
Class -VII Mathematics (Ex. 5.1)

Answers

1. Complementary angle = $90^\circ - \text{given angle}$
 - (i) Complement of $20^\circ = 90^\circ - 20^\circ = 70^\circ$
 - (ii) Complement of $63^\circ = 90^\circ - 63^\circ = 27^\circ$
 - (iii) Complement of $57^\circ = 90^\circ - 57^\circ = 33^\circ$
2. Supplementary angle = $180^\circ - \text{given angle}$
 - (i) Supplement of $105^\circ = 180^\circ - 105^\circ = 75^\circ$
 - (ii) Supplement of $87^\circ = 180^\circ - 87^\circ = 93^\circ$
 - (iii) Supplement of $154^\circ = 180^\circ - 154^\circ = 26^\circ$
3. If sum of two angles is 180° , then they are called supplementary angles.
If sum of two angles is 90° , then they are called complementary angles.
 - (i) $65^\circ + 115^\circ = 180^\circ$ These are supplementary angles.
 - (ii) $63^\circ + 27^\circ = 90^\circ$ These are complementary angles.
 - (iii) $112^\circ + 68^\circ = 180^\circ$ These are supplementary angles.
 - (iv) $130^\circ + 50^\circ = 180^\circ$ These are supplementary angles.
 - (v) $45^\circ + 45^\circ = 90^\circ$ These are complementary angles.
 - (vi) $80^\circ + 10^\circ = 90^\circ$ These are complementary angles.

4. Let one of the two equal complementary angles be x .

$$\therefore x + x = 90^\circ \Rightarrow 2x = 90^\circ \Rightarrow x = \frac{90^\circ}{2} = 45^\circ$$

Thus, 45° is equal to its complement.

5. Let x be two equal angles of its supplement.

$$\begin{aligned} \text{Therefore, } x + x &= 180^\circ && \text{[Supplementary angles]} \\ \Rightarrow 2x &= 180^\circ \\ \Rightarrow x &= \frac{180^\circ}{2} = 90^\circ \end{aligned}$$

Thus, 90° is equal to its supplement.

6. If $\angle 1$ is decreased then, $\angle 2$ will increase with the same measure, so that both the angles still remain supplementary.
7.
 - (i) No, because sum of two acute angles is less than 180° .
 - (ii) No, because sum of two obtuse angles is more than 180° .
 - (iii) Yes, because sum of two right angles is 180° .

8. Let the complementary angles be x and y , i.e., $x + y = 90^\circ$

It is given that $x > 45^\circ$

$$\text{Adding } y \text{ both sides, } x + y > 45^\circ + y$$

$$\Rightarrow 90^\circ > 45^\circ + y \Rightarrow 90^\circ - 45^\circ > y \Rightarrow y < 45^\circ$$

Thus, its complementary angle is less than 45° .

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9. (i) Yes, in $\angle AOE$, OC is common arm.
(ii) No, they have no non-common arms on opposite side of common arm.
(iii) Yes, they form linear pair.
(iv) Yes, they are supplementary.
(v) Yes, they are vertically opposite angles.
(vi) Vertically opposite angles of $\angle 5$ is $\angle COB$.
10. (i) Vertically opposite angles, $\angle 1, \angle 4$; $\angle 5, \angle 2 + \angle 3$.
(ii) Linear pairs $\angle 1, \angle 5$; $\angle 5, \angle 4$.
11. $\angle 1$ and $\angle 2$ are not adjacent angles because their vertex is not common.
12. (i) $x = 55^\circ$ [Vertically opposite angles]
Now $55^\circ + y = 180^\circ$ [Linear pair]
 $\Rightarrow y = 180^\circ - 55^\circ = 125^\circ$
Also $y = z = 125^\circ$ [Vertically opposite angles]
Thus, $x = 55^\circ, y = 125^\circ$ and $z = 125^\circ$.
- (ii) $40^\circ + x + 25^\circ = 180^\circ$ [Angles on straight line]
 $\Rightarrow 65^\circ + x = 180^\circ$
 $\Rightarrow x = 180^\circ - 65^\circ = 115^\circ$
Now $40^\circ + y = 180^\circ$ [Linear pair]
 $\Rightarrow y = 180^\circ - 40^\circ = 140^\circ$ (i)
Also $y + z = 180^\circ$ [Linear pair]
 $\Rightarrow 140^\circ + z = 180^\circ$ [From eq. (i)]
 $\Rightarrow z = 180^\circ - 140^\circ = 40^\circ$
Thus, $x = 115^\circ, y = 140^\circ$ and $z = 40^\circ$.
13. (i) 90° (ii) 180° (iii) supplementary
(iv) linear pair (v) equal (vi) obtuse angles
14. (i) Obtuse vertically opposite angles means greater than 90° and equal $\angle AOD = \angle BOC$.
(ii) Adjacent complementary angles means angles have common vertex, common arm, non-common arms are on either side of common arm and sum of angles is 90° .
(iii) Equal supplementary angles means sum of angles is 180° and supplement angles are equal.
(iv) Unequal supplementary angles means sum of angles is 180° and supplement angles are unequal.
i.e., $\angle AOE, \angle EOC$; $\angle AOD, \angle DOC$ and $\angle AOB, \angle BOC$
(v) Adjacent angles that do not form a linear pair mean, angles have common ray but the angles in a linear pair are not supplementary.
i.e., $\angle AOB, \angle AOE$; $\angle AOE, \angle EOD$ and $\angle EOD, \angle COD$
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Class -VII Mathematics (Ex. 5.2)**Answers**

1. (i) Given, $a \parallel b$ then $\angle 1 = \angle 5$ [Corresponding angles]
If two parallel lines are cut by a transversal, each pair of corresponding angles are equal in measure.
- (ii) Given, $\angle 4 = \angle 6$, then $a \parallel b$ [Alternate interior angles]
When a transversal cuts two lines such that pairs of alternate interior angles are equal, the lines have to be parallel.
- (iii) Given, $\angle 4 + \angle 5 = 180^\circ$, then $a \parallel b$ [
When a transversal cuts two lines, such that pairs of interior angles on the same side of transversal are supplementary, the lines have to be parallel.
2. (i) The pairs of corresponding angles:
 $\angle 1, \angle 5$; $\angle 2, \angle 6$; $\angle 4, \angle 8$ and $\angle 3, \angle 7$
- (ii) The pairs of alternate interior angles are:
 $\angle 3, \angle 5$ and $\angle 2, \angle 8$
- (iii) The pair of interior angles on the same side of the transversal:
 $\angle 3, \angle 8$ and $\angle 2, \angle 5$
- (iv) The vertically opposite angles are:
 $\angle 1, \angle 3$; $\angle 2, \angle 4$; $\angle 6, \angle 8$ and $\angle 5, \angle 7$
3. Given, $p \parallel q$ and cut by a transversal line.
- $\therefore 125^\circ + e = 180^\circ$ [Linear pair]
 $\therefore e = 180^\circ - 125^\circ = 55^\circ$ (i)
- Now $e = f = 55^\circ$ [Vertically opposite angles]
- Also $a = f = 55^\circ$ [Alternate interior angles]
 $a + b = 180^\circ$ [Linear pair]
 $\Rightarrow 55^\circ + b = 180^\circ$ [From eq. (i)]
 $\Rightarrow b = 180^\circ - 55^\circ = 125^\circ$
- Now $a = c = 55^\circ$ and $b = d = 125^\circ$ [Vertically opposite angles]
- Thus, $a = 55^\circ, b = 125^\circ, c = 55^\circ, d = 125^\circ, e = 55^\circ$ and $f = 55^\circ$.
4. (i) Given, $l \parallel m$ and t is transversal line.
 \therefore Interior vertically opposite angle between lines l and $t = 110^\circ$.
 $\therefore 110^\circ + x = 180^\circ$ [Supplementary angles]
 $\Rightarrow x = 180^\circ - 110^\circ = 70^\circ$
- (ii) Given, $l \parallel m$ and t is transversal line.
 $x + 2x = 180$ [Interior opposite angles]
 $\Rightarrow 3x = 180^\circ \Rightarrow x = \frac{180^\circ}{3} = 60^\circ$
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- (iii) Given, $l \parallel m$ and $a \parallel b$.
 $x = 100^\circ$ [Corresponding angles]
5. (i) Given, $AB \parallel DE$ and BC is a transversal line and $\angle ABC = 70^\circ$
 $\therefore \angle ABC = \angle DGC$ [Corresponding angles]
 $\therefore \angle DGC = 70^\circ$ (i)
- (ii) Given, $BC \parallel EF$ and DE is a transversal line and $\angle DGC = 70^\circ$
 $\therefore \angle DGC = \angle DEF$ [Corresponding angles]
 $\therefore \angle DEF = 70^\circ$ [From eq. (i)]
6. (i) $126^\circ + 44^\circ = 170^\circ$
 l is not parallel to m because sum of interior opposite angles should be 180° .
- (ii) $75^\circ + 75^\circ = 150^\circ$
 l is not parallel to m because sum of angles does not obey the property of parallel lines.
- (iii) $57^\circ + 123^\circ = 180^\circ$
 l is parallel to m due to supplementary angles property of parallel lines.
- (iv) $98^\circ + 72^\circ = 170^\circ$
 l is not parallel to m because sum of angles does not obey the property of parallel lines.
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