Important Questions Class 8 Maths Chapter 3 – Understanding Quadrilaterals

Question 1: A quadrilateral has three acute angles, each measuring 80°. What is the measure of the fourth angle of the quadrilateral?

Answer 1:– Let x be the measure of the fourth angle of a quadrilateral.

The sum of all the angles of a quadrilateral + 360°

80° + 80° + 80° + x = 360° …………(since the measure of all the three acute angles = 80°)

240° + x = 360°

x = 360° – 240°

x = 120°

Hence, the fourth angle made by the quadrilateral is 120°.

Question 2: Find the measure of all the exterior angles of a regular polygon with

(i) 9 sides and (ii) 15 sides.

Answer 2 : (i) Total measure of all exterior angles = 360°

Each exterior angle =sum of exterior angle = 360° = 40°

number of sides 9

Each exterior angle = 40°

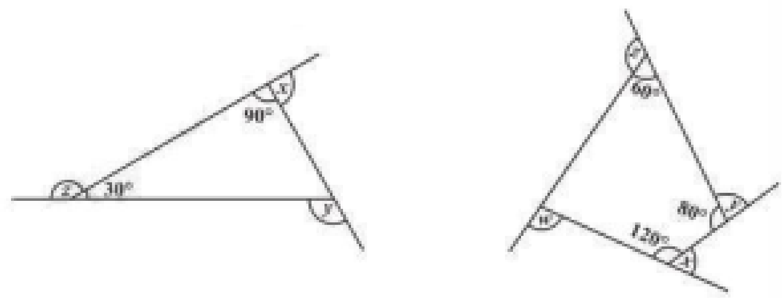
(ii) Total measure of all exterior angles = 360°

Each exterior angle = sum of exterior angle =360° = 24°

number of sides 15

Each exterior angle = 24°

Question 3:



(a) Find $x + y + z$ (b) Find $x + y + z + w$

Answer 3: a) The sum of all the angles of the triangle = 180°

One side of a triangle

= 180°- (90° + 30°) = 60°

In a linear pair, the sum of two adjacent angles altogether measures up to 180°

x + 90° = 180°

x = 180° – 90°

= 90°

Similarly,

y + 60° = 180°

y = 180° – 60°

= 120°

similarly,

z + 30° = 180°

z = 180° – 30°

= 150°

Hence,x + y + z

= 90° + 120° + 150°

$= 360°$

Thus, the sum of the angles x, y, and z is altogether 360°

1. b) Sum of all angles of quadrilateral = 360°

One side of quadrilateral = 360°- (60° + 80° + 120°) = 360° – 260° = 100°

$x + 120° = 180°$

$x = 180° – 120°$

$= 60°$

$y + 80° = 180°$

$y = 180° – 80°$

$= 100°$

$z + 60° = 180°$

$z = 180° – 60°$

$= 120°$

$w + 100° = 180°$

$w = 180° – 100° = 80°$

$x + y + z + w = 60° + 100° + 120° + 80° = 360°$

Question 4: Adjacent sides of a rectangle are in the ratio 5: 12; if the perimeter of the given rectangle is 34 cm, find the length of the diagonal.

Answer 4: The ratio of the adjacent sides of the rectangle is 5: 12

Let 5x and 12x be adjacent sides.

The perimeter is the sum of all the given sides of a rectangle.

5x + 12x + 5x + 12x = 34 cm ……(since the opposite sides of the rectangle are the same)

34x = 34

x = 34/34

x = 1 cm

Therefore, the adjacent sides of the rectangle are 5 cm and 12 cm, respectively.

That is,

Length =12 cm

Breadth = 5 cm

Length of the diagonal = √(l2 + b2)

= √(122 + 52)

= √(144 + 25)

= √169

= 13 cm

Hence, the length of the diagonal of a rectangle is 13 cm.

Question 5: How many sides do regular polygons consist of if each interior angle is 165°?

Answer 5: A regular polygon with an interior angle of 165°

We need to find the sides of the given regular polygon:-

The sum of all exterior angles of any given polygon is 360°.

Formula Used: Number of sides = 360∘ /Exterior angle

Exterior angle=180∘−Interior angle

Thus,

Each interior angle =165°

Hence, the measure of every exterior angle will be

=180°−165°

=15°

Therefore, the number of sides of the given polygon will be

$=360°/15°$

$=24°$

Question 6: Find x in the following figure.

Answer 6: The two interior angles in the given figures are right angles = 90°

$70° + m = 180°$

$m = 180° – 70°$

$= 110°$

(In a linear pair, the sum of two adjacent angles altogether measures up to 180°)

$60° + n = 180°$

$n = 180° – 60°$

$= 120°$

(In a linear pair, the sum of two adjacent angles altogether measures up to 180°)

The given figure has five sides, and it is a pentagon.

Thus, the sum of the angles of the pentagon = 540°

$90° + 90° + 110° + 120° + y = 540°$

$410° + y = 540°$

$y = 540° – 410° = 130°$

$x + y = 180°$….. (Linear pair)

$x + 130° = 180°$

$x = 180° – 130°$

$= 50°$

Question 7: ABCD is a parallelogram with ∠A = 80°. The internal bisectors of ∠B and ∠C meet each other at O. Find the measure of the three angles of ΔBCO.

Answer 7: The measure of angle A = 80°.

In a parallelogram, the opposite angles are the same.

Hence,

$\angle A = \angle C = 80°$

And

$\angle OCB = (1/2) \times \angle C$

$= (1/2) \times 80°$

$= 40°$

$\angle B = 180° - \angle A$ (the sum of interior angles situated on the same side of the transversal is supplementary)

$= 180° - 80°$

$= 100°$

Also,

$\angle CBO = (1/2) \times \angle B$

$\angle CBO = (1/2) \times 100°$

$\angle CBO = 50°$.

By the property of the sum of the angle BCO, we get,

$\angle BOC + \angle OBC + \angle CBO = 180°$

$\angle BOC = 180° - (\angle OBC + CBO)$

$= 180° - (40° + 50°)$

$= 180° - 90°$

$= 90°$

Hence, the measure of all the angles of triangle BCO is 40°, 50° and 90°.

Question 8: The measure of the two adjacent angles of the given parallelogram is the ratio of 3:2. Then, find the measure of each angle of the parallelogram.

Answer 8: A parallelogram with adjacent angles in the ratio of 3:2

To find:- The measure of each of the angles of the parallelogram.

Let the measure of angle A be 3x

Let the measure of angle B be 2x

Since the sum of the measures of adjacent angles is 180° for a parallelogram,

$\angle A+\angle B=180°$

$3x+2x=180°$

$5x=180°$

$x=36°$

$\angle A=\angle C=3x=108°$

$\angle B=\angle D=2x=72°$ (Opposite angles of a parallelogram are equal).

Hence, the angles of a parallelogram are 108°, 72°,108°and 72°

Question 9: Is it ever possible to have a regular polygon, each of whose interior angles is 100?

Answer 9: The sum of all the exterior angles of a regular polygon is 360°

As we also know, the sum of interior and exterior angles are 180°

Exterior angle + interior angle = 180-100=80°

When we divide the exterior angle, we will get the number of exterior angles

since it is a regular polygon means the number of exterior angles equals the number of sides.

Therefore n=360/ 80=4.5

And we know that 4.5 is not an integer, so having a regular polygon is impossible.

Whose exterior angle is 100°

Question 10: ABCD is a parallelogram in which ∠A=110°. Find the measure of the angles B, C and D, respectively.

Answer 10: The measure of angle A=110°

the sum of all adjacent angles of a parallelogram is 180°

∠A + ∠B = 180

110°+ ∠B = 180°

∠B = 180°- 110°

= 70°.

Also ∠B + ∠C = 180° [Since ∠B and ∠C are adjacent angles]

70°+ ∠C = 180°

∠C = 180°- 70°

= 110°.

Now ∠C + ∠D = 180° [Since ∠C and ∠D are adjacent angles]

110o+ ∠D = 180°

∠D = 180°- 110°

= 70°

Question11: A diagonal and a side of a rhombus are of equal length. Find the measure of the angles of the rhombus.

Answer 11: Let ABCD be the rhombus.

All the sides of a rhombus are the same.

Thus, AB = BC = CD = DA.

The side and diagonal of a rhombus are equal.

AB = BD

Therefore, AB = BC = CD = DA = BD

Consider triangle ABD,

Each side of a triangle ABD is congruent.

Hence, ΔABD is an equilateral triangle.

Similarly,

ΔBCD is also an equilateral triangle.

Thus, $\angle BAD = \angle ABD = \angle ADB = \angle DBC = \angle BCD = \angle CDB = 60°$

$\angle ABC = \angle ABD + \angle DBC = 60° + 60° = 120°$

And

$\angle ADC = \angle ADB + \angle CDB = 60° + 60° = 120°$

Hence, all angles of the given rhombus are 60°, 120°, 60° and 120°, respectively.

Question 12: The two adjacent angles of a parallelogram are the same. Find the measure of each and every angle of the parallelogram.

Answer 12: A parallelogram with two equal adjacent angles.

To find:- the measure of each of the angles of the parallelogram.

The sum of all the adjacent angles of a parallelogram is supplementary.

$\angle A+\angle B=180°$

$2\angle A = 180°$

$\angle A = 90°$

$\angle B = \angle A = 90°$

In a parallelogram, the opposite sides are the same.

Therefore,

$\angle C=\angle A=90°$

$\angle D=\angle B=90°$

Hence, each angle of the parallelogram measures 90°.

Question 13: The measures of the two adjacent angles of a parallelogram are in the given ratio 3: 2. Find the measure of every angle of the parallelogram.

Answer 13: Let the measures of two adjacent angles ∠A and ∠B be 3x and 2x, respectively, in parallelogram ABCD.

$\angle A + \angle B = 180°$

$\Rightarrow 3x + 2x = 180°$

$\Rightarrow 5x = 180°$

$\Rightarrow x = 36°$

The opposite sides of a parallelogram are the same.

$\angle A = \angle C = 3x = 3 \times 36° = 108°$

$\angle B = \angle D = 2x = 2 \times 36° = 72°$

Question 14: State whether true or false.

(a) All the rectangles are squares.

(b) All the rhombuses are parallelograms.

(c) All the squares are rhombuses and also rectangles.

(d) All the squares are not parallelograms.

(e) All the kites are rhombuses.

(f) All the rhombuses are kites.

(g) All the parallelograms are trapeziums.

(h) All the squares are trapeziums.

Answer 14: (a) This statement is false.

Since all squares are rectangles, all rectangles are not squares.

(b) This statement is true.

(c) This statement is true.

(d) This statement is false.

Since all squares are parallelograms, the opposite sides are parallel, and opposite angles are congruent.

(e) This statement is false.

Since, for example, the length of the sides of a kite is not the same length.

(f) This statement is true.

(g) This statement is true.

(h) This statement is true.

Question 15: Two adjacent angles of a parallelogram are equal. What is the measure of each of these angles?

Answer 15: Let ∠A and ∠B be two adjacent angles.

But we know that the sum of adjacent angles of a parallelogram is 180o

$\angle A + \angle B = 180°$

But given that $\angle A = \angle B$

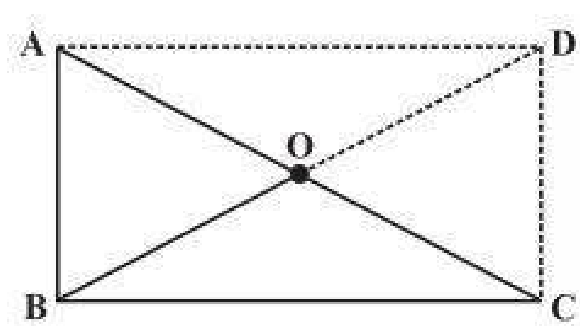
Now substituting, we get

$\angle A + \angle A = 180°$

$2\angle A = 180°$

$\angle A = 180/2 = 90°$

Question 16:Triangle ABC is a right-angled triangle, and O is the midpoint of the side opposite to the right angle. State why O is equidistant from A, B and C. (The dotted lines are drawn additionally to help you).



Answer 16: AD and DC are drawn in such a way that AD is parallel to BC

and AB is parallel to DC

AD = BC and AB = DC

ABCD is a rectangle since the opposite sides are equal and parallel to each other, and the measure of all the interior angles is altogether 90°.

In a rectangle, all the diagonals bisect each other and are of equal length.

Therefore, AO = OC = BO = OD

Hence, O is equidistant from A, B and C.

Question 17: Is the quadrilateral ABCD a parallelogram if

(i) the measure of angle D + the measure of angle B = 180°?

(ii) AB = DC = 8 cm , the length of AD = 4 cm and the length of BC = 4.4 cm?

(iii)The measure of angle A = 70° and the measure of angle C = 65°?

Answer 17: (i) Yes, the quadrilateral ABCD can be a parallelogram if $\angle D + \angle B = 180°$ but it should also fulfil certain conditions, which are as follows:

(a) The sum of all the adjacent angles should be 180°.

(b) Opposite angles of a parallelogram must be equal.

(ii) No, opposite sides should be of the same length. Here, $AD \neq BC$

(iii) No, opposite angles should be of the same measures. $\angle A \neq \angle C$

Question 18: Find the measure of angles P and S if SP and RQ are parallel.

Answer 18: $\angle P + \angle Q = 180°$ (angles on the same side of transversal)

$\angle P + 130° = 180°$

$\angle P = 180° – 130° = 50°$

also, $\angle R + \angle S = 180°$ (angles on the same side of transversal)

$\Rightarrow 90° + \angle S = 180°$

$\Rightarrow \angle S = 180° – 90° = 90°$

Thus, $\angle P = 50°$ and $\angle S = 90°$

Yes, there is more than one method to find $m\angle P$.

PQRS is a quadrilateral. The sum of measures of all angles is 360°.

Since we know the measurement of ∠Q, ∠R and ∠S.

∠Q = 130°, ∠R = 90° and ∠S = 90°

∠P + 130° + 90° + 90° = 360°

⇒ ∠P + 310° = 360°

⇒ ∠P = 360° – 310° = 50°

Question 19: The opposite angles of a parallelogram are (3x + 5)° and (61 – x)°. Find the measure of four angles.

Answer 19: (3x + 5)° and (61 – x)° are the opposite angles of a parallelogram.

The opposite angles of a parallelogram are the same.

Therefore, (3x + 5)° = (61 – x)°

3x + x = 61° – 5°

4x = 56°

x = 56°/4

x = 14°

The first angle of the parallelogram =3x + 5

= 3(14) + 5

= 42 + 5 = 47°

The second angle of the parallelogram=61 – x

= 61 – 14 = 47°

The measure of angles adjacent to the given angles = 180° – 47° = 133°

Hence, the measure of the four angles of the parallelogram is 47°, 133°, 47°, and 133°.

Question 20: What is the maximum exterior angle possible for a regular polygon?

Answer 20: To find:- The maximum exterior angle possible for a regular polygon.

A polygon with minimum sides is an equilateral triangle.

So, the number of sides =3

The sum of all exterior angles of a polygon is 360°

Exterior angle =360°/Number of sides

Therefore, the maximum exterior angle possible will be

=360°/3