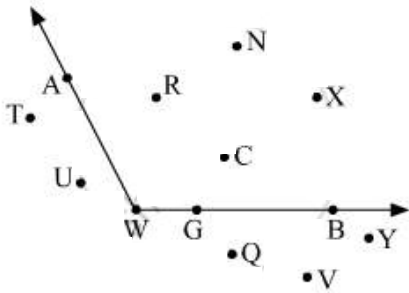# Angles and Pairs of Angles

PRACTICE SET 15 [PAGE 25]

Practice Set 15 | Q 1 | Page 25

Observe the figure and complete the table for ∠AWB.
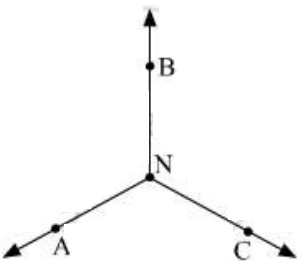

Points in the interior	
Points in the exterior	
Points on the arms of the angles	

Solution:

Points in the interior	R, C, N, X
Points in the exterior	T, U, Q, V, Y
Points on the arms of the angles	A, W, G, B

Practice Set 15 | Q 2 | Page 25

Name the pairs of adjacent angles in the figures below.
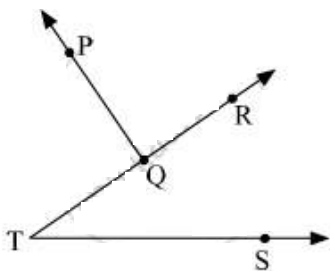
Solution: Two angles that have a common vertex, a common arm, and separate interiors are said to be adjacent angles.

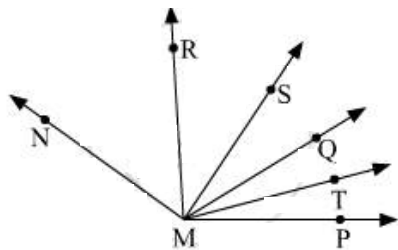The pairs of adjacent angles are given below:

∠ANB and ∠BNC,

∠BNC and ∠ANC,

∠ANC and ∠ANB,

∠PQR and ∠PQT.

Practice Set 15 | Q 3.1 | Page 25

Are the following pair adjacent angle? If not, state the reason.

∠PMQ and ∠RMQ

Solution: ∠PMQ and ∠RMQ

Two angles which have a common vertex, a common arm and separate interiors are said to be adjacent angles

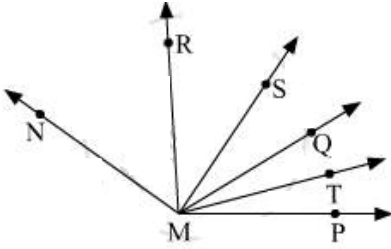In ∠PMQ and ∠RMQ, M is the common vertex and MQ is the common arm. Therefore, ∠PMQ and ∠RMQ are adjacent angles.

Practice Set 15 | Q 3.2 | Page 25

Are the following pair adjacent angle? If not, state the reason.

∠RMQ and ∠SMR

Solution: ∠RMQ and ∠SMR

Two angles which have a common vertex, a common arm, and separate interiors are said to be adjacent angles

The angles ∠RMQ and ∠SMR have a common vertex M, but don't have common arm. Therefore, ∠RMQ and ∠SMR are not adjacent angles.

Practice Set 15 | Q 3.3 | Page 25

Are the following pair adjacent angle? If not, state the reason.

∠RMS and ∠RMT

Solution: ∠RMQ and ∠SMR

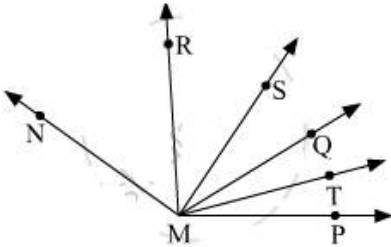Two angles which have a common vertex, a common arm, and separate interiors are said to be adjacent angles

The angles ∠RMS and ∠RMT have a common vertex M, but don't have common arm. Therefore, ∠RMS and ∠RMT are not adjacent angles.

Practice Set 15 | Q 3.4 | Page 25

Are the following pair adjacent angle? If not, state the reason.

∠SMT and ∠RMS

Solution: ∠RMQ and ∠SMR

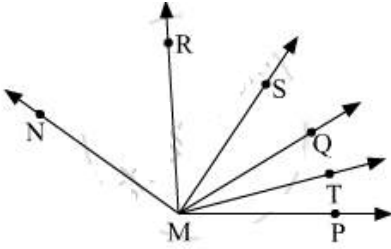Two angles which have a common vertex, a common arm, and separate interiors are said to be adjacent angles

In ∠SMT and ∠RMS, M is the common vertex and SM is the common arm. Therefore, ∠SMT and ∠RMS are adjacent angles.

PRACTICE SET 16 [PAGE 26]

Practice Set 16 | Q 1.1 | Page 26

The measures of the angle is given below. Write the measures of their complementary angle.

$40°$

Solution: Let the measure of the complementary angle be a.

40 + a = 90

∴ a = 50°

Hence, the measure of the complement of an angle of measure 40° is 50°

Practice Set 16 | Q 1.2 | Page 26

The measures of the angle is given below. Write the measures of their complementary angle.

$63°$

Solution: Let the measure of the complementary angle be a.

63 + a = 90

∴ a = 27°

Hence, the measure of the complement of an angle of measure 63° is 27°

Practice Set 16 | Q 1.3 | Page 26

The measures of the angle is given below. Write the measures of their complementary angle.

$45°$

Solution: Let the measure of the complementary angle be a.

45 + a = 90

∴ a = 45°

Hence, the measure of the complement of an angle of measure 45° is 45°.

Practice Set 16 | Q 1.4 | Page 26

The measures of the angle is given below. Write the measures of their complementary angle.

55°

Solution: Let the measure of the complementary angle be a.

55 + a = 90

∴ a = 35°

Hence, the measure of the complement of an angle of measure 55° is 35°

Practice Set 16 | Q 1.5 | Page 26

The measures of the angle is given below. Write the measures of their complementary angle.

20°

Solution: Let the measure of the complementary angle be a.

20 + a = 90

∴ a = 70°

Hence, the measure of the complement of an angle of measure 20° is 70°

Practice Set 16 | Q 1.6 | Page 26

The measures of the angle is given below. Write the measures of their complementary angle.

90°

Solution: Let the measure of the complementary angle be a.

90 + a = 90

∴ a = 0°

Hence, the measure of the complement of an angle of measure 90° is 0°.

Practice Set 16 | Q 1.7 | Page 26

The measures of the angle is given below. Write the measures of their complementary angle.

x°

Solution: Let the measure of the complementary angle be a.

x + a = 90

∴ a = (90 − x)°

Hence, the measure of the complement of an angle of measure x° is (90 − x)°

Practice Set 16 | Q 2 | Page 26

(y −- 20)° and (y + 30)° are the measures of complementary angles. Find the measure of each angle.

Solution: Sum of two complementary angles is 90°

∴ (y - 20)° + (y + 30)° = 90°

⇒ y - 20 + y + 30 = 90

⇒ 2y + 10 = 90

⇒ 2y = 80

⇒ y = 40

Hence, the measure of the two angles are 20° and 70°.

PRACTICE SET 17 [PAGE 27]

Practice Set 17 | Q 1.1 | Page 27

Write the measure of the supplement of the angle given below.

15°

Solution: Let the measure of the supplementary angle be a.

15 + a = 180

∴ a = 165°

Hence, the measure of the supplement of an angle of measure 15° is 165°.

Practice Set 17 | Q 1.2 | Page 27

Write the measure of the supplement of the angle given below.

85°

Solution: Let the measure of the supplementary angle be a.

85 + a = 180

∴ a = 95°

Hence, the measure of the supplement of an angle of measure 85° is 95°.

Practice Set 17 | Q 1.3 | Page 27

Write the measure of the supplement of the angle given below.

120°

Solution: Let the measure of the supplementary angle be a.

120 + a = 180

∴ a = 60°

Hence, the measure of the supplement of an angle of measure 120° is 60°.

Practice Set 17 | Q 1.4 | Page 27

Write the measure of the supplement of the angle given below.

37°

Solution: Let the measure of the supplementary angle be a.

37 + a = 180

∴ a = 143°

Hence, the measure of the supplement of an angle of measure 37° is 143°.

Practice Set 17 | Q 1.5 | Page 27

Write the measure of the supplement of the angle given below.

108°

Solution: Let the measure of the supplementary angle be a.

108 + a = 180

∴ a = 72°

Hence, the measure of the supplement of an angle of measure 108° is 72°.

Practice Set 17 | Q 1.6 | Page 27

Write the measure of the supplement of the angle given below.

0°

Solution: Let the measure of the supplementary angle be a.

0 + a = 180

∴ a = 180°

Hence, the measure of the supplement of an angle of measure 0° is 180°.

Practice Set 17 | Q 1.7 | Page 27

Write the measure of the supplement of the angle given below.

a°

Solution: Let the measure of the supplementary angle be x.

a + x = 180

∴ x = (180 − a)°

Hence, the measure of the supplement of an angle of measure a° is (180 − a)°.

Practice Set 17 | Q 2 | Page 27

The measures of some angles are given below. Use them to make pairs of complementary and supplementary angles.

m∠B = 60° m∠N = 30° m∠Y = 90° m∠J = 150°
m∠D = 75° m∠E = 0° m∠F = 15° m∠G = 120°

Solution: If the sum of the measures of two angles is 90° they are known as complementary angles.

Hence, the pairs of complementary angles are ∠B and ∠N, ∠D and ∠F, ∠Y, and ∠E.

If the sum of the measures of two angles is 180° they are known as supplementary angles.

Hence, the pairs of supplementary angles are ∠B and ∠G, ∠N, and ∠J.

Practice Set 17 | Q 3 | Page 27

In ∆XYZ, m∠Y = 90°. What kind of a pair do ∠X and ∠Z make?

Solution: In ∆XYZ,

∠X + ∠Y + ∠Z = 180˚ (Angle Sum property of triangle

⇒ ∠X + 90˚ + ∠Z = 180˚

⇒ ∠X + ∠Z = 90˚

Since, the sum of the measure of the two angles is 90˚.
Hence, ∠X and ∠Z are complementary angles.

Practice Set 17 | Q 4 | Page 27

The difference between the measures of the two angles of a complementary pair is 40˚.

Find the measures of the two angles.

Solution: Let the measure of the first angle a.

Then, the measure of the other angle a + 40°

Now, a + a + 40 = 90

⇒ 2a = 50

⇒ a = 25°

Hence, the measure of the two angles are 25° and 65°.

Practice Set 17 | Q 5 | Page 27

□ PTNM is a rectangle. Write the names of the pairs of supplementary angles.

Solution: If the sum of the measures of two angles is 180° they are known as supplementary angles.

The measure of all the angles of a rectangle is 90°.

Hence, the pairs of supplementary angles are ∠P and ∠M, ∠T and ∠N, ∠P and ∠T, ∠M and ∠N, ∠P and ∠N, ∠M and ∠T.

Practice Set 17 | Q 6 | Page 27

If m∠A = 70°, what is the measure of the supplement of the complement of ∠A?

Solution: Let the measure of the complementary angle be a.

70 + a = 90

∴ a = 20°

Let the measure of the supplementary angle of 20° be x.

20 + x = 180

∴ x = 160°

Hence, the measure of the supplement of the complement of ∠A is 160°.

Practice Set 17 | Q 7 | Page 27

If ∠A and ∠B are supplementary angles and m∠B = (x + 20)°, then what would

be m∠A?

Solution: Let the measure of the supplementary angle of ∠B be a.

(x + 20)° + a = 180

∴ a = (160 − x)°

Hence, the measure of ∠A is (160 − x)°.

PRACTICE SET 18 [PAGE 28]
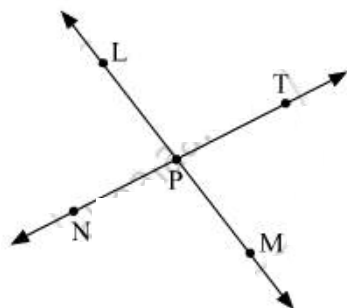
Practice Set 18 | Q 1 | Page 28

Name the pairs of opposite rays in the figure alongside.

Solution: Two rays that have a common origin and form a straight line are said to be opposite rays.

Hence, the pairs of opposite rays are ray PL & ray PM and ray PN & ray PT.

Practice Set 18 | Q 2 | Page 28

Are the ray PM and PT opposite rays? Give reasons for your answer.

Solution: Ray PM and PT are not opposite rays because they do not form a straight line.

PRACTICE SET 19 [PAGE 29]

Practice Set 19 | Q 1.1 | Page 29
Draw the pairs of angles as described below. If that is not possible, say why.

Complementary angles that are not adjacent.

Solution:
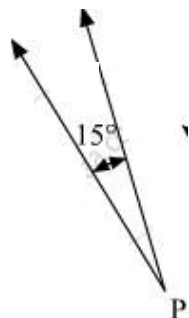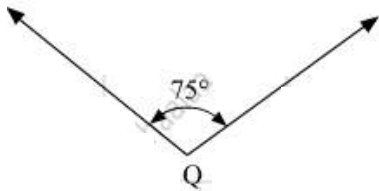
75°

Q

Draw the pairs of angles as described below. If that is not possible, say why.

Angles in a linear pair are not supplementary.

Solution: If the sum of the measures of two angles is 180° they are known as supplementary angles.

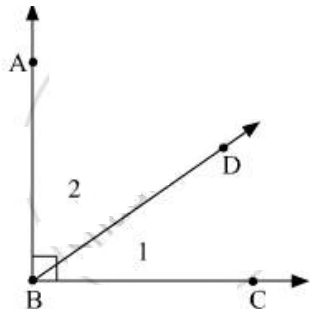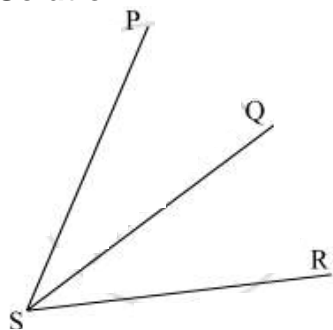The sum of the measures of the angles in a linear pair is 180°.

Therefore, angles in a linear pair are always supplementary.

Draw the pairs of angles as described below. If that is not possible, say why.

Complementary angles that do not form a linear pair.

Solution:

Draw the pairs of angles as described below. If that is not possible, say why.

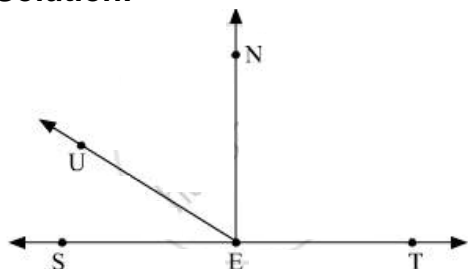Adjacent angles which are not in a linear pair.

Solution:

Practice Set 19 | Q 1.5 | Page 29

Draw the pairs of angles as described below. If that is not possible, say why.

Angles which are neither complementary nor adjacent.

Solution:

Practice Set 19 | Q 1.6 | Page 29

Draw the pairs of angles as described below. If that is not possible, say why.

Angles in a linear pair which are complementary.

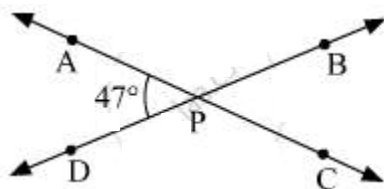**Solution:** If the sum of the measures of two angles is 180° they are known as supplementary angles.

The sum of the measures of the angles in a linear pair is 180°.

Therefore, angles in a linear pair are always supplementary.

PRACTICE SET 20 [PAGE 30]

Practice Set 20 | Q 1 | Page 30

Lines AC and BD intersect at point P. m∠APD = 47° . Find the measures of ∠APB, ∠BPC, ∠CPD.

Solution: In the given figure,

∠DPA + ∠APB = 180° (Linear Pair angles)

⇒ 47° + ∠APB = 180°

⇒ ∠APB = 133°

Now,

∠APD = ∠BPC = 47° (Vertically opposite angles)

∠APB = ∠DPC = 133° (Vertically opposite angles)

Hence, the measures of ∠APB, ∠BPC, ∠CPD are 133°, 47° and 133° respectively.

Practice Set 20 | Q 2 | Page 30

Lines PQ and RS intersect at point M. m∠PMR = x° What are the measures of ∠PMS, ∠SMQ and ∠QMR?
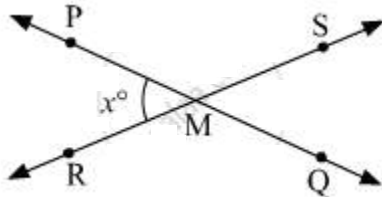
Solution: In the given figure,

∠RMP + ∠PMS = 180° (Linear Pair angles)

⇒ x° + ∠PMS = 180°

⇒ ∠PMS = (180 − x)°

Now,

∠PMR = ∠SMQ = x° (Vertically opposite angles)

∠PMS = ∠RMQ = (180 − x)° (Vertically opposite angles)

Hence, the measures of ∠PMS, ∠SMQ and ∠QMR are
(180 − x)°, x° and (180 − x)° respectively.

PRACTICE SET 21 [PAGE 33]

Practice Set 21 | Q 1 | Page 33

∠ACD is an exterior angle of ∆∆ABC. The measures of ∠A and ∠B are equal. If m∠ACD = 140°, find the measures of the angles ∠A and ∠B.
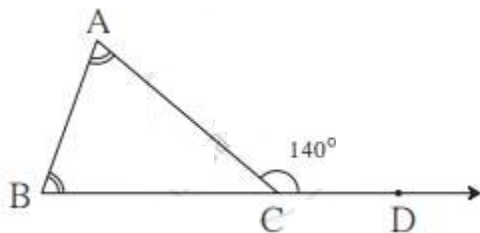
Solution: ∠A + ∠B = ∠ACD (Exterior angle property)

⇒ 2∠A = 140° (∵∠A = ∠B)

⇒ ∠A = 70°

Hence, the measures of ∠A and ∠B are 70° and 70° respectively.

Practice Set 21 | Q 2 | Page 33

Using the measures of the angles given in the figure alongside, find the measures of the remaining three angles.
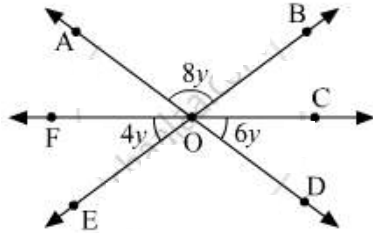
Solution: In the given figure,

∠BOC = ∠FOE = 4y (Vertically opposite angles)

∠EOD = ∠AOB = 8y (Vertically opposite angles)

∠AOF = ∠COD = 6y (Vertically opposite angles)

Now, ∠AOB + ∠BOC + ∠COD = 180° (Linear Pair angles)

⇒ 8y + 4y + 6y = 180°

⇒ 18y =180°

⇒ y =10°

Therefore,

∠BOC = 4y

= 40°

∠EOD = 8y

= 80°

∠AOF = 6y

= 60°

Hence, the measures of ∠BOC, ∠EOD, ∠AOF are 40°, 80° and 80° respectively.

Practice Set 21 | Q 3 | Page 33

In the isosceles triangle ABC, ∠A, and ∠B are equal. ∠ACD is an exterior angle of △ABC. The measures of ∠ACB and ∠ACD are (3x-17)° and (8x + 10)° respectively. Find the measures of ∠ACB and ∠ACD. Also find the measures of ∠A and ∠B.

Solution: Given:

∠ACB = (3x - 17)°

∠ACD = (8x + 10)°

Now, ∠ACB + ∠ACD = 180° (Linear Pair angles)

⇒ 3x − 17+ 8x + 10 = 180

⇒ 11x =187

⇒ x =17

Therefore,

∠ACB = (3x - 17)°

= (51- 17)°

= 34°

∠ACD = (8x + 10)°

= (136+ 10)°

= 146°

Now, ∠A + ∠B = ∠ACD (Exterior angle property)

⇒ 2∠A = 146° (∵∠A = ∠B)

⇒ ∠A = 73°

Hence, the measures of ∠ACB, ∠ACD, ∠A and ∠B
are 146°, 34°, 73° and 73° respectively.