(*b*) Discuss whether the rest of those present sympathize with him in his treatment of Skylock towards the end of the Scene.

3. Was Portia's decision in the case in accordance with law and justice? Give reasons for your answer.

4. Quote lines from the Trial Scene in which the following are mentioned; Lorenzo, Jessica, Padua, Venice, Pythagoras. Bellario.

SENIOR LEAVING TRIGONOMETRY.

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(Continued from last issue.)

1. (*a*). If an arc of 5 feet on a circle 8 feet in diameter subtends at the centre an angle of $71^{\circ}\ 37'\ 11''$, find the value of π to four places of decimals.

Take the general solution, and let d = the diameter, a = the arc, and θ = the angle in radians and A° in degrees. Then $a = \frac{1}{2}d\theta$; and $\theta = {}^{\pi}/_{180}.A^{\circ}$

$$\therefore \pi = \frac{180\theta}{A^{\circ}} = \frac{180}{A^{\circ}} \cdot \frac{2a}{d} = \frac{180}{71.61972\ldots} \cdot \frac{10}{8} = 3.14159 -$$

(*b*) This is mere book work.

2. (*a*) If $\tan A = {}^{m}/_{n}$, find the value of sin A and of cos A; supposing A an angle between 90° and 180°.

$$\text{Sin } A = \frac{\tan A}{\sec A} = \frac{\tan A}{\sqrt{1 + \tan^2 A}} = \frac{m}{\sqrt{m^2 + n^2}}$$

$$\text{Cos } A = \frac{1}{\sec A} = \frac{1}{\sqrt{1 + \tan^2 A}} = \frac{n}{\sqrt{m^2 + n^2}}$$

(*b*) Show that $\cos A(2 \sec A + \tan A)(\sec A - 2 \tan A) = 2 \cos A - 3 \tan A$.

Multiplying the brackets, the left-hand member becomes

$$\text{Cos } A \left\{ \frac{2}{\cos^2 A} - \frac{3 \sin A}{\cos^2 A} - \frac{2 \sin^2 A}{\cos^2 A} \right\} = \cos A \left\{ \frac{2 \cos^2 A}{\cos^2 A} - \frac{3 \sin A}{\cos^2 A} \right\}$$

$= 2 \cos A - 3 \tan A$.

3. (*a*). Let OP, OQ, OR be three concurrent lines, having the $\angle POQ = B$, and $\angle POR = A$. Then $\angle QOR = A - B$. Also let QP be perpendicular upon OP. The projection of the sides, in order, of the triangle OPQ, upon OR is zero.

i. e. Proj. OP + proj. PQ + proj. QO = 0

$\therefore$ OP cos A + PQ sin A − QO cos (A − B) = 0

$\therefore$ $\cos(A - B) = {}^{OP}/_{QO} \cos A + {}^{PQ}/_{QO} \sin A = \cos B \cos A + \sin B \sin A$.

This method of obtaining these relations, by projection, is preferable to any other, not only on account of the importance of the principle, but because of its conciseness and also on account of its generality, a.d the ease with which it admits of extensions and modifications.

Thus if OP lie between OQ and OR while everything else remains the same, we readily obtain the expression for cos (A + B). While if we project on a line perpendicular to OR we get expressions for sin (A − B) and sin (A + B).

(*b*) Show that $\cos^2 A + \cos^2(120^{\circ} + A) + \cos^2(120^{\circ} - A) = {}^{3}/_{2}$.

On account of the relation $\cos^2\theta = \frac{1}{2}(1 + \cos 2\theta)$, this becomes $\frac{1}{2}[3 + \cos 2A + \cos(240^{\circ} + 2A) + \cos(240^{\circ} - 2A)] = \frac{1}{2}(3 + \cos 2A + 2 \cos 240^{\circ} \cos 2A)$. But $\cos 240^{\circ} = -\frac{1}{2}$; $\therefore$ The expression becomes $\frac{1}{2}(3 + \cos 2A - \cos 2A) = {}^{3}/_{2}$.