

NAME:

SECTION:

Instructor:

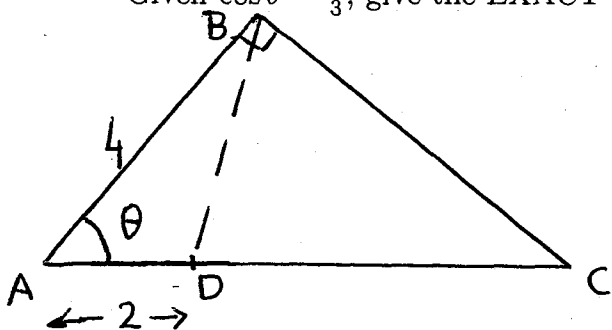
I	30	II	10	III	25	IV	20	V	20	VI	20	VII	15	VIII	20	Total	160

NO CALCULATOR means: NO CALCULATOR.

I. NO CALCULATOR.

(30 points)

Given $\cos \theta = \frac{2}{3}$, give the EXACT values of $|BD|$ and $|BC|$.

**II. With calculator.**

(10 points)

Find angles θ and ν in degrees so that

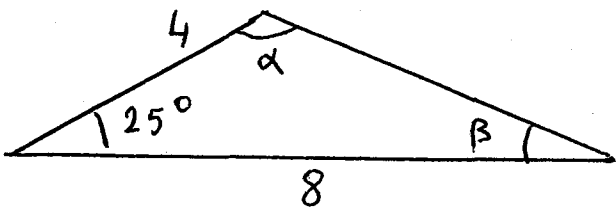
$$\sin \theta = \frac{1}{3} \text{ and } 90^\circ \leq \theta \leq 270^\circ$$

$$\sin \nu = -\frac{1}{3} \text{ and } 90^\circ \leq \nu \leq 270^\circ.$$

III. An airplane flies at constant elevation in the direction of Dane County airport. From the airplane, the airport is first seen at an angle of depression of 10° . Approaching the airport, **5** miles further, the airport is seen at an angle of depression of 20° . At which elevation (above ground) is the airplane flying? (25 points)

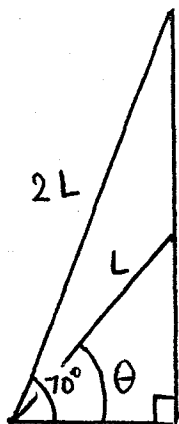
IV. Evaluate the angles α and β .

(20 points)



V. Evaluate the angle θ

(20 points)



VI. Check the identity:

(20 points)

$$(1 - \sin 2y)(\sin y + \cos y)^2 = \cos^2(2y)$$

VII. WITHOUT CALCULATOR. Find an angle θ , with $\frac{\pi}{2} \leq \theta \leq \pi$, and $\cos 2\theta = \cos \theta$.
 (15 points)

VIII. The graph below is the graph of $\sin(3x + \frac{\pi}{4})$. (20 points)

1) Give the values of a , b and c .

2) All the values of x_j ($j = 1, 2, 3$ or 4) satisfy $\sin(3x_j + \frac{\pi}{4}) = \frac{-1}{3}$. Give the values of x_2, x_3 and x_4 in terms of x_1 . For which j is $3x_j + \frac{\pi}{4} = \sin^{-1}(\frac{-1}{3})$?

