# Quadrilateral & Polygon Questions for CDS, SSC & Railways Exams

## Quadrilateral & Polygon Quiz 1

Directions: Kindly study the following questions carefully and choose the right answer:

**1. Two light rods AB = a + b, CD = a – b symmetrically lying on a horizontal AB. There are kept intact by two strings AC and BD. The perpendicular distance between rods in a. The length of AC is given by**

A. a B. b C. $\sqrt{a^2 - b^2}$ D. $\sqrt{a^2 + b^2}$

**2. If PQRS be a rectangle such PQ = $\sqrt{3}$ QR. Then, what is ? PRS equal to ?**

A. 60 B. 45° C. 30° D. 15°

**3. In a trapezium, the two non-parallel sides are equal in length, each being of 5 cm. The parallel sides are at a distance of 3 cm apart. If the smaller side of the parallel sides is of length 2 cm, then the sum of the diagonals of the trapezium is**

A. $10\sqrt{5}cm$ B. $6\sqrt{5}cm$ C. $3\sqrt{5}cm$ D. $5\sqrt{5}cm$

**4. The area of a rectangle lies between 40 $cm^2$ and 45 $cm^2$. If one of the sides is 5 cm, then its diagonal lies between**

A. 8 cm and 10 cm B. 9 cm and 11 cm C. 10 cm and 12 cm D. 11 cm and 13 cm

**5. Let ABCD be a parallelogram. Let P, Q, R and S be the mid-points of sides AB, BC, CD and DA respectively. Consider the following statements.**

**I. Area of triangle APS < Area of triangle DSR, if BD < AC.**

**II. Area of triangle ABC = 4 (Area of triangle BPQ).**

**Select the correct answer using the codes given below.**

A. Only I B. Only III C. Both I and II D. Neither I nor II

**6. The area of a rhombus with side of 13 cm and one diagonal 10 cm will be**

A. 140 $cm^2$ B. 130 $cm^2$ C. 120 $cm^2$ D. 110 $cm^2$

**7. Consider the following statements**

**I. Let ABCD be a parallelogram which is not a rectangle. Then, $2(AB^2 + BC^2) \neq AC^2 + BD^2$**

**II. If ABCD is a rhombus with AB = 4 cm, then $AC^2 + BD^2 = n^3$ some positive integer n.**

**Which of the above statements is/are correct?**

A. only I B. Only II C. Both I and II D. Neither I nor II

**8. ABCD is a parallelogram. E is a point on BC such that BE : EC = m : n. If AE and DB intersect in F, then what is the ratio of the area of ΔFEB to the area of ΔAFD?**

A. $\frac{m}{n}$ B. $\left(\frac{m}{n}\right)^2$ C. $\left(\frac{n}{m}\right)^2$ D. $\left[\frac{m}{m+n}\right]^2$

**9. A quadrilateral ABCD is inscribed in a circle. If AB is parallel to CD and AC = BD, then the quadrilateral must be a**

A. parallelogram B. rhombus C. trapezium D. None of these

**10. ABCD is a quadrilateral such that BC = BA and CD > AD. Which one of the following is correct?**

A. ∠BAD = ∠BCD B. ∠BAD < ∠BCD C. ∠BAD > ∠BCD D. 2∠BAD = ∠BCD

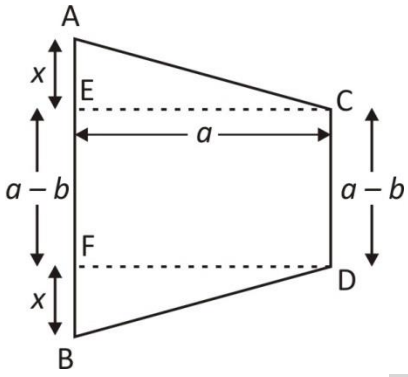
**Correct Answers:**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| D | C | B | B | B | C | B | D | C | C |

**Explanations:**

**1.**

Since, they are symmetrically on horizontal plane.




∴ AC = BD

∴ AE = BF = x

Now, AB = (a – b) + 2x

i.e. a + b = a – b +2x ⇒ 2b = 2x ⇒ b = x

Now in ΔACE,

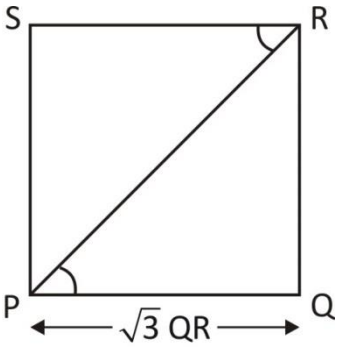
$x^2 + a^2 = AC^2$

$AC = b^2 + a^2 \Rightarrow AC = \sqrt{b^2 + a^2}$

Hence, option D is correct.

**2.**

In rectangle PQRS,




PQ || RS

∴ ∠RPQ = ∠ PRS ...(i)

( ∵ vertically opposite angles)

Now in ΔPQR,

$\tan \angle QPR = \frac{RQ}{PQ} \Rightarrow \tan \angle QPR = \frac{QR}{\sqrt{3}QR}$

$\Rightarrow \angle QPR = 30°$

$\therefore \quad \angle PRS = 30°$ [ From the equation (i) ]

Hence, option C is correct.

**3.**

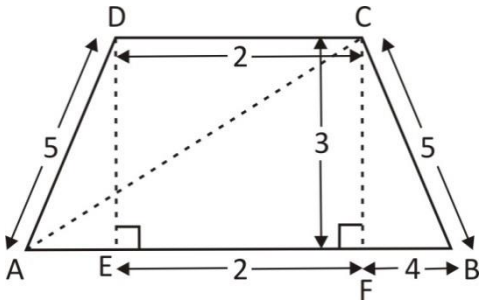
In $\Delta BCF$,

By the pythagoras theorem,

$BF^2 = BC^2 - CF^2$

$(BF)^2 = (5)^2 - (3)^2 \Rightarrow BF = 4$ cm

$\therefore \quad AB = 2 + 4 + 4 = 10$ cm




Now, in $\Delta ACF$,

$AC^2 = CF^2 + FA^2 \Rightarrow AC^2 = 32 + 62$

$AC = \sqrt{45}$ cm

Similarly, BD = 45 cm

$\therefore$ Sum of diagonal = $2 \times \sqrt{45} = 2 \times 3\sqrt{5} = 6\sqrt{5}$ cm.

Hence, option B is correct.

**4.**

Area of rectangle lies between 40 $cm^2$ and 45 $cm^2$

Now, one side = 5 cm

Since, area can't be less than 40 $cm^2$

$\therefore$ Other side can't be less than = $\frac{40}{5}$ = 8 cm

Since, area can't be greater than 45 $cm^2$.

$\therefore$ Other side can't be greater than = $\frac{45}{5}$ = 9 cm

∴ Minimum value of diagonal = $\sqrt{8^2 + 5^2} = \sqrt{89}$ = 9.43 cm

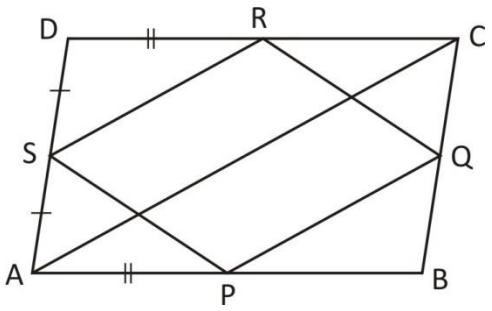
∴ Maximum value of diagonal = $\sqrt{9^2 + 5^2}$ = $\sqrt{106}$ = 10.3 cm

So, diagonal lies between 9 cm and 11 cm.

Hence, option B is correct.

**5.**

Area of ΔAPS = Area of ΔDSR



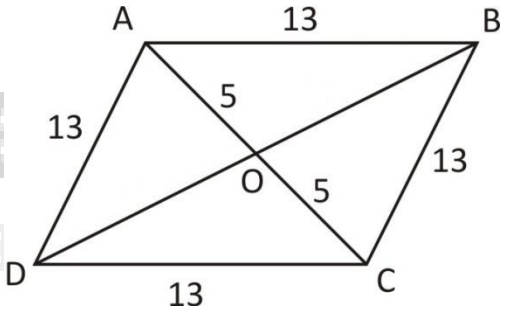

∵ AS = SD and AP = DR

∴ ar (ΔABC) = 4 ar (ΔBPQ).

Hence, option B is correct.

**6.**

As we know that diagonals of a rhombus bisect each other at right angles.




Therefore, applying the Pythagoras theorem taking triangle ΔOCD into consideration, we get

$OD^2 + OC^2 = DC^2$

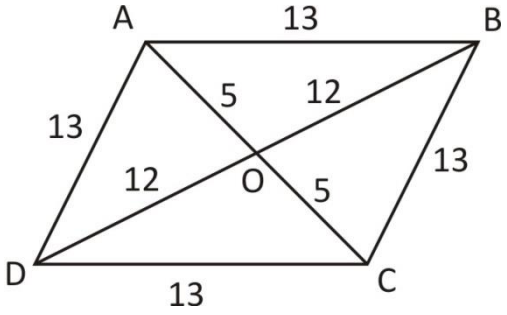
$OD^2 = DC^2 - OC^2$

$OD^2 = (13)^2 - (5)^2 = 169 - 25$

$OD^2 = 144 \Rightarrow OD = \sqrt{144}$

OD = 12 cm.

Therefore, Diagonal ($d_2$) = 12 + 12 = 24 cm and Diagonal ($d_1$) = 10 cm

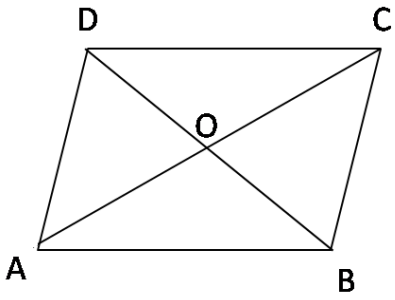



∴ Area of rhombus = $\frac{d_1 \times d_2}{2} = \frac{24 \times 10}{2}$ = 120 square cm.

Hence, option C is correct.

**7.**

I. ABCD is a parallelogram, then




$AC^2 + BD^2 = 2(AB^2 + BC^2)$

II. ABCD is a rhombus and diagonals AC and BD bisect each other.

∴ AO = OC and OB = OD

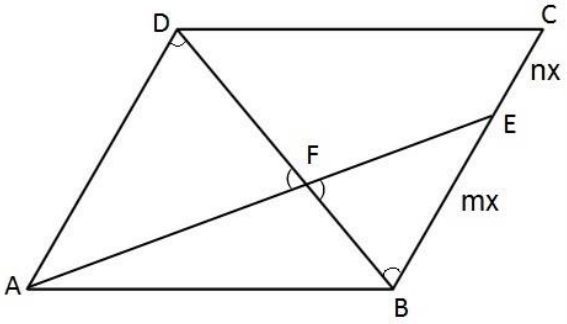
In ΔAOB, $AB^2 = AO^2 + OB^2$

$(4)^2 = \frac{(AC)^2}{2} + \frac{(BD)^2}{2}$

∴ AC2 + BD2 = 64 = (4)3 i.e., n3

Hence, option B is correct.

**8.**




In ΔAFD and Δ BFE,

∠AFD = ∠BFE (∵ vertically opposite angles)

and ∠ADC = ∠ABC (alternate angles)

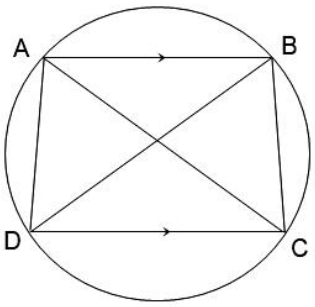
∴ ΔAFD – ΔBFE

So, $\frac{ar(\Delta FEB)}{ar(\Delta AFD)} = \frac{EB^2}{AD^2} = \frac{mx^2}{(mx+nx)^2} = \frac{m2}{(m+n)^2} = \left[\frac{m}{m+n}\right]^2$

Hence, option D is correct.

**9.**

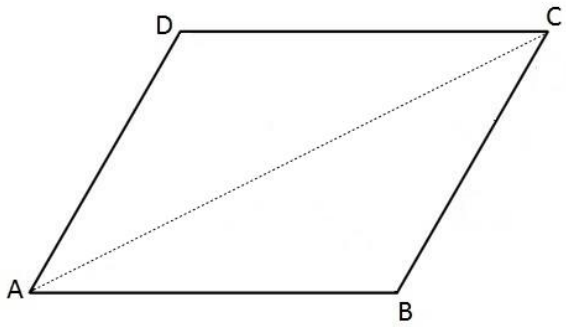
The quadrilateral must be a trapezium because a quadrilateral where only one pair of opposite sides are parallel (in the case AB || CD) is a trapezium.




Hence, option C is correct.

**10.**

Join AC.




Now, in ΔABC

∵ AB = BC

∠BAC = ∠BCA ....(i) ( ∵ angles opposite to equal side)

In ΔADC,

CD > AD

∠DAC > ∠DCA

(Since in a triangle opposite to greater side is bigger than the angle opposite to smaller side)

On adding Eq. (i) and (ii), we get

∠BAD > ∠BCD

Hence, option C is correct.