

MATHEMATICS
WORKSHEET_120326
CHAPTER 04 QUADRILATERALS
(ANSWERS)

SUBJECT: MATHEMATICS
CLASS : VIII

MAX. MARKS : 40
DURATION : 1½ hrs

General Instructions:

- (i). All questions are compulsory.
- (ii). This question paper contains 20 questions divided into five Sections A, B, C, D and E.
- (iii). **Section A** comprises of 10 MCQs of 1 mark each. **Section B** comprises of 4 questions of 2 marks each. **Section C** comprises of 3 questions of 3 marks each. **Section D** comprises of 1 question of 5 marks each and **Section E** comprises of 2 Case Study Based Questions of 4 marks each.
- (iv). There is no overall choice.
- (v). **Use of Calculators is not permitted**

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. A quadrilateral has angles 80° , 100° , 70° and x° . What is the value of x ?
(a) 100° (b) 110° (c) 120° (d) 90°
Ans. (b) 110°
Sum of interior angles of a quadrilateral = 360° .
 $\Rightarrow 80^\circ + 100^\circ + 70^\circ + x = 360^\circ \Rightarrow x = 110^\circ$.
2. The sum of interior angles of a polygon with 6 sides is:
(a) 360° (b) 540° (c) 720° (d) 900°
Ans. c) 720°
Sum of interior angles of polygon = $(n - 2) \times 180^\circ$
 $\Rightarrow (6 - 2) \times 180^\circ = 4 \times 180^\circ = 720^\circ$.
3. Which of the following quadrilaterals has both pairs of opposite sides parallel and all angles equal?
(a) Rhombus (b) Parallelogram (c) Square (d) Trapezium
Ans. (c) Square
A square has both pairs of opposite sides parallel and all angles equal (each 90°).
4. If the three angles of a quadrilateral are 70° , 90° and 120° , then find the measure of the fourth angle.
(a) 100° (b) 75° (c) 80° (d) 60°
Ans: (c) 80°
Sum of all angles of a quadrilateral = 360°
Let fourth angle = x°
 $70^\circ + 90^\circ + 120^\circ + x = 360^\circ$
 $\Rightarrow 280^\circ + x = 360^\circ$
 $\Rightarrow x = 360^\circ - 280^\circ$
 $\Rightarrow x = 80^\circ$
5. Find the measure of each interior angle of a regular polygon with 12 sides.
(a) 150° (b) 160° (c) 130° (d) 180°
Ans: (a) 150°
6. The measure of two adjacent angles of a parallelogram are in the ratio 2:3. Find the measure of each of the angles of a parallelogram.
(a) 72° , 108° (b) 54° , 112° (c) 68° , 99° (d) 86° , 114°
Ans. (a) 72° , 108°
Let the two adjacent angles of parallelogram be $2x$, and $3x$

Sum of adjacent angles of a parallelogram, $2x + 3x = 180^\circ$
 $\Rightarrow 5x = 180^\circ$
 $\Rightarrow x = 36^\circ$
 First angle $= 2 \times 36^\circ = 72^\circ$
 Second angle $= 3 \times 36^\circ = 108^\circ$
 Third angle $= 72^\circ$ and fourth angle $= 108^\circ$

7. Identify the quadrilateral with the following properties:

(i) One pair of opposite sides are parallel

(ii) Diagonals are unequal

(a) Parallelogram (b) Trapezium (c) Rectangle (d) Rhombus

Ans. (b) Trapezium

A trapezium has one pair of opposite sides parallel and diagonals that are generally unequal.

8. In a parallelogram, which pair of angles is always supplementary?

(a) Opposite angles (b) Adjacent angles (c) Alternate angles (d) Corresponding angles

Ans. (b) Adjacent angles

In any parallelogram, adjacent angles are supplementary, i.e., their sum is 180° .

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

9. **Assertion (A):** A kite has one pair of opposite angles equal.

Reason (R): Adjacent sides of a kite are unequal.

Ans. (c) A is true but R is false

A kite has one pair of opposite angles equal, but adjacent sides in a kite are equal in pairs, not unequal.

10. **Assertion (A):** All the parallelograms are rectangles.

Reason(R): All the rhombuses are parallelograms.

Ans: (d) A is false but R is true

All parallelograms are not rectangles but all rhombuses are parallelograms.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. One angle of a quadrilateral is 120° and the remaining three angles are equal. Find the measure of each of the three equal angles.

Ans: One angle of a quadrilateral is 120° .

Let the measure of each of the three equal angles be x .

According to the question, $120^\circ + x + x + x = 360^\circ$ (by angle sum property)

$$\Rightarrow 120^\circ + 3x = 360^\circ \Rightarrow 3x = 360^\circ - 120^\circ$$

$$\Rightarrow x = 240/3 = 80^\circ$$

Therefore, measure of each of the remaining three equal angles is 80° .

12. How many sides does a regular polygon have, if each of its interior angles is 165° ?

Ans: Let there be n sides of the polygon.

$$\text{Then, each interior angle} = \frac{(n-2) \times 180^\circ}{n}$$

$$\Rightarrow \frac{(n-2) \times 180^\circ}{n} = 165^\circ \Rightarrow (n-2) \times 180 = 165n$$

$\Rightarrow 180n - 360 = 165n$
 $\Rightarrow 180n - 165n = 360 \Rightarrow 15n = 360$
 $\Rightarrow n = 360/15 = 24$
 Hence, the polygon has 24 sides.

- 13.** Ram was designing a rangoli using polygon shapes. He created a pattern using a regular polygon in which each interior angle measured 120° . Find the number of sides of the polygon and classify it.

Ans. Interior angle = 120°

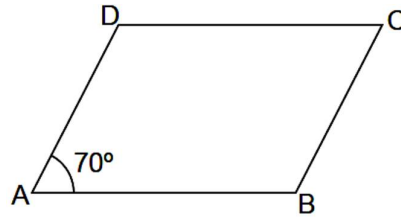
Use formula: $180(n-2)/n = 120$

$\Rightarrow 180n - 360 = 120n \Rightarrow 60n = 360 \Rightarrow n = 6$

Shape = Regular Hexagon

- 14.** One angle of a parallelogram is of measure 70° . Find the measure of the remaining angles of the parallelogram.

Ans: Let ABCD be a parallelogram and $\angle A = 70^\circ$.



Since opposite angles of a parallelogram are equal,

$\therefore \angle C = \angle A = 70^\circ$

Now $AD \parallel BC$ and AB is a transversal which intersects them at A and B respectively,

$\therefore \angle A + \angle B = 180^\circ$

[$\because$ Sum of the interior angles on the same side of the transversal is 180°]

$\Rightarrow 70^\circ + \angle B = 180^\circ$

$\Rightarrow \angle B = 180^\circ - 70^\circ = 110^\circ$

Also $\angle D = \angle B$ [$\because$ Opposite angles of a parallelogram are equal]

So, $\angle D = 110^\circ$

SECTION – C

Questions 15 to 17 carry 3 marks each.

- 15.** The sum of the exterior angles of a polygon is one-ninth of sum of the interior angles. Find the number of sides of the polygon.

Ans: Let the number of sides of the polygon be n .

Then sum of the exterior angles of the polygon = 360°

According to the question, we have

Sum of the exterior angles = $\frac{1}{9} \times$ Sum of the interior angles

$\Rightarrow$ Sum of interior angles = $9 \times$ Sum of exterior angles

$\therefore$ Sum of interior angles = $9 \times 360^\circ = 3240^\circ$

But the sum of the interior angles of the polygon of n sides = $(n - 2) \times 180^\circ$

$\therefore (n - 2) \times 180^\circ = 3240^\circ$

$\Rightarrow n - 2 = \frac{3240}{180} = 18$

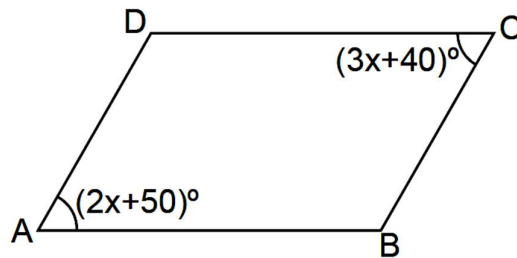
So, $n = 18 + 2 = 20$

Hence, the polygon has 20 sides.

- 16.** ABCD is a parallelogram where $m\angle A = (2x + 50^\circ)$ and $m\angle C = (3x + 40^\circ)$.

(i) Find the value of x

(ii) Find the measure of each angle.



Ans: (i) We know that opposite angles of a parallelogram are equal in measure.

$$\therefore m\angle A = m\angle C$$

$$\Rightarrow 2x + 50^\circ = 3x + 40^\circ$$

$$\Rightarrow 2x - 3x = 40^\circ - 50^\circ$$

$$\Rightarrow -x = -10^\circ \Rightarrow x = 10^\circ$$

$$(ii) \text{ Since } x = 10^\circ, \text{ then } m\angle A = 2x + 50^\circ = 2(10^\circ) + 50^\circ = 20^\circ + 50^\circ = 70^\circ$$

$$m\angle C = 3x + 40^\circ = 3(10^\circ) + 40^\circ = 30^\circ + 40^\circ = 70^\circ$$

Also $m\angle A + m\angle B = 180^\circ$ [$\because$ Sum of the interior angles on the same side of the transversal is 180°]

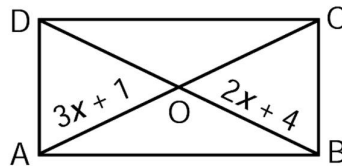
$$\Rightarrow 70^\circ + m\angle B = 180^\circ$$

$$\Rightarrow m\angle B = 180^\circ - 70^\circ = 110^\circ$$

Now $m\angle B = m\angle D$ [$\because$ Opposite angles of a parallelogram are equal]

As $m\angle B = 110^\circ$, so $m\angle D = 110^\circ$

17. In the below figure, ABCD is a rectangle. Its diagonals meet at O. Find x, if $OA = 3x + 1$ and $OB = 2x + 4$.



Ans; Since, the diagonals of a rectangle are equal, therefore, $AC = BD \dots(i)$

Also, the diagonals of a rectangle bisect each other at O.

Therefore, $OA = \frac{1}{2} \times AC$ and $OB = \frac{1}{2} \times BD \dots(ii)$

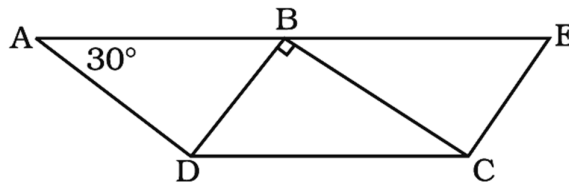
From (i) and (ii), we get $OA = OB$

$$\Rightarrow 3x + 1 = 2x + 4$$

$$\Rightarrow 3x - 2x = 4 - 1 \Rightarrow x = 3$$

OR

In the given figure, ABCD and BDCE are parallelograms with common base DC. If $BC \perp BD$, then find $\angle BEC$.



Ans: From the given figure,

$$\angle BAD = 30^\circ$$

$$\angle BCD = 30^\circ \dots [\because \text{opposite angles of parallelogram are equal}]$$

Now, let us consider the triangle CBD

$$\text{From angle sum property, } \angle DBC + \angle BCD + \angle CDB = 180^\circ$$

$$90^\circ + 30^\circ + \angle CDB = 180^\circ$$

$$120^\circ + \angle CDB = 180^\circ$$

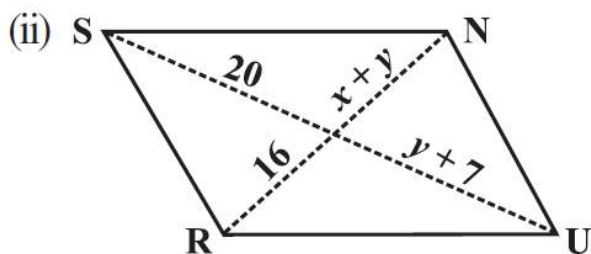
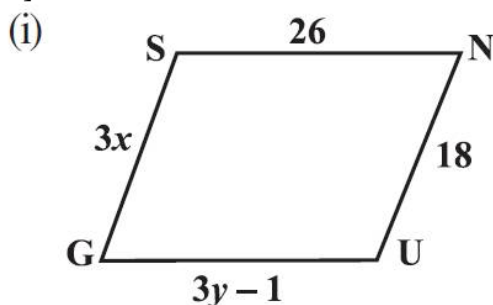
$$\angle CDB = 180^\circ - 120^\circ$$

$$\Rightarrow \angle CDB = 60^\circ$$

$\therefore \angle BEC = 60^\circ$, because opposite angles of parallelogram are equal.

SECTION – D
Questions 18 carry 5 marks.

- 18.** The following figures GUNS and RUNS are parallelograms. Find x and y . (Lengths are in cm) [2 + 3 marks]



Ans: (a) GUNS is a parallelogram and we know that opposite sides of a parallelogram are equal.

Hence, $GU = SN$ and $GS = UN$

$$\Rightarrow 3y - 1 = 26$$

$$\Rightarrow 3y = 26 + 1$$

$$\Rightarrow 3y = 27 \Rightarrow y = 27/3 \Rightarrow y = 9$$

Now, $GS = UN$

$$\Rightarrow 3x = 18 \Rightarrow x = 18/3 \Rightarrow x = 6$$

Hence, $x = 6$, $y = 9$

(b) (b) RUNS, is a parallelogram and we know that diagonals of a parallelogram bisect each other.

US and RN are diagonals

$$\therefore RO = ON \text{ and } SO = OU$$

$$\Rightarrow SO = OU$$

$$\Rightarrow 20 = x + 7$$

$$\Rightarrow x = 20 - 7 \Rightarrow x = 13$$

Now, $RO = ON$

$$\Rightarrow 16 = x + y$$

$$\Rightarrow 16 = 13 + y$$

$$\Rightarrow 13 + y = 16$$

$$\Rightarrow y = 16 - 13 \Rightarrow y = 3$$

Hence, $x = 13$, $y = 3$

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

- 19.** A renowned flooring company is developing designer tiles shaped as special quadrilaterals. One new tile design has four equal-length sides, and when measured, its diagonals intersect at right angles but differ in length. The company's production engineer must classify this shape correctly for consistency in manufacturing and cataloging.



By using the above, give the answers of the following questions:

- (a) What is the name of this quadrilateral?
- (b) Mention any two properties of this shape.
- (c) Could this tile be a square? Why or why not?
- (d) Name another quadrilateral with perpendicular diagonals and unequal side lengths.

Ans: (a) The tile is a rhombus.

(b) Two properties:

(i) All sides are equal in length.

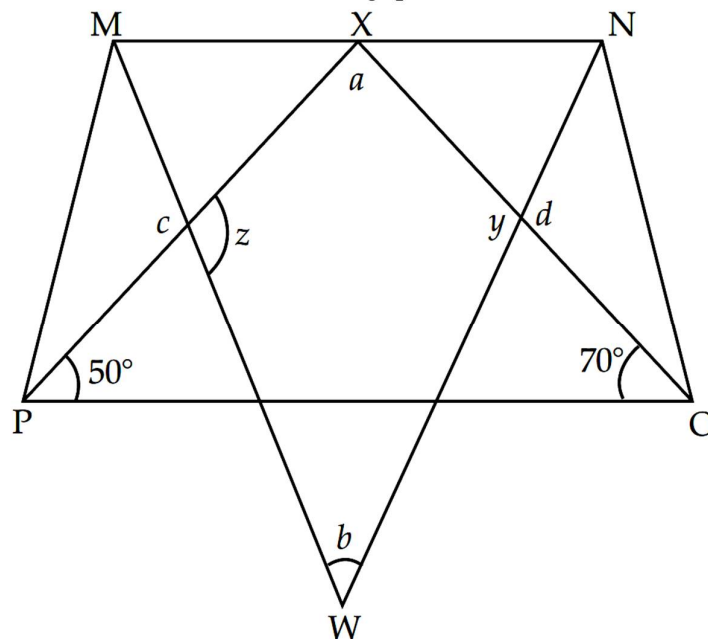
(ii) Diagonals bisect each other at 90° , but they are not of equal length.

(c) No, it cannot be a square because although a square also has equal sides and perpendicular diagonals, a square's diagonals are always equal.

(d) A kite is another quadrilateral with perpendicular diagonals, but its adjacent sides are only equal in pairs, not all sides.

- 20.** There is a trapezium MNOP, angle bisector of $\angle M$ and $\angle N$ meet at point W, and angle bisector of $\angle O$ and $\angle P$ meet at point X on side MN of trapezium MNOP.

By using the figure give the answers of the following questions:



(i) What is the value of a ? (1)

(ii) What is the value of d ? ($1\frac{1}{2}$)

(iii) What is the value of c ? ($1\frac{1}{2}$)

Ans: (i) In Triangle XPO, $\angle XPO = 50^\circ$ (XP is angle bisector of $\angle X$)

$\angle XOP = 70^\circ$ (XO is angle bisector of $\angle XPO$)

$$\Rightarrow \angle XOP + \angle XPO + a = 180^\circ$$

$$\Rightarrow 70^\circ + 50^\circ + a = 180^\circ$$

$$\Rightarrow a = 180^\circ - 120^\circ$$

$$\Rightarrow a = 60^\circ$$

(ii) $\angle O + \angle N = 180^\circ$ (sum of adjacent angles of trapezium is 180°)

$$\Rightarrow \frac{1}{2} \text{ of } \angle O + \frac{1}{2} \text{ of } \angle N = 90^\circ$$

$$\Rightarrow 70^\circ + \frac{1}{2} \text{ of } \angle N = 90^\circ$$

$$\Rightarrow \frac{1}{2} \text{ of } \angle N = 20^\circ$$

$$\text{In triangle NOY} = \frac{1}{2} \text{ of } \angle N + \frac{1}{2} \text{ of } \angle O + d = 180^\circ$$

$$\Rightarrow 70^\circ + 20^\circ + d = 180^\circ$$

$$\Rightarrow d = 90^\circ$$

(iii) $\angle P + \angle M = 180^\circ$ (sum of adjacent angles of trapezium is 180°)

$$\Rightarrow \frac{1}{2} \text{ of } \angle P + \frac{1}{2} \text{ of } \angle M = 90^\circ$$

$$\Rightarrow 50^\circ + \frac{1}{2} \text{ of } \angle M = 90^\circ$$

$$\Rightarrow \frac{1}{2} \text{ of } \angle M = 40^\circ$$

$$\text{In triangle MZP} = \frac{1}{2} \text{ of } \angle P + \frac{1}{2} \text{ of } \angle M + c = 180^\circ$$

$$\Rightarrow 50^\circ + 40^\circ + c = 180^\circ$$

$$\Rightarrow c = 90^\circ$$

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