CLASS 10 · MATHEMATICS · CHAPTER 6

Triangles - NCERT Examples

Examples 1-8 with independently verified solutions.

CHAPTER	RESOURCE	SOURCE
Triangles	NCERT Examples	NCERT Mathematics, Reprint 2026-27

PART 1

Verified NCERT questions and solutions

Verified NCERT questions and solutions

Solutions are checked independently and follow the supplied NCERT chapter edition.

NCERT EXAMPLE

Example 1

basic proportionality theorem · ratios · parallel lines

A line intersects sides AB and AC of △ABC at D and E respectively and is parallel to BC. Prove that AD/AB = AE/AC.

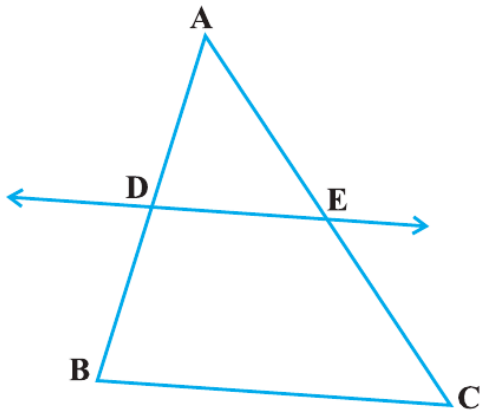


Fig. 6.13

Figure 6-13 from the supplied NCERT chapter.

Solution

GIVEN:

In triangle ABC, D lies on AB, E lies on AC and DE is parallel to BC.

TO PROVE:

AD/AB = AE/AC.

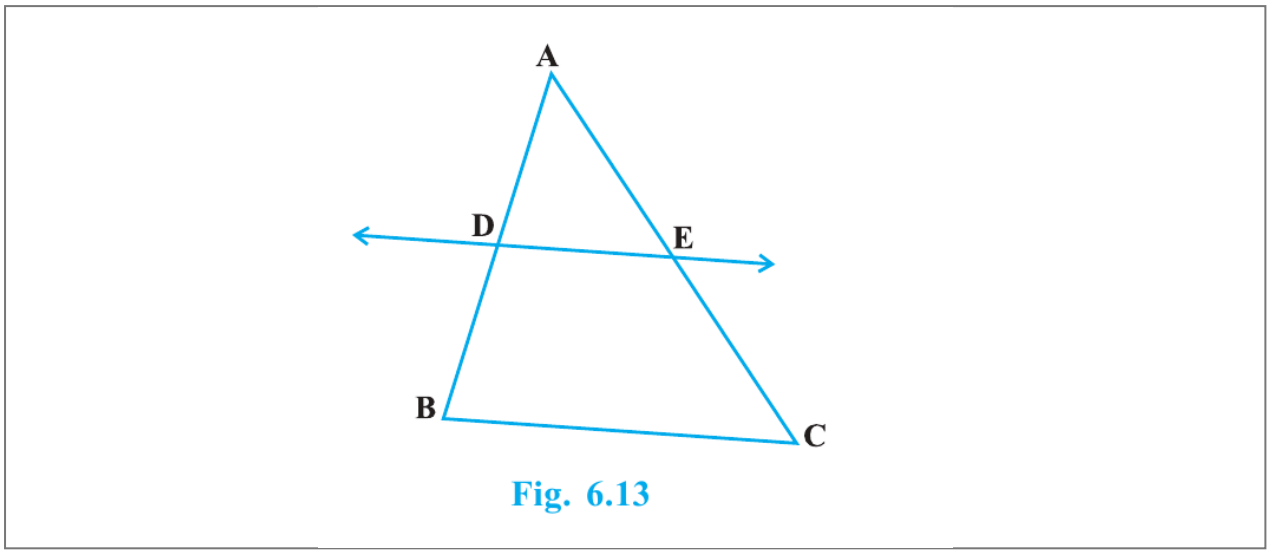


Fig. 6.13

Figure 6-13 from the supplied NCERT chapter.

PROOF:

By the Basic Proportionality Theorem:

$$\frac{AD}{DB} = \frac{AE}{EC}$$

Taking reciprocals:

$$\frac{DB}{AD} = \frac{EC}{AE}$$

Adding 1 to both sides:

$$\frac{DB}{AD} + 1 = \frac{EC}{AE} + 1$$

$$\frac{DB + AD}{AD} = \frac{EC + AE}{AE}$$

$$\frac{AB}{AD} = \frac{AC}{AE}$$

Taking reciprocals again:

$$\frac{AD}{AB} = \frac{AE}{AC}$$

Final answer

Therefore, AD/AB = AE/AC.

NCERT EXAMPLE

Example 2

basic proportionality theorem · trapezium · parallel lines

ABCD is a trapezium with AB ∥ DC. E and F are points on the non-parallel sides AD and BC respectively such that EF is parallel to AB. Show that AE/ED = BF/FC.

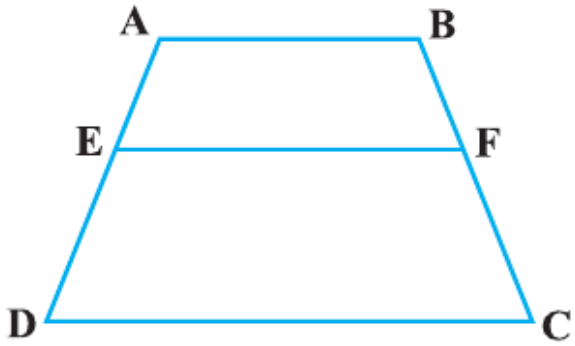


Fig. 6.14

Figure 6-14 from the supplied NCERT chapter.

Solution

GIVEN:

ABCD is a trapezium with AB parallel to DC; E and F lie on AD and BC, and EF is parallel to AB.

TO PROVE:

AE/ED = BF/FC.

CONSTRUCTION:

Join A to C. Mark G where AC meets EF.

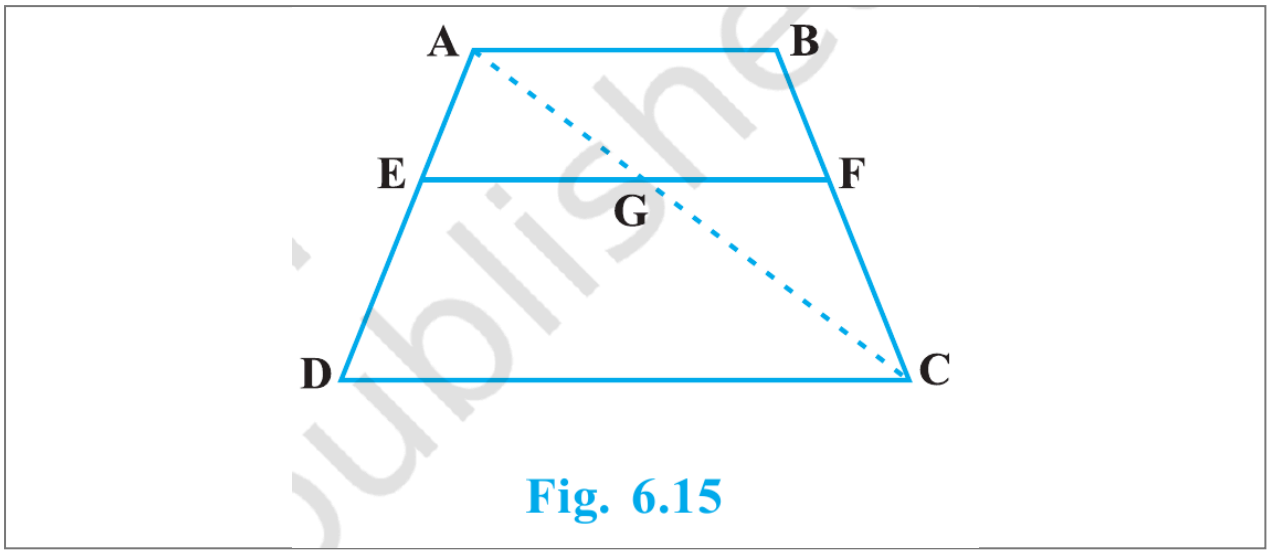


Figure 6-15 from the supplied NCERT chapter.

PROOF:

Since AB ∥ DC and EF ∥ AB, we also have EF ∥ DC.

In △ADC, EG ∥ DC. By BPT:

$$\frac{AE}{ED} = \frac{AG}{GC} \quad \ldots(1)$$

In △CAB, GF ∥ AB. By BPT:

$$\frac{CG}{GA} = \frac{CF}{FB}$$

Taking reciprocals:

$$\frac{AG}{GC} = \frac{BF}{FC} \quad \ldots(2)$$

From (1) and (2):

$$\frac{AE}{ED} = \frac{BF}{FC}$$

Final answer

Therefore, AE/ED = BF/FC.

NCERT EXAMPLE

Example 3

converse of BPT · isosceles triangle · parallel lines

In Figure 6.16, PS/SQ = PT/TR and ∠PST = ∠PRQ. Prove that PQR is an isosceles triangle.

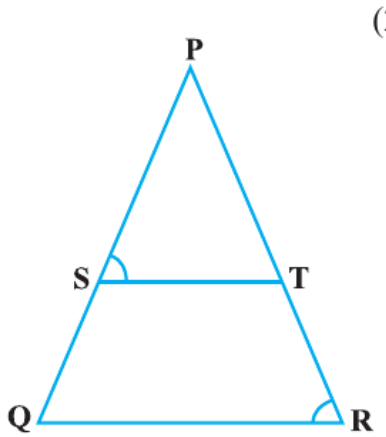


Fig. 6.16

Figure 6-16 from the supplied NCERT chapter.

Solution

GIVEN:

S and T lie on PQ and PR, respectively; PS/SQ = PT/TR and angle PST equals angle PRQ.

TO PROVE:

Triangle PQR is isosceles.

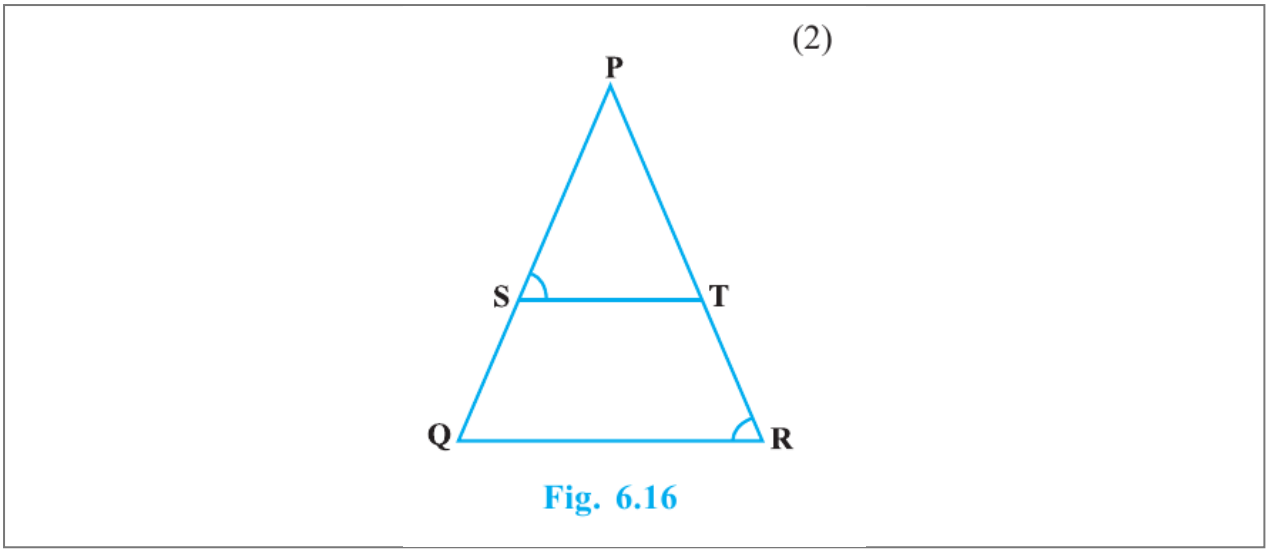


Figure 6-16 from the supplied NCERT chapter.

PROOF:

$$\frac{PS}{SQ} = \frac{PT}{TR}$$

Since S and T divide PQ and PR in the same ratio, ST ∥ QR by the converse of BPT.

Therefore, ∠PST = ∠PQR because they are corresponding angles.

But ∠PST = ∠PRQ is given. Hence ∠PQR = ∠PRQ.

Sides opposite equal angles of a triangle are equal, so PR = PQ.

Final answer

Therefore, △PQR is isosceles with PQ = PR.

NCERT EXAMPLE

Example 4

AAA similarity · parallel lines

In Figure 6.29, PQ ∥ RS. Prove that △POQ ~ △SOR.

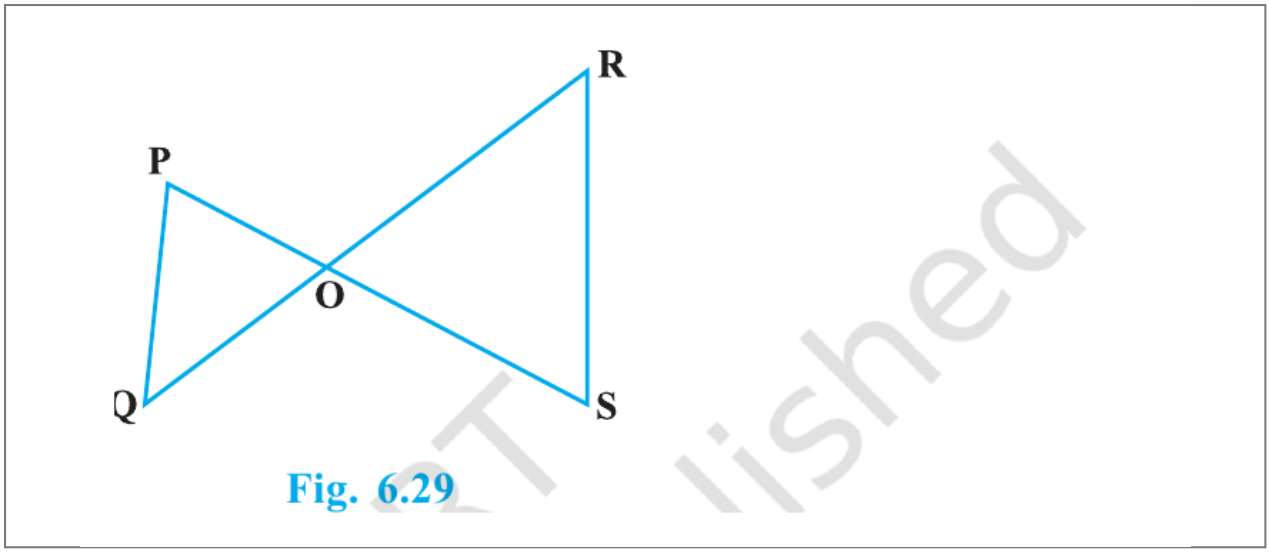


Figure 6-29 from the supplied NCERT chapter.

Solution

GIVEN:

PQ is parallel to RS, and the intersecting lines meet at O.

TO PROVE:

Triangle POQ is similar to triangle SOR.

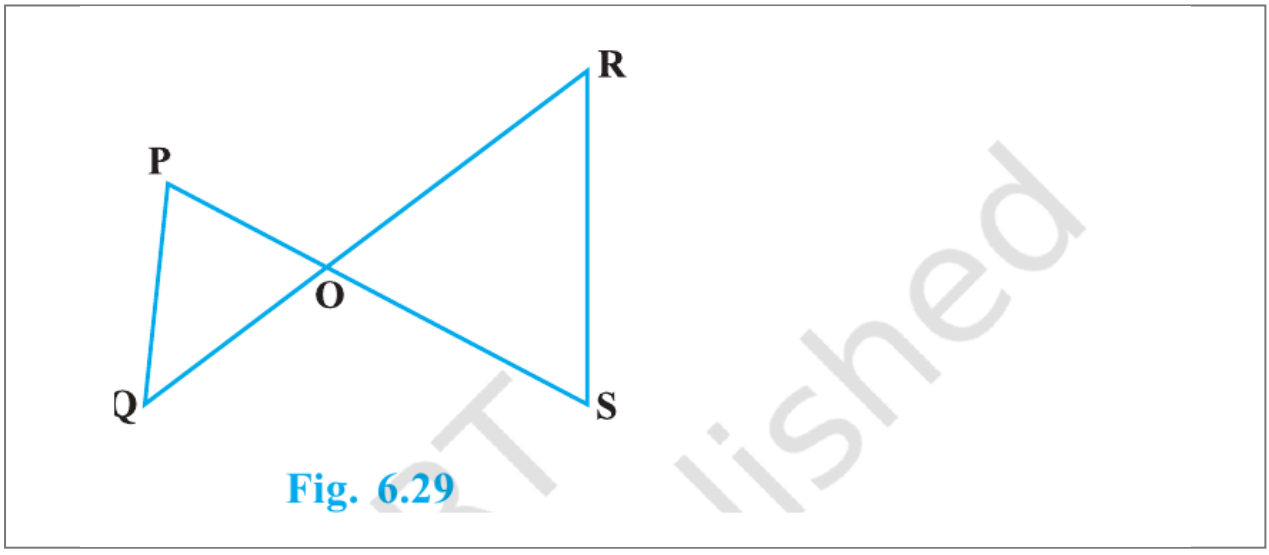


Figure 6-29 from the supplied NCERT chapter.

PROOF:

$$\angle OPQ = \angle OSR$$

Alternate interior angles, since PQ is parallel to RS.

$$\angle OQP = \angle ORS$$

Alternate interior angles, since PQ is parallel to RS.

$$\angle POQ = \angle SOR$$

Vertically opposite angles.

Thus the correspondence is P ↔ S, O ↔ O and Q ↔ R.

Therefore, △POQ ~ △SOR by the AAA similarity criterion.

Final answer

Therefore, △POQ ~ △SOR.

NCERT EXAMPLE

Example 5

SSS similarity · corresponding angles

Observe Figure 6.30 and find ∠P.

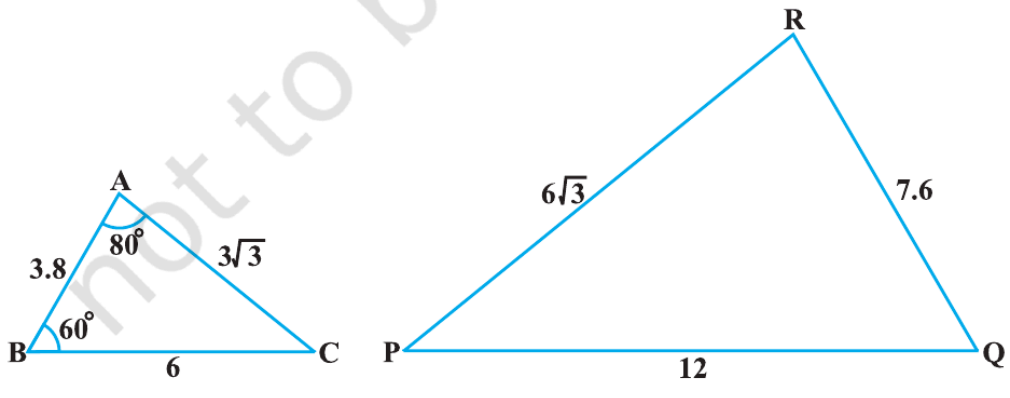


Fig. 6.30

Figure 6-30 from the supplied NCERT chapter.

Solution

GIVEN:

The side lengths and two angles of triangles ABC and PQR are marked in Figure 6.30.

TO FIND:

The measure of angle P.

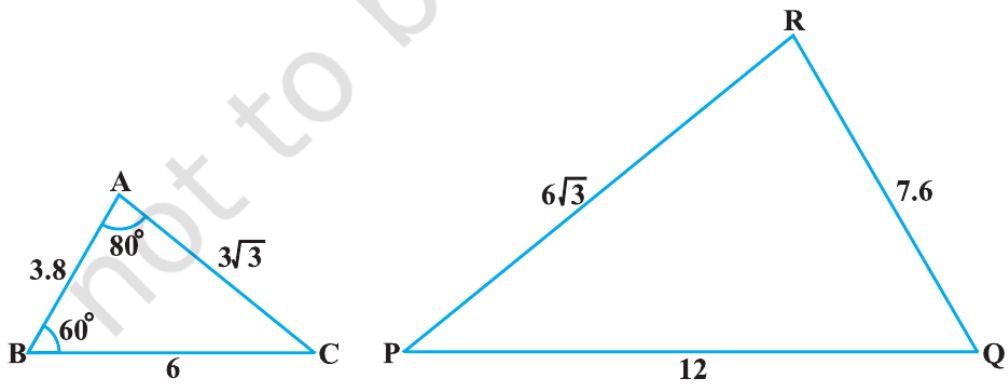


Fig. 6.30

Figure 6-30 from the supplied NCERT chapter.

SOLUTION:

In △ABC and △RQP:

$$\frac{AB}{RQ} = \frac{3.8}{7.6} = \frac{1}{2}$$

$$\frac{BC}{QP} = \frac{6}{12} = \frac{1}{2}$$

$$\frac{CA}{PR} = \frac{3\sqrt{3}}{6\sqrt{3}} = \frac{1}{2}$$

Thus:

$$\frac{AB}{RQ} = \frac{BC}{QP} = \frac{CA}{PR}$$

Therefore, △ABC ~ △RQP by SSS similarity.

The verified correspondence is A ↔ R, B ↔ Q and C ↔ P. Hence ∠P = ∠C.

By the angle-sum property, ∠C = 180° − 80° − 60° = 40°.

Final answer

∠P = 40°.

NCERT EXAMPLE

Example 6

SAS similarity · vertically opposite angles

In Figure 6.31, OA × OB = OC × OD. Show that ∠A = ∠C and ∠B = ∠D.

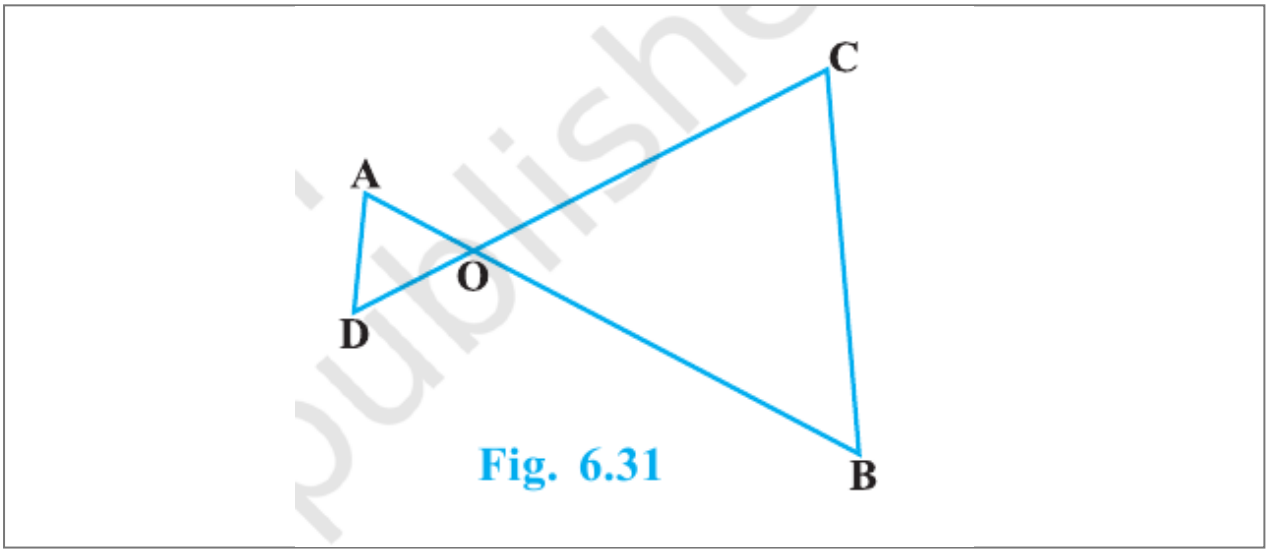


Figure 6-31 from the supplied NCERT chapter.

Solution

GIVEN:

OA × OB = OC × OD in the intersecting-segment diagram.

TO PROVE:

Angle A equals angle C, and angle B equals angle D.

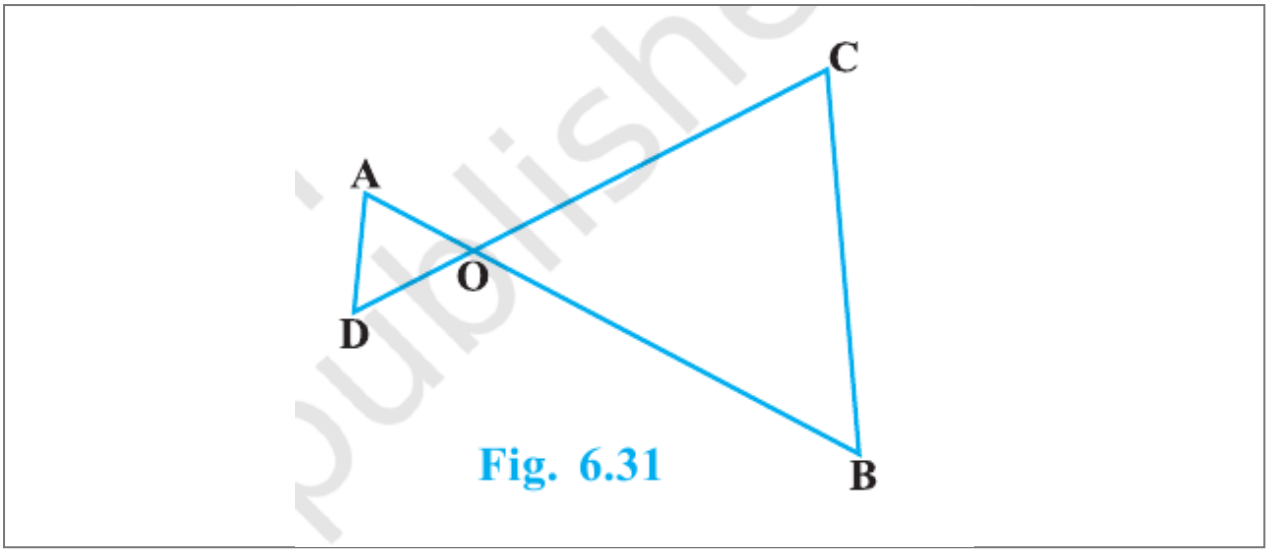


Figure 6-31 from the supplied NCERT chapter.

PROOF:

Dividing both sides by OC × OB:

$$\frac{OA}{OC} = \frac{OD}{OB} \quad \ldots(1)$$

Also, ∠AOD = ∠COB because they are vertically opposite angles. ...(2)

From (1) and (2), the two sides including the equal angle are proportional.

Therefore, △AOD ~ △COB by SAS similarity, with A ↔ C and D ↔ B.

Corresponding angles of similar triangles are equal, so ∠A = ∠C and ∠D = ∠B.

Final answer

∠A = ∠C and ∠B = ∠D.

NCERT EXAMPLE

Example 7

AA similarity · shadows · application

A girl of height 90 cm is walking away from the base of a lamp-post at 1.2 m/s. If the lamp is 3.6 m above the ground, find the length of her shadow after 4 seconds.

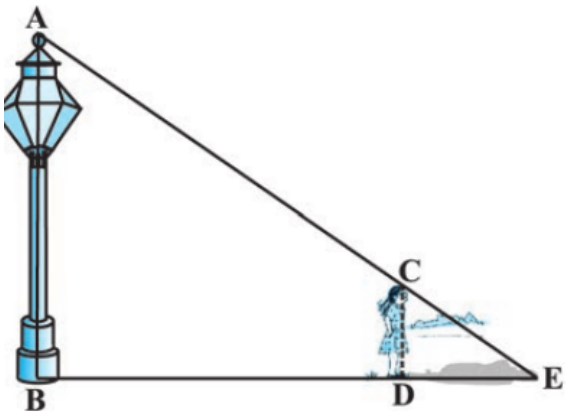


Fig. 6.32

Figure 6-32 from the supplied NCERT chapter.

Solution

GIVEN:

The lamp is 3.6 m high; the girl is 0.9 m high and walks at 1.2 m/s for 4 s.

TO FIND:

The length of the girl's shadow after 4 s.

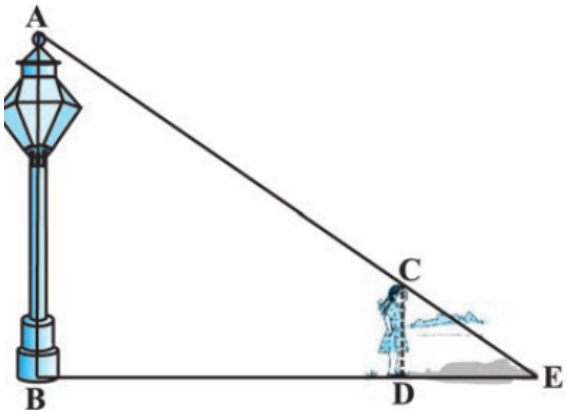


Fig. 6.32

Figure 6-32 from the supplied NCERT chapter.

SOLUTION:

Let DE = x m be the girl's shadow after 4 seconds.

Distance walked, BD = 1.2 × 4 = 4.8 m. Therefore, BE = BD + DE = 4.8 + x metres.

AB = 3.6 m and CD = 90 cm = 0.9 m.

In △ABE and △CDE, ∠B = ∠D = 90° and ∠E is common. Therefore, △ABE ~ △CDE by AA similarity.

The correspondence is A ↔ C, B ↔ D and E ↔ E. Hence:

$$\frac{BE}{DE} = \frac{AB}{CD}$$

$$\frac{4.8 + x}{x} = \frac{3.6}{0.9} = 4$$

$$4.8 + x = 4x$$

$$4x - x = 4.8$$

$$3x = 4.8$$

$$x = 1.6$$

Final answer

The girl's shadow is 1.6 m long.

NCERT EXAMPLE

Example 8

similar triangles · medians · SAS similarity · SSS similarity

CM and RN are respectively the medians of △ABC and △PQR. If △ABC ~ △PQR, prove that:

(i) △AMC ~ △PNR

(ii) CM/RN = AB/PQ

(iii) △CMB ~ △RNQ

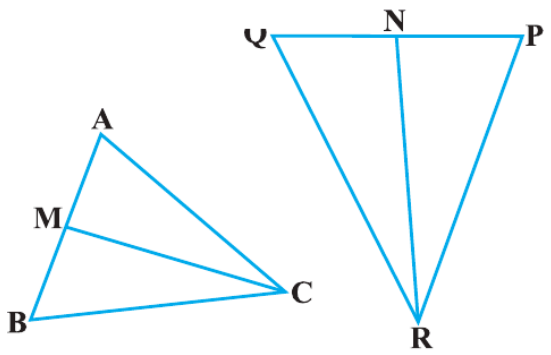


Fig. 6.33

Figure 6-33 from the supplied NCERT chapter.

Solution

GIVEN:

Triangle ABC is similar to triangle PQR; CM and RN are the corresponding medians.

TO PROVE:

Parts (i) and (iii): the stated triangle similarities; part (ii): CM/RN = AB/PQ.

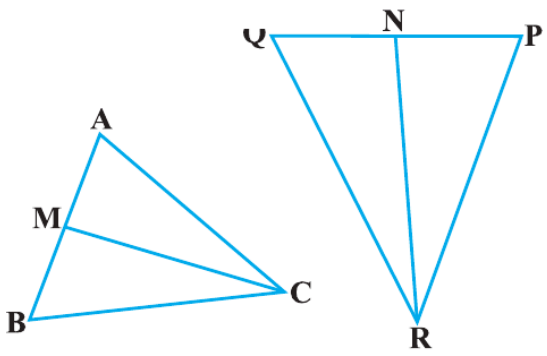


Fig. 6.33

Figure 6-33 from the supplied NCERT chapter.

PROOF:

Given △ABC ~ △PQR, the correspondence is A ↔ P, B ↔ Q and C ↔ R.

Therefore, corresponding sides and angles are equal in ratio:

$$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{CA}{RP} \qquad ...(1)$$

$$\angle A = \angle P, \quad \angle B = \angle Q, \quad \angle C = \angle R$$

(i) Since CM and RN are medians:

$$AB = 2AM, \qquad PQ = 2PN$$

$$\frac{AM}{PN} = \frac{AB}{PQ} = \frac{CA}{RP}$$

Also, ∠MAC = ∠NPR because ∠A = ∠P. Therefore, △AMC ~ △PNR by SAS similarity.

(ii) From △AMC ~ △PNR:

$$\frac{CM}{RN} = \frac{CA}{RP}$$

From (1):

$$\frac{CA}{RP} = \frac{AB}{PQ}$$

Therefore:

$$\frac{CM}{RN} = \frac{AB}{PQ}$$

(iii) From (1) and part (ii):

$$\frac{CM}{RN} = \frac{BC}{QR}$$

Also:

$$BM = \frac{AB}{2}, \qquad QN = \frac{PQ}{2}$$

$$\frac{BM}{QN} = \frac{AB}{PQ} = \frac{CM}{RN}$$

Thus:

$$\frac{CM}{RN} = \frac{BC}{QR} = \frac{BM}{QN}$$

Therefore, △CMB ~ △RNQ by SSS similarity.

Final answer

(i) △AMC ~ △PNR; (ii) CM/RN = AB/PQ; (iii) △CMB ~ △RNQ.