

CONGRUENCE AND ① INEQUALITY ON SIDES

OF TRIANGLES
Class: IX; Mathematics
FOUNDATION: SOLUTIONS

TEACHING TASK

01 In $\triangle ABC$, $\triangle PQR$

$$AB = PQ = 5.2 \text{ cm}$$

$$AC = PR = 3.5 \text{ cm}$$

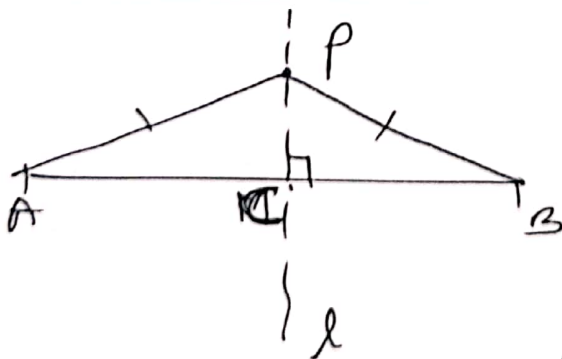
$$CA = QR = 4 \text{ cm}$$

$\therefore \triangle ABC \cong \triangle PQR$ (S.S.S. Congruency) Ans: C

02 $\angle Q = 180^\circ - (70^\circ + 50^\circ)$
 $= 60^\circ$

Ans: D

03



(i) $PA = PB$

(ii) $\angle APC = \angle BPC$

(iii) $\angle PAC = \angle PBC$

All true Ans: D

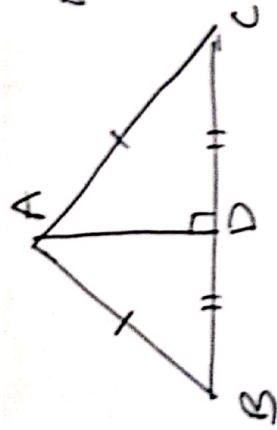
$$\triangle PAC \cong \triangle PBC \text{ (S.S.S.)}$$

04 $\triangle ACB \cong \triangle ADB$ (SAS)

$$\therefore BC = BD, \text{ ~~AB = AD~~}$$

Ans: D

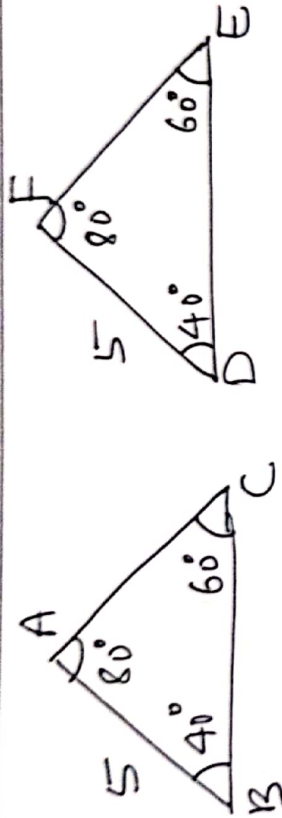
05



All the options are correct. (2)

Ans: D

06



Ans: B

 $\therefore \angle E = 60^\circ$

07



Two triangles are isosceles and congruent

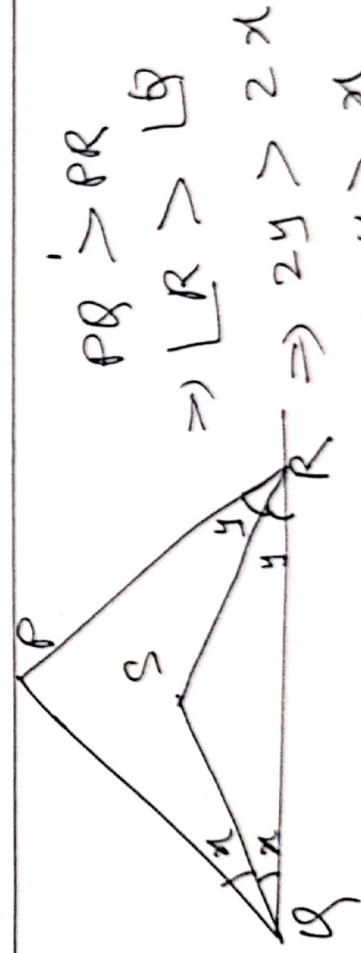
Ans: B

08

 $\triangle ABC \cong \triangle BMD$ (SAS) $\Rightarrow BD = AC$ $\Rightarrow \angle DMB = \angle AMC$ (v.o.A)

Ans: D

09.



$$PQ > PR$$

$$\Rightarrow \angle R > \angle Q$$

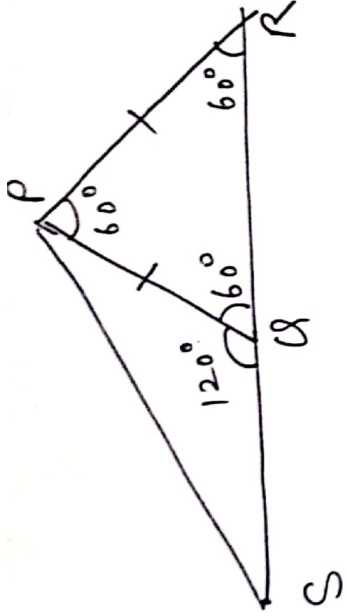
$$\Rightarrow 2y > 2x$$

$$\Rightarrow y > x$$

$$\Rightarrow SQ > SR$$

Ans: A

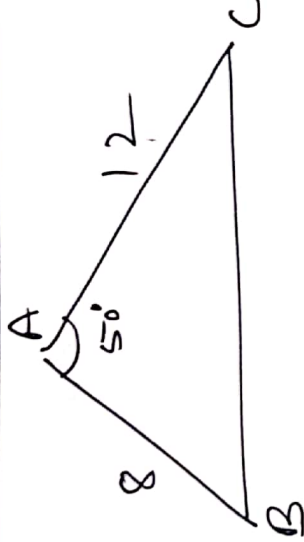
10



Area: D

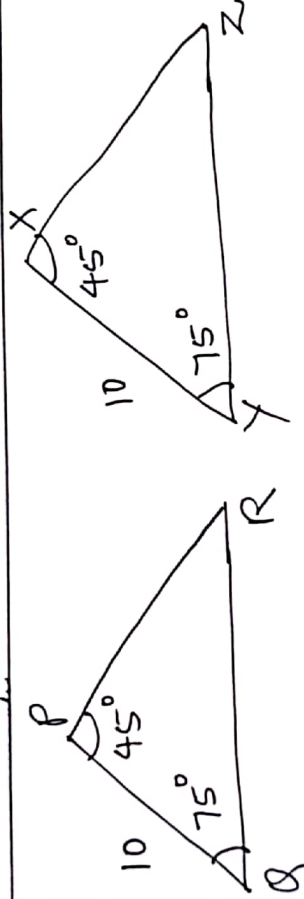
$$PS > PQ.$$

11.



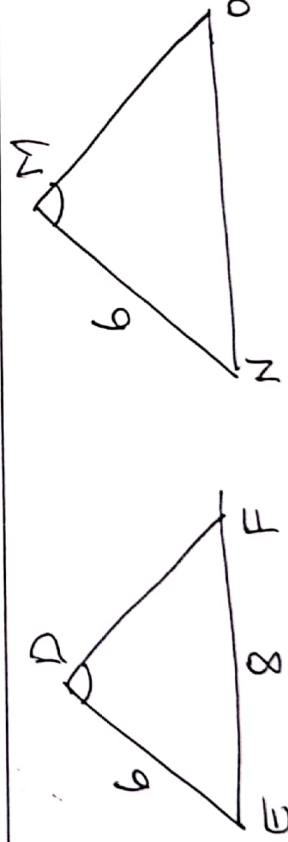
Area: C

12.



$$\therefore \angle X = 45^\circ$$

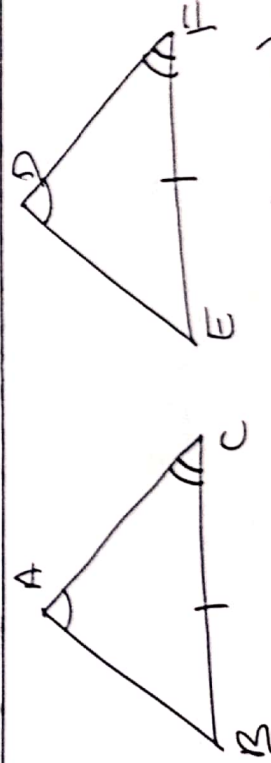
13.



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

Area: A

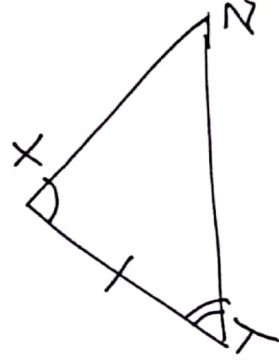
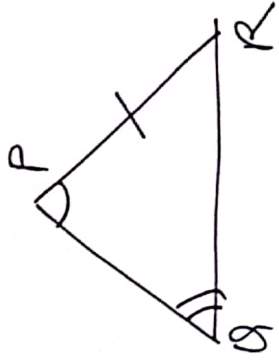
14.



Area: C

$$\triangle ABC \cong \triangle DEF \text{ (SAS)}$$

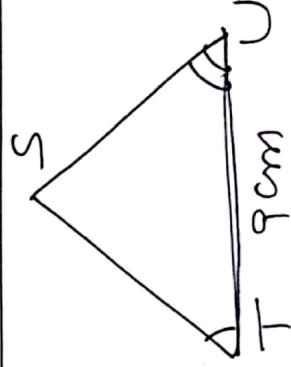
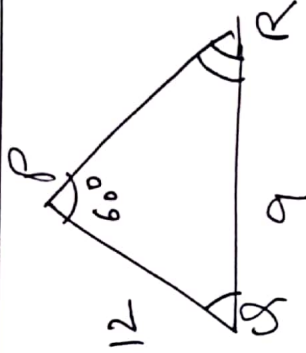
15.



(4)

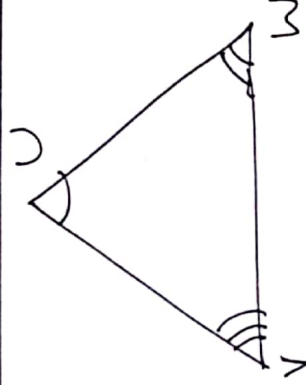
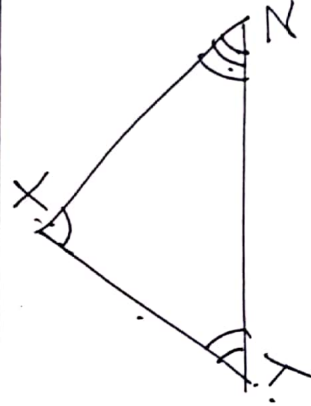
We have to prove $PQ = XY$ (or)

16



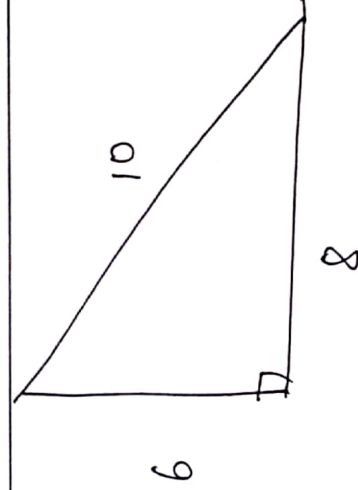
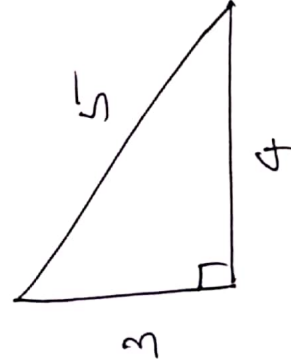
Ans: B

17.



$XY = UW$, $YZ = VW$, $XZ = VW$

18



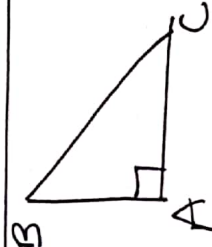
These two $\triangle$ s are not congruent

Ans: B

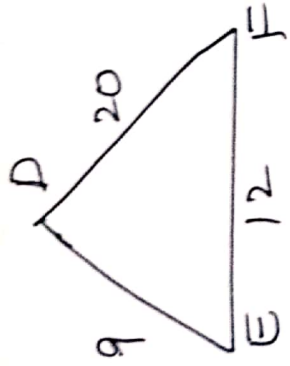
19

$SSS \Rightarrow$ Corresponding Angles are Congruent

20.



21.



$$DF > EF > DE$$

$$\Rightarrow LE > LD > LF$$

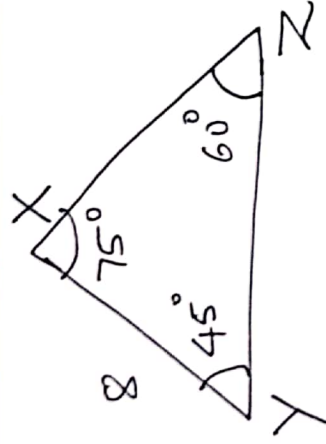
$$\Rightarrow LE > LF \text{ Also}$$

$$LD + LE > LF$$

Ans: B, D

(5)

22.

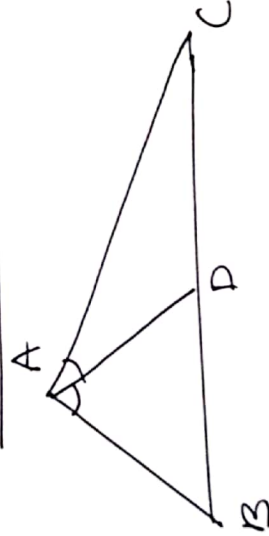


$$75^\circ > 60^\circ > 45^\circ$$

$$YZ > XY > XZ$$

$$\Rightarrow YZ > XZ \text{ Ans: A}$$

01.



$$(i) AC > CD$$

JEE ADVANCED LEVEL

02.

$$A) \triangle ABC \cong \triangle PQR \text{ (SAS)}$$

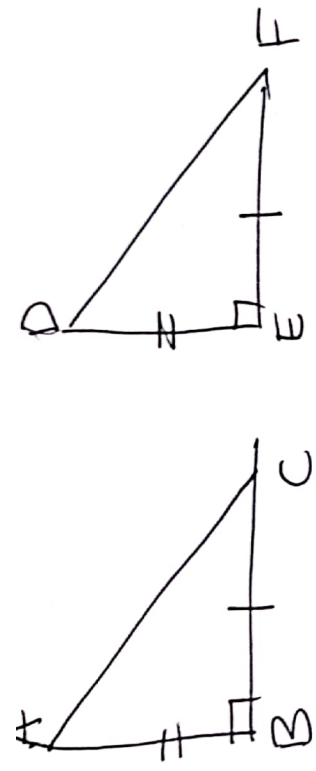
$$B) \triangle ABC \cong \triangle LMN \text{ (No need of Congruent)}$$

$$C) \triangle ABC \cong \triangle ABC \text{ (ASA)}$$

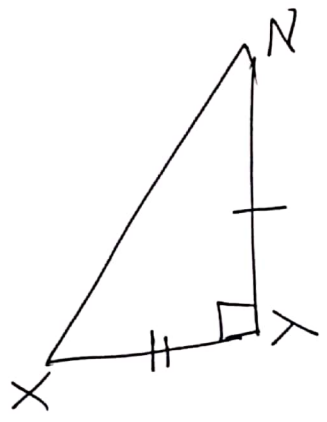
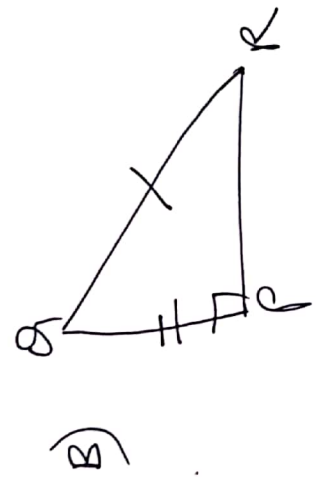
$$D) \triangle ABC \cong \triangle DEF \text{ (SAS)}$$

Ans: A, C, D

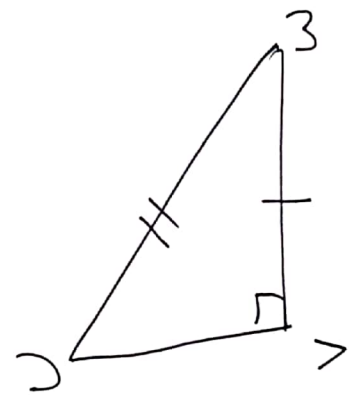
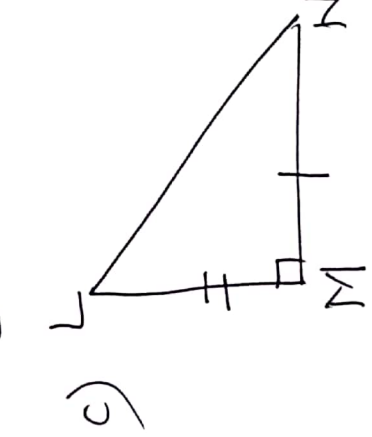
03 A) (6)



$\triangle ABC \cong \triangle DEF$ (SAS)



$\triangle ABC, \triangle XYZ$ need not be Congruent



$\triangle LMN, \triangle UVW$ need not be Congruent

04 D) $(9, 12, 15), (12, 9, 15)$
 triangles are Congruent

Ans: D

05 Assertion: Conceptual (True)
 Reason: Conceptual (True)

Ans: A

06 Assertion: Conceptual (True)
 Reason: Conceptual (True)

Ans: A

07

Assertion: (Conceptual (True))Reason: Conceptual (True)

(1)

08

Assertion: False, the triangles are Congruent by RHS. (False)Reason: Conceptual (True)

Ans: D

09.

Assertion: Conceptual (~~True~~) (False)Reason: Conceptual (True)

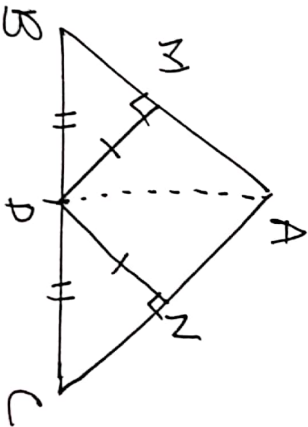
not necessarily both sides, one side enough

Ans: D

10. Statement I: Conceptual (True)Statement II: Conceptual (True)

Ans: A

11.

Statement I: $\triangle BMD \cong \triangle CND$ (RHS) $\Rightarrow$ $BM = CN \rightarrow$ ① $\triangle DMA \cong \triangle DNA$ (RHS) $\Rightarrow$ $AM = AN \rightarrow$ ②① + ② $\Rightarrow$ $AB = AC$ $\therefore \triangle ABC$ is Isosceles $\triangle$

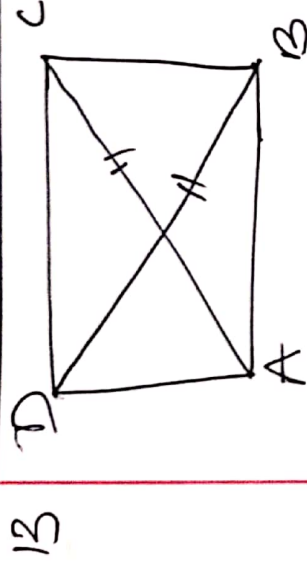
Ans: A

Statement II: Conceptual (True)

12 $\triangle ABC \cong \triangle CBA$

8

Ans: D

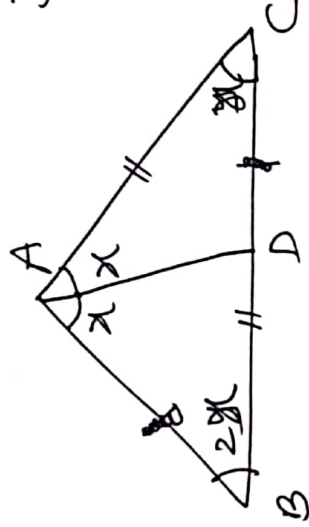


$\angle ABC = 90^\circ$

Ans: B

14.

In this problem take $AC = BC$

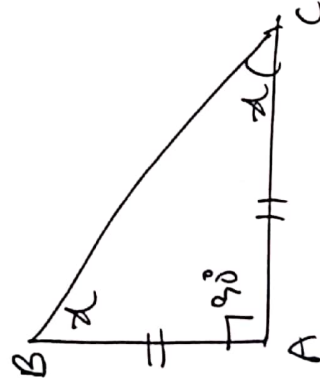


$2x + 2x + x = 180^\circ$

$\Rightarrow x = 36^\circ$

$\angle BAC = 2x = 72^\circ$

15.



$x + x + 90^\circ = 180^\circ$

$\therefore x = 45^\circ$

Ans: 45

16 a) S.S.S

b) R.H.S

c) A.S.A

d) S.A.S.

Ans: b, c, d, e

17

a) $AB + AC > AC$

b) $DE < DE + EF$

c) $|PQ - QR| < PR$

d) $yz > |xy - xz|$

Ans: b, c, d, e.

LEARNERS TASK

9

CUQ's

01. Conceptual:

Ans: A

02. $\triangle ABC \cong \triangle PSR$

Ans: C

03. $\triangle CBA \cong \triangle RDE$

Ans: A

04. Conceptual

Ans: D

05. RHS

Ans: D

06. Conceptual

Ans: D

07. only options A & B are correct.

Ans: D

08. ASA

Ans: A

09. $AB = AC \Rightarrow \angle C = \angle B$

Ans: C

10. $AD = BE$

Since $\triangle AEB \cong \triangle ADB$ (RHS)

Ans: B

JEE MAINS LEVEL

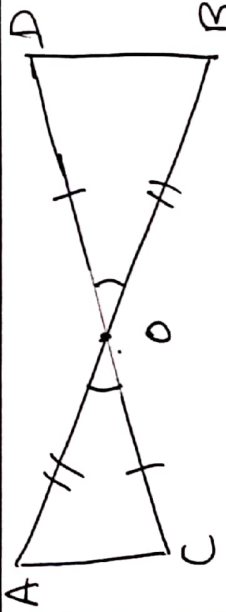
01. Conceptual.

Ans: D

02. $\triangle ABC$ is not Congruent to $\triangle RPQ$

Ans: A

$BC = PQ$ is not possible



$\Rightarrow AC = BD$, Also

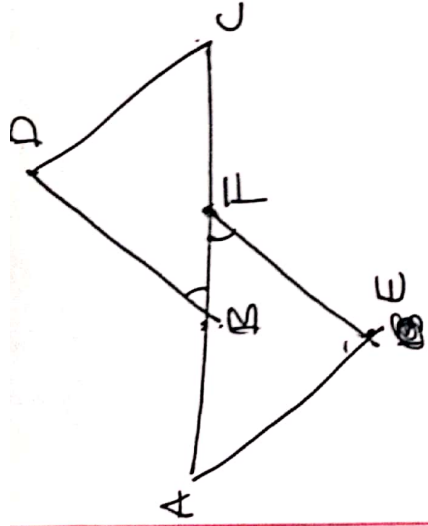
$\Rightarrow AC \parallel BD$

$\triangle AOC \cong \triangle BOD$ (SAS)

Ans: D

04.

10

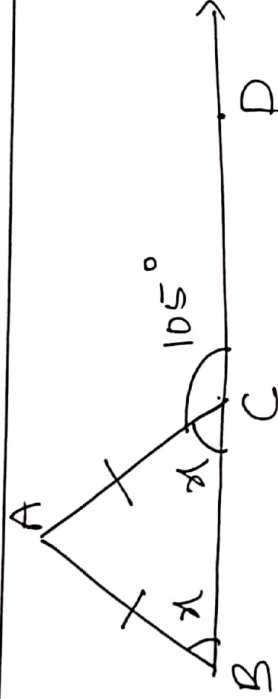


$$\begin{array}{l|l} \text{Given } AB = CF & \text{Given } EF = BD \\ \Rightarrow AB + BF = CF + BF & \overline{AFE} = \overline{DBC} \\ \Rightarrow AF = BC & \end{array}$$

$$\therefore \triangle AFE \cong \triangle CBD \text{ (SAS)}$$

Ans: D

05



$$\angle A = 105^\circ \quad \text{We have } x = 180^\circ - 105^\circ$$

$$x = 75^\circ$$

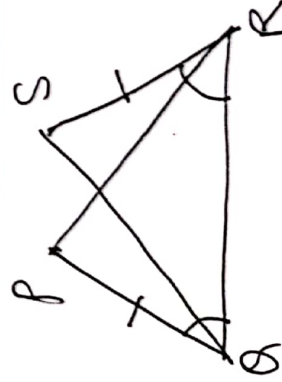
$$\therefore x + x + A = 180^\circ$$

$$\Rightarrow 75^\circ + 75^\circ + A = 180^\circ$$

$$\Rightarrow A = 30^\circ$$

Ans: B

06



$$\overline{PQ} = \overline{SR} \text{ (Given)}$$

$$\overline{PQR} = \overline{SRQ} \text{ (Given)}$$

$$QR = QR \text{ (Common side)}$$

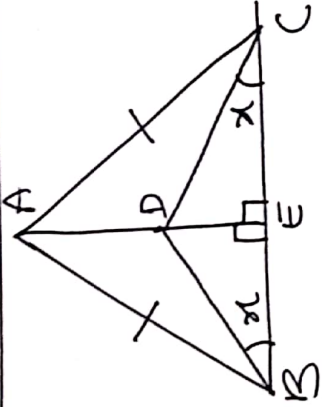
$$\therefore \triangle PQR \cong \triangle QRS \text{ (SAS)}$$

Ans: B

07 $\triangle CAB \cong \triangle PQR$

Ans: C

08



$\triangle ABE \cong \triangle ACE$ (RHS)

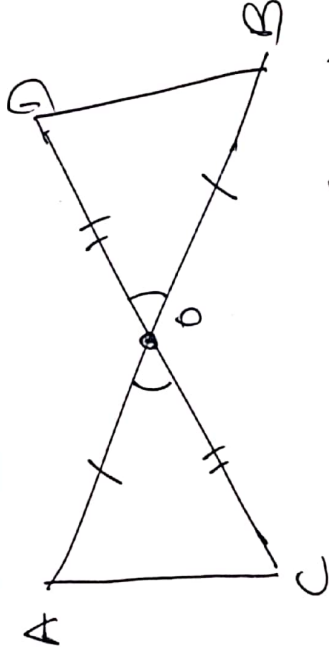
$\therefore \underline{BE = EC}$

$\Rightarrow \underline{\angle BAE = \angle CAE}$

$\therefore$ AD bisects $\underline{\angle BAC}$

Ans: C

09.



$\triangle AOC \cong \triangle BOD$ (SAS)

$\Rightarrow AC = BD$

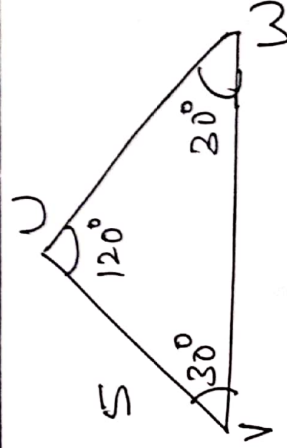
Also $\underline{\angle CAB = \angle ABD}$ (Alternate interior angles as AB is transversal)

$\Rightarrow AC \parallel BD$

10 R.H.S.

Ans B

11.



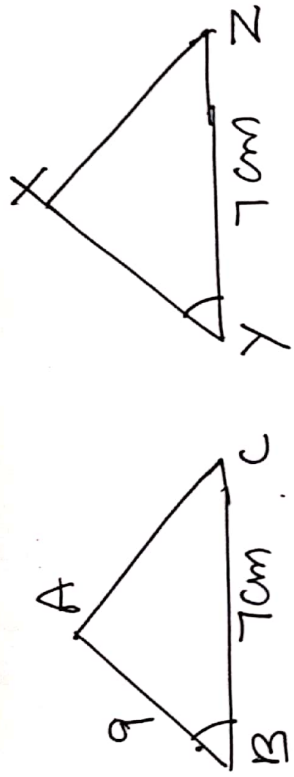
$\underline{W} + 30^\circ + 120^\circ = 180^\circ$

$\Rightarrow \underline{W} = 30^\circ$

$\Rightarrow \underline{UW} = 5 \text{ cm}$

Ans: —

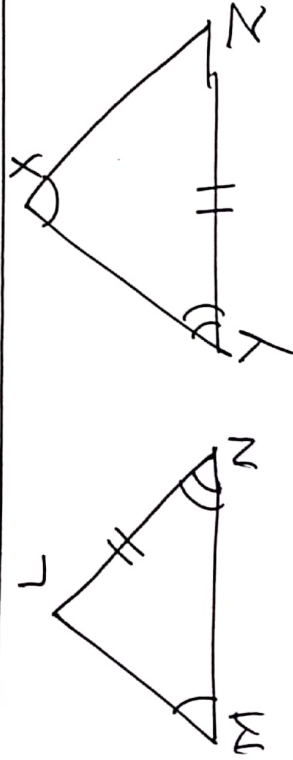
12.



$$YZ = 7\text{cm}$$

Ans: A

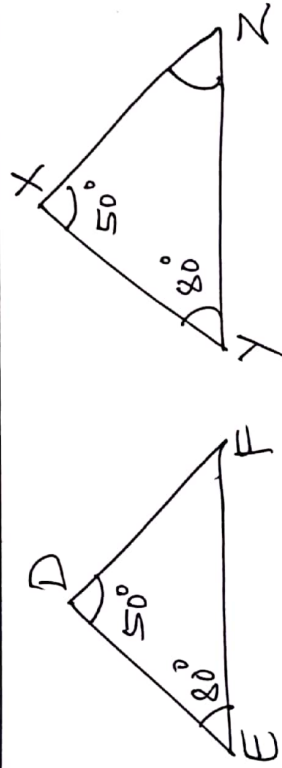
13.



$$\triangle LMN \cong \triangle XYZ \text{ (ASA)}$$

Ans: A

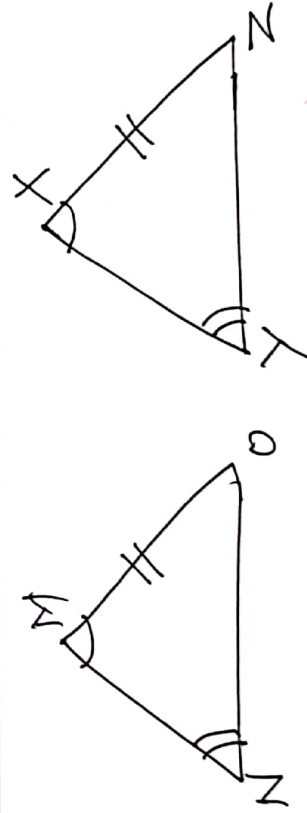
14.



$$Z = 180^\circ - (50^\circ + 80^\circ) = 50^\circ$$

Ans: B

15.



$$A) \angle O = \angle Z \text{ (True)}$$

Ans: A

16.

SSS $\rightarrow$ Three sides

Ans: C

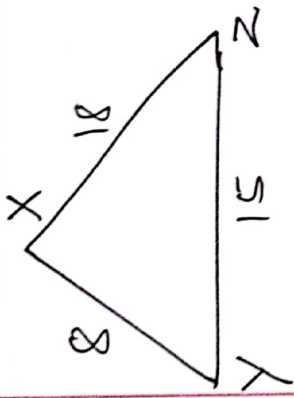
17.

SSS $\rightarrow$ it is a special type of SAS

Ans: A

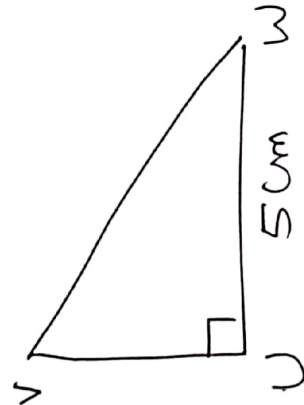
18

19.



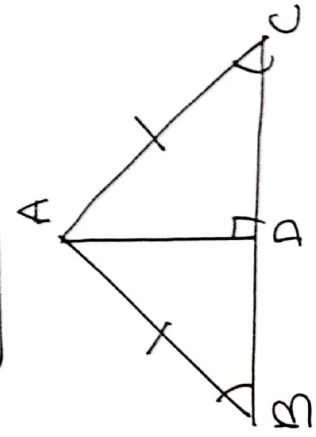
- A) $XY + YZ > XZ$ (True)
- B) $XZ + YZ > XY$ (True)
- C) $XY + XZ > YZ$ (True)
- D) $YZ + XZ > XY$ (True)

20.



- A) $UV + VW > UW$ (True)
- B) $UV + UW > VW$ (True)
- C) $UW + VW > UV$ (True)
- D) $UV = VW$ (Not possible)

21.



JEE ADVANCED LEVEL

- (A) $AB = AC$ (True)
- (B) AD bisects BC (True)
- (C) AD bisects $\angle C$ (False)
- (D) $AB = BD$ (False)

$\triangle ABD \cong \triangle ADC$ (RHS)

$\therefore$ Ans: A, B

02 All corresponding angles are equal
Also except right angle, remaining angles acute (14)

Ans: C, A

03 options: A, B, C True

Ans: A, B, C

04. Assertion: Conceptual (True)

Reason: Conceptual (True)

Ans: A

05 Assertion: Conceptual (True)

Reason: Conceptual (True)

Ans: A

06 Assertion: ASA (True)

Reason: Conceptual (True)

Ans: A

07 Assertion: Conceptual (True)

Reason: Conceptual (True)

Ans: A

08 Assertion: Conceptual (~~True~~) (No need)

Reason: Conceptual (True)

Ans: D

09. Statement I: Conceptual (True)

Statement II: Conceptual (True)

Ans: A

13. $\angle A = 60^\circ$, $\angle B = 45^\circ$, $\angle C = 75^\circ$

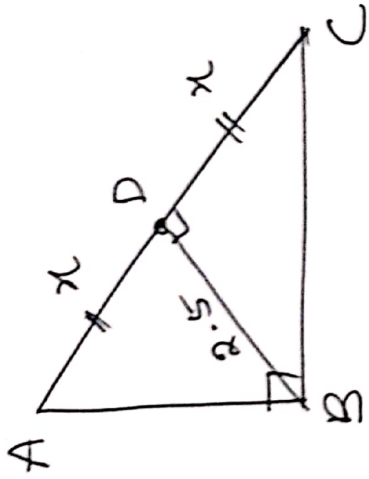
$$\Rightarrow \angle B < \angle A < \angle C$$

$$\Rightarrow \overline{AC} < \overline{BC} < \overline{AB}$$

Ans: C

14.

15



We have $BD^2 = AD \cdot DC$

$$\Rightarrow (2.5)^2 = x \cdot x$$

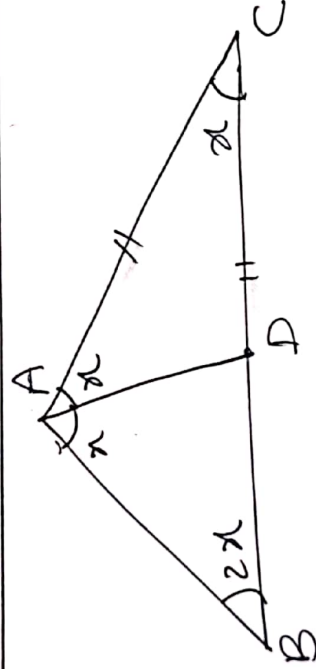
$$\Rightarrow (2.5)^2 = x^2$$

$$\Rightarrow x = 2.5$$

$$\therefore AC = 2x = 5\text{cm}$$

Ans: 5

15-



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

$$\Rightarrow x = 36^\circ$$

$$\Rightarrow \angle BAC = 72^\circ$$

$$(i) \angle BAC = 72^\circ$$

$$(ii) \angle ABC = 72^\circ =$$

$$(iii) \angle ADC = 180^\circ - (x + x)$$

$$= 180^\circ - 72^\circ$$

$$= 108^\circ$$

$$(iv) \angle ADB = 180^\circ - (2x + x)$$

$$= 180^\circ - 3 \times 36^\circ$$

$$\Rightarrow \angle ADB = 72^\circ$$

Ans: 72, 108, 72