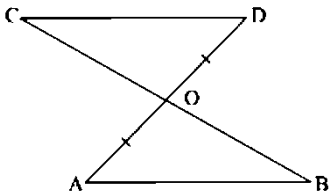
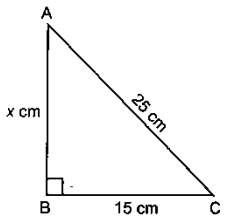
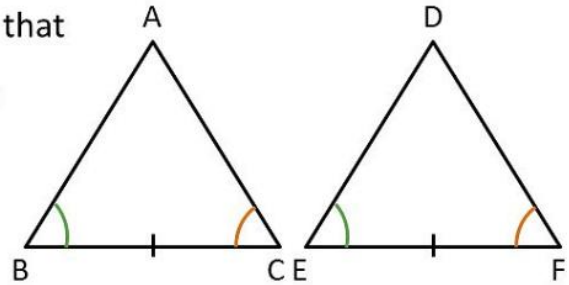
THE VILLAGE
INTERNATIONAL SCHOOL
"We Nurture Dreams"

Date:04/11/24 GRADE: IX	MT - 02 (2024-25) ANSWER KEY MATHEMATICS	Max marks: 20 Time: 50 Minutes

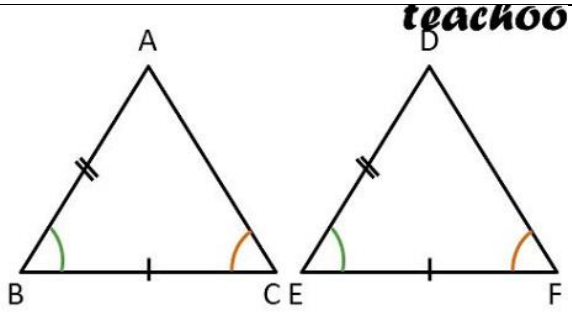
General Instructions:
1 All questions are compulsory.
2. Marks are indicated against each question.

Qn. No	QUESTIONS 1 TO 5 CARRY ONE MARK EACH	Marks allocated
1	Which of the following is not a criterion for congruence of triangles? a. SAS b. ASA c. SSA d. SSS	1
2	In Δ PQR, ∠R = ∠P and QR = 4 cm and PR = 5 cm. Then the length of PQ is a. 2 cm b. 2.5 cm c. 5 cm d. 4 cm	1
3	Given three sticks of lengths 10cm, 5cm and 3cm. A triangle is formed using the sticks then area of the triangle will be a. 57 cm^2 b. 25 cm^2 c. 15 cm^2 d. Unable to form a triangle, so no area can be calculated	1
4.	If two sides of a triangle are 8cm and 11 cm and perimeter of triangle is 32 cm. Then value of third side is a. 19cm b. 13 cm c. 21.5 cm d. 16 cm	1

5	Assertion (A): If $\triangle ABC \cong \triangle RPQ$, then $BC = QR$ Reason (R): Corresponding parts of congruent triangles are equal. (a) Both the statements – A and R are true, and R is the right explanation for A (b) Both the statements – A and R are true; R is not the correct explanation for A (c) A is false, but R is true (d) R is true, but A is false	1
	QUESTIONS 6 AND 7 CARRY TWO MARKS EACH	
6	Line-segment AB is parallel to another line-segment CD. O is the midpoint of AD. Show that (i) △AOB≅△DOC (ii) O is also the midpoint of BC.  Given: AB is parallel to another line segment CD. O is the midpoint of AD In $\triangle AOB$ and $\triangle DOC$ $\angle AOB = \angle COD$ (Vertically opposite angle) $\angle BAO = \angle CDO$ ...(Given AB parallel to DC and AD meet both lines so alternate angles are equal) $AO = OD$ ....(O is the midpoint of AD) $\triangle AOB \cong \triangle DOC$...($ASAtest$) So, $BO = CO$Then, O is the midpoint of BC.	2
	or **Solution** In ΔABD and ΔBAC, AD = BC (Given) ∠DAB = ∠CBA (Given) AB = BA (Common) ∴ ΔABD ≅ ΔBAC (By SAS congruence rule) ∴ BD = AC (By CPCT) And, ∠ABD = ∠BAC (By CPCT)	

7	a. Find the area of an equilateral triangle with side 2 √3 cm. Given, side of an equilateral triangle is 2√3cm Area of an equilateral triangle $=\sqrt{3}/4(\text{side})^2$ $=\sqrt{3}/4(2\sqrt{3})^2=\sqrt{3}/4\times4\times3=3\sqrt{3}\ cm^2$ b. If the base of a right-angled triangle is 15cm and its hypotenuse is 25 cm, then find its area.  $AC^2 = AB^2 + BC^2$ $\Rightarrow \quad 25^2 = x^2 + 15^2$ $\Rightarrow \quad x^2 = 25^2 - 15^2 = 625 - 225 = 400$ $\therefore \quad x = \sqrt{400} = 20\ cm$ $\therefore$ Area of right-angled triangle $= \frac{1}{2} \times$ base $\times$ height $ar(ABC) = \frac{1}{2} \times 15 \times 20 = 150\ cm^2$	2
	QUESTIONS 8 AND 9 CARRY THREE MARKS EACH	
8	State and prove ASA congruence Given :- Δ ABC and Δ DEF such that ∠B = ∠E & ∠C = ∠F and BC = EF  To Prove :- △ABC ≅ △DEF	3

Case 1: **Let AB = DE**



In ΔABC and ΔDEF

AB = DE (Assumed)

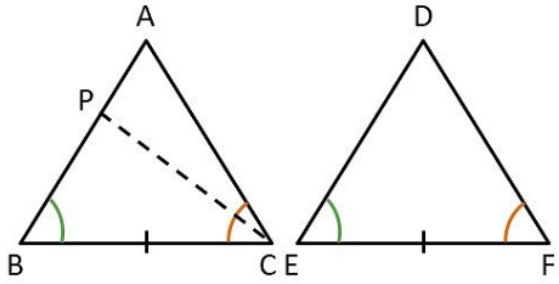
∠B = ∠E (Given)

BC = EF (Given)

⇒ ΔABC ≅ ΔDEF (SAS congruence rule)

Case 2: **AB > DE**

Construction :- Take a point P on AB such that PB = DE



In ΔPBC and ΔDEF

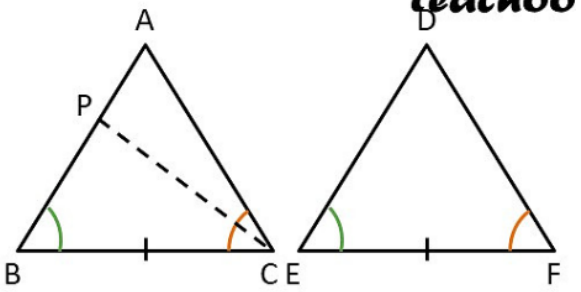
PB = DE (Assumed)

∠B = ∠E (Given)

BC = EF (Given)

⇒ ΔPBC ≅ ΔDEF (SAS congruence rule)

⇒ ∠PCB = ∠DFE (CPCT)



But ∠ACB = ∠DFE (Given)

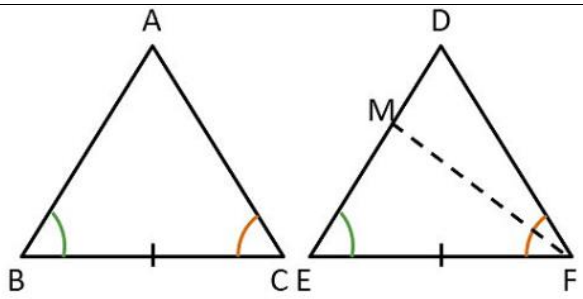
Thus, ∠ACB = ∠PCB

This is possible only if P is coincides with A

⇒ AB = DE

∴ By Case 1

ΔABC ≅ ΔDEF



Case 3: If AB < DE

If AB < DE, then by choosing a point M on DE such that

AB = ME and repeating the argument in Case (2).

We get ΔABC ≅ ΔDEF

Or

Given:

AB = AC and

the bisectors of ∠B and ∠C intersect each other at O

(i) Since ABC is an isosceles with AB = AC,

∠B = ∠C

½ ∠B = ½ ∠C

⇒ ∠OBC = ∠OCB (Angle bisectors)

∴ OB = OC (Side opposite to the equal angles are equal)

(ii) In ΔAOB and ΔAOC,

AB = AC (Given in the question)

AO = AO (Common arm)

OB = OC (As Proved Already)

So, ΔAOB ≅ ΔAOC by SSS congruence condition.

BAO = CAO (by CPCT)

Thus, AO bisects ∠A.

9	A triangular field has vertices A, B and C and the length of sides are 130 m,140 m and 150 m. The farmer wants to fence his field all round leaving a space 5 m wide, with a gate on one side. The cost of fencing it with barbed wire is ₹ 20 per metre. After fencing, farmer cultivates carrot in the field. What is the total area of the field? Also find the total cost of fencing. Area = 5600 m^2 Total cost = Rs. 8300 Or The sides of a triangular plot are in the ratio 12:17:25 and its perimeter is 540 m. Find its area. If the farmer wants to have fencing all around it at the rate Rs 50 per metre find the cost of fencing.	3
	Let the sides of the triangle be 12x, 17x and 25x. Hence, 12x + 17x + 25x = 540 cm 54x = 540 cm x = 10 Therefore, a = 12x = 12 x 10 = 120 b = 17x = 17 x 10 = 170 c = 25x = 25 x 10 = 250 Semi-perimeter, s= $\frac{540}{2}$= 270 cm Putting the values of s, a, b and c in Heron's formula, we will get $A = \sqrt{s(s-a)(s-b)(s-c)}$ $A = \sqrt{270(270-120)(270-170)(270-250)}$ $A = \sqrt{270 \times 150 \times 100 \times 20}$ = 9000 sq. cm Total cost of fencing = Rs 27000	

10	Case Study: While selling clothes for making flags, a shopkeeper claims to sell each piece of cloth in the shape of an equilateral triangle of each side 10 cm while actually he was selling the same in the shape of an isosceles triangle with sides 10 cm, 10 cm and 8 cm.  1. Find the area of an equilateral triangular flag? 2. If the shopkeeper sells 500 equilateral triangular flags, then find its area. 3. What is the semi-perimeter of an isosceles triangular flag. 4. Find the area of an isosceles triangular flag.	
	Answers: 1. $25\sqrt{3}$ cm^2 2. $12500\sqrt{3}$ cm^2 3. 14cm 4. $8\sqrt{21}$ cm^2	