GRADE 10 · TRIGONOMETRY

Trig Ratios for Any Angle: CAST & Reference Angles (Grade 10)

MEMORANDUM

Name: ..... Class: .....

Date: .....

MARK ____ / 29

Answer all questions. Show all your working — marks are awarded for method as well as the final answer. **Teacher copy: accept any correct equivalent method.**

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1 Write down the quadrant in which $235°$ lies, and state which of sin, cos and tan is positive there. **(2)**

> Quadrant 3; only tan is positive. ✓✓ (2)

2 Determine the reference angle for $\theta = 295°$. **(2)**

> Q4, so $\beta = 360° - 295° = 65°$ ✓✓ (2)

3 Evaluate $\cos 150°$ without using a calculator. **(3)**

> Q2, $\beta = 30°$, cos is negative in Q2, so $\cos 150° = -\cos 30° = -\frac{\sqrt{3}}{2}$ ✓✓✓ (3)

4 Evaluate $\tan 225°$ without using a calculator. **(3)**

> Q3, $\beta = 45°$, tan is positive in Q3, so $\tan 225° = +\tan 45° = 1$ ✓✓✓ (3)

5 P$(-8\ ;\ -6)$ lies on the arm of θ. Determine $\sin\theta$, $\cos\theta$ and $\tan\theta$. **(4)**

> $r = \sqrt{64 + 36} = 10$ ✓; $\sin\theta = -\frac{6}{10} = -\frac{3}{5}$ ✓; $\cos\theta = -\frac{8}{10} = -\frac{4}{5}$ ✓; $\tan\theta = -\frac{6}{-8} = \frac{3}{4}$ ✓ (Q3, so only tan is positive) (4)

6 If $\cos\theta = \frac{8}{17}$ and $\sin\theta < 0$, determine $\sin\theta$ and $\tan\theta$. **(4)**

> cos positive, sin negative → Q4. $x = 8$, $r = 17$, $y^2 = 289 - 64 = 225$, $y = \pm 15$; in Q4 y is negative so $y = -15$. $\sin\theta = -\frac{15}{17}$, $\tan\theta = -\frac{15}{8}$ ✓✓✓✓ (4)

7 Write down the value of $\text{cosec}\ 30°$. **(2)**

> $\text{cosec}\ 30° = 1 \div \sin 30° = 1 \div ½ = 2$ ✓✓ (2)

8 Explain why sec $90°$ is undefined. **(2)**

> $\sec\theta = \frac{1}{\cos\theta}$ and $\cos 90° = 0$; division by zero is undefined. ✓✓ (2)

9 Evaluate cosec $210°$ without using a calculator. **(3)**

> $210°$ is in Q3, so $\beta = 210° - 180° = 30°$; in Q3 only tan is positive, so $\sin 210° = -\sin 30° = -½$; cosec $210° = 1 \div (-½) = -2$ ✓✓✓ (3)

10 Without using a calculator, show that $\sin 150° + \cos 300° = 1$. **(4)**

> sin $150°$: Q2, $\beta = 180° - 150° = 30°$, and sin is positive in Q2, so $\sin 150° = +\sin 30° = ½$; cos $300°$: Q4, $\beta = 360° - 300° = 60°$, and cos is positive in Q4, so $\cos 300° = +\cos 60° = ½$; $½ + ½ = 1$ ✓✓✓✓ (4)

TOTAL: 29 marks

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