

Exercise 10 D

1 b $b = \sqrt{42.5^2 - 20^2}$
 $= \frac{75}{2} = 37.5$

$$\sin \theta = \frac{37.5}{42.5} = \frac{15}{17}$$

$$\cos \theta = \frac{20}{42.5} = \frac{8}{17}$$

$$\tan \theta = \frac{37.5}{20} = \frac{15}{8}$$

d $d = \sqrt{14^2 - (5\sqrt{3})^2}$
 $= 11$

$$\sin \theta = \frac{5\sqrt{3}}{14}$$

$$\cos \theta = \frac{11}{14}$$

$$\tan \theta = \frac{5\sqrt{3}}{11}$$

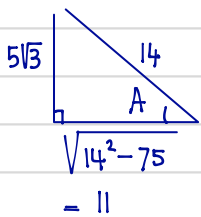
f. $f = \sqrt{32 + 16^2}$
 $= 12\sqrt{2}$

$$\sin \theta = \frac{4\sqrt{2}}{12\sqrt{2}} = \frac{1}{3}$$

$$\cos \theta = \frac{16}{12\sqrt{2}} = \frac{2}{3}\sqrt{2}$$

$$\tan \theta = \frac{4\sqrt{2}}{16} = \frac{1}{4}\sqrt{2}$$

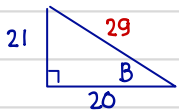
2 a. $\sin A = \frac{5\sqrt{3}}{14}$ (Obtuse = Q2)



$$\cos \theta = -\frac{11}{14}$$

b $\tan B = -\frac{21}{20}$

$$180 < B < 360 \rightarrow B @ Q4$$



$$\cos B = +\frac{20}{29}$$

c $\cos C = \frac{1}{2}$

$$C = 60, 300$$

$$\sin C = \frac{1}{2}\sqrt{3}, -\frac{1}{2}\sqrt{3}$$

d $\tan D = 5 \sin D, -180 < D < 180$

$$\frac{\sin D}{\cos D} = 5 \sin D$$

$$\frac{\sin D}{\cos D} - 5 \sin D = 0$$

$$\sin D \left(\frac{1}{\cos D} - 5 \right) = 0$$

$$\sin D = 0 \text{ or } \frac{1}{\cos D} = 5$$

$$D = 0, \pm 180 \quad \cos D = \frac{1}{5}$$

$$D = 78.5, -78.5$$

$$\therefore D = \pm 78.5, 0$$

3 a $\frac{1}{\sin \theta} - \frac{1}{\tan \theta} \equiv \frac{1 - \cos \theta}{\sin \theta}$
 $\frac{1}{\sin \theta} - \frac{1}{\sin \theta} \equiv \frac{1 - \cos \theta}{\sin \theta}$

c. $\frac{1}{\cos \theta} + \frac{\sin \theta}{\cos \theta} \equiv \frac{\cos \theta}{1 - \sin \theta}$

$$\frac{1 + \sin \theta}{\cos \theta} \equiv \frac{\cos \theta}{1 - \sin \theta} \times \frac{1 + \sin \theta}{1 + \sin \theta}$$

$$\frac{1 + \sin \theta}{\cos \theta} \equiv \frac{\cos \theta (1 + \sin \theta)}{1 - \sin^2 \theta}$$

$$\equiv \frac{\cos \theta (1 + \sin \theta)}{\cos^2 \theta}$$

$$\frac{1 + \sin \theta}{\cos \theta} \equiv \frac{1 + \sin \theta}{\cos \theta}$$

d $\frac{\tan \theta \sin \theta}{1 - \cos \theta} \equiv 1 + \frac{1}{\cos \theta}$

$$\frac{\sin^2 \theta}{\cos \theta (1 - \cos \theta)} \equiv 1 + \frac{1}{\cos \theta}$$

$$\frac{1 - \cos^2 \theta}{\cos \theta (1 - \cos \theta)} \equiv 1 + \frac{1}{\cos \theta}$$

$$\frac{(1 + \cos \theta)(1 - \cos \theta)}{\cos \theta (1 - \cos \theta)} = \frac{\cos \theta + 1}{\cos \theta}$$

b $\frac{\sin^2 \theta}{1 - \cos \theta} \equiv 1 + \cos \theta$

$$\frac{1 - \cos^2 \theta}{1 - \cos \theta} \equiv 1 + \cos \theta$$

$$\frac{(1 + \cos \theta)(1 - \cos \theta)}{1 - \cos \theta} \equiv 1 + \cos \theta$$

$$1 + \cos \theta \equiv 1 + \cos \theta$$

$$4. a \quad 4 \sin^2 \theta - 1 = 0$$

$$4 \sin^2 \theta = 1$$

$$\sin^2 \theta = \frac{1}{4}$$

$$\sin \theta = \pm \frac{1}{2}$$

$$\theta = 30, 150, 210, 330$$

$$b \quad \sin^2 \theta + 2 \cos^2 \theta = 2$$

$$(1 - \cos^2 \theta) + 2 \cos^2 \theta = 2$$

$$1 + \cos^2 \theta = 2$$

$$\cos^2 \theta = 1$$

$$\cos \theta = \pm 1$$

$$\theta = 0, 180, 360$$

$$c. \quad 10 \sin^2 \theta - 5 \cos^2 \theta + 2 = 4 \sin \theta$$

$$10 \sin^2 \theta - 5(1 - \sin^2 \theta) + 2 - 4 \sin \theta = 0$$

$$15 \sin^2 \theta - 4 \sin \theta - 3 = 0$$

$$(5 \sin \theta - 3)(3 \sin \theta + 1) = 0$$

$$\sin \theta = \frac{3}{5} \quad \sin \theta = -\frac{1}{3}$$

$$\theta = 36.9, 143.1 \quad \theta = 199.5, 340.5$$

$$d \quad 4 \sin^2 \theta \cos \theta = \tan^2 \theta$$

$$4 \sin^2 \theta \cos \theta = \frac{\sin^2 \theta}{\cos^2 \theta}$$

$$4 \sin^2 \theta \cos \theta - \frac{\sin^2 \theta}{\cos^2 \theta} = 0$$

$$\sin^2 \theta \left(4 \cos \theta - \frac{1}{\cos^2 \theta} \right) = 0$$

$$\sin^2 \theta = 0 \quad \text{or} \quad 4 \cos \theta = \frac{1}{\cos^2 \theta}$$

$$\sin \theta = 0$$

$$\theta = 0, 180, 360$$

$$4 \cos^3 \theta = 1$$

$$\cos^3 \theta = \frac{1}{4}$$

$$\cos \theta = \sqrt[3]{\frac{1}{4}}$$

$$\theta = 51, 309.0$$

$$\therefore \theta = 0, 51, 180, 309, 360$$

$$5. \quad -180 < \theta < 180$$

$$2 \tan \theta - 3 = \frac{2}{\tan \theta}$$

$$2 \tan^2 \theta - 3 \tan \theta - 2 = 0$$

$$(2 \tan \theta + 1)(\tan \theta - 2) = 0$$

$$\tan \theta = -\frac{1}{2} \quad \tan \theta = 2$$

$$\theta = 153.4, -26.6 \quad \theta = 63.4, -116.6$$

$$\therefore \theta = -116.6, -26.6, 63.4, 153.4$$