

Trigonometric Functions

Exercise 7.1 — Complete Solutions

Class 10th Mathematics

Step-by-step worked solutions for Exercise 7.1

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EXERCISE 7.1 - Trigonometric Functions

Question 1: Find the Signs of Trigonometric Functions

Concept: Signs of trigonometric functions in different quadrants:

Quadrant	I (0° - 90°)	II (90° - 180°)	III (180° - 270°)	IV (270° - 360°)
sin, cosec	+	+	-	-
cos, sec	+	-	-	+
tan, cot	+	-	+	-

1(i) $\sin 55^\circ$

- 55° lies in **Quadrant I** (0° to 90°)
- In Quadrant I, all trigonometric functions are positive

Answer: Positive (+) ✓

1(ii) $\cos 145^\circ$

- 145° lies in **Quadrant II** (90° to 180°)
- In Quadrant II, cos is negative

Answer: Negative (-) ✓

1(iii) $\tan 111^\circ$

- 111° lies in **Quadrant II** (90° to 180°)
- In Quadrant II, tan is negative

Answer: Negative (-) ✓

1(iv) $\sec 179^\circ$

- 179° lies in **Quadrant II** (90° to 180°)
- In Quadrant II, sec ($1/\cos$) is negative

Answer: Negative (-) ✓

1(v) $\csc 88^\circ$

- 88° lies in **Quadrant I** (0° to 90°)
- In Quadrant I, all functions are positive

Answer: Positive (+) ✓

1(vi) $\cot 14^\circ$

- 14° lies in **Quadrant I** (0° to 90°)
- In Quadrant I, all functions are positive

Answer: Positive (+) ✓

Question 2: Fill in the Blanks

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2(i) $\tan (180^\circ - \theta) = \dots \tan \theta$

Solution:

$$\tan (180^\circ - \theta) = -\tan \theta$$

Answer: – (negative)

2(ii) $\sin (180^\circ - \theta) = \dots \sin \theta$

Solution:

$$\sin (180^\circ - \theta) = \sin \theta$$

Answer: + (positive, no sign change)

2(iii) $\tan (90^\circ + \theta) = \dots \cot \theta$

Solution:

$$\tan (90^\circ + \theta) = -\cot \theta$$

Answer: – (negative)

2(iv) $\cos (90^\circ + \theta) = \dots \sin \theta$

Solution:

$$\cos (90^\circ + \theta) = -\sin \theta$$

Answer: – (negative)

2(v) $\operatorname{cosec} (180^\circ - \theta) = \dots \operatorname{cosec} \theta$

Solution:

$$\operatorname{cosec} (180^\circ - \theta) = \operatorname{cosec} \theta$$

Answer: + (positive, no sign change)

2(vi) $\sec (90^\circ - \theta) = \dots \operatorname{cosec} \theta$

Solution:

$$\sec (90^\circ - \theta) = \operatorname{cosec} \theta$$

Answer: + (positive, no sign change)**Question 3: Exact Values of Trigonometric Functions**

3(i) $\sin 150^\circ$

Solution:

$$150^\circ = 180^\circ - 30^\circ$$

Answer:

3(ii) $\tan 150^\circ$

Solution:

$$150^\circ = 180^\circ - 30^\circ$$

Answer:

3(iii) $\sec 150^\circ$

Solution:

$$150^\circ = 180^\circ - 30^\circ$$

Answer:

3(iv) cosec 120°

Solution:

$$120^\circ = 180^\circ - 60^\circ$$

Answer:

3(v) cos 120°

Solution:

$$120^\circ = 180^\circ - 60^\circ$$

Answer:

3(vi) cot 120°

Solution:

$$120^\circ = 180^\circ - 60^\circ$$

Answer:

3(vii) sin 135°

Solution:

$$135^\circ = 180^\circ - 45^\circ$$

Answer:

3(viii) sec 135°

Solution:

$$135^\circ = 180^\circ - 45^\circ$$

Answer:

3(ix) cot 135°

Solution:

$$135^\circ = 180^\circ - 45^\circ$$

Answer:

Summary Table

Question 1: Signs

Function	Angle	Quadrant	Sign
sin 55°	55°	I	+
cos 145°	145°	II	-

Function	Angle	Quadrant	Sign
$\tan 111^\circ$	111°	II	-
$\sec 179^\circ$	179°	II	-
$\operatorname{cosec} 88^\circ$	88°	I	+
$\cot 14^\circ$	14°	I	+

Question 2: Fill in the Blanks

Expression	Answer
$\tan (180^\circ - \theta) = - \tan \theta$	-
$\sin (180^\circ - \theta) = + \sin \theta$	+
$\tan (90^\circ + \theta) = - \cot \theta$	-
$\cos (90^\circ + \theta) = - \sin \theta$	-
$\operatorname{cosec} (180^\circ - \theta) = + \operatorname{cosec} \theta$	+
$\sec (90^\circ - \theta) = + \sec \theta$	+

Question 3: Exact Values

Function	Value
$\sin 150^\circ$	
$\tan 150^\circ$	
$\sec 150^\circ$	
$\operatorname{cosec} 120^\circ$	
$\cos 120^\circ$	
$\cot 120^\circ$	
$\sin 135^\circ$	
$\sec 135^\circ$	

Function

Value

$\cot 135^\circ$

Key Formulas Used:

1. $\sin(180^\circ - \theta) = \sin \theta$
2. $\cos(180^\circ - \theta) = -\cos \theta$
3. $\tan(180^\circ - \theta) = -\tan \theta$
4. $\sin(90^\circ + \theta) = \cos \theta$
5. $\cos(90^\circ + \theta) = -\sin \theta$
6. $\tan(90^\circ + \theta) = -\cot \theta$
7. $\sec(90^\circ - \theta) = \operatorname{cosec} \theta$

Standard Values Used:

Angle	sin	cos	tan	cot	sec	cosec
30°						2
45°			1	1		
60°					2	