

SATISH CHANDRA MEMORIAL SCHOOL

QUADRILATERALS

ASSERTION & REASON, CASE STUDY

Directions:

- (a) Assertion and reason are true and reason is the correct explanation of assertion.
- (b) Both assertion and reason are true but reason is not the correct explanation of assertion.
- (c) Assertion is true but reason is false.
- (d) Assertion is false but reason is true.

Q.1. Assertion : The angles of a quadrilateral are x° , $(x - 10)^\circ$, $(x + 30)^\circ$ and $(2x)^\circ$, the smallest angle is equal to 58° .

Reason : Sum of the angles of a quadrilateral is 360° .

Q.2. Assertion : If the diagonals of a parallelogram ABCD are equal, then $\angle ABC = 90^\circ$.

Reason : If the diagonals of a parallelogram are equal, it becomes a rectangle.

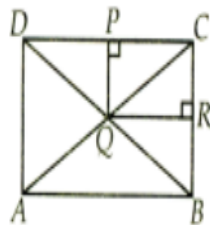
Q.3. Assertion : A parallelogram consists of two congruent triangles.

Reason : Diagonal of a parallelogram divides it into two congruent triangles.

Q.4. Assertion : ABCD is a square. AC and BD intersect at O. The measure of $\angle ABC = 90^\circ$.

Reason : Diagonals of a square bisect each other at right angles.

Q.5. Assertion : ABCD and PQRC are rectangles and Q is a midpoint of AC . Then DP = PC.



Reason : The line segment joining the midpoint of any two sides of a triangle is parallel to the third side and equal to half of it.

Q.6. Assertion : In $\triangle ABC$, median AD is produced to X such that AD = DX . Then ABXC is a parallelogram.

Reason : Diagonals AX and BC bisect each other at right angles

Q.7. Assertion : The consecutive sides of a quadrilateral have one common point.

Reason : The opposite sides of a quadrilateral have two common point

Q.8. Assertion : Two opposite angles of a parallelogram are $(3x-2)^\circ$ and $(50-x)^\circ$. The measure of one of the angle is 37° .

Reason : Opposite angles of a parallelogram are equal.

Q.9. Assertion : If the angles of a quadrilateral are in the ratio $2 : 3 : 7 : 6$, then the measure of angles are 40° , 60° , 140° , 120° , respectively.

Reason : The sum of the angles of a quadrilateral is 360° .

Q.10. Assertion : In $\triangle ABC$, E and F are the midpoints of AC and AB respectively. The altitude AP at BC intersects FE at Q. Then, $AQ = QP$.

Reason : Q is the midpoint of AP.

11. **Assertion (A):** If the diagonal of a parallelogram are equal, then it is a rectangle.

Reason (R): The diagonals of parallelogram bisect each other at right angles.

12. **Assertion (A):** The quadrilateral formed by joining the midpoints of consecutive sides of a quadrilateral whose diagonals are perpendicular is a rectangle.

Reason (R): The line segment in a triangle joining the midpoint of any two sides of the triangle is said to be parallel to its third side and is also half of the length of the third side and the quadrilateral formed by joining the midpoints of consecutive sides of a quadrilateral is a parallelogram.

13. **Assertion (A):** ABCD is a quadrilateral in which P, Q, R and S are the midpoints of AB, BC, CD and DA respectively. Then, PQRS is a parallelogram.

Reason (R): The line segment joining the midpoints of any two sides of a triangle is parallel to the third side and equal to half of it.

14. **Assertion (A):** In a rhombus ABCD, the diagonal AC bisects $\angle A$ as well as $\angle C$.

Reason (R): The diagonals of a rhombus bisect each other at right angles.

15. **Assertion (A):** Every parallelogram is a rectangle.

Reason (R): The angle bisectors of parallelogram form a rectangle.

16. **Assertion (A):** The diagonals of a ||gm bisect each other.

Reason (R): If the diagonals of a ||gm are equal and intersect at right angles then the parallelogram is a square.

17. **Assertion (A):** A quadrilateral with all sides equal is a rhombus.

Reason (R): A rhombus is a quadrilateral with all sides equal, but it is not necessary that all internal angles are right angles.

18. **Assertion (A):** A quadrilateral with opposite sides equal and opposite internal angles equal is a parallelogram.

Reason (R): A parallelogram is a quadrilateral with opposite sides equal, but it is not necessary that opposite internal angles are equal.

19. **Assertion (A):** A quadrilateral with all internal angles right angles is a rectangle.

Reason (R): A rectangle is a quadrilateral with all internal angles right angles and opposite sides equal.

20. **Assertion (A):** A quadrilateral with diagonals bisecting each other is a parallelogram.

Reason (R): A parallelogram is a quadrilateral with diagonals bisecting each other, but it is not necessary that opposite internal angles are equal.

21. **Assertion (A):** A quadrilateral with all sides equal and all internal angles right angles is a square.

Reason (R): A square is a quadrilateral with all sides equal and all internal angles right angles.

22. **Assertion (A):** A quadrilateral with opposite sides equal and opposite internal angles equal is a rectangle.

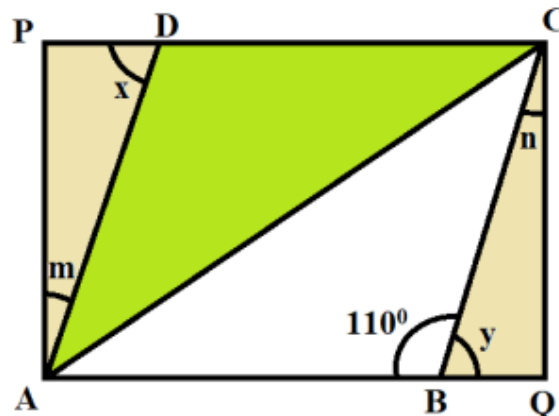
Reason (R): A rectangle is a quadrilateral with opposite sides equal, but it is not necessary that opposite internal angles are equal.

23. **Assertion (A):** A quadrilateral with diagonals bisecting each other at right angles is a rhombus.

Reason (R): A rhombus is a quadrilateral with diagonals bisecting each other, but it is not necessary that they bisect at right angles.

CASE STUDY : 1

In the middle of the city, there was a park ABCD in the form of a parallelogram form so that $AB = CD$, $AB \parallel CD$ and $AD = BC$, $AD \parallel BC$. Municipality converted this park into a rectangular form by adding land in the form of $\triangle APD$ and $\triangle BCQ$. Both the triangular shape of land were covered by planting flower plants.



(a) Show that $\triangle APD$ and $\triangle BCQ$ are congruent. (2)

OR

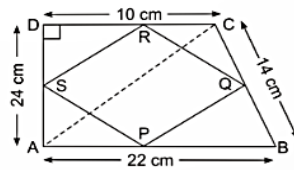
What is the value of $\angle m$? (2)

(b) Which side is equal to PD? (1)

(c) Show that $\triangle ABC$ and $\triangle CDA$ are congruent. (1)

CASE STUDY 2:

Person A has a quadrilateral shaped paper which he cut from a circular paper. Person B joined the mid-points of all sides and another quadrilateral was formed.



Above figure shows how the paper appears, side $AB = 22$ cm, $BC = 14$ cm, $CD = 10$ cm and $AD = 24$ cm.

Q1. The measure of diagonal AC is:

- a. 13 cm b. 30 cm c. 28 cm d. 26 cm

Q2. If $PQ \parallel AC$, then the measure of PQ is:

- a. 15 cm b. 13 cm c. 17 cm d. 19 cm

Q3. Quadrilateral PQRS is which of type quadrilateral?

- a. Rhombus b. Rectangle
c. Parallelogram d. Trapezium

Q4. While proving quadrilateral is a rectangle, choose the correct option:

- a. by showing opposite sides equal and each adjacent angle is 90°
b. by proving diagonals are equal
c. by proving all angles 90°
d. by proving all of the above

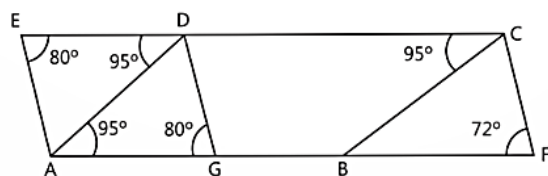
Q5. In any quadrilateral, the sum of all angles is:

- a. 250° b. 360° c. 290° d. 270°

CASE STUDY 3:

A parallelogram shape park ABCD is in the middle of the city. Municipality decided to increase its area, so at the left side of park a triangle AED was added and on the right-side triangle BFC was added. At point G on AB, municipality put a swing.





On the basis of the above information, solve the following questions:

Q 1. Prove that AGDE is a parallelogram when $ED \parallel AG$, $AE \parallel DG$.

Q 2. Find the value of $\angle ADC$.

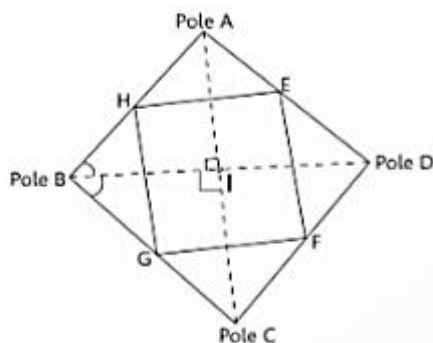
Q 3. Find the value of $\angle DCF$.

CASE STUDY 4:

Due to frequent robberies in the colony during night. The secretary with the members together decides to attach more lights besides the street light set by municipality. There are poles on which lights are attached.



These 4 poles are connected to each other through wire and they form a quadrilateral. Light from pole B focus light on mid-point G of wire between pole C and pole D, from pole C focus light on mid-point F of wire between pole C and pole D. Similarly pole D and pole A focus light on the mid-point E and H respectively.



On the basis of the above information, solve the following questions:

Q 1. If BD is the bisector of $\angle B$ then prove that I is the mid-point of AC.

Q 2. Prove that quadrilateral EFGH is a parallelogram.

Q 3. Is it true that every parallelogram is a rectangle?