TB(3B) Ch.9 Trigonometric Relations
Conventional Questions

1. [16-17 Standardized Test, #2]

It is given that $\cos\theta = \frac{\sqrt{5}}{4}$, where θ is an acute angle. Without finding the value of θ, write down the values of $\sin\theta$ and $\tan\theta$ in surd form. **(2 marks)**

2. [16-17 Final Exam, #8]

Evaluate $\frac{\sin 60°}{\cos 60° \tan^2 60°}$. Leave the answer in surd form. **(2 marks)**

3. [16-17 Final Exam, #10]

If $\tan(90° - \theta) = 3$, without using a calculator, find the value of $\frac{\cos^3\theta + \cos\theta\sin^2\theta}{\sin\theta}$.

(3 marks)

4. [16-17 Final Exam, #19]

Find the value of

$\sin 1°\cos 1°\tan 1° - \sin 2°\cos 2°\tan 2° + \sin 3°\cos 3°\tan 3° - \ldots + \sin 89°\cos 89°\tan 89°$.

(2 marks)

5. [17-18 Standardized Test, #3]

It is given that $\tan\theta = \frac{\sqrt{5}}{2}$, where θ is an acute angle. Find the value of $\sin\theta\cos\theta$ in surd form without evaluating θ. **(2 marks)**

6. [17-18 Final Exam, #4]

Evaluate $\frac{\tan 60° \cos^2 45°}{\sin 30°}$ without using calculator. Leave the answer in surd form. **(2 marks)**

7. [17-18 Final Exam, #5]

ΔABC is a right-angled triangle where $\angle A = \theta$ and $\angle C = 90°$. If $AB = 7$ and $BC = 2$, find the value of $\tan\theta$ in surd form without evaluating θ. **(2 marks)**

8. [17-18 Final Exam, #10]

(a) Prove that $\sin\theta\tan^2(90° - \theta) \equiv \frac{1}{\sin\theta} - \sin\theta$. **(2 marks)**

(b) Hence, or otherwise, solve $\sin\theta\tan^2(90° - \theta) - \frac{1}{\sin\theta} = -\frac{1}{2\tan(90° - \theta)}$,

where $0° < \theta < 90°$. **(2 marks)**

9. [18-19 Standardized Test 2, 4]

Evaluate $\dfrac{\cos 30° \sin 45° \tan 60°}{\sin 60°}$ without using calculator. Leave your answer in surd form.

(2 marks)

10. [18-19 Standardized Test 2, 7]

(a) Prove that $\cos^2\theta - \cos^2\theta \sin^2\theta \equiv \sin^2\theta \cos^2\theta \tan^2(90° - \theta)$, where θ is an acute angle.

(2 marks)

(b) It is given that $\sin^4\theta - \sin^4(90° - \theta) = 1 - k^2$. Show that $k = \sqrt{2}\cos\theta$. **(3 marks)**

11. [18-19 Final Exam, #7]

Without using a calculator,

(a) solve $\sin(60° - 2\theta) = \cos 50°$, **(2 marks)**

(b) find the value of $\tan^2 60° - \dfrac{1}{4\cos 60°} - \sin^2 45°$. **(2 marks)**

12. [18-19 Final Exam, #16]

If $a + b = 90°$, simplify $(\sin a + \sin b)^2 - 2\cos a \cos b$. **(2 marks)**

13. [20-21 Final Exam #5]

Find the acute angle θ in $\tan(\theta - 30°) = \dfrac{1}{\tan 2\theta}$. **(2 marks)**

14. [20-21 Final Exam #6]

It is given that $\sin\theta = \dfrac{\sqrt{2}}{3}$, where θ is an acute angle. Without evaluating θ,

(a) find the values of $\cos\theta$ and $\tan\theta$. **(2 marks)**

(b) Hence, find the value of $\sin\theta\tan\theta$. **(2 marks)**

(Leave all your answers in surd form.)

15. [20-21 Final Exam #11]

(a) Prove that $\dfrac{1 - \sin(90° - \theta)\cos\theta}{\tan\theta} \equiv \sin\theta\cos\theta$. **(2 marks)**

(b) Hence, or otherwise, find the acute angle x such that $\dfrac{1 - \sin 60° \cos 30°}{\tan 30°} = \dfrac{\tan x}{4}$. **(2 marks)**