MATHEMATICS
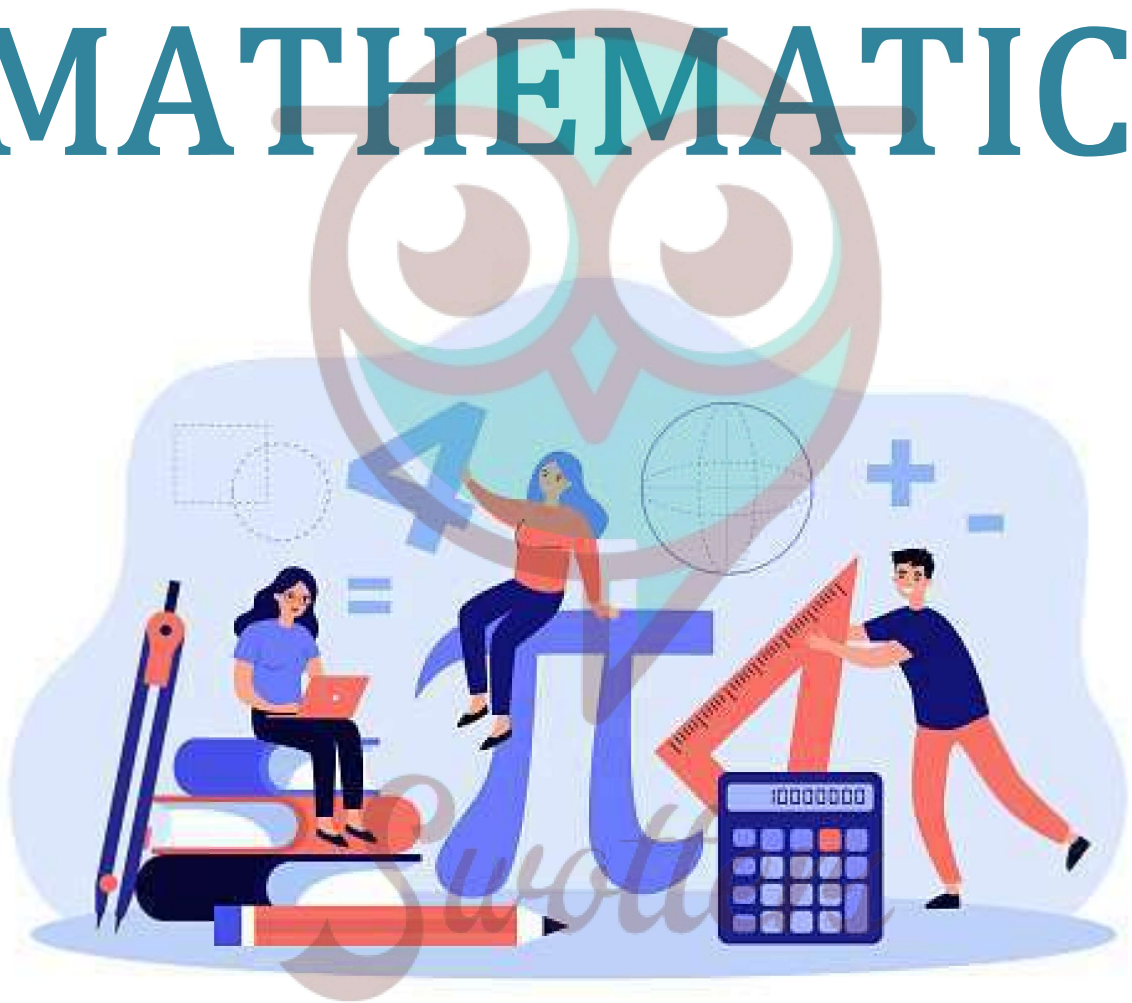
Important Questions

Multiple Choice questions-

Question 1. In a right-angled triangle where angle A = 90° and AB = AC. What are the values of angle B?

(a) 45°

(b) 35°

(c) 75°

(d) 65°

Question 2. In a triangle ABC if ∠A = 53° and ∠C = 44° then the value of ∠B is:

(a) 46°

(b) 83°

(c) 93°

(d) 73°

Question 3. Given four points such that no three of them are collinear, then the number of lines that can be drawn through them are:

(a) 4 lines

(b) 8 lines

(c) 6 lines

(d) 2 lines

Question 4. If one angle of triangle is equal to the sum of the other two angles then triangle is:

(a) Acute triangle

(b) Obtuse triangle

(c) Right triangle

(d) None of these

Question 5. How many degrees are there in an angle which equals one-fifth of its supplement?

(a) 15°

(b) 30°

(c) 75°

(d) 150°

Question 6. Sum of the measure of an angle and its vertically opposite angle is always.

(a) Zero

(b) Thrice the measure of the original angle

(c) Double the measure of the original angle

(d) Equal to the measure of the original angle

Question 7. If two parallel lines are cut by a transversal, then the pairs of corresponding angles are congruent.

(a) Equal

(b) Complementary

(c) Supplementary

(d) corresponding

Question 8. The bisectors of the base angles of an isosceles triangle ABC, with AB = AC, meet at O. If ∠B = ∠C = 50Â°. What is the measure of angle O?

(a) 120°

(b) 130°

(c) 80°

(d) 150°

Question 9. The angles of a triangle are in the ratio 2 : 3 : 4. The angles, in order, are :

(a) 80°, 40°, 60°

(b) 20°, 60°, 80°

(c) 40°, 60°, 80°
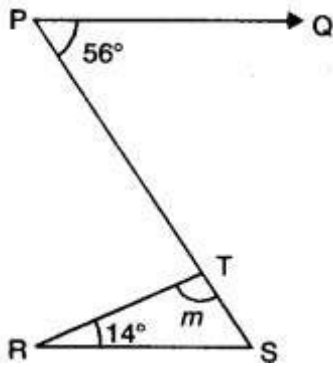
(d) 60°, 40°, 80°

Question 10. An acute angle is:

(a) More than 90 degrees

(b) Less than 90 degrees

(c) Equal to 90 degrees

(d) Equal to 180 degrees

Very Short:

1. If an angle is half of its complementary angle, then find its degree measure.

2. The two complementary angles are in the ratio 1 : 5. Find the measures of the angles.

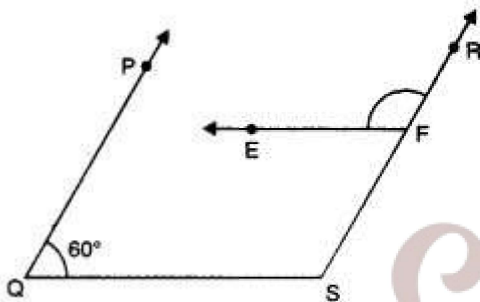3. In the given figure, if PQ || RS, then find the measure of angle m.
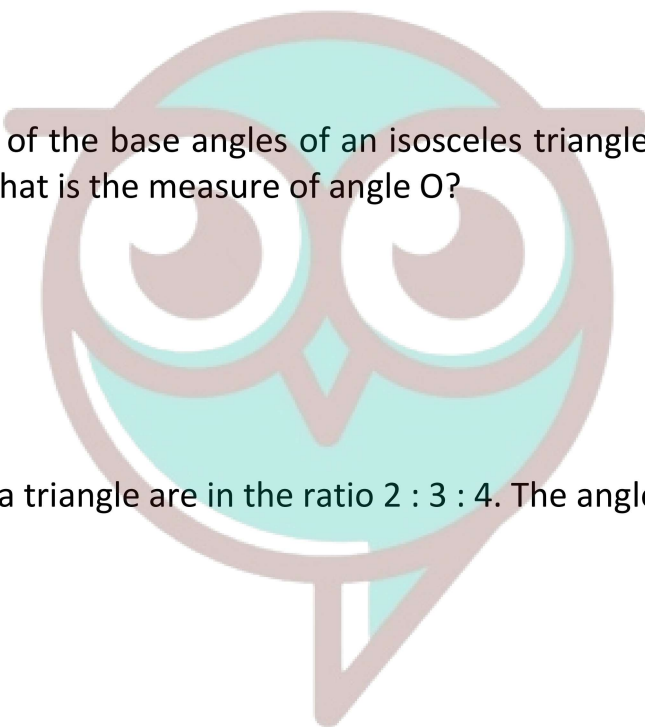
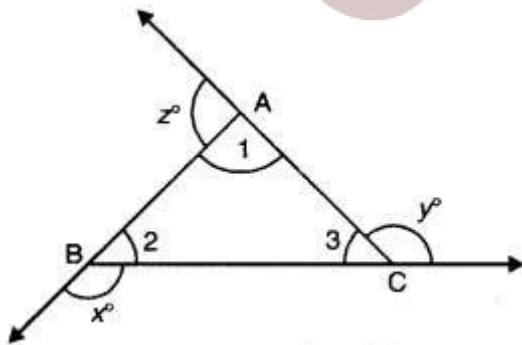4. If an angle is 14o more than its complement, then find its measure.

5. If AB || EF and EF || CD, then find the value of x.

6. In the given figure, lines AB and CD intersect at O. Find the value of x.
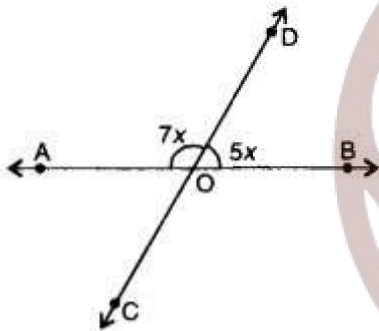
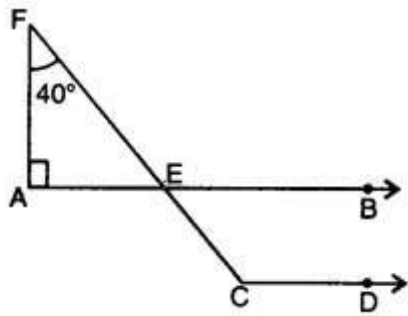7. In the given figure, PQ || RS and EF || QS. If ∠PQS = 60°, then find the measure of ∠RFE.

8. In the given figure, if x°, y° and z° are exterior angles of ΔABC, then find the value of x° + y° + z°.

Short Questions:

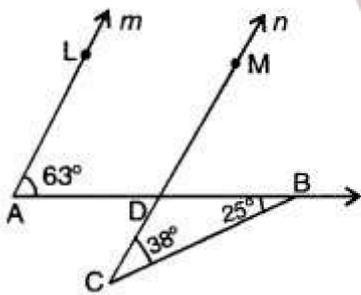1.   In the given figure, AB || CD, ∠FAE = 90°, ∠AFE = 40°, find ∠ECD.

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2.   In the fig., AD and CE are the angle bisectors of ∠A and ∠C respectively. If ∠ABC = 90°, then find ∠AOC.
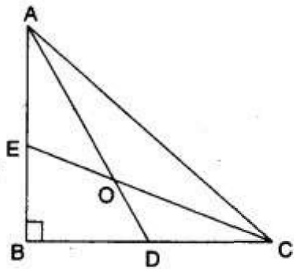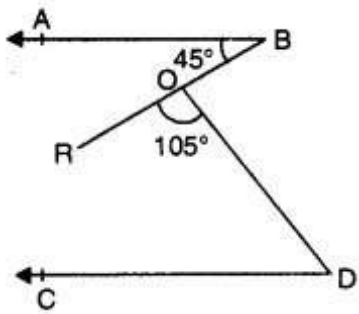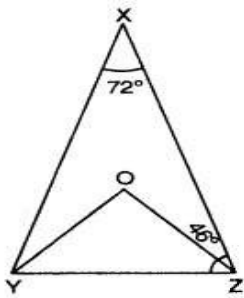

3.   In the given figure, prove that m || n.

4.   In the given figure, two straight lines PQ and RS intersect each other at O. If ∠POT = 75°, find the values of a, b, c.
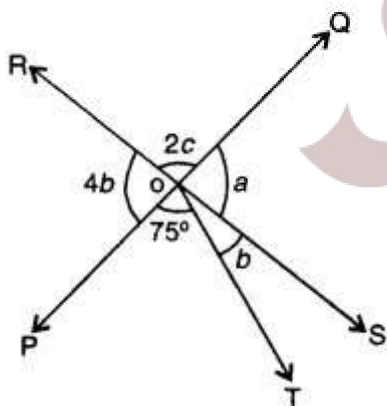
5.   In figure, if AB || CD. If ∠ABR = 45° and ∠ROD = 105°, then find ∠ODC.

6. In the figure, ∠X = 72°, ∠XZY = 46°. If YO and ZO are bisectors of ∠XYZ and ∠XZY respectively of ΔXYZ, find ∠OYZ and ∠YOZ.

Long Questions:

1. If two parallel lines are intersected by a transversal, prove that the bisectors of two pairs of interior angles form a rectangle.

2. If in ΔABC, the bisectors of ∠B and ∠C intersect each other at O. Prove that $\angle BOC = 90° \frac{1}{2} <$ A
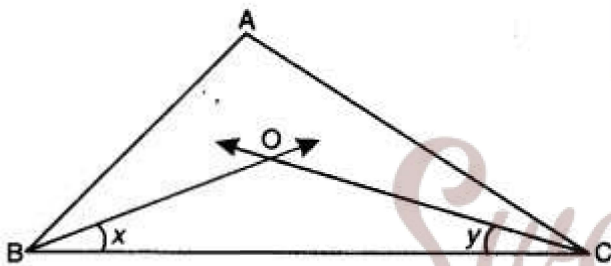
3. In figure, if l || m and ∠1 = $(2x + y)°$, ∠4 = $(x + 2y)°$ and ∠6 = $(3y + 20)°$. Find ∠7 and ∠8.

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4. In the given figure, if PQ ⊥ PS, PQ || SR, ∠SQR = 28o and ∠QRT = 65°. Find the values of x, y and z.

5. In figure, AP and DP are bisectors of two adjacent angles A and D of a quadrilateral ABCD. Prove that 2∠APD = ∠B + ∠C.
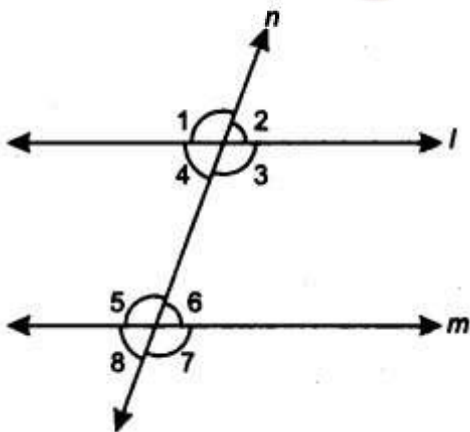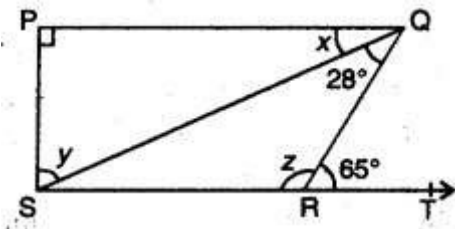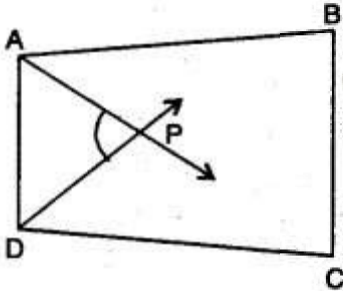

Assertion and Reason Questions-

1. In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

Assertion: Two adjacent angles always form a linear pair..

Reason: In a linear pair of angles two non-common arms are opposite rays.

2. In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

Assertion: A triangle can have tow obtuse angles.

Reason: Sum of the three angles in a triangle is always 180°.

Case Study Questions-

1. Read the Source/ Text given below and answer these questions:
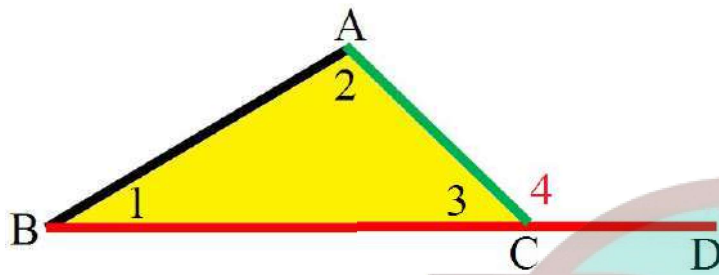
Ashok is studying in 9th class in Govt School, Chhatarpur. Once he was at his home and was doing his geometry homework. He was trying to measure three angles of a triangle using the Dee, but his dee was old and his Dee's numbers were erased and the lines on the dee were visible. Let us help Ashok to find the angles of the triangle. He found that the second angle of the triangle was three times as large as the first. The measure of the third angle is double of the first angle.

Now answer the following questions:

i. What was the value of the first angle?

    a. 30°
    b. 45°
    c. 60°
    d. 90°

ii. What was the value of the third angle?

    a. 30°
    b. 45°
    c. 60°
    d. 90°

iii. What was the value of the second angle?

    a. 30°
    b. 45°
    c. 60°
    d. 90°

iv. What was the value of $\angle 4 \angle 4$ as shown the figure?
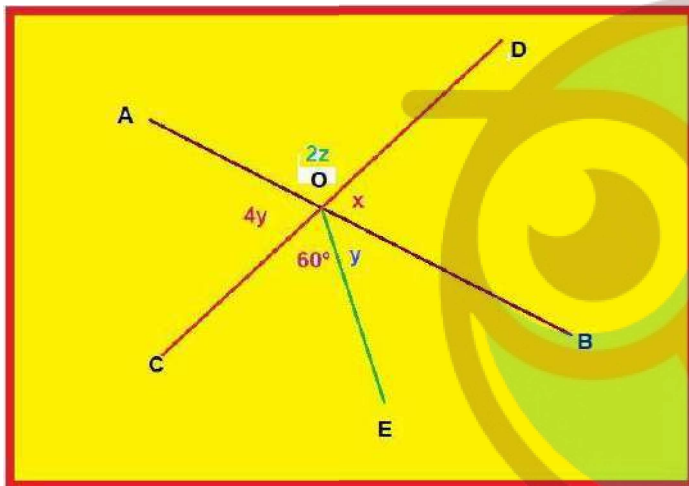
    a. 120°
    b. 45°
    c. 60°

 d. 90°

v. What was the sum of all three angles measured by Ashok using Dee?

 a. 270°
 b. 180°
 c. 100°
 d. 90°

2. Read the Source/ Text given below and answer any four questions:

Maths teacher draws a straight line AB shown on the blackboard as per the following figure.

 i.   Now he told Raju to draw another line CD as in the figure.
 ii.   The teacher told Ajay to mark ∠AOD as 2z.
 iii. Suraj was told to mark ∠AOC as 4y.
 iv.   Clive Made and angle ∠COE=60∘.
 v.   Peter marked ∠BOE and ∠BOD as y and x respectively.

Now answer the following questions:

 i.   What is the value of x?

 a. 48°
 b. 96°
 c. 100°
 d. 120°

 ii.   What is the value of y?

 a. 48°
 b. 96°
 c. 100°
 d. 24°

 iii. What is the value of z?

 a. 48°

b. 96°

c. 42°

d. 120°

iv. What should be the value of x + 2z?

    a. 148°

    b. 360°

    c. 180°

    d. 120°

v. What is the relation between y and z?

    a. 2y + z = 90°

    b. 2y + z = 180°

    c. 4y + 2z = 120°

    d. y = 2z

Answer Key:

MCQ:

1. (a) 45°

2. (b) 83°

3. (c) 6 lines

4. (c) Right triangle

5. (b) 30°

6. (c) Double the measure of the original angle

7. (d) Corresponding

8. (b) 130°

9. (c) 40°, 60°, 80°

10. (b) Less than 90 degrees

Very Short Answer:

1. Let the required angle be x

∴ Its complement = 90° - x

Now, according to given statement, we obtain

$x = \frac{1}{2}(90° - x)$

$\Rightarrow 2x = 90° - x$

$\Rightarrow 3x = 90°$

$\Rightarrow x = 30°$

Hence, the required angle is 30°.

2. Let the two complementary angles be x and 5x.

    ∴ x + 5x = 90°

    $\Rightarrow$ 6x = 90°

    $\Rightarrow$ x = 15°

3. Here, PQ || RS, PS is a transversal.

    $\Rightarrow$ ∠PSR = ∠SPQ = 56°

    Also, ∠TRS + m + ∠TSR = 180°

    14° + m + 56° = 180°

    $\Rightarrow$ m = 180° − 14 − 56 = 110°

4. Let the required angle be x

    ∴ Its complement = 90° − x

    Now, according to given statement, we obtain

    x = 90° − x + 14°

    $\Rightarrow$ 2x = 104°

    $\Rightarrow$ x = 52°

    Hence, the required angle is 52o.

5. Since EF || CD ∴ y + 150° = 180°

$\Rightarrow$ y = 180° − 150° = 30°

Now, ∠BCD = ∠ABC

x + y = 70°

x + 30 = 70

$\Rightarrow$ x = 70° − 30° = 40°

Hence, the value of x is 40°

6. Here, lines AB and CD intersect at O.

∴ ∠AOD and ∠BOD forming a linear pair

$\Rightarrow$ ∠AOD + ∠BOD = 180°
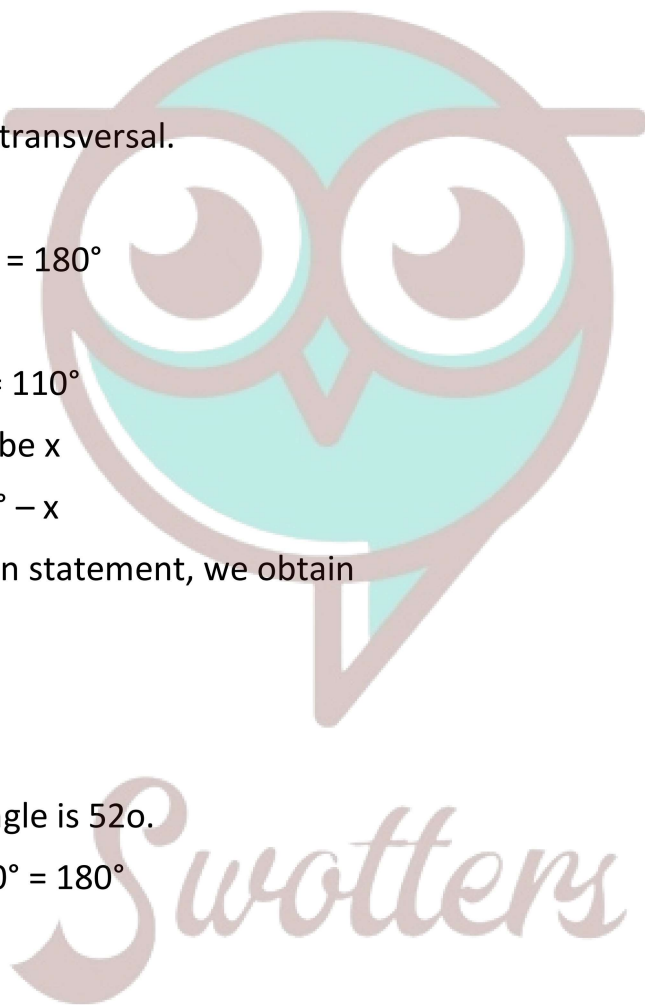
$\Rightarrow$ 7x + 5x = 180°

$\Rightarrow$ 12x = 180°

$\Rightarrow$ x = 15°

7. Since PQ || RS

$\therefore$ ∠PQS + ∠QSR = 180°

$\Rightarrow$ 60° + ∠QSR = 180°

$\Rightarrow$ ∠QSR = 120°

Now, EF || QS

$\Rightarrow$ ∠RFE = ∠QSR [corresponding ∠s]

$\Rightarrow$ ∠RFE = 120°

8. We know that an exterior angle of a triangle is equal to sum of two opposite interior angles.

$\Rightarrow$ x° = ∠1 + ∠3

$\Rightarrow$ y° = ∠2 + ∠1

$\Rightarrow$ z° = ∠3 + ∠2

Adding all these, we have

x° + y° + z° = 2(∠1 + ∠2 + ∠3)

= 2 × 180°

= 360°
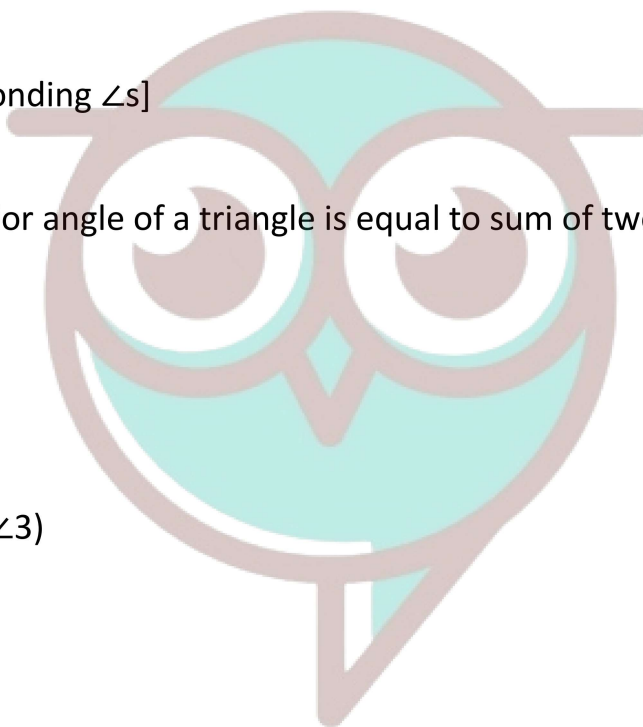
Short Answer:

Ans: 1. In AFAE,

ext. ∠FEB = ∠A + F

= 90° + 40° = 130°

Since AB || CD

$\therefore$ ∠ECD = FEB = 130°

Hence, ∠ECD = 130°.

Ans: 2. $\because$ AD and CE are the bisector of ∠A and ∠C

∴ $\angle OAC = \frac{1}{2} \angle A$ and

$\angle OCA = \frac{1}{2} \angle C$

⇒ $\angle OAC + \angle OCA = \frac{1}{2} (\angle A + \angle C)$

$= \frac{1}{2} (180° - \angle B)$ [∵ $\angle A + \angle B + \angle C = 180°$]

$= \frac{1}{2} (180° - 90°]$ [∵ $\angle ABC = 90°$]

$= \frac{1}{2} \times 90° = 45°$

In ΔAOC,

∠AOC + ∠OAC + ∠OCA = 180°

⇒ ∠AOC + 45o = 180°

⇒ ∠AOC = 180° − 45° = 135°

Ans: 3. In ΔBCD,

ext. ∠BDM = ∠C + ∠B

= 38° + 25° = 63°

Now, ∠LAD = ∠MDB = 63°

But these are corresponding angles.

Hence, m || n

Ans: 4. Here, 4b + 75° + b = 180° [a straight angle]

5b = 180° − 75° = 105°

$b - \frac{105°}{5} = 21°$

∴ a = 4b = 4 × 21° = 84° (vertically opp. ∠s]

Again, 2c + a = 180° [a linear pair]

⇒ 2c + 84° = 180°

⇒ 2c = 96°

⇒ $c = \frac{96°}{2} = 48°$

Hence, the values of a, b and c are a = 84°, b = 21° and c = 48°.

Ans: 5.
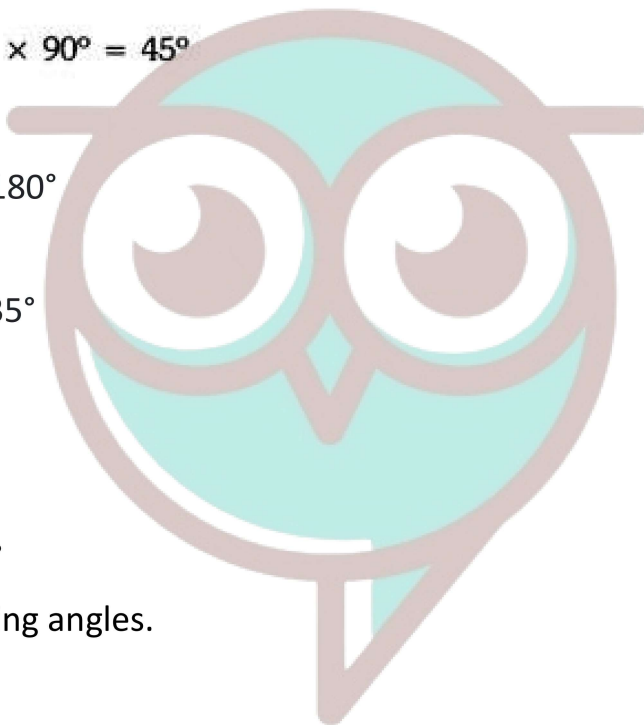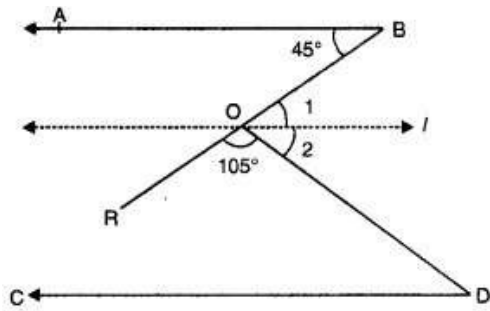
Through O, draw a line 'l' parallel to AB.

⇒ line I will also parallel to CD, then

∠1 = 45°[alternate int. angles]

∠1 + ∠2 + 105° = 180° [straight angle]

∠2 = 180° − 105° − 45°

⇒ ∠2 = 30°

Now, ∠ODC = ∠2 [alternate int. angles]

= ∠ODC = 30°

Ans: 6. In ΔXYZ, we have

∠X + XY + ∠Z = 180°

⇒ ∠Y + ∠Z = 180° − ∠X

⇒ ∠Y + ∠Z = 180° − 72°

⇒ Y + ∠Z = 108°

⇒ $\frac{1}{2}$ ∠Y + $\frac{1}{2}$∠Z = $\frac{1}{2}$ × 108°

∠OYZ + ∠OZY = 54°

[∵ YO and ZO are the bisector of ∠XYZ and ∠XZY]

⇒ ∠OYZ + $\frac{1}{2}$ × 46° = 54°

∠OYZ + 23° = 54°

⇒ ∠OYZ = 549 − 23° = 31°

In ΔYOZ, we have

∠YOZ = 180° − (∠OYZ + ∠OZY)

= 180° − (31° + 23°) 180° − 54° = 126°

Long Answer:

Ans: 1. Given: AB || CD and transversal EF cut them at P and Q respectively and the bisectors of pair of interior angles form a quadrilateral PRQS
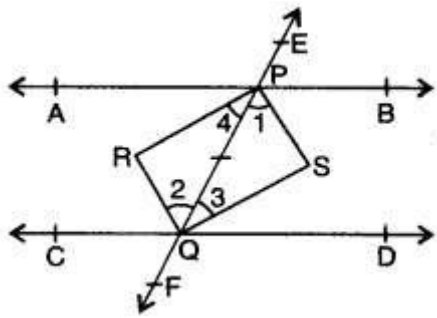
To Prove: PRQS is a rectangle.

Proof: ∵ PS, QR, QS and PR are the bisectors of angles

∠BPQ, ∠CQP, ∠DQP and ∠APQ respectively.

∴∠1 = $\frac{1}{2}$ ∠BPQ, ∠2 = $\frac{1}{2}$∠CQP,

∠3 = $\frac{1}{2}$ ∠DQP and ∠4 = $\frac{1}{2}$∠APQ

Now, AB || CD and EF is a transversal

∴ ∠BPQ = ∠CQP

⇒ ∠1 = ∠2 (∵ ∠1 $\frac{1}{2}$ ∠BPQ and ∠2 = $\frac{1}{2}$∠QP)

But these are pairs of alternate interior angles of PS and QR

∴ PS || QR

Similarly, we can prove ∠3 = ∠4 = QS || PR

∴ PRQS is a parallelogram.

Further ∠1 + ∠3 = $\frac{1}{2}$∠BPQ + $\frac{1}{2}$∠DQP = $\frac{1}{2}$ (∠BPQ + ∠DQP)

= $\frac{1}{2}$ × 180° = 90° (∵ ∠BPQ + ∠DQP = 180°)

∴ In ΔPSQ, we have ∠PSQ = 180° − (∠1 + ∠3) = 180° − 90° = 90°

Thus, PRRS is a parallelogram whose one angle ∠PSQ = 90°.

Hence, PRQS is a rectangle.

Ans: 2. Let ∠B = 2x and ∠C = 2y

∵OB and OC bisect ∠B and ∠C respectively.

$\angle OBC = \frac{1}{2}\angle B = \frac{1}{2} \times 2x = x$

and $\angle OCB = \frac{1}{2}\angle C = \frac{1}{2} \times 2y = y$

Now, in ΔBOC, we have

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

$\Rightarrow \angle BOC + x + y = 180°$

$\Rightarrow \angle BOC = 180° - (x + y)$

Now, in ΔABC, we have

$\angle A + 2B + C = 180°$

$\Rightarrow \angle A + 2x + 2y = 180°$

$\Rightarrow 2(x + y) = \frac{1}{2}(180° - \angle A)$

$\Rightarrow x + y = 90° - \frac{1}{2}\angle A$ .....(ii)

From (i) and (ii), we have

$\angle BOC = 180° - (90° - \frac{1}{2}\angle A) = 90° + \frac{1}{2} \angle A$

Ans: 3. Here, $\angle 1$ and $\angle 4$ are forming a linear pair

$\angle 1 + \angle 4 = 180°$

$(2x + y)° + (x + 2y)° = 180°$

$3(x + y)° = 180°$

$x + y = 60$

Since I || m and n is a transversal

$\angle 4 = \angle 6$

$(x + 2y)° = (3y + 20)°$

$x - y = 20$

Adding (i) and (ii), we have

$2x = 80 = x = 40$

From (i), we have

$40 + y = 60 \Rightarrow y = 20$
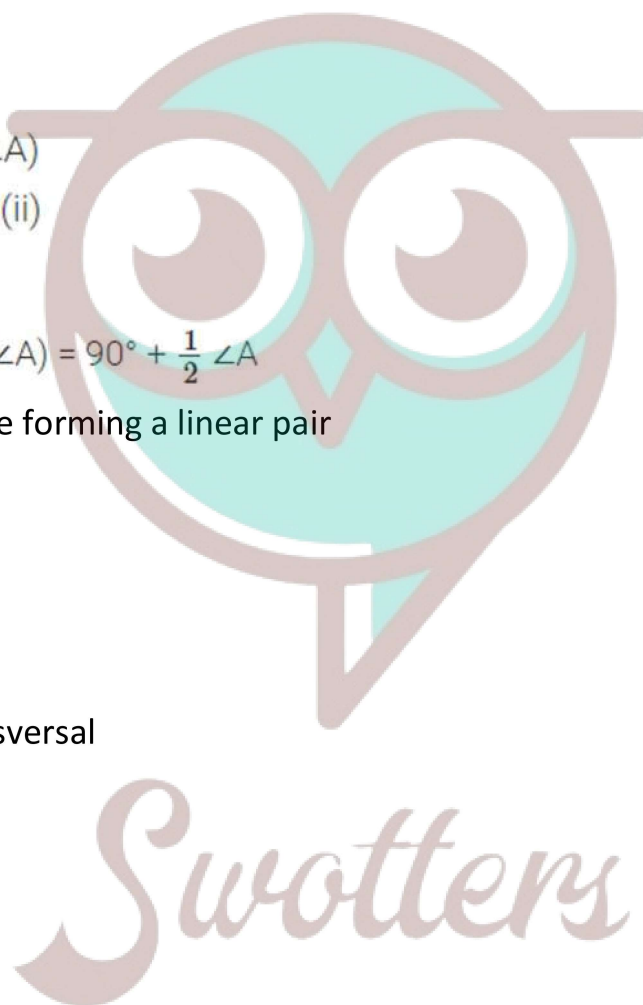
Now, $\angle 1 = (2 \times 40 + 20)° = 100°$

$\angle 4 = (40 + 2 \times 20)° = 80°$

$\angle 8 = \angle 4 = 80°$ [corresponding $\angle s$]

$\angle 1 = \angle 3 = 100°$ [vertically opp. $\angle s$]

∠7 = ∠3 = 100° [corresponding ∠s]

Hence, ∠7 = 100° and ∠8 = 80°

Ans: 4. Here, PQ || SR .

⇒ ∠PQR = ∠QRT

⇒ x + 28° = 65°

⇒ x = 65° - 28° = 37°

Now, in it. ΔSPQ, ∠P = 90°

∴ ∠P + x + y = 180° [angle sum property]

∴ 90° + 37° + y = 180°

⇒ y = 180° − 90° - 37° = 53°

Now, ∠SRQ + ∠QRT = 180° [linear pair]

z + 65° = 180°

z = 180° - 65° = 115°

Ans: 5. In quadrilateral ABCD, we have

∠A + ∠B.+ ∠C + ∠D = 360°

$$\Rightarrow \frac{1}{2} \angle A + \frac{1}{2} \angle B + \frac{1}{2} \angle C + \frac{1}{2} \angle D = \frac{1}{2} \times 360°$$

$$\Rightarrow \frac{1}{2} \angle A + \frac{1}{2} \angle D = 180° - \frac{1}{2}(\angle B + \angle C)$$

As, AP and DP are the bisectors of ∠A and ∠D

$$\therefore \qquad \angle PAD = \frac{1}{2} \angle A$$

$$\text{and} \qquad \angle PDA = \frac{1}{2} \angle D$$

Now, $\angle PAD + \angle PDA = 180° - \frac{1}{2} (\angle B + \angle C)$ ...(i)

In ΔAPD, we have

$$\angle APD + \angle PAD + \angle PDA = 180°$$

$$\Rightarrow \angle APD + 180° - \frac{1}{2} (\angle B + \angle C) = 180° \qquad \text{[using (i)]}$$

$$\Rightarrow \qquad \angle APD = \frac{1}{2} (\angle B + \angle C)$$

$$\Rightarrow \qquad 2\angle APD = \angle B + \angle C$$

Assertion and Reason Answers-

1. d) Assertion is wrong statement but reason is correct statement.

Explanation:

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Linear pair

Adjacent angles with opposite rays as noncommon arms are called the linear pair.

They form a straight angle.

Hence **Reason is True.**

Two adjacent angles form a linear pair if non common arms are opposite rays.

If non common sides are not opposite rays then adjacent angles does not form a linear pair.

Hence Assertion "Two adjacent angles always form a linear pair" is False

For example two adjacent angles which are complementary forms a right angle not a linear pair.

2. d)   Assertion is wrong statement but reason is correct statement.

Explanation:

ASSERTION : A triangle can have two obtuse angles.

Obtuse angle are the angles whos measure are between 90° and 180°

If a triangle has two obtuse angles then sum of those two angles will be

between   (90° + 90°) and (180° + 180°)

= between 180° and 360°

Hence sum of all the angles of triangle would be greater than 180°

But Sum of all the angles of a triangle is 180°

Hence This is not possible

so Assertion is FALSE

REASON : The sum of all the interior angles of a triangle is 180°
TRUE

Case Study Answers-

1.

(i)	(a)	30°
(ii)	(c)	60°
(iii)	(d)	90°
(iv)	(a)	120°
(v)	(b)	180°

2.

(i)	(b)	96°
(ii)	(d)	24°
(iii)	(c)	42°
(iv)	(c)	180°
(v)	(a)	2y + z = 90°