01-02 삼각비와 활용_Basic_1(빠른 정답)

중3-2 중단원평가 2025.06.13

1. [정답] (1) $\frac{5}{13}$ (2) $\frac{12}{13}$
2. [정답] $\frac{3}{2}$
3. [정답] ⑤
4. [정답] $-\frac{\sqrt{2}}{6}$
5. [정답] 35°

6. [정답] $4,\ 4\sqrt{3}$
7. [정답] ③
8. [정답] ①
9. [정답] (1) 0.6691 (2) 0.7431 (3) 0.9004
10. [정답] $\frac{1}{2}$

11. [정답] $\sqrt{3}$
12. [정답] **1.53**
13. [정답] ①
14. [정답] $\frac{5\sqrt{2}}{8}$
15. [정답] (1) 30°, 45° (2) $h\tan 30^\circ$, $h\tan 45^\circ$
(3)$50(3-\sqrt{3})$

16. [정답] **100**
17. [정답] ⑤
18. [정답] $12\sqrt{3}\,\mathrm{cm}^2$
19. [정답] $\left(\frac{80}{3}\pi-16\right)\mathrm{cm}^2$
20. [정답] $\frac{1}{2}$, $\frac{1}{2}ab$

01-02 삼각비와 활용_Basic_1(해설)

중3-2 중단원평가 2025.06.13

1) [정답] (1) $\frac{5}{13}$ (2) $\frac{12}{13}$

[해설]

피타고라스의 정리에 의해 $\overline{AC}=\sqrt{12^2+5^2}=13$

(1) $\sin A=\frac{\overline{BC}}{\overline{AC}}=\frac{5}{13}$

(2) $\sin C=\frac{\overline{AB}}{\overline{AC}}=\frac{12}{13}$

2) [정답] $\frac{3}{2}$

[해설]

직선 $y=\frac{3}{2}x+1$이 x축, y축과 만나는 점을 각각 A, B라 하면

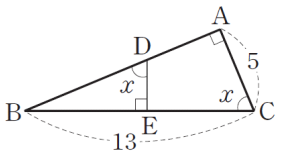
$$A\left(-\frac{2}{3},\ 0\right),\ B(0,\ 1)$$

따라서 직각삼각형 AOB에서 $\overline{OA}=\frac{2}{3}$, $\overline{OB}=1$

$$\therefore\ \tan a=\frac{\overline{OB}}{\overline{OA}}=\frac{3}{2}$$

3) [정답] ⑤

[해설]



$\triangle ABC$ 와 $\triangle EBD$ 에서 $\angle B$는 공통,

$\angle BAC=\angle BED=90^\circ$이므로 $\triangle ABC\sim\triangle EBD$ (AA닮음)

$$\therefore\ \angle BCA=\angle BDE=x$$

$\triangle ABC$ 에서 $\overline{AB}=\sqrt{13^2-5^2}=12$이므로

$$\sin x=\frac{\overline{AB}}{\overline{BC}}=\frac{12}{13}$$

4) [정답] $-\frac{\sqrt{2}}{6}$

[해설]

$\triangle BFH$ 는 $\angle BFH=90^\circ$인 직각삼각형이고

$$\overline{FH}=\sqrt{6^2+6^2}=6\sqrt{2},$$

$$\overline{BH}=\sqrt{6^2+6^2+6^2}=6\sqrt{3}$$

$$\sin x=\frac{\overline{BF}}{\overline{BH}}=\frac{6}{6\sqrt{3}}=\frac{\sqrt{3}}{3}$$

$$\cos x=\frac{\overline{FH}}{\overline{BH}}=\frac{6\sqrt{2}}{6\sqrt{3}}=\frac{\sqrt{6}}{3}$$

$$\tan x=\frac{\overline{BF}}{\overline{FH}}=\frac{6}{6\sqrt{2}}=\frac{\sqrt{2}}{2}$$

$$\therefore\ \sin x\times\cos x-\tan x=\frac{\sqrt{3}}{3}\times\frac{\sqrt{6}}{3}-\frac{\sqrt{2}}{2}$$

$$=\frac{\sqrt{2}}{3}-\frac{\sqrt{2}}{2}$$

$$=-\frac{\sqrt{2}}{6}$$

5) [정답] 35°

[해설]

$20^\circ<x<50^\circ$에서 $40^\circ<2x<100^\circ$

$$\therefore\ 15^\circ<2x-25^\circ<75^\circ$$

$\cos 45^\circ=\frac{\sqrt{2}}{2}$이므로 $2x-25^\circ=45^\circ$

$2x=70^\circ$ $\therefore\ x=35^\circ$

6) [정답] 4, $4\sqrt{3}$

[해설]

$\sin 30^\circ=\frac{x}{8}=\frac{1}{2}$ $\therefore\ x=4$

$\cos 30^\circ=\frac{y}{8}=\frac{\sqrt{3}}{2}$ $\therefore\ y=4\sqrt{3}$

7) [정답] ③

[해설]

$\overline{AD}=\overline{AE}\sin 45^\circ$

$$=6\times\frac{1}{\sqrt{2}}=3\sqrt{2}$$

$\overline{DF}=\overline{AD}\tan 30^\circ$

$$=3\sqrt{2}\times\frac{1}{\sqrt{3}}=\sqrt{6}$$

$$\therefore\ \triangle ADF=\frac{1}{2}\overline{AD}\times\overline{DF}=3\sqrt{3}$$

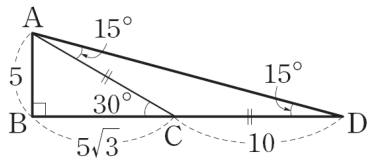
8) [정답] ①

[해설]

$\triangle ABC$ 에서

$$\sin 30^\circ = \frac{5}{\overline{AC}} = \frac{1}{2} \qquad \therefore\ \overline{AC} = 10$$

$$\tan 30^\circ = \frac{5}{\overline{BC}} = \frac{\sqrt{3}}{3} \qquad \therefore\ \overline{BC} = 5\sqrt{3}$$



위의 그림에서 $\angle ADC = \angle DAC$이므로 $\triangle ACD$ 는 이등변삼각형이다.

$$\therefore\ \overline{AC} = \overline{CD} = 10$$

$$\therefore\ \tan 15^\circ = \frac{5}{10+5\sqrt{3}} = \frac{1}{2+\sqrt{3}}$$

$$= \frac{2-\sqrt{3}}{(2+\sqrt{3})(2-\sqrt{3})}$$

$$= 2-\sqrt{3}$$

9) [정답] (1) 0.6691 (2) 0.7431 (3) 0.9004

[해설]

10) [정답] $\frac{1}{2}$

[해설]

$$(\text{준 식}) = 1+\frac{\sqrt{2}}{2}\times\frac{\sqrt{2}}{2}-0-1 = \frac{1}{2}$$

11) [정답] $\sqrt{3}$

[해설]

$45^\circ < A < 90^\circ$ 일 때, $0 < \cos A < \sin A$이므로

$$\cos A - \sin A < 0,\ \sin A + \cos A > 0$$

$$\therefore\ \sqrt{(\cos A-\sin A)^2}+\sqrt{(\sin A+\cos A)^2}$$

$$= -(\cos A-\sin A)+(\sin A+\cos A)$$

$$= 2\sin A$$

이때 $2\sin A = \sqrt{3}$이므로 $\sin A = \frac{\sqrt{3}}{2}$

$$\therefore\ \angle A = 60^\circ$$

$$\therefore\ \tan A = \tan 60^\circ = \sqrt{3}$$

12) [정답] **1.53**

[해설]

$x = 9\sin 38^\circ = 9\times 0.62 = 5.58$

$y = 9\cos 38^\circ = 9\times 0.79 = 7.11$

$$\therefore\ y-x = 7.11-5.58 = 1.53$$

13) [정답] ①

[해설]

$$\overline{FG} = 6\cos 45^\circ = 6\times\frac{\sqrt{2}}{2} = 3\sqrt{2}\ (\text{cm})$$

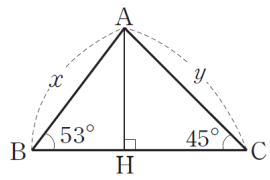
$$\overline{CG} = 6\sin 45^\circ = 6\times\frac{\sqrt{2}}{2} = 3\sqrt{2}\ (\text{cm})$$

따라서 구하는 부피는

$$3\sqrt{2}\times 3\sqrt{2}\times 5 = 90\ (\text{cm}^3)$$

14) [정답] $\frac{5\sqrt{2}}{8}$

[해설]



위의 그림과 같이 꼭짓점 A에서 $\overline{BC}$에 내린 수선의 발을 H라 하면

$$\overline{AH} = y\sin 45^\circ = \frac{\sqrt{2}}{2}y$$

$$\therefore\ x = \frac{\overline{AH}}{\sin 53^\circ} = \frac{\sqrt{2}}{2}y\times\frac{1}{0.8} = \frac{5\sqrt{2}}{8}y$$

$$\therefore\ k = \frac{5\sqrt{2}}{8}$$

15) [정답] (1) **30°**, 45° (2) $h\tan 30^\circ$, $h\tan 45^\circ$ (3)$50(3-\sqrt{3})$

[해설]

(2) $\overline{BH} = h\tan 30^\circ$, $\overline{CH} = h\tan 45^\circ$

(3) $\overline{BH}+\overline{CH} = 100$이므로

$$h(\tan 30^\circ + \tan 45^\circ) = 100$$

$$\therefore\ h = \frac{100}{\tan 30^\circ + \tan 45^\circ}$$

$$= \frac{100}{\frac{\sqrt{3}}{3}+1} = 50(3-\sqrt{3})$$

16) [정답] **100**

[해설]

$\overline{AH}=h$ 라 하면

$\angle CAH=90^\circ-37^\circ=53^\circ$

$\tan 53^\circ=\dfrac{\overline{CH}}{h}$

$\therefore\ \overline{CH}=h\tan 53^\circ=1.32h$

$\angle BAH=90^\circ-(180^\circ-127^\circ)=37^\circ$

$\tan 37^\circ=\dfrac{\overline{BH}}{h}$

$\therefore\ \overline{BH}=h\tan 37^\circ=0.75h$

$\overline{CH}-\overline{BH}=\overline{BC}$ 이므로

$1.32h-0.75h=57$

$0.57h=57$

$\therefore\ h=\dfrac{57}{0.57}=100$

17) [정답] ⑤

[해설]

$\overline{AD}=h$라 하면

$\overline{BD}=h\tan 60^\circ=\sqrt{3}h$, $\overline{CD}=h\tan 45^\circ=h$이므로

$\overline{BC}=\overline{BD}-\overline{CD}=(\sqrt{3}-1)h=100$

$\therefore\ h=\dfrac{100}{\sqrt{3}-1}=50(\sqrt{3}+1)(\mathrm{m})$

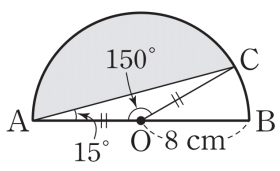
18) [정답] $\mathbf{12\sqrt{3}\,cm^2}$

[해설]

$S=\dfrac{1}{2}\times 6\times 8\times sin(180^\circ-120^\circ)=24\times\dfrac{\sqrt{3}}{2}=12\sqrt{3}$

19) [정답] $\mathbf{\left(\dfrac{80}{3}\pi-16\right)cm^2}$

[해설]



$\overline{OC}$를 그으면 $\overline{OA}=\overline{OC}$이므로

$\angle ACO=15^\circ$

$\angle AOC=180^\circ-(15^\circ+15^\circ)=150^\circ$

$\therefore$ (색칠한 부분의 넓이)

=(부채꼴 AOC의 넓이)$-\triangle AOC$

$=\pi\times 8^2\times\dfrac{150}{360}-\dfrac{1}{2}\times 8\times 8\times sin(180^\circ-150^\circ)$

$=\pi\times 8^2\times\dfrac{5}{12}-\dfrac{1}{2}\times 8\times 8\times\dfrac{1}{2}$

$=\dfrac{80}{3}\pi-16\,(\mathrm{cm}^2)$

20) [정답] $\dfrac{1}{2}$, $\dfrac{1}{2}ab$

[해설]

(가) $\dfrac{1}{2}$ (나) $\dfrac{1}{2}ab$