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Triangles — CBSE Class 10 Mathematics Chapter Test

FREE CHAPTER TEST · CLASS X · MATHEMATICS (041) · PATTERN OF THE CBSE SAMPLE QUESTION PAPER 2026-27

TIME ALLOWED	MAXIMUM MARKS	QUESTIONS	NAME / ROLL NO.
1½ hours	40	19 (A 10 · B 3 · C 2 · D 2 · E 2)	

GENERAL INSTRUCTIONS

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 19 questions. All questions are compulsory.
2. This question paper is divided into five sections: A, B, C, D and E.
3. In Section A, Questions 1 to 8 are multiple choice questions (MCQs) and Questions 9 and 10 are assertion-reason based questions of 1 mark each.
4. In Section B, Q11–13 are very short answer (VSA) type questions, carrying 2 marks each.
5. In Section C, Q14–15 are short answer (SA) type questions, carrying 3 marks each.
6. In Section D, Q16–17 are long answer (LA) type questions, carrying 5 marks each.
7. In Section E, Q18–19 are case study based questions, carrying 4 marks each, with sub-parts of the values of 1, 1 and 2 marks.
8. There is no overall choice. However, an internal choice has been provided in 1 question of Section B, 1 question of Section C, 1 question of Section D and in the 2-mark sub-part of each question of Section E.
9. Use of calculators is not allowed.
10. This chapter test follows the section structure, question types and marks per question of the CBSE Class X Mathematics (Standard, 041) Sample Question Paper 2026-27, at half the length of the 80-mark board paper: 40 marks in 1½ hours.
11. The answer key and the marking scheme are at the end of this booklet. Attempt the paper in 1½ hours before you look at them.

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Chapter: Triangles · **Topics:** Similar figures and triangles · Basic Proportionality Theorem and its converse · Criteria for similarity · Shadows, mirrors and heights · Ratios of sides and perimeters

SECTION A

This section comprises 10 questions of 1 mark each: 8 multiple choice questions (MCQs) and 2 assertion-reason based questions.

1. In ΔABC, $DE \parallel BC$ with D on AB and E on AC. If AD = 2 cm, DB = 3 cm and AE = 4 cm, then EC is 1

(A) 6 cm (B) 4 cm

(C) 8 cm (D) 3 cm

2. $\Delta ABC \sim \Delta PQR$ with $\frac{AB}{PQ} = \frac{2}{3}$. If BC = 8 cm, then QR is 1

(A) 10 cm (B) 12 cm

(C) 16 cm (D) 6 cm

3. In ΔABC, $\angle A = 50°$ and $\angle B = 60°$; in ΔPQR, $\angle P = 50°$ and $\angle R = 70°$. The triangles are similar by the criterion 1

(A) SSS (B) SAS

(C) AA (AAA) (D) RHS

4. A vertical pole 5 m high casts a shadow 3 m long. At the same time a tower casts a shadow 24 m long. The height of the tower is 1

(A) 30 m (B) 36 m

(C) 45 m (D) 40 m

5. D and E are points on sides AB and AC of ΔABC with $\frac{AD}{DB} = \frac{AE}{EC} = \frac{3}{5}$. Then $DE \parallel BC$, by 1

(A) the Basic Proportionality Theorem (B) the converse of the Basic Proportionality Theorem

(C) the SSS criterion (D) the RHS criterion

6. The sides of two similar triangles are in the ratio 3 : 4. The ratio of their perimeters is 1

(A) 9 : 16 (B) 4 : 3

(C) 27 : 64 (D) 3 : 4

7. Which of the following pairs of triangles are always similar? 1

(A) two isosceles triangles (B) two right triangles

(C) two equilateral triangles (D) two scalene triangles

8. $\Delta ABC \sim \Delta DEF$, $\angle A = 47°$ and $\angle E = 63°$. Then $\angle C$ is 1

(A) 70° (B) 63°

(C) 47° (D) 110°

9. **Assertion (A):** If DE ∥ BC in ΔABC, with D on AB and E on AC, then $\frac{AD}{DB} = \frac{AE}{EC}$. 1

Reason (R): A line drawn parallel to one side of a triangle, meeting the other two sides in distinct points, divides them in the same ratio.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

10. **Assertion (A):** Two triangles whose corresponding sides are proportional are congruent. 1

Reason (R): If the corresponding sides of two triangles are proportional, the triangles are similar.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

SECTION B

This section comprises 3 very short answer (VSA) type questions of 2 marks each.

11. (a) In ΔABC, DE ∥ BC with D on AB and E on AC. If AD = x + 1, DB = x − 1, AE = x + 5 and EC = x + 1, find x. 2

OR

(b) E and F are points on the sides PQ and PR of ΔPQR with PE = 4.2 cm, EQ = 2.8 cm, PF = 4.5 cm and FR = 3.5 cm. Is EF ∥ QR? Give a reason.

12. Using the Basic Proportionality Theorem, prove that a line drawn through the mid-point of one side of a triangle, parallel to another side, bisects the third side. 2

13. ΔABC ~ ΔPQR. The perimeters of ΔABC and ΔPQR are 36 cm and 24 cm. If AB = 9 cm, find PQ. 2

SECTION C

This section comprises 2 short answer (SA) type questions of 3 marks each.

14. (a) PQRS is a trapezium with PQ ∥ SR, and its diagonals PR and QS meet at O. Show that OP × OS = OQ × OR. 3

OR

(b) P and Q are points on the sides BC and AC of ΔABC such that ∠ABC = ∠PQC. Show that ΔCBA ~ ΔCQP.

15. The perimeters of two similar triangles are 30 cm and 20 cm. (i) One side of the first triangle is 12 cm; find the corresponding side of the second. (ii) A side of the second is 9 cm; find the corresponding side of the first. 3

SECTION D

This section comprises 2 long answer (LA) type questions of 5 marks each.

16. (a) State and prove the Basic Proportionality Theorem. 5

OR

(b) In ΔABC, D and E are points on AB and AC with DE ∥ BC, and BE and CD meet at O. Prove that AD/AB = DE/BC and that OD/OC = OE/OB = DE/BC.

17. A girl of height 1.2 m is walking away from the base of a lamp-post at a speed of 1.5 m/s. The lamp is 4.8 m above the ground. Find the length of her shadow after 4 seconds. 5

SECTION E

This section comprises 2 case study based questions of 4 marks each, with sub-parts of 1, 1 and 2 marks.

18. To find the height of a tree, Ravi places a small mirror flat on the ground 10 m from the foot of the tree. Standing 2 m from the mirror on the other side, with his eyes 1.5 m above the ground, he sees the top of the tree in the mirror. (The angles that the two rays make with the mirror are equal, and Ravi and the tree are vertical.)

(i) Name the criterion by which the two triangles formed are similar. [1]

(ii) Write the ratio of Ravi's eye height to his distance from the mirror. [1]

(iii) Find the height of the tree. [2]

OR

(iii) If the tree were 9 m tall, how far from the tree would the mirror have to be placed (Ravi standing in the same place relative to the mirror)? [2]

19. A triangular garden plot ABC has a straight path DE parallel to BC, with D on AB and E on AC. AD = 6 m, DB = 9 m and AE = 8 m.

(i) Find EC. [1]

(ii) Find the ratio AD : AB. [1]

(iii) If BC = 20 m, find the length of the path DE. [2]

OR

(iii) Find the ratio of the perimeters of ΔADE and ΔABC. [2]

END OF THE QUESTION PAPER

ANSWER KEY — SECTION A

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
(A)	(B)	(C)	(D)	(B)	(D)	(C)	(A)	(A)	(D)

MARKING SCHEME AND WORKED SOLUTIONS

Marks for each step are shown in brackets, as in the CBSE marking scheme. Any correct alternative method earns full marks.

Q1. Answer (A). AD/DB = AE/EC: 2/3 = 4/EC.

Q2. Answer (B). BC/QR = 2/3.

Q3. Answer (C). $\angle C = 70° = \angle R$ and $\angle A = \angle P$: two pairs of equal angles.

Q4. Answer (D). 5/3 = h/24 (similar triangles).

Q5. Answer (B). A line dividing two sides in the same ratio is parallel to the third side.

Q6. Answer (D). Perimeters are in the same ratio as corresponding sides.

Q7. Answer (C). All angles of an equilateral triangle are 60°.

Q8. Answer (A). $\angle B = \angle E = 63°$; $\angle C = 180° - 47° - 63°$.

Q9. Answer (A). R is the Basic Proportionality Theorem, which gives A. Answer (A).

Q10. Answer (D). Proportional sides give similar triangles (R true), not necessarily congruent ones (sides 3, 4, 5 and 6, 8, 10). Answer (D).

Q11. (2 marks) Answer: (a) x = 3; (b) not parallel.
(a) By BPT, $(x + 1)/(x - 1) = (x + 5)/(x + 1)$. [1] $(x + 1)^2 = (x - 1)(x + 5)$: $x^2 + 2x + 1 = x^2 + 4x - 5$, so $2x = 6$ and $x = 3$. [1]
OR (b) PE/EQ = 4.2/2.8 = 1.5 and PF/FR = 4.5/3.5 = 9/7 ≈ 1.29. [1] The ratios are unequal, so EF is not parallel to QR (converse of BPT). [1]

Q12. (2 marks) Answer: BPT with AD = DB gives AE = EC.
Let D be the mid-point of AB and DE ∥ BC meet AC at E. By BPT, AD/DB = AE/EC. [1] AD = DB, so AE/EC = 1, i.e. AE = EC: E is the mid-point of AC. [1]

Q13. (2 marks) Answer: 6 cm.
Ratio of perimeters = ratio of corresponding sides: 36/24 = AB/PQ. [1] PQ = 9 × 24/36 = 6 cm. [1]

Q14. (3 marks) Answer: (a) ΔOPQ ~ ΔORS; (b) AA similarity.
(a) In ΔOPQ and ΔORS: $\angle OPQ = \angle ORS$ and $\angle OQP = \angle OSR$ (alternate angles, PQ ∥ SR). [1] So ΔOPQ ~ ΔORS (AA). [1] Hence OP/OR = OQ/OS, i.e. OP × OS = OQ × OR. [1]
OR (b) In ΔCBA and ΔCQP: $\angle CBA = \angle CQP$ (given) [1] and $\angle C$ is common. [1] So ΔCBA ~ ΔCQP (AA). [1]

Q15. (3 marks) Answer: (i) 8 cm; (ii) 13.5 cm.
Ratio of corresponding sides = 30 : 20 = 3 : 2. [1] (i) 12 × 2/3 = 8 cm. [1] (ii) 9 × 3/2 = 13.5 cm. [1]

Q16. (5 marks) Answer: (a) statement and proof; (b) OD/OC = OE/OB = DE/BC = AD/AB.
(a) Statement [1]: if a line is drawn parallel to one side of a triangle to meet the other two sides in distinct points, the other two sides are divided in the same ratio. Given ΔABC with DE ∥ BC, D on AB, E on AC; to prove AD/DB = AE/EC. Construction: join BE and CD; draw DM ⊥ AC and EN ⊥ AB. [1] ar(ADE)/ar(BDE) = (½ AD × EN)/(½ DB × EN) = AD/DB; ar(ADE)/ar(DEC) = (½ AE × DM)/(½ EC × DM) = AE/EC. [2] ΔBDE and ΔDEC are on the same base DE and between the same parallels DE and BC, so ar(BDE) = ar(DEC); hence AD/DB = AE/EC. [1]
OR (b) DE ∥ BC, so ∠ADE = ∠ABC and ∠AED = ∠ACB (corresponding angles); hence ΔADE ~ ΔABC (AA) [1] and AD/AB = DE/BC. [1] In ΔODE and ΔOCB: ∠ODE = ∠OCB and ∠OED = ∠OBC (alternate angles, DE ∥ BC) [1], and ∠DOE = ∠COB (vertically opposite). So ΔODE ~ ΔOCB (AA) [1], hence OD/OC = OE/OB = DE/BC. [1]

Q17. (5 marks) Answer: 2 m.
After 4 s she is 1.5 × 4 = 6 m from the base of the lamp-post. [1] Let the shadow be s m. The lamp-post and the girl stand upright, and the light rays are common, so the triangles are similar (AA). [1] 4.8/(6 + s) = 1.2/s [1], so 4.8s = 7.2 + 1.2s, 3.6s = 7.2 [1], s = 2 m. [1]

Q18. (4 marks) Answer: (i) AA; (ii) 3 : 4; (iii) 7.5 m, or 12 m.
(i) AA: both triangles have a right angle, and the angles at the mirror are equal. [1]
(ii) 1.5 : 2 = 3 : 4. [1]
(iii)(a) h/10 = 1.5/2 [1], h = 7.5 m. [1]
OR (iii)(b) 9/d = 1.5/2 [1], d = 12 m. [1]

Q19. (4 marks) Answer: (i) 12 m; (ii) 2 : 5; (iii) 8 m, or 2 : 5.
(i) By BPT, 6/9 = 8/EC, EC = 12 m. [1]
(ii) 6 : 15 = 2 : 5. [1]
(iii)(a) ΔADE ~ ΔABC (AA, DE ∥ BC) [1], so DE/BC = 2/5, DE = 8 m. [1]
OR (iii)(b) The triangles are similar with ratio of sides 2 : 5 [1], so the perimeters are in the ratio 2 : 5. [1]

All questions are original and © Master Testing Agency. Free to download and use for personal practice; not for resale. Every numerical answer in this paper was checked independently by computer on figures built with coordinates, and every proof on many random triangles.