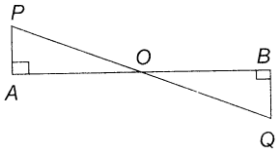
Congruence of Triangles

Mathematical Reasoning

1. Which of the following statements is INCORRECT?
(a) Two triangles having same area are congruent.
(b) If two sides and one angle of a triangle are equal to the corresponding two sides and the angle of another triangle, then the two triangles are congruent.
(c) If the hypotenuse of one right angled triangle is equal to the hypotenuse of another right angled triangle, then the triangles are congruent,
(d) All of these

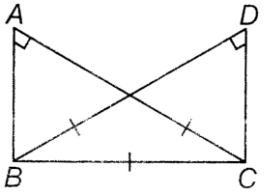
2. In $\Delta ABC,\ AB = AC$ and AD is perpendicular bisector of BC. The property by which ΔADB is not congruent to ΔADC is ____.
(a) SAS property (b) SSS property
(c) RHS property (d) AAA property

3. In the given figure, $PA \perp AB,\ QB \perp AB$ and $\Delta OAP = \Delta OBQ$, then



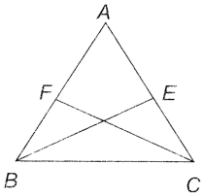
(a) $PA = OB$ (b) $AP = QB$
(c) $OP = BQ$ (d) $OA = OQ$

4. In the given figure, triangles ABC and DCB are right angled at A and D respectively and $AC = DB$, then $\Delta ABC \cong \Delta DCB$ by _____ criterion.



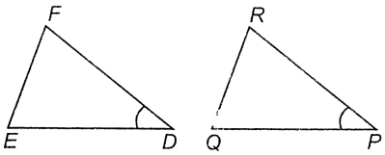
(a) AAA (b) SAS
(c) ASS (d) None of these

5. In the given figure, ABC Is an isosceles triangle in which $AB = AC$. If E and F be the midpoints of AC and AB respectively, then BE is equal to ____.



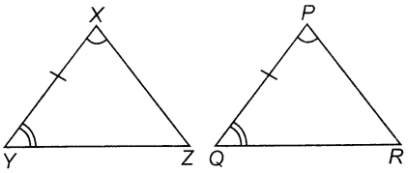
(a) CF (b) AB
(c) CE (d) BF

6. If you want to prove that $\Delta FED \cong \Delta RQP$ using the SAS criterion where $\angle D = \angle P$, then:



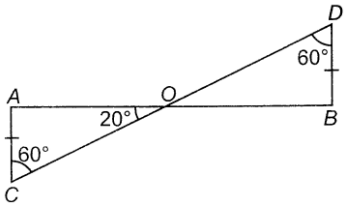
(a) FD = QP (b) QP = ED
(c) FD = RP (d) Both (B) and (C)

7. Which congruence criterion can be used to conclude $\Delta XYZ = \Delta QPR$?



(a) SAS (b) SSS
(c) RHS (d) None of these

8. If $\Delta AOC \cong \Delta ODB,$. then measure of $\angle ODB$ is

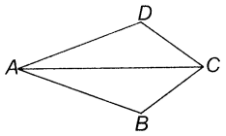


(a) 100^o (b) 50^o
(c) 80^o (d) None of these

9. If $\Delta ABC \cong \Delta PRQ$, then $\angle B$ and PQ are respectively equal to

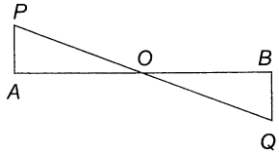
(a) $\angle P$ and AC (b) $\angle P$ and BC
(c) $\angle R$ and AC (d) $\angle Q$ and AB

10. In the given figure, if $AB = AD$ and $CB = CD$, then



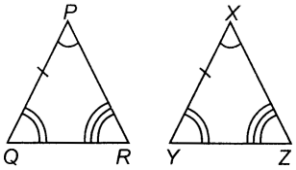
(a) $\Delta ABC \cong \Delta ADC$
(b) $\Delta BCA = \Delta DCA$
(c) $\Delta ADC = \Delta ABC$
(d) All of these

11. In the given figure, if $\Delta OAP = \Delta OBQ$, then which of the following is NOT true?



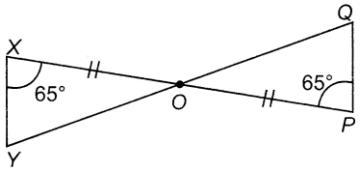
(a) AO = BO (b) AP = SO
(c) PO = BO (d) $\angle APO = \angle BQO$

12. $\Delta PQR \cong \Delta XYZ$ by ____congruency rule.



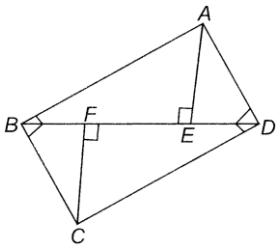
(a) SSS (b) AAA
(c) SAS (d) ASA

13. Which congruence criterion can be used to state that $\Delta XOY = \Delta POQ$?



(a) ASA (b) SAS
(c) SSS (d) RHS

DIRECTIONS (14 - 15): Study the figure and information given below carefully and answer the following questions.



CF and AE are equal perpendiculars on BD, BF = FE = ED.

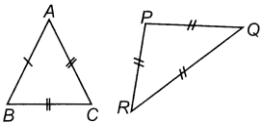
14. ΔABE is congruent to

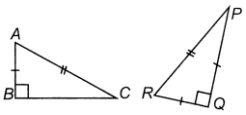
(a) ΔAED (b) ΔBFC
(c) ΔCDF (d) ΔBCD

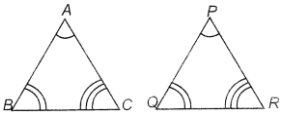
15. $\angle BAE =$ .....

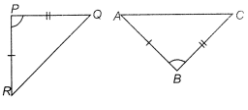
(a) $\angle BCD$ (b) $\angle CBA$
(c) $\angle ADC$ (d) $\angle DCF$

16. Select the odd one out.

(a) 

(b) 

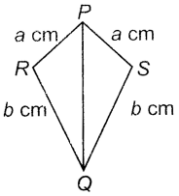
(c) 

(d) 

17. If for ΔABC and ΔDEF, the correspondence $CAB \leftrightarrow EDF$ gives a congruence, then which of the following is NOT true?

(a) AC = DE (b) AB = EF
(c) $\angle A = \angle D$ (d) $\angle C = \angle E$

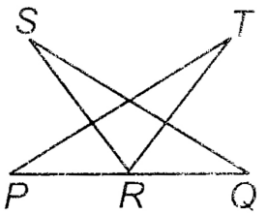
18. By which congruency criterion, $\Delta PQR \cong \Delta PQS$?



(a) RHS (b) ASA
(c) SSS (d) SAS

19. In two triangles PQR and LMN, PQ = QR $\angle P = \angle M$ and QR = LN,, then which of the following statements is CORRECT?
(a) Triangles are congruent only
(b) Triangles are isosceles only
(c) Triangles are both congruent and isosceles
(d) None of these

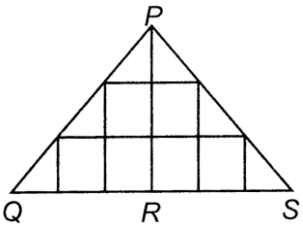
20. In the given figure, If PR - QR, $\angle SRP = \angle TRQ$ and $\angle SQP = \angle TPO$, then



(a) $\Delta SQR \cong \Delta PTR$ & $SR = TR$
(b) $\Delta SOR \cong \Delta TPR$ & $SR = TR$
(c) $\Delta RQS \cong \Delta TPR$ & $SR = TR$
(d) $\Delta QRS \cong \Delta PRT$ & $SR = RT$

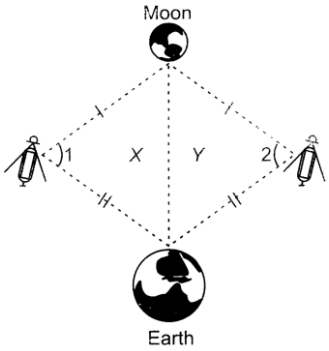
EVERY DAY MATHEMATICS

21. Ananya is designing the window shown in the figure. She wants to make ΔPRQ congruent to ΔPRS. She designs the window so that $PR \perp QS$. Which of the following conditions will make the two triangles congruent?



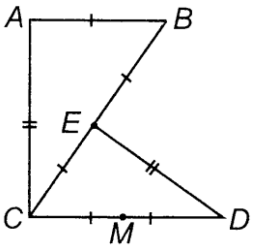
(a) RQ = RS
(b) PQ = PS
(c) Both (A) and (B)
(d) None of these

22. Two satellites are being launched such that their distance while moving in their respective orbits, are equal from Earth and Moon.



Which of the following statements is/are true?
(a) Figure X is not congruent to figure Y.
(b) $\angle 1$ and $\angle 2$ are not equal.
(c) Both (A) and (B)
(d) None of these

23. Akira gave a problem to her sister Kiara. However, Kiara got stuck. Help Kiara identify whether the triangles are congruent and choose the correct option.

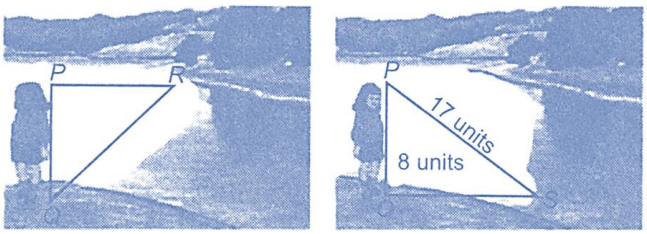


(a) Yes, $\Delta ABC \cong \Delta DCE$
(b) No, they are not congruent
(c) Yes. $\Delta DCE \cong \Delta CAB$
(d) Yes, $\Delta DEC \cong \Delta CAB$

24. Three students Pia, Sia and Tia wrote a statement on a blackboard.
Pia wrote, "All rectangles are congruent".
Sia wrote, "All equilateral triangles are congruent".
Tia wrote, "All right angled triangles are congruent".
Who wrote the INCORRECT statement?
(a) Pia (b) Sia

(c) Tia (d) All of them

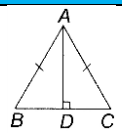
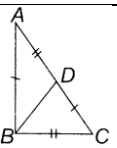
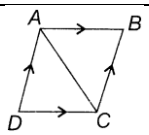
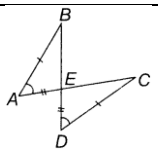
25. Tiara wants to know the width of the given river. While doing so, she stands on the edge of the river and look straight across to a point on the other edge without changing the inclination of the neck and head. She turns side ways until the vision is in line with a point on the side of the stream.
From the above description, find the value of QR.



(a) 25 units
(b) 12 units
(c) 15 units
(d) Can't be determined

ACHIEVERS SECTION (HOTS)

26. Match the figures in Column-l with their corresponding congruence criterion given in Column-N.

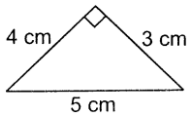
Column I	Column II
(i) 	(a) ASA congruency
(ii) 	(b) RHS congruency
(iii) 	(c) SSS congruency
(iv) 	(d) SAS congruency

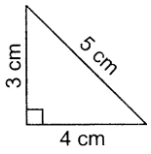
(a) (i) → (b), (ii) → (d), (iii) → (a), (iv) → (c)
(b) (i) → (c), (ii) → (a), (iii) → (b), (iv) → (d)
(c) (i) → (b), (ii) → (c), (iii) → (a), (iv) → (d)
(d) (i) → (a), (ii) → (c). (iii) → (b), (iv) → (d)

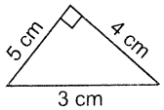
27. Which of the following statements is CORRECT?
Statement-1: Two triangles are said to be congruent If two sides and an angle of one triangle are respectively equal to the two sides and an angle of the other.
Statement-2: Two triangles are congruent if two sides and the included angle of the one must be equal to the corresponding two sides and included angle of the other.
(a) Only Statement-1
(b) Only Statement-2
(c) Both Statement-1 and Statement-2
(d) Neither Statement-1 nor Statement-2

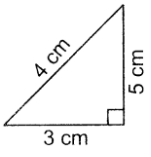
28. Which of the following statements is CORRECT?
(a) In an isosceles triangle, the angles opposite to equal sides are equal.
(b) The bisector of the vertical angle of an isosceles triangle bisects the base at right angles.
(c) If the hypotenuse and an acute angle of one right angled triangle is equal to the hypotenuse and the corresponding acute angle of another triangle, then the triangles are congruent.
(d) All of these

29. Which of the following pair of triangles are congruent by RHS criterion?

(i) 

(ii) 

(iii) 

(iv) 

(a) (i) and (ii) (b) (iii) and (iv)
(c) (i) and (iii) (d) (ii) and (iv)

30. State T for true and 'F' for false.
1. To examine the congruency of plane figures, the superposition method is used.
2. If two line segments have different lengths, they are congruent.
3. The measure of two congruent angles is the same.
4. Object which are exact copies of one another are called plane objects.
5. If the corresponding angles of two triangles are equal, the triangles are said to be congruent.

	1	2	3	4	5
(a)	T	T	F	T	F
(b)	T	F	T	F	T
(c)	T	F	T	F	F
(d)	T	F	T	T	T

ANSWER KEY				
1. D	**2.** D	**3.** B	**4.** D	**5.** A
6. D	**7.** D	**8.** A	**9.** C	**10.** D
11. C	**12.** D	**13.** A	**14.** C	**15.** D
16. A	**17.** B	**18.** C	**19.** D	**20.** A
21. C	**22.** D	**23.** D	**24.** D	**25.** C
26. C	**27.** B	**28.** D	**29.** A	**30.** A

SOLUTION

1. (d)

2. (d)

3. (b)

4. (d)

5. (a): Since, AB = AC

$\Rightarrow \frac{1}{2}AB = \frac{1}{2}AC \Rightarrow BF = EC$

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

[Angles opposite to equal sides are equal]

In ΔBEC and ΔCFB

EC = FB (proved above)

$\angle B = \angle C$ (proved above)

BC = BC (common)

$\therefore \Delta BEC \cong \Delta CFB$ (By SAS)

$\Rightarrow BE = CF$ (By CPCT)

6. (d): In ΔFED and ΔRQP

For SAS criterion, we must have

FD = RP

$\angle D = \angle P$

ED = QP

then, $\Delta FED \cong \Delta RQP$ (By SAS)

7. (d): In ΔXYZ and ΔPQR

$\angle YXZ = \angle QPR$ (given)

$XY = PQ$ (given)

$\angle XYZ = \angle PQR$ (given)

$\therefore \Delta XYZ \cong \Delta PQR$ (By ASA)

8. (a): In ΔOAC

$\angle OAC + \angle OCA + \angle AOC = 180^o$

(angle sum property)

$\angle OAC + 60^o + 20^o = 180^o$

$\angle OAC = 180^o - (60^o + 20^o) = 180^o - 80^o = 100^o$

As $\Delta AOC \cong \Delta ODB$

$\therefore \angle OAC = \angle OBD$ (By CPCT)

So. $\angle OBD = 100^o$

9. (c): Since, $\Delta ABC \cong \Delta PRQ$

$\therefore$ Their corresponding parts are equal.

$\therefore \angle B = \angle R$ and $PQ = AC$

10. (d): In ΔABC and ΔADC, we have

AB = AD (given)

CB = CD (given)

AC = AC (common)

$\therefore \Delta ABC \cong \Delta ADC$ (By SSS)

$\therefore \angle ADC = \angle ABC$ and $\angle BCA = \angle DCA$

(By CPCT)

11. (c): We have $\Delta OAP \cong \Delta OBQ$

So, $AP = BQ$, $AO = BO$, $OP = OQ$

and $\angle APO = \angle BOO$, $\angle OAP = \angle OBQ$,

$\angle AOP = \angle BOQ$

12. (d): In APOR and AXVZ

$= \angle QPR = \angle YXZ$ (given)

$PQ = XY$ (given)

$\angle PQR = \angle XYZ$ (given)

$\therefore \Delta PQP \cong \angle XYZ$ (By ASA)

13. (a): In ΔXOY and ΔPOQ

$\angle YXO = \angle QPO = 65^o$ (given)

$OX = OP$ (given) and $\angle XOY = \angle POQ$ (vertically opposite angles)

$\therefore \ \Delta XOY \cong \Delta POQ$ (By ASA)

14. (c): In AABE and ACDF

AE = CF (given)

$\angle AEB = \angle CFD = 90^o$ (given)

$BF + FE = DE + EF$

$\Rightarrow$ BE = DF $\Rightarrow \Delta ABE \cong \Delta CDF$ (By SAS)

15. (d): As, $\Delta ABE \cong \Delta CDF$

$\therefore \ \angle BAE = \angle DCF$ (By CPCT)

16. (a): In all other options, triangles are congruent.

17. (b): We can conclude

CA= ED, AB= DF, CB = EF,

$\angle CAB = \angle EDF, \ \angle ACB = \angle DEF,$

$\angle ABC = \angle DFE$

18. (c): In ΔPQR and ΔPQS

$PR = PS = a \ cm$ (given)

$RQ = SQ = b \ cm$ (given)

$PQ = PO$ (common)

$\therefore \ \Delta PQR \cong \Delta SQR$ (By SSS)

$\Rightarrow \ \Delta PQR \cong \Delta PQS$

19. (d)

20. (a)

21. (c)

22. (d): In ΔPQR and ΔSQR

$PQ = QS$ (given)

$PR = SR$ (given)

$QR = QP$ (common)

$\therefore \ \Delta PQR \cong \Delta SQR$ (By SSS) X

$\Rightarrow \ \angle 1 = \angle 2$ (By CPCT)

23. (d): In the given figure,

$MD = MC = EC = EB = AB$

$\Rightarrow DC = MD + MC = CE + EB = CB \ldots$ (1)

Also, $AB = EC$ ... (2)

In ΔDEC and ΔCAB

$DE = CA$ (given)

$DC = CB$ (from(1))

$EC = AB$ (from (2))

$\therefore \ \Delta DEC \cong \Delta CAB$ (By SSS)

24. (d)

25. (c): in ΔPQS.

$PS^2 = PQ^2 + QS^2$

$17^2 = 8^2 + QS^2$ or $QS^2 = 289 - 64$

$\Rightarrow \ QS^2 = 225 \ \Rightarrow \ QS = 15$

from given conditions,

$RQ = OS$ (By CPCT) $(\because \Delta PQR = \Delta PQS)$

$\therefore \ QR = 15$ units.

26. (c)

27. (b)

28. (d)

29. (a) (i)

In ΔABC & ΔQRP, we have

$AB = QR = 4 \ cm$

$BC = RP = 5 cm$ [Hypotenuse]

$\angle A = \angle Q$ [Each 90^o]

$\therefore \ \Delta ABC \cong \Delta QRP$ [RHS criterion]

30. (c)