\angle ABD = \angle ACD$6. A, B, and C now form a triangle. Show that AC > AB.(Image Will Be Updated Soon)Ans: $\angle PBC + \angle ABC = 180^\circ $ ${\text{[Linear pair]}}$ ... (1)Similarly, $\angle QCB + \angle ACB = 180^\circ $ ... (2)Also, it is given that $\angle PBC < \angle QCB$ ... (3)Now, comparing equations 1, 2 and 3 we can say that$\angle ABC > \angle ACB$$\therefore AC > AB$ ${\text{[Sides opposite to larger angle of triangle are larger]}}$3. Prove that ∠PSR > ∠PSQ.(Image Will Be Updated Soon)Ans: In $\Delta PQR$$PR > PQ$ (Given)$ \Rightarrow \angle Q > \angle R$ ${\text{[Angles opposite to larger side are larger]}}$ ... (1)Now in $\Delta PQS$$\angle SPQ + \angle PQS + \angle QSP = 180^\circ $ ... (2)Similarly, in $\Delta PRS$$\angle SPR + \angle PRS + \angle RSP = 180^\circ $ ... (3)Also, $\angle SPQ = \angle SPR$ [PS bisects $\angle P$] ... (4)Equating equations 2 and 3 we get that$\angle SPQ + \angle PQS + \angle QSP = \angle SPR + \angle PRS + \angle RSP$$ \Rightarrow \angle PQS + \angle QSP = \angle PRS + \angle RSP$ ${\text{[Using equation 4]}}$ ... (5)Comparing equation 5 and 1, we can say that$\angle RSP > \angle QSP$Hence $\angle PSR > \angle PSQ$.6. Additional tools include online graphing calculators, geometry art, polyhedra, fractals and specially designated areas for parents and teachers, so everyone can participate in the learning process. Check out these top online resources to get started. ABCya Parents and teachers can find math games on ABCya for children in pre-K through sixth grade. If AD is extended to intersect BC at P, show that(i) \[\Delta ABD \cong \Delta ACD\](ii) \[\Delta ABP \cong \Delta ACP\](iii) AP bisects $\angle A$ as well as $\angle D$(iv)AP is the bisector of BC(Image Will Be Updated Soon)Ans: (i) In ΔABD and ΔACD,$AB = AC$ ${\text{[Equal sides of isosceles triangle]}}$$DB = DC$ ${\text{[Equal sides of isosceles triangle]}}$$AD=AD (Common)$\therefore \Delta ABD \cong \Delta ACD$ ${\text{[By SSS]}}$$ \Rightarrow \angle BAD = \angle CAD$ [CPCT] $ \Rightarrow \angle BAP = \angle CAP$$ ... (1)And $\angle ADB = \angle ADC$ (CPCT) ... (2)(ii) In $\Delta ABP$$ and $\Delta ACP$$AB = AC$ ${\text{[Equal sides of isosceles triangle]}}$$\angle BAP = \angle CAP$ ${\text{[From 1]}}$$AP = AP$ (Common)$\therefore \Delta ABP \cong \Delta ACP$ ${\text{[By SAS]}}$$\therefore BP = CP$ (CPCT) ... (3)Similarly, $\angle APB = \angle APC$ (CPCT) ... (4)(iii) AP is bisector of $\angle A$ ${\text{[From 1]}}$Now, since AP is a line segment$\therefore \angle ADB + \angle BDP = 180^\circ $ ... (5)Similarly, $\angle ADC + \angle CDP = 180^\circ $ ... (6)Comparing equations 2, 5 and 6 we can say that$\angle BDP = \angle CDP$$\therefore $AP bisects $\angle D$Hence AP bisects both $\angle A$ and $\angle D$(iv)We know,$\angle APB + \angle APC = 180^\circ $$ \Rightarrow \angle APB + \angle APB = 180^\circ $ ${\text{[From 4]}}$$ \Rightarrow \angle APB = 90^\circ $ ... (7)From equations 3 and 7 we can say that,AP is perpendicular bisector of BC.2. AD is an altitude of an isosceles triangles ABC in which AB = AC. Show that the angles of an equilateral triangle are 60º each.Ans:(Image Will Be Updated Soon)In $\angle B = \angle C$ ${\text{[Angles opposite to equal sides of a triangle]}}$$Similarly,$\angle A = \angle B$ ${\text{[Angles opposite to equal sides of a triangle]}}$$ \Rightarrow \angle A = \angle B = \angle C$Now, we know that$\angle A + \angle B + \angle C = 180^\circ $ ${\text{[Angle sum property]}}$$ \Rightarrow \angle A + \angle A + \angle A = 180^\circ $$ \Rightarrow 3\angle A = 180^\circ $$ \Rightarrow \angle A = 60^\circ $$\therefore \angle A = \angle B = \angle C = 60^\circ $Hence proved.Exercise 7.31. Who wouldn't want to try to learn more about math with games like "Percent Panic," "Secret Message Maker" and "State Bingo"?Hooda Math Games Offer Creative LearningHooda Math Games is another popular, free online site for math games pitched to kindergarten through high school-aged learners. The intersection point of the angle bisectors of a triangle's internal angles is the triangle's centre.(Image Will Be Updated Soon)By drawing the angle bisectors of the interior angles of this triangle in ΔABC, we may get the incentre of this triangle. ΔABC is an isosceles triangle in which AB = AC. @ExploreLearning/Twitter Duckster's Fast Math Playing a Fast Math game online allows students to sharpen their skills... well — quickly. @spilgames/Twitter Reflex: The Game Students using Reflex get to play engaging games designed to build math fluency. When they answer a question incorrectly, a red X appears. ABC is an isosceles triangle in which altitudes BE and CF are drawn to equal sides AC and AB respectively (see the given figure). ABC is a triangle. The

intersection of these bisectors is marked by the letter O. CC0/Pixapopz/Pixabay Amidst all the school subjects, math is often difficult for young learners. Show that(i) \[\Delta ABE \cong \Delta ACF\](ii) AB = AC i.e., ABC is an isosceles triangle(Image Will Be Updated Soon)Ans: In $\Delta ABE$and ΔACF,\[\angle BAE = \angle CAF\](Common)$\angle BEA = \angle CFA$ ${\text{[Each 90°]}}$$BE = CF$ [Given]$\therefore \Delta ABE \cong \Delta ACF$ ${\text{[by AAS]}}$$\therefore AB = AC$ (CPCT)And therefore, ΔABC is an isosceles triangle with AB=AC.5. ABC and DBC are two isosceles triangles on the same base BC (see the given figure). Join A to O. Also, ∠PBC < ∠QCB. Even better, each time they succeed, they win reward tokens. From exercises aimed at teaching younger students basic arithmetic to more advanced games that perfect the skills of junior high and high school students, online math games give kids at all grade levels the fun tools they need to improve their math skills. Show that \[\Delta ABC \cong \Delta CDA\].(Image Will Be Updated Soon)Given: l and m are two parallel lines intersected by another pair of parallel lines p and q To prove: \[\Delta ABC \cong \Delta CDA\].In \[\Delta ABC{\text{ , }}\Delta CDA\],\[\angle BAC{\text{ }} = \angle DCA\] (Alternate interior angles, as\[p{\text{ }}||{\text{ }}q\])2AC = CA (Common)\[\angle BCA{\text{ }} = \angle DAC\] (Alternate interior angles, as \[l{\text{ }}||{\text{ }}m\])\[\therefore \Delta ABC \cong \Delta CDA\] (By ASA congruence rule)5. These solutions will help students to score better marks than ever.This means that students can pass their final examination with flying colors. The founder, Stephen Schutz, works with a team of animators, artists, designers, educators, musicians, programmers, quality engineers, systems specialists and writers to make Starfall a fun educational option for kids in kindergarten through grade three. Prove that(i) \[\Delta ABD{\text{ }} \cong \Delta BAC\](ii) BD = AC(iii)\[\angle ABD{\text{ }} = \angle BAC\].(Image Will Be Updated Soon)Ans : Given: ABCD is a quadrilateral where AD = BC and \[\angle DAB{\text{ }} = \angle CBA\]To prove: (i) \[\Delta ABD{\text{ }} \cong \Delta BAC\](ii) BD = AC(iii)\[\angle ABD{\text{ }} = \angle BAC\].In \[\Delta ABD{\text{ , }}\Delta BAC\],AD = BC (Given)\[\angle DAB{\text{ }} = \angle CBA\] (Given)AB = BA (Common)\[\therefore \Delta ABD{\text{ }} \cong \Delta BAC\] (By SAS congruence rule)\[\therefore BD{\text{ }} = {\text{ }}AC\] (By CPCT)And, \[\angle ABD{\text{ }} = \angle BAC\] (By CPCT)3. The circumcentre is the only point in a triangle that is equidistant from its vertices. As a result, the ice cream parlour should be located near ΔABC's circumcenter O.(Image Will Be Updated Soon)The maximum amount of people can approach it in this case.By drawing perpendicular bisectors of the sides of this triangle, we can find the circumcentre O.4. Complete the hexagonal and star shaped rangolies (see the given figures) by filling them with as many equilateral triangles of side 1 cm as you can. What can you say about BC and BD?(Image Will Be Updated Soon)Ans: Given: In quadrilateral ACBD, AC = AD and AB is bisected by \[\angle A\]To find: Show that \[\Delta ABC{\text{ }} \cong \Delta ABD\]. In \[\Delta ABC{\text{ , }}\Delta ABD\]\[AC{\text{ }} = {\text{ }}AD\] (Given)\[\angle CAB{\text{ }} = \angle DAB\] (AB bisects ∠A)\[AB{\text{ }} = {\text{ }}AB\] (Common)\[\therefore \Delta ABC{\text{ }} \cong \Delta ABD\] (By SAS congruence rule)\[\therefore BC{\text{ }} = {\text{ }}BD\] (By CPCT)Therefore, BC and BD are of equal lengths.2. ABCD is a quadrilateral in which AD = BC and \[\angle DAB{\text{ }} = \angle CBA\] (See the given figure). Math games can also be sorted based on themes like holidays and different skill sets. Answering questions accurately gives them more time on the next problem as a reward. AB is a line segment and P is its mid-point. Also, in this criteria for congruence, RHS stands for Right Angle Hypotenuse Side.Properties of Isosceles TriangleStudents should also learn about the properties of isosceles triangles for writing NCERT solutions of class 9 maths chapter 7. Or think about a 25% off sale at the student's favorite sports shop. In addition, the NCERT solutions class 9 maths chapter 7 covers key formulas, questions, and theorems based on congruent triangles and triangle inequalities.NCERT Solutions for Class 9 Maths Other Chapters PDF DownloadAccording to chapter 7 class 9 maths NCERT solutions, congruent triangles are a pair of triangles in which all three sides are corresponding. In right triangle ABC, right angled at C, M is the mid-point of hypotenuse AB. Line l is the bisector of an angle \[\angle A\] and B is any point on l. The games on sites like Girl Games are for everyone, of course, but they often hold a little extra appeal for young ladies. In addition, many of the free games meet requirements within the Common Core State Standards Initiative.The site is very popular due to its content and its easy-to-use interface. Draw AP ⊥ BC to show that ∠B= ∠C.(Image Will Be Updated Soon)Ans: In ΔABP and $\Delta ACP$$AB = AC$ (Given)$AP = AP$ (Common)$\angle APB = \angle APC$ ${\text{[Each 90°]}}$$\therefore \Delta ABP \cong \Delta ACP$ ${\text{[By RHS]}}$$ \Rightarrow \angle ABP = \angle ACP$ (CPCT)Exercise 7.41. We've found a few of them and share the details here about Cool Math Games, ABCya and Hooda math games, which can all contribute to students being able to navigate the world of math more easily.Coolmath Games for Math TrainingCoolmath Games helps everyone train their brains, using logic, thinking and math. @HoodaMath/Twitter CoolMath For those who thought math couldn't be fun, the CoolMath network of websites has been proving them wrong since 1999. Point D is joined to point B (see the given figure). The class 9 ch 7 maths solutions can be downloaded for free. Enjoy exploring the sites and gain confidence in skills that easily carry over to the real world. The games can be sorted by grade as well as skill type, such as fractions and division. MORE FROM LIFE123.COM @MathCoachCorner/Twitter Students at every grade level can benefit from playing interactive math games online. 7th Chapter Triangles are extremely useful in learning all of these concepts through the use of exercises provided by Vedantu in the form of NCERT Solutions for Class 9 Maths Chapter 7 - Triangles. In the given figure, PR > PQ and PS bisects ∠QPR. This age-old system of offering a reward, helps them attain fact fluency and improve their overall math skills. Find ∠B and ∠C.(Image Will Be Updated Soon)Ans: Since AB = AC,$\angle B = \angle C$ ${\text{[Angles opposite to equal sides of a triangle]}}$Now, we know$\angle A + \angle B + \angle C = 180^\circ $ ${\text{[Angle sum property]}}$$ \Rightarrow \angle A + 2\angle C = 180^\circ $$ \Rightarrow 90^\circ + 2\angle C = 180^\circ $$ \Rightarrow 2\angle C = 90^\circ $$ \Rightarrow \angle C = 45^\circ $$\therefore \angle B = 45^\circ $Hence $\angle B$ and $\angle C$ are each 45$^\circ $8. The site offers tons of practice opportunities for students who have to take "fast fact" quizzes every week. It includes lessons in pre-algebra, algebra and pre-calculus. @Starfalledu/Twitter Hooda Parents and educators who are looking for a comprehensive resource for helping students all the way through high school with addition, subtraction, multiplication, division, fraction, integers and algebra can find plenty of fun math games on Hooda. Using RHS congruence rule, prove that the triangle ABC is isosceles.Ans:(Image Will Be Updated Soon)In ΔBEC and $\Delta CFB$$BE = CF$ (Given)$\angle BEC = \angle CFB$ ${\text{[Each 90°]}}$$BC=CB (Common)$\therefore \Delta BEC \cong \Delta CFB$ ${\text{[By RHS Congruency]}}$$ \Rightarrow \angle BCE = \angle CBF$ (CPCT)$\therefore AB = AC$ ${\text{[Sides opposite to equal angles of a triangle are equal]}}$Therefore, ΔABC is an isosceles triangle.5. ABC is an isosceles triangle with AB = AC. The most important property is that if the two sides of the triangle are equal, the angles opposite those sides are also equal and vice versa is also true.The Inequalities in TrianglesThe unequal sides of the triangle and the angles opposite are related as if the two sides of a triangle are unequal, then the angles opposite to the longer side will be larger than the angle opposite to the shorter side.Triangle InequalityAccording to various NCERT class 9 maths solutions chapter 7, the sum of the lengths of any two sides of a triangle must be larger than the third side.Triangles Class 9 NCERT Solutions PDF Free DownloadStudents can download NCERT solutions for class 9 maths chapter triangles from Vedantu.