

TRIGONOMETRY 3D

Form 6

Vol 3

Part 1 – Angle between 2 lines

1. C 2. D 3. D
1. C

Not that $\triangle CGH$, $\triangle CEH$ and $\triangle CGH$ are congruent triangles.
i.e. $\triangle CGE$ is equilateral.

2. D

$$x = \sqrt{6^2 + 8^2} = 10$$

$$y = \sqrt{10^2 + 10^2} = 10\sqrt{2} \approx 14.1$$

3. D

$$x = \sqrt{9^2 + 12^2} = 15$$

$$\tan \theta = \frac{5}{15} = \frac{1}{3}$$

Part 2 – Angle between line and plane

1. B 2. B 3. A 4. C 5. B
6. D 7. C
1. B

$$CF = \sqrt{4^2 + 12^2} = \sqrt{160} \text{ cm}$$

$$\tan \angle ECF = \frac{EF}{CF} = \frac{3}{\sqrt{160}}$$

$$\angle ECF \approx 13.3423638^\circ$$

$$\angle ECF \approx 13.3^\circ$$

2. B

$$FM = \sqrt{6^2 + 8^2} = 10 \text{ cm}$$

$$\tan \angle AMF = \frac{AF}{FM} = \frac{6}{10}$$

$$\angle AMF \approx 30.96375653^\circ$$

$$\angle AMF \approx 31^\circ$$

3. A

$$BM = \sqrt{0.5^2 + 0.5^2} = \sqrt{0.5} \text{ cm}$$

$$\tan \angle GMB = \frac{GB}{BM} = \frac{1}{\sqrt{0.5}}$$

$$\angle GMB \approx 54.73561032^\circ$$

$$\angle AMF \approx 55^\circ$$

4. C

$$DH = \sqrt{8^2 + 12^2} = 4\sqrt{13} \text{ cm}$$

$$AH = \sqrt{8^2 + 8^2 + 12^2} = 4\sqrt{17} \text{ cm}$$

5. B

$$\angle AHD = \tan^{-1} \frac{8}{4\sqrt{13}} \approx 29^\circ$$

6. D

$$FH = \sqrt{8^2 + 8^2} = 8\sqrt{2} \text{ cm}$$

$$\angle AHF = \tan^{-1} \frac{12}{8\sqrt{2}} \approx 47^\circ$$

7. C

Denote the midpoint of AB by M .

Note that $\triangle VMC$ is right-angled isosceles triangle.

$$\therefore \angle VCA = 45^\circ$$

Part 3 – Angle between 2 planes (with horizontal)

1. B 2. A 3. B 4. A 5. C
6. C 7. D 8. B

1. B

Denote the midpoint of BC by X and midpoint of AD by Y .

$$VM = VC \sin 60^\circ = \sqrt{3}x \text{ cm}$$

$$\cos \angle VXY = \frac{\frac{1}{2}XY}{VX} = \frac{x}{\sqrt{3}x}$$

$$\angle VXY \approx 54.73561032^\circ$$

$$\angle VXY \approx 54.7^\circ$$

2. A

$$VM = VB \sin 60^\circ = \sqrt{3}k \text{ cm}$$

Let θ be the required angle.

$$\tan \theta = \frac{\sqrt{3}k}{2k}$$

$$\theta \approx 40.89339465^\circ$$

$$\theta \approx 40.9^\circ$$

3. B

$$\tan \frac{\theta}{2} = \frac{1}{2}$$

$$\frac{\theta}{2} \approx 26.56505118^\circ$$

$$\theta \approx 53.13010235^\circ$$

$$\tan \theta = \frac{4}{3}$$

4. A

$$MD = \sqrt{7^2 + 10^2} = \sqrt{149} \approx 12.2 \text{ cm}$$

5. C

$$\angle VDM = \tan^{-1} \frac{20}{\sqrt{149}} = 58.6^\circ$$

6. C

$$\text{required angle} = \tan^{-1} \frac{VM}{CD} = \tan^{-1} 2 \approx 63.4^\circ$$

7. D

$$FM = \frac{\sqrt{4^2 + 4^2}}{2} = \frac{\sqrt{32}}{2} = 2\sqrt{2} \approx 2.83 \text{ cm}$$

8. B

$$\angle AMF = \tan^{-1} \frac{4}{2\sqrt{2}} \approx 55^\circ$$