



CAMI Mathematics: Grade 11

GRADE 11 Numerical reductions with special angles

11.9 Numerical reductions with special angles

1. Express the following as acute angles

(a)
$$\frac{\tan 330^\circ \cdot \cos 315^\circ}{\tan 225^\circ \cdot \sin 300^\circ \cdot \tan 150^\circ}$$

(b)
$$\frac{\sin 315^\circ \cdot \tan 330^\circ}{\tan 300^\circ \cdot \sin 240^\circ \cdot \tan 315^\circ}$$

(c)
$$\frac{\cos 240^\circ \cdot \cos 330^\circ}{\sin 150^\circ \cdot \cos 210^\circ \cdot \cos 225^\circ}$$

2. Express the following as acute angles (negative angles included)

(a)
$$\frac{\tan^2(-225^\circ) \cdot \sin 315^\circ}{\sin(-150^\circ) \cdot \sin 120^\circ}$$

(b)
$$\frac{\sin(-150^\circ) \cdot \tan(-30^\circ)}{\tan 315^\circ \cdot \sin(-225^\circ) \cdot \cos(-150^\circ)}$$

(c)
$$\frac{\tan 240^\circ \cdot \sin(-120^\circ) \cdot \cos(-150^\circ)}{\cos(-45^\circ)}$$



MEMO

1. Express the following as acute angles [7.3.2.1]

(a)

$$\begin{aligned} & \frac{\tan 330^\circ \cdot \cos 315^\circ}{\tan 225^\circ \cdot \sin 300^\circ \cdot \tan 150^\circ} \\ &= \frac{(-\tan 30^\circ) \cdot \cos 45^\circ}{\tan 45^\circ \cdot (-\sin 60^\circ) \cdot (-\tan 30^\circ)} \\ &= \frac{-\cos 45^\circ}{\tan 45^\circ \cdot \sin 60^\circ \cdot \tan 30^\circ} \end{aligned}$$

(b)

$$\begin{aligned} & \frac{\sin 315^\circ \cdot \tan 330^\circ}{\tan 300^\circ \cdot \sin 240^\circ \cdot \tan 315^\circ} \\ &= \frac{(-\sin 45^\circ) \cdot (-\tan 30^\circ)}{(-\tan 60^\circ) \cdot (-\sin 60^\circ) \cdot (-\tan 45^\circ)} \\ &= -\frac{\sin 45^\circ \cdot \tan 30^\circ}{\tan 60^\circ \cdot \sin 60^\circ \cdot \tan 45^\circ} \end{aligned}$$

(c)

$$\begin{aligned} & \frac{\cos 240^\circ \cdot \cos 330^\circ}{\sin 150^\circ \cdot \cos 210^\circ \cdot \cos 225^\circ} \\ &= \frac{(-\cos 60^\circ) \cdot \cos 30^\circ}{\sin 30^\circ \cdot (-\cos 30^\circ) \cdot (-\cos 45^\circ)} \\ &= -\frac{\cos 60^\circ}{\sin 30^\circ \cdot \cos 45^\circ} \end{aligned}$$

2. Express the following as acute angles (negative angles included) [7.3.2.3]

(a)

$$\begin{aligned} & \frac{\tan^2(-225^\circ) \cdot \sin 315^\circ}{\sin(-150^\circ) \cdot \sin 120^\circ} \\ &= \frac{\tan^2 45^\circ \cdot (-\sin 45^\circ)}{-\sin 30^\circ \cdot \sin 60^\circ} \end{aligned}$$



CAMI Mathematics: Grade 11

(b)

$$\begin{aligned} & \frac{\sin(-150^\circ) \cdot \tan(-30^\circ)}{\tan 315^\circ \cdot \sin(-225^\circ) \cdot \cos(-150^\circ)} \\ &= \frac{(-\sin 30^\circ) \cdot (-\tan 30^\circ)}{(-\tan 45^\circ) \cdot \sin 45^\circ \cdot (-\cos 30^\circ)} \\ &= \frac{\sin 30^\circ \cdot \tan 30^\circ}{\tan 45^\circ \cdot \sin 45^\circ \cdot \cos 30^\circ} \end{aligned}$$

(c)

$$\begin{aligned} & \frac{\tan 240^\circ \cdot \sin(-120^\circ) \cdot \cos(-150^\circ)}{\cos(-45^\circ)} \\ &= \frac{\tan 60^\circ \cdot (-\sin 60^\circ) \cdot (-\cos 30^\circ)}{\cos 45^\circ} \\ &= \frac{\tan 60^\circ \cdot \sin 60^\circ \cdot \cos 30^\circ}{\cos 45^\circ} \end{aligned}$$

