Unit 7 · Trigonometry

WORKSHEET

Full marks 30

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 30

1 Key words [3]

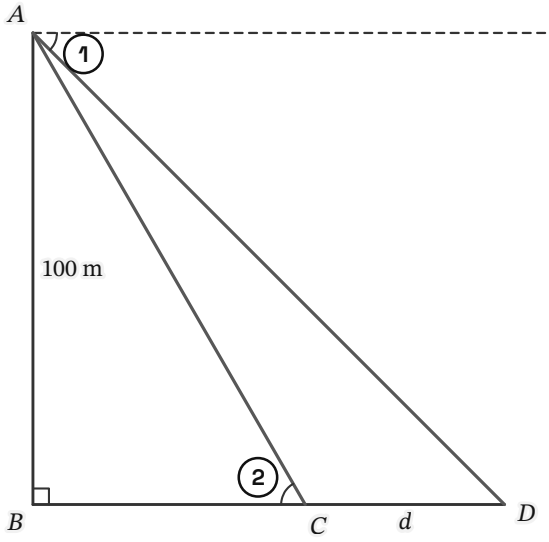
Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

angle of depression	**angle of elevation**	**compound angle**	**hypotenuse**	**line of sight**
multiple angles	**radian**	**submultiple angle**		

An angle made by adding or subtracting two angles, such as $A + B$, is a _____. $2A$ and $3A$ are _____ of A, and $A/2$ is a _____ of A. When you look up at the top of a tower, the angle between the horizontal and your _____ is the _____. When you look down from a cliff at a boat, the angle below the horizontal is the _____.

2 Read the figure [1]

A cliff AB is 100 m high. From its top A, boat D is seen at an angle of depression of 45°, and boat C, nearer the cliff, at an angle of depression of 60°. Two angles in the figure are left blank: write them in.



1. _____ **2.** _____

3 Multiple choice [5]

Choose the correct option for each of the following questions.

i. $\sin(A + B)$ is equal to [1]

a. $\sin A \cos B + \cos A \sin B$ **b.** $\sin A + \sin B$

c. $\cos A \cos B - \sin A \sin B$ **d.** $\sin A \cos B - \cos A \sin B$

ii. Which of these is equal to $\cos 2A$? [1]

a. $2\sin^2 A - 1$ **b.** $1 - 2\cos^2 A$

c. $1 - 2\sin^2 A$ **d.** $\cos^2 A + \sin^2 A$

iii. The exact value of $\sin 15^\circ$ is [1]

a. $\frac{\sqrt{3}+1}{2\sqrt{2}}$ **b.** $\frac{\sqrt{3}-1}{2\sqrt{2}}$

c. $\frac{\sqrt{3}-1}{2}$ **d.** $\frac{1}{2\sqrt{2}}$

iv. $\sin 5A + \sin 3A$ is equal to [1]

a. $2\cos 4A \sin A$ **b.** $2\sin 8A \cos 2A$

c. $2\sin 4A \cos A$ **d.** $\sin 8A$

v. A pole 20 m high casts a shadow $20\sqrt{3}$ m long on level ground. What is the sun's altitude (its angle of elevation)? [1]

a. 60° **b.** 45°

c. 15° **d.** 30°

4 Very short answers [3]

Write very short answers to the following questions.

a. Write $\tan 2A$ in terms of $\tan A$. [1]

b. Express $2\sin 40^\circ \cos 10^\circ$ as a sum. [1]

c. If $A + B = 45^\circ$, find the value of $(1 + \tan A)(1 + \tan B)$. [1]

5 Short answers [8]

Write short answers to the following questions.

a. Find the mistake. Hari writes: "$\cos 75^\circ = \cos 45^\circ + \cos 30^\circ = \frac{1}{\sqrt{2}} + \frac{\sqrt{3}}{2} \approx 1.57$." What has he done wrong? Find the correct value. [2]

b. Prove that $\frac{\sin 2A}{1 + \cos 2A} = \tan A$. [2]

c. If $\cos A = \frac{3}{5}$ and A is acute, find $\sin 2A$ and $\cos 2A$. **[2]**

d. The angles of elevation of the top of a 30 ft pole from two points on the same side are $60°$ and $45°$. Find the distance between the points. **[2]**

6 Long answers **[8]**

Solve the following problems. Show your working.

a. If $A + B + C = \pi$, prove that $\sin 2A + \sin 2B + \sin 2C = 4\sin A \sin B \sin C$. **[4]**

b. From the roof of a building 30 m high, the angles of depression of the top and the foot of a column are $45°$ and $60°$. Find the height of the column. **[4]**

Answer:

7 Think [2]

Think, then answer.

Rina stands 10 m from a tree and sees its top at an angle of elevation θ. She says: "From 20 m away the angle will be $\theta/2$." Is she right? Explain with an example.

8 Activity: How tall is your school? (not marked)

Make a clinometer from a protractor, a straw and a thread with a small weight. Stand at three distances from a wall of the school building and read the angle of elevation of its top. Measure the height of your eye too. Fill in the table.

Distance from the wall (m)	Angle of elevation	Eye height (m)	Height = distance × tan(angle) + eye height