Unit 7 · Trigonometry

HARDER WORKSHEET

Full marks 23

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 23

1 Multiple choice [3]

Choose the correct option for each of the following questions.

i. If $\tan A = \frac{1}{2}$ and $\tan B = \frac{1}{3}$, with A and B acute, then $A + B$ is [1]

a. 30° **b.** 45°

c. 60° **d.** 90°

ii. What is the greatest value $\sin x \cos x$ can take? [1]

a. 1 **b.** 2

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

iii. The value of $\cos 20^\circ \cos 40^\circ \cos 80^\circ$ is [1]

a. $\frac{1}{4}$ **b.** $\frac{1}{2}$

c. $\frac{\sqrt{3}}{8}$ **d.** $\frac{1}{8}$

2 Short answers [8]

Write short answers to the following questions.

a. Find the mistake. Sunita writes: "$\sin 2A = 2\sin A$, so $\sin 60^\circ = 2\sin 30^\circ = 1$." Find her mistake and give the correct value of $\sin 60^\circ$ from $\sin 30^\circ$. [2]

b. Work backwards. If $\tan \frac{A}{2} = \frac{1}{2}$, find $\sin A$, $\cos A$ and $\tan A$. [2]

c. Show that $\sin 3A = 4\sin A \sin(60^\circ - A)\sin(60^\circ + A)$. [2]

d. Is the report possible? A student writes: "From a point 30 m from the foot of a tower, the angle of elevation of the top of the tower is 60°, and of the top of the flag on it, 45°." Explain. **[2]**

3 Long answers **[8]**

Solve the following problems. Show your working.

a. A mobile tower 40 m high stands on a hilltop. From a point on the plain, the angle of elevation of the foot of the tower is 30° and of its top 45°. Find the height of the hill and how far the point is from the hill's foot (the point straight under the tower). **[4]**

Answer:

b. If $A + B + C = \pi$, prove that $\cos^2 A + \cos^2 B + \cos^2 C = 1 - 2\cos A \cos B \cos C$. **[4]**

4 Think **[4]**

Think, then answer.

a. Without a calculator, which is larger: $\sin 40° + \sin 20°$ or $\sin 80°$? Explain. **[2]**

b. Make your own. Choose two acute angles A and B, not 0° and not equal, whose tangents are simple fractions and with $A + B = 45^\circ$. Show that they work. **[2]**