| Board – CBSE | Class – 7th | Topic – Lines and Angles 5.1 |

Q.1 Find the complement of each of the following angles:
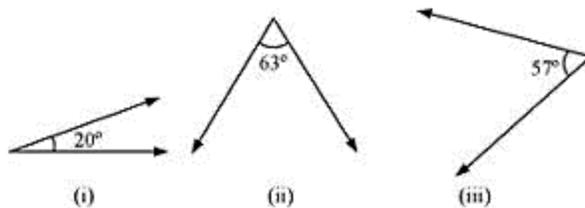
Sol: The sum of the measures of complementary angles is 90°.

(i) 20°

Complement = 90° − 20° = 70°

(ii) 63°

Complement = 90° − 63° = 27°

(iii)57°

Complement = 90° − 57° = 33°

Q.2 Find the supplement of each of the following angles:
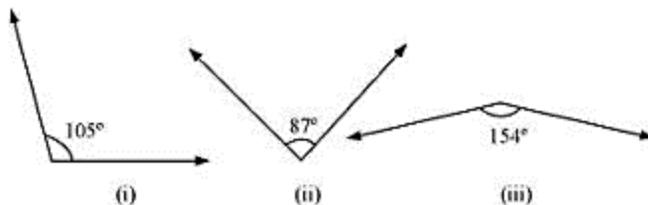
Sol: The sum of the measures of supplementary angles is 180°.

(i) 105°

Supplement = 180° − 105° = 75°

(ii) 87°

Supplement = 180° − 87° = 93°

(iii) 154°

Supplement = 180° − 154° = 26°

Q.3 Identify which of the following pairs of angles are complementary and which are supplementary.

(i) 65°, 115°   (ii) 63°, 27°   (iii) 112°, 68° (iv) 130°, 50° (v) 45°, 45°   (vi) 80°, 10°

Sol: The sum of the measures of complementary angles is 90º and that of supplementary angles is 180º.

(i) 65°, 115°

Sum of the measures of these angles = 65° + 115° = 180°

∴ These angles are supplementary angles.

(ii) 63°, 27°

Sum of the measures of these angles = 63° + 27° = 90°

∴ These angles are complementary angles.

(iii) 112°, 68°

Sum of the measures of these angles = 112° + 68° = 180°

∴ These angles are supplementary angles.

(iv)   130°, 50°

Sum of the measures of these angles = 130° + 50° = 180°

∴ These angles are supplementary angles.

(v)   45°, 45°

Sum of the measures of these angles = 45° + 45° = 90°

∴ These angles are complementary angles.

(vi)   80°, 10°

Sum of the measures of these angles = 80° + 10° = 90°

∴ These angles are complementary angles.

Q.4 Find the angle which is equal to its complement.

Sol: Let the angle be x.

Complement of this angle is also x.

The sum of the measures of a complementary angle pair is 90°.

∴ x + x = 90°

2x = 90°

$x = \dfrac{90°}{2} = 45°$

Q.5 Find the angle which is equal to its supplement.

Sol: Let the angle be x.

Supplement of this angle is also x.

The sum of the measures of a supplementary angle pair is 180°.

∴ x + x = 180°

2x = 180°

x = 90°

Q.6 In the given figure, ∠1 and ∠2 are supplementary angles. If ∠1 is decreased, what changes should take place in ∠2 so that both the angles still remain supplementary.
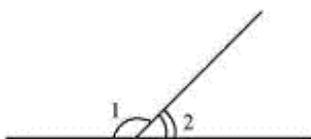
Sol: ∠1 and ∠2 are supplementary angles.

If ∠1 is reduced, then ∠2 should be increased by the same measure so that this angle pair remains supplementary.

Q.7 Can two angles be supplementary if both of them are:

(i) Acute?   (ii) Obtuse?   (iii) Right?

Sol: (i) No. Acute angle is always lesser than 90º. It can be observed that two angles, even of 89º, cannot add up to 180º. Therefore, two acute angles cannot be in a supplementary angle pair.

(ii) No. Obtuse angle is always greater than 90º. It can be observed that two angles, even of 91º, will always add up to more than 180º. Therefore, two obtuse angles cannot be in a supplementary angle pair.

(iii) Yes. Right angles are of 90º and 90º + 90º = 180°

Therefore, two right angles form a supplementary angle pair together.

Q.8 An angle is greater than 45°. Is its complementary angle greater than 45° or equal to 45° or less than 45°?

Sol: Let A and B are two angles making a complementary angle pair and A is greater than 45°.

A + B = 90°

B = 90° − A

Therefore, B will be lesser than 45°.

Q.9 In the adjoining figure:

(i) Is ∠1 adjacent to ∠2?

(ii) Is ∠AOC adjacent to ∠AOE?

(iii) Do ∠COE and ∠EOD form a linear pair?

(iv) Are ∠BOD and ∠DOA supplementary?

(v) Is ∠1 vertically opposite to ∠4?

(vi) What is the vertically opposite angle of ∠5?
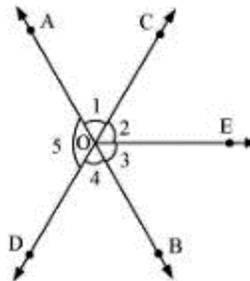
Sol: (i) Yes. Since they have a common vertex O and also a common arm OC. Also, their non-common arms, OA and OE, are on either side of the common arm.

(ii) No. They have a common vertex O and also a common arm OA. However, their non-common arms, OC and OE, are on the same side of the common arm. Therefore, these are not adjacent to each other.

(iii) Yes. Since they have a common vertex O and a common arm OE. Also, their non-common arms, OC and OD, are opposite rays.

(iv) Yes. Since ∠BOD and ∠DOA have a common vertex O and their non-common arms are opposite to each   other.

(v) Yes. Since these are formed due to the intersection of two straight lines (AB and CD).

(vi) ∠COB is the vertically opposite angle of ∠5 as these are formed due to the intersection of two straight lines, AB and CD.

Q.10 Indicate which pairs of angles are:

(i) Vertically opposite angles. (ii) Linear pairs.
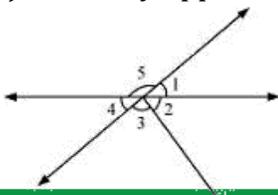
Sol: (i) ∠1 and ∠4, ∠5 and ∠2 +∠3 are vertically opposite angles as these are formed due to the intersection of two straight lines.

(ii) ∠1 and ∠5, ∠5 and ∠4 as these have a common vertex and also have non-common arms opposite to each other.

Q.11 In the following figure, is ∠1 adjacent to ∠2? Give reasons.
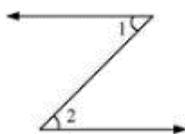
Sol: ∠1 and ∠2 are not adjacent angles because their vertex is not common.

Q.12 Find the value of the angles x, y, and z in each of the following:
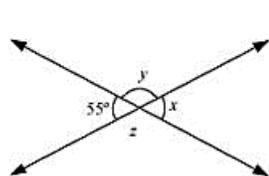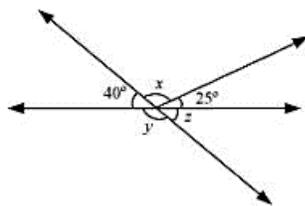
(i)   (ii)

Sol: (i) Since ∠x and ∠55° are vertically opposite angles,

$\angle x = 55°$

$\angle x + \angle y = 180°$ (Linear pair)

$55° + \angle y = 180°$

$\angle y = 180º - 55º = 125°$

$\angle y = \angle z$ (Vertically opposite angles)

$\angle z = 125°$

(ii) $\angle z = 40°$ (Vertically opposite angles)

$\angle y + \angle z = 180°$ (Linear pair)

$\angle y = 180° - 40° = 140°$

$40° + ∠x + 25° = 180°$ (Angles on a straight line)

$65° + ∠x = 180°$

$∠x = 180° − 65° = 115°$

Q.13 Fill in the blanks:

(i) If two angles are complementary, then the sum of their measures is _____.

(ii) If two angles are supplementary, then the sum of their measures is _____.

(iii) Two angles forming a linear pair are _____.

(iv) If two adjacent angles are supplementary, they form a _____.

(v) If two lines intersect at a point, then the vertically opposite angles are always _____.

(vi) If two lines intersect at a point, and if one pair of vertically opposite angles are acute angles, then the other pair of vertically opposite angles are _____.

Sol: (i) 90°   (ii) 180°   (iii) Supplementary   (iv) Linear pair

(v) Equal   (vi) Obtuse angles

Q.14 In the adjoining figure, name the following pairs of angles.
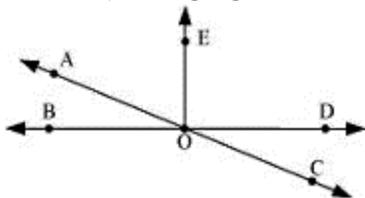
(i) Obtuse vertically opposite angles

(ii) Adjacent complementary angles

(iii) Equal supplementary angles

(iv) Unequal supplementary angles

(v) Adjacent angles that do not form a linear pair

Sol: (i) ∠AOD, ∠BOC   (ii) ∠EOA, ∠AOB   (iii) ∠EOB, ∠EOD   (iv) ∠EOA, ∠EOC

(v) ∠AOB and ∠AOE, ∠AOE and ∠EOD, ∠EOD and ∠COD