Types of Pair of Angles

Exercise

Solution 1:

Pair of angle	Type of pair of angle
∠SJR and ∠PJQ	Vertically opposite angles
∠RJB and ∠AJP	Vertically opposite angles
∠BJQ and ∠AJS	Vertically opposite angles
∠PJQ and ∠PJS	Supplementary angles
∠RJS and ∠SJP	Supplementary angles
∠AJS and ∠AJQ	Supplementary angles
∠RJS and ∠RJQ	Supplementary angles
∠AJP and ∠AJR	Supplementary angles
∠QJP and ∠QJR	Supplementary angles
∠SJA and ∠SJB	Supplementary angles
∠PJA and ∠PJB	Supplementary angles
∠SJR and ∠SJP	Supplementary angles
∠BJR and ∠BJP	Supplementary angles
∠RJB and ∠RJA	Supplementary angles
∠QJB and ∠QJA	Supplementary angles
∠SJR and ∠RJB	Complementary angles
∠AJP and ∠PJQ	Complementary angles

Solution 2:

1. 27° + 63° = 90°
   If the sum of the measures of two angles is 90°, they form a pair of complementary angles.
   ∴27°, 63° form a pair of complementary angles.
2. 110°+ 70° = 180°
   If the sum of the measures of two angles is 180°, they form a pair of supplementary angles.
   ∴110°, 70° form a pair of supplementary angles.

3. 7°+ 83°= 90°
   If the sum of the measures of two angles is 90°, they form a pair of complementary angles.
   ∴7°, 83° form a pair of complementary angles.
4. 135°+ 45° = 180°
   If the sum of the measures of two angles is 180°, they form a pair of supplementary angles.
   ∴135°, 45° form a pair of supplementary angles
5. 58°+ 32°= 90°
   If the sum of the measures of two angles is 90°, they form a pair of complementary angles.
   ∴58°, 32° form a pair of complementary angles.

Solution 3:

No.	Measure of an angle	Measure of its complementary angle	Measure of its supplementary angle
1	72°	90° - 72° = 18°	180° - 72° = 108°
2	50°	90° - 50° = 40°	180° - 50° = 130°
3	80°	90° - 80° = 10°	180° - 80° = 100°
4	87°	90° - 87° = 3°	180° - 87° = 93°
5	36°	90° - 36° = 54°	180° - 36° = 144°
6	25°	90° - 25° = 65°	180° - 25° = 155°
7	48°	90° - 48° = 42°	180° - 48° = 132°
8	67°	90° - 67° = 23°	180° - 67° = 113°
9	34°	90° - 34°= 56°	180° - 34° = 146°
10	71°	90° - 71° = 19°	180° - 71° = 109°

Solution 4:

Given, ∠AED and ∠BED are angles of a linear pair.
m∠BED = 145°
m∠AED + m∠BED = 180°
⇒ m∠AED + 145°=180°
⇒ m∠AED =180° – 145° = 35°

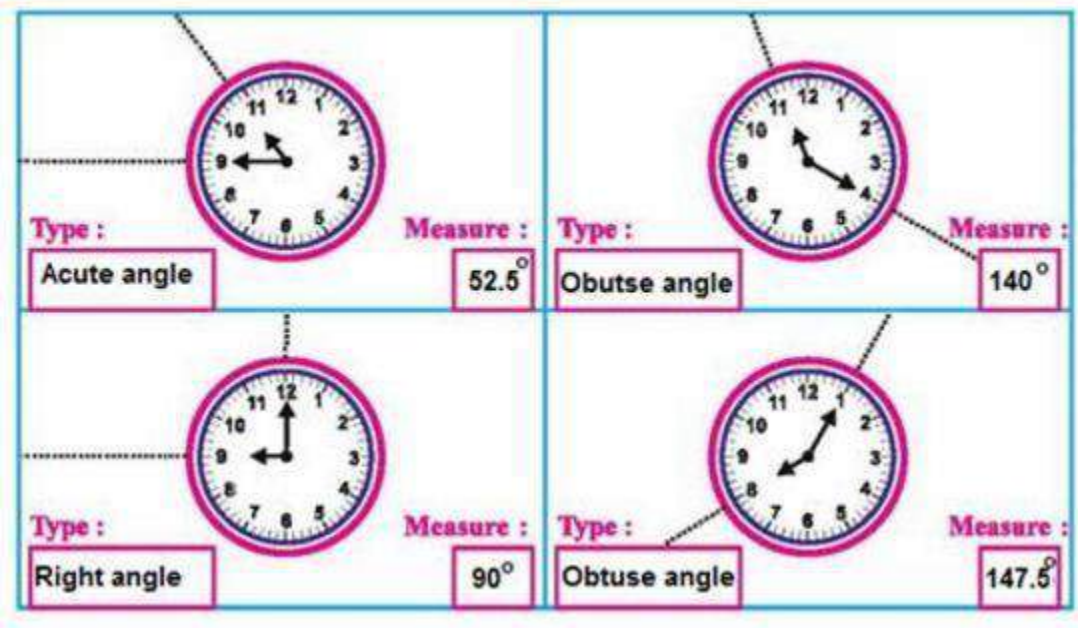
m∠AEC = m∠BED = 145° ….[Vertically Opposite angles]
m∠BEC = m∠AED = 35° ….[Vertically Opposite angles]

Solution 5:

1. Two pairs of vertically opposite angles are formed.
2. ∠XMQ and ∠PMY; ∠XMP and ∠YMQ are vertically opposite angles.
3. Four pairs of angles of a linear pair are formed.
4. ∠XMQ and ∠QMY; ∠QMY and ∠YMP; ∠YMP and ∠PMX; ∠PMX and ∠XMQ are the angles forming a linear pair.
5. Given, m∠XMQ = 90°m∠XMP = m∠XMQ ….[angles of a linear pair]⇒m∠XMP + 90° = 180°⇒ m∠XMP = 90°
m∠XMP= m∠YMQ = 90° ….[Vertically Opposite angles]
⇒ m∠XMP = 180° – 90° = 90°
m∠XMP + m∠XMQ = 180°
m∠PMY = m∠XMQ = 90° ….[Vertically Opposite angles]

Activity

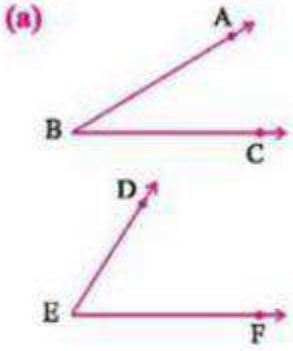
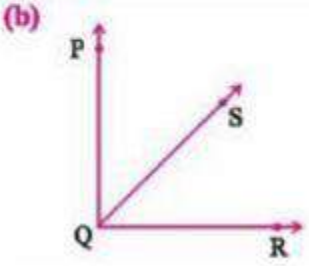
Solution 1:



Solution 2:

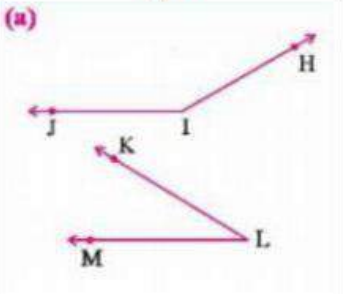
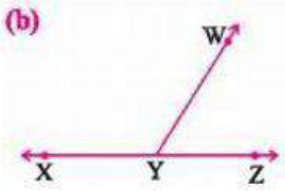
Acute Angle	Right Angle	Obtuse Angle
(1), (5)	(2), (4), (7), (9)	(3), (6), (8)

Solution 3:

Figure	Measure of angles	Addition of measures of angle
(a) 	m∠ABC = 30° m∠DEF = 60°	m∠ABC + m∠DEF = 30° + 60° = 90°
(b) 	m∠PQS = 45° m∠RQS = 45°	m∠ABC + m∠DEF = 45° + 45° = 90°

(1) Measure of ∠ABC is 30°.
(2) Measure of ∠DEF is 60°.
(3) The sum of the measures of both angles in fig(a) is 90°.
(4) The sum of the measures of both angles in fig(b) is 90°.

Solution 4:

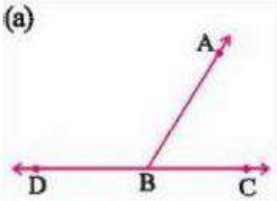
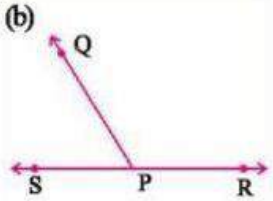
Figure	Measure of angles	Addition of measures of angle
(a) 	m∠HIJ = 150° m∠KLM = 30°	m∠HIJ + m∠KLM = 150°+30° = 180°
(b) 	m∠WYZ = 60° m∠WYX = 120°	m∠WYZ + m∠WYX = 60° + 120° = 180°

(1) The measure of m∠KLM is 30°.
(2) The sum of m∠KLM and m∠HIJ is 180°.
(3) Then sum of m∠WYZ and m∠WYX is 180°

Solution 5:

No.	Pair of complementary angles	Pair of supplementary angles
1	35°, 55°	120°, 60°
2	65°, 25°	75°, 105°
3	23°, 67°	81°, 99°
4		145°, 35°

Solution 6:

Figure	Common arm	Opposite rays	Sum of measures of angles
(a)  Figure 2.4	$\overrightarrow{BA}$	$\overrightarrow{BA}$ and $\overrightarrow{BD}$	$m\angle ABD + m\angle ABC = 120° + 60° = 180°$
(b)  Figure 2.5	$\overrightarrow{PQ}$	$\overrightarrow{PS}$ and $\overrightarrow{PR}$	$m\angle SPQ + m\angle RPQ = 50° + 130° = 180°$

Practice – 1

Solution 1(1):

2. 70˚
The measure of given angle = 60˚
Measure of complementary angle of an angle = 90˚ – the measure of the given angle = 90˚ – 20˚ = 70˚
∴ Measure of its complementary angle is 70˚.

Solution 1(2):

1. 25˚
Measure of complementary angle of an angle = 90˚ – the measure of the given angle
The measure of given angle = 55˚
∴ Measure of its complementary angle = 90˚ – 55˚ = 25˚

Solution 1(3):

1. 7˚
Measure of complementary angle of an angle = 90˚ – the measure of the given angle
The measure of given angle = 83˚
∴ Measure of its complementary angle = 90˚ – 83˚ = 7˚

Solution 2:

Calculations:
1. The measure of given angle = 50˚
∴ Measure of its complementary angle = 90˚ – 50˚ = 40˚
2. The measure of given angle = 63˚
∴ Measure of its complementary angle = 90˚ – 63˚ = 27˚
3. The measure of given angle = 47˚
∴ Measure of its complementary angle = 90˚ 47˚ = 43˚
4. The measure of given angle = 56˚
∴ Measure of its complementary angle = 90˚ – 56˚ = 34˚
5. The measure of given angle = 12˚
∴ Measure of its complementary angle = 90˚ – 12˚ = 78˚
6. The measure of given angle = 67˚
∴ Measure of its complementary angle = 90˚ – 67˚ = 23˚

S. No	Angle 1	Angle 2
1	50˚	40˚
2	27˚	63˚
3	47˚	43˚
4	56˚	34˚
5	78˚	12˚
6	67˚	23˚

Solution 3:

The measure of given angle = 23˚
Measure of complementary angle of an angle = 90˚ – the measure of the given angle = 90˚- 23˚ = 67˚
∴ Measure of its complementary angle is 67˚.

Solution 4:

The measure of given angle = 36˚
Measure of complementary angle of an angle = 90˚ – the measure of the given angle = 90˚ – 36˚ = 54˚
∴ Measure of its complementary angle is 54˚.

Solution 5:

1. The sum of measures of two complementary angles = 90˚. The sum of measures of given two angles = 15˚ + 75˚ = 90˚
   Hence, the given pair of angles is a pair of complementary angles.
2. The sum of measures of two complementary angles = 90˚. The sum of measures of given two angles = 75˚ + 47˚= 123˚ ≠ 90˚
   Hence, the given pair of angles is not a pair of complementary angles.
3. The sum of measures of two complementary angles = 90˚. The sum of measures of given two angles = 64˚ + 26˚ = 90˚
   Hence, the given pair of angles is a pair of complementary angles.
4. The sum of measures of two complementary angles = 90˚. The sum of measures of given two angles = 50˚ + 40˚ = 90˚
   Hence, the given pair of angles is a pair of complementary angles.
5. The sum of measures of two complementary angles = 90˚. The sum of measures of given two angles = 33˚ + 66˚
   = 99˚ ≠ 90˚
   Hence, the given pair of angles is not a pair of complementary angles.
6. The sum of measures of two complementary angles = 90˚. The sum of measures of given two angles = 20˚ + 70˚ = 90˚
   Hence, the given pair of angles is a pair of complementary angles.

Solution 6:

1. The measure of an acute angle = 35˚
   Measure of complementary angle of an angle = 90˚ – the measure of the given angle
   ∴ Measure of its complementary angle = 90˚ – 35˚ = 55˚
2. The measure of an acute angle = 22˚
   Measure of complementary angle of an angle = 90˚ – the measure of the given

angle
∴ Measure of its complementary angle = 90˚ – 22˚ = 68˚

3. The measure of an acute angle = 59˚
   Measure of complementary angle of an angle = 90˚ -the measure of the given angle
   ∴ Measure of its complementary angle = 90˚ – 59˚ = 31˚

Practice – 2

Solution 1:

1. Measure of supplementary angle of an angle = 180˚ – the measure of the given angle
   The measure of given angle = 47˚
   ∴ Measure of its complementary angle = 180˚ – 47˚ = 133˚
2. Measure of supplementary angle of an angle = 180˚ – the measure of the given angle
   The measure of given angle = 75˚
   ∴ Measure of its complementary angle = 180˚ – 75˚ = 105˚
3. Measure of supplementary angle of an angle = 180˚ – the measure of the given angle
   The measure of given angle = 112˚
   ∴ Measure of its complementary angle = 180˚ – 112˚ = 68˚
4. Measure of supplementary angle of an angle = 180˚ – the measure of the given angle
   The measure of given angle = 90˚
   ∴ Measure of its complementary angle = 180˚ – 90˚ = 90˚
5. Measure of supplementary angle of an angle = 180˚ – the measure of the given angle
   The measure of given angle = 109˚
   ∴ Measure of its complementary angle = 180˚ – 109˚ = 71˚
6. Measure of supplementary angle of an angle = 180˚ – the measure of the given angle
   The measure of given angle = 100˚
   ∴ Measure of its complementary angle = 180˚ – 100˚ = 80˚
7. Measure of supplementary angle of an angle = 180˚ – the measure of the given angle
   The measure of given angle = 81˚
   ∴ Measure of its complementary angle = 180˚ – 81˚ = 99˚
8. Measure of supplementary angle of an angle = 180˚ – the measure of the given angle
   The measure of given angle = 60˚
   ∴ Measure of its complementary angle = 180˚ – 60˚ = 120˚
9. Measure of supplementary angle of an angle = 180˚ – the measure of the given angle

The measure of given angle = 145˚
∴ Measure of its complementary angle = 180˚ – 145˚ = 35˚

10. Measure of supplementary angle of an angle = 180˚ – the measure of the given angle
The measure of given angle = 132˚
∴ Measure of its complementary angle = 180˚ – 132˚ = 48˚

Solution 2:

The sum of measures of a pair of supplementary angles = 180˚ The measure of given angle = 66˚
The measure of its supplementary angle = 180˚ – 66˚ = 114˚

Solution 3:

The sum of measures of a pair of supplementary angles = 180˚
Here the measures of both angles are equal
∴The measure of each given angle = 180 ÷ 2 = 90˚
The measure of each angle = 90˚

Practice – 3

Solution 1:

1. Angles forming a linear pair are always supplementary.
∴The sum of measures of angles of a linear pair = 180˚
The measure of given angle = 20˚
∴Measure of angle forming its linear pair = 180˚ – 20˚ = 160˚
2. Angles forming a linear pair are always supplementary.
∴The sum of measures of angles of a linear pair = 180˚
The measure of given angle = 130˚
∴Measure of angle forming its linear pair = 180˚ – 130˚ = 50˚
3. Angles forming a linear pair are always supplementary.
∴The sum of measures of angles of a linear pair = 180˚
The measure of given angle = 111˚
∴Measure of angle forming its linear pair = 180˚ – 111˚ = 69˚
4. Angles forming a linear pair are always supplementary.
∴The sum of measures of angles of a linear pair = 180˚
The measure of given angle = 50˚
∴Measure of angle forming its linear pair = 180˚ – 50˚ = 130˚
5. Angles forming a linear pair are always supplementary.
∴The sum of measures of angles of a linear pair = 180˚
The measure of given angle = 85˚
∴Measure of angle forming its linear pair = 180˚ – 85˚ = 95˚

6. Angles forming a linear pair are always supplementary.
   ∴The sum of measures of angles of a linear pair = 180˚
   The measure of given angle = 107˚
   ∴Measure of angle forming its linear pair = 180˚ – 107˚ = 73˚
7. Angles forming a linear pair are always supplementary.
   ∴The sum of measures of angles of a linear pair = 180˚
   The measure of given angle = 155˚
   ∴Measure of angle forming its linear pair = 180˚ – 155˚ = 25˚

Solution 2:

The measure of given angle = 82˚
Angles forming a linear pair are always supplementary.
∴The sum of measures of angles of a linear pair = 180˚
∴Measure of angle forming its linear pair = 180˚ – 82˚ = 98˚

Solution 3:

Angles forming a linear pair are always supplementary.
∴The sum of measures of angles of a linear pair = 180˚
The given angle is a right angle.
∴The measure of this angle = 90˚
∴Measure of angle forming its linear pair = 180˚ – 90˚ = 90˚

Solution 4:

Angles forming a linear pair are always supplementary.
∴The sum of measures of angles of a linear pair = 180˚
∴The measure of the given angle = 108˚
∴Measure of angle forming its linear pair = 180˚ – 108˚ = 72˚

Solution 5:

1. 27˚ and 153˚
   (27˚ + 153˚ = 180˚)
2. 90˚ and 90˚
   (90˚ + 90˚ = 180˚)
3. 130˚ and 50˚
   (130˚ + 50˚ = 180˚)
4. 80˚ and 100˚
   (80˚ + 100˚ = 180˚)
5. 35˚ and 145˚
   (35˚ + 145˚ = 180˚)

Practice – 4

Solution 1:

1. Vertically opposite angle of ∠XVZ is ∠WVY
2. Vertically opposite angle of ∠XVW is ∠YVZ
3. m∠XVW = 120˚ then,

i. m∠WVY = 60˚

Calculation:

∠XVZ and ∠WVY form a linear pair.

∴m∠XVZ + m∠WVY = 180˚

m∠XVW = 120˚

∴m∠WVY = 180˚ – 120˚ = 60˚

ii. m∠XVZ = 60˚

Calculation:

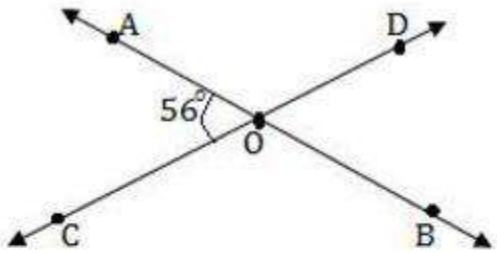
∠XVW and ∠XVZ form a linear pair.

∴m∠XVW+ m∠XVZ = 180˚

m∠XVW = 120˚

∴ m∠XVYZ = 180˚ – 120˚ = 60˚

Solution 2:



$\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersect each other at point O forming angle of 56°

m∠ AOC = 56° ....(given)

m∠ AOC + m∠ AOD = 180° ....(linear pair)

∴ m∠ AOD = 180° – 56° = 124°

∠ AOC and ∠ BOD are vertically opposite angles.

∴ m∠ AOC = m∠BOD = 56°

Also, ∠ AOD and ∠ BOC are vertically opposite angles.

∴ m∠ AOD= m∠ BOC = 124°

Hence, measures of the other three angles are :

m∠ AOD = 124°, m∠ BOD = 56° and m∠ COB = 124°.

Solution 3:

The angles of linear pairs are always supplementary.
In the given figure, the two pairs of supplementary angles are:
∠EFH and ∠GFH
∠EFI and ∠GFI