Basic trigonometry Quiz

I. Multiple-choice question (Each question has at least one correct answer.)

() 1. Refer to the attached figure. In a right-angled triangle with side lengths 1, 2, and 3, where θ is the angle opposite the side of length 1, which of the following is true?



()2. Select the correct option: (There is more than one correct answer.) (1) $\sin 70^{\circ} > \sin 50^{\circ}$ (2) $\cos 70^{\circ} > \cos 50^{\circ}$ (3) $\sin 20^{\circ} > \cos 20^{\circ}$ (4) $\sin 40^{\circ} > \frac{1}{2}$ (5) $\cos 15^{\circ} > \frac{\sqrt{3}}{2}$ Ans: (1)(4)(5)

()3. If both α and β are acute angles, and $\alpha > 45^{\circ} > \beta$, which of the following is correct? (1) $\sin \alpha > \sin \beta$ (2) $\cos \alpha > \cos \beta$ (3) $\sin \alpha > \tan \alpha$

- (4) $\tan \alpha > \tan \beta$ (5) $\cos \beta > \tan \beta$ Ans: (1)(4)
- II. Other question
- 1. In the following diagram, find the value of p=?





2. The diagram below shows 4 similar right-angled triangles, each has one angle that is 30°. The missing side x can be represented as $\frac{a^2}{b^2}$ where a and b are both integers. Find (a,b)=?



Ans: (4,3)

3. Use the trigonometric identities to simply the following expressions: (angle x is an acute angle)

(1)
$$\frac{\sqrt{1-\cos^2 x}}{\tan x}$$
 (2) $\frac{\sin x}{\sqrt{1-\sin^2 x}}$ (3) $\frac{\cos^2 x}{1+\sin x}$

Ans: (1) $\cos x$ (2) $\tan x$ (3) $1 - \sin x$

- 4. Given $0^{\circ} < x < 45^{\circ}$ and $\sin x + \cos x = \frac{7}{5}$, find (1) $\sin x \cos x$ (2) $\sin x \cos x$ Ans: (1) $-\frac{1}{5}$ (2) $\frac{12}{25}$
- 5. In rectangle *ABCD*, let *P* be a point on the side \overline{CD} and $\angle PAD = \alpha$, $\angle PBC = \beta$. Given that $\overline{AB} = 6$ and $\overline{BC} = 4$. Find $\tan \alpha + \tan \beta = ?$

Ans: $\frac{3}{2}$

6. The school is organizing an off-campus activity at an amusement park, where there is a Ferris wheel with a diameter of 68 meters. The highest point of the Ferris wheel is 90 meters above the ground, and it rotates counterclockwise at a constant speed, taking 15 minutes to complete one full rotation. John and three friends board the Ferris wheel at point A (as shown in the figure). Ten minutes later, John waves to his teacher on the ground. What is John's approximate height above the ground at this time?



Ans: 73

7. Prove that
$$\frac{1}{1+\sin x} + \frac{1}{1-\sin x} = \frac{2}{\cos^2 x}$$

 $\frac{1}{1+\sin x} + \frac{1}{1-\sin x} = \frac{1-\sin x + 1 + \sin x}{(1+\sin x)(1-\sin x)} = \frac{2}{1-\sin^2 x} = \frac{2}{\cos^2 x}$

製作者:國立臺灣師範大學附屬高級中學 蕭煜修