Trigonometric Ratios (Acute Angles)

1. If $\cos\theta = x$ and $0° < \theta < 90°$, then $\tan\theta =$

   A. $\dfrac{1}{\sqrt{1-x^2}}$.
   B. $\sqrt{1-x^2}$.
   C. $\dfrac{\sqrt{1-x^2}}{x}$.
   D. $\dfrac{x}{\sqrt{1-x^2}}$.
   E. $\pm\dfrac{x}{\sqrt{1-x^2}}$.

   [1980-CE-MATHS 2-17]

2. If $0° < \theta < 90°$ and $\sin\theta = \dfrac{k}{2}$, then $\cos\theta =$

   A. $1-\dfrac{k}{2}$.
   B. $\dfrac{2}{\sqrt{4+k^2}}$.
   C. $\dfrac{\sqrt{4+k^2}}{2}$.
   D. $\dfrac{2}{\sqrt{4-k^2}}$.
   E. $\dfrac{\sqrt{4-k^2}}{2}$.

   [1981-CE-MATHS 2-18]

3. If $\tan\theta = \dfrac{2ab}{a^2-b^2}$ and $0° < \theta < 90°$, then $\cos\theta =$

   A. $\dfrac{a^2+b^2}{a^2-b^2}$.
   B. $\dfrac{a^2-b^2}{a^2+b^2}$.
   C. $\dfrac{a^2-b^2}{\sqrt{a^2+b^2}}$.
   D. $\dfrac{\sqrt{a^2-b^2}}{a^2+b^2}$.
   E. $\sqrt{\dfrac{a^2-b^2}{a^2+b^2}}$.

   [1985-CE-MATHS 2-18]

4. If $0° < x < y < 90°$, which of the following must be true?

   (1) $\sin x < \sin y$
   (2) $\cos x < \cos y$
   (3) $\sin x < \cos y$

   A. (1) only
   B. (2) only
   C. (1) and (2) only
   D. (1) and (3) only
   E. (2) and (3) only

   [2001-CE-MATHS 2-17]

5. If $45° < \theta < 90°$, which of the following must be true?

   (1) $\tan\theta > \sin\theta$
   (2) $\tan\theta > \cos\theta$
   (3) $\cos\theta > \sin\theta$

   A. (1) and (2) only
   B. (1) and (3) only
   C. (2) and (3) only
   D. (1), (2) and (3)

   [2002-CE-MATHS 2-22]

6. If θ is an acute angle and $\sin\theta = \cos\theta$, then $\cos\theta =$

   A. $\dfrac{1}{2}$.
   B. $\dfrac{\sqrt{2}}{2}$.
   C. $\dfrac{\sqrt{3}}{2}$.
   D. 1 .

   [2003-CE-MATHS 2-22]

7. If $0° < \theta < 45°$, which of the following must be true?

   (1) $\tan\theta < \cos\theta$
   (2) $\sin\theta < \tan\theta$
   (3) $\sin\theta < \cos\theta$

   A. (1) only
   B. (3) only
   C. (1) and (2) only
   D. (2) and (3) only

   [2006-CE-MATHS 2-22]

8. In ΔABC, $AB : BC : AC = 3 : 4 : 5$. Find $\tan A : \cos C$.

   A. 3 : 5
   B. 4 : 3
   C. 4 : 5
   D. 5 : 3

   [2009-CE-MATHS 2-25]

Trigonometric Ratios (Up to 360°)

9. If $\sin\theta = -\dfrac{5}{7}$ and $180° < \theta < 270°$, then $\tan\theta =$

   A. $\dfrac{\sqrt{7^2-5^2}}{5}$.
   B. $-\dfrac{\sqrt{7^2-5^2}}{5}$.

C. $\frac{5}{\sqrt{7^2-5^2}}$.

D. $-\frac{5}{\sqrt{7^2-5^2}}$.

E. $\frac{5}{\sqrt{7^2+5^2}}$.

[1977-CE-MATHS 2-21]

10. $1 + \cos 180° =$

A. 0 .
B. 1 .
C. 2 .
D. $1 - 180°$.
E. $1 + 180°$.

[1977-CE-MATHS 2-22*]

11. $\tan 225° =$

A. -1 .
B. 0 .
C. 1 .
D. $\sqrt{2}$.
E. $\frac{1}{\sqrt{2}}$.

[SP-CE-MATHS 2-31*]

12. If θ increases from 135° to 180°, then $\tan\theta$ increases from

A. negative infinity to -1.
B. 1 to infinity.
C. -1 to 0.
D. 0 to 1.
E. -1 to 1.

[SP-CE-MATHS 2-50]

13. In ΔABC, $\cos A = \frac{\sqrt{3}}{2}$ and $\cos B = \frac{\sqrt{2}}{2}$. Then $\cos 2(A+B) =$

A. $\sqrt{3}+\sqrt{2}$.
B. $\frac{1}{2}$.
C. $-\frac{1}{2}$.
D. $\frac{\sqrt{3}}{2}$.
E. $-\frac{\sqrt{3}}{2}$.

[SP-CE-MATHS A2-46]

14. $\sin 300° =$

A. 60° .
B. $\sin 60°$.
C. $-\sin 60°$.
D. $\cos 60°$.
E. $-\cos 60°$.

[1979-CE-MATHS 2-7]

15. If $\tan\theta$ and $\cos\theta$ are both negative, what are the possible quadrants in which θ could lie?

A. the first quadrant only
B. the second quadrant only
C. the third quadrant only
D. the fourth quadrant only
E. any of the four quadrant

[1979-CE-MATHS 2-16]

16. When θ increases from 180° to 270°, $\sin\theta$

A. increases from -1 to 0.
B. increases from 0 to 1.
C. decreases from 1 to 0.
D. decreases from 0 to -1.
E. decreases from 1 to -1.

[1979-CE-MATHS 2-40]

17. If $\tan x = -\frac{3}{4}$ and x is an angle in the second quadrant, what is the value of $\sin x + \cos x$?

A. $-\frac{7}{5}$
B. $-\frac{1}{5}$
C. $\frac{1}{5}$
D. 1
E. $\frac{7}{5}$

[1982-CE-MATHS 2-18]

18. If $\tan A = -\frac{5}{4}$, then $\frac{2\sin A - 3\cos A}{3\sin A + 2\cos A} =$

A. $-\frac{22}{7}$.
B. $-\frac{22}{23}$.
C. $-\frac{2}{23}$.
D. $\frac{2}{23}$.
E. $\frac{22}{7}$.

[1988-CE-MATHS 2-16]

19. If $\tan\theta = -\frac{4}{3}$ and θ lies in the second quadrant, then $\sin\theta - 2\cos\theta =$

A. 2.
B. -2.
C. $\frac{11}{5}$.
D. $\frac{2}{5}$.
E. $-\frac{2}{5}$.

[1990-CE-MATHS 2-18]

Range of Trigonometric Functions

20. What is the smallest possible value of $\sin x\cos y$?

A. -1
B. $-\frac{1}{2}$
C. 0
D. $\frac{1}{2}$
E. 1

[SP-CE-MATHS A2-45]

21. If $0^\circ \le \theta \le 360^\circ$, the minimum value of

$$1 + 2\cos\frac{\theta}{2}$$

is

A. -2.
B. -1.
C. 0.
D. 1.
E. 2.

[1981-CE-MATHS 2-44]

22. If $0^\circ \le x \le 180^\circ$ and $\sin x \le \cos x$, what is the range of x?

A. $0^\circ \le x \le 45^\circ$
B. $0^\circ \le x \le 90^\circ$
C. $45^\circ \le x \le 90^\circ$
D. $45^\circ \le x \le 180^\circ$
E. $90^\circ \le x \le 180^\circ$

[1982-CE-MATHS 2-49*]

23. The maximum value of $\cos^2 3x$ is

A. 1.
B. 2.
C. 3.
D. 6.
E. 9.

[1983-CE-MATHS 2-49]

24. The greatest value of $\frac{3}{4+2\cos\theta}$ is

A. 3.
B. $\frac{3}{2}$.
C. $\frac{3}{4}$.
D. $\frac{3}{5}$.
E. $\frac{1}{2}$.

[1984-CE-MATHS 2-44]

25. If $0^\circ \le \theta \le 360^\circ$, then the largest value of $2\sin^2\theta + \cos^2\theta + 2$ is

A. 1.
B. 2.
C. 3.
D. 4.
E. 5.

[1985-CE-MATHS 2-46]

26. If x and y can take any value between 0 and 360, what is the greatest value of $2\sin x^\circ - \cos y^\circ$?

A. 1
B. 2
C. 3
D. $\sqrt{5}$
E. It cannot be found.

[1988-CE-MATHS 2-47]

27. The least value of $9\cos^2\theta - 6\cos\theta + 1$ is

A. -4.
B. 0.
C. 1.
D. 4.
E. 16.

[1989-CE-MATHS 2-15]

28. The greatest value of $1 - 2\sin\theta$ is

A. 5.
B. 3.
C. 1.
D. 0.
E. -1.

[1992-CE-MATHS 2-18]

29. The largest value of $3\sin^2\theta + 2\cos^2\theta - 1$ is

A. 1.
B. $\frac{3}{2}$.
C. 2.
D. 3.
E. 4.

[1993-CE-MATHS 2-22]

30. The largest value of $(3\cos 2\theta - 1)^2 + 1$ is

A. 2 .
B. 5 .
C. 17 .
D. 26 .
E. 50 .

[1994-CE-MATHS 2-48]

31. The greatest value of $\dfrac{1}{2^{1-\sin x}}$ is

A. $\dfrac{1}{2}$.
B. $\dfrac{1}{4}$.
C. 1 .
D. 2 .
E. 4 .

[1995-CE-MATHS 2-18]

32. For $0° \le \theta < 90°$, the maximum value of $\dfrac{2}{3+\sin^2\theta}$ is

A. $\dfrac{2}{5}$.
B. $\dfrac{1}{2}$.
C. $\dfrac{2}{3}$.
D. 1 .

[2002-CE-MATHS 2-21]

33. For $0° \le x \le 90°$, the least value of $\dfrac{4}{2-\cos x}$ is

A. 0 .
B. 1 .
C. 2 .
D. 4 .

[2004-CE-MATHS 2-20]

34. For $0° \le \theta \le 90°$, the greatest value of $\dfrac{5-\sin\theta}{4+\sin\theta}$ is

A. $\dfrac{4}{5}$.
B. 1 .
C. $\dfrac{5}{4}$.
D. 2 .

[2005-CE-MATHS 2-20]

35. For $0° \le \theta \le 360°$, the least value of $\dfrac{2+\sin\theta}{2-\sin\theta}$ is

A. -1 .
B. $\dfrac{1}{3}$.
C. 1 .
D. 3 .

[2008-CE-MATHS 2-47]

HKDSE Problems

36. For $0° \le \theta \le 90°$, the least value of $\dfrac{30}{3\sin^2\theta + 2\sin^2(90° - \theta)}$ is

A. 5 .
B. 6 .
C. 10 .
D. 15 .

[PP-DSE-MATHS 2-23]

Trigonometric Relationships (1)

1. If $A + B = 180°$, which of the following is/are true?

   (1) $\sin A = \sin B$
   (2) $\cos A = \cos B$
   (3) $\tan A = \tan B$

   A. (1) only
   B. (2) only
   C. (3) only
   D. (1), (2) and (3)
   E. none of them

   [1982-CE-MATHS 2-19]

2. $\dfrac{\cos(90° - \theta)}{\tan(180° - \theta)} =$

   A. $\cos\theta$.
   B. $-\cos\theta$.
   C. $-\dfrac{\sin^2\theta}{\cos\theta}$.
   D. $-\dfrac{\cos^2\theta}{\sin\theta}$.
   E. $\dfrac{\sin^2\theta}{\cos\theta}$.

   [1983-CE-MATHS 2-17]

3. $\sin(180° + \theta) + \sin(\theta - 90°) =$

   A. $\sin\theta + \cos\theta$.
   B. $\sin\theta - \cos\theta$.
   C. $\cos\theta - \sin\theta$.
   D. $-\cos\theta - \sin\theta$.
   E. $2\sin\theta$.

   [1990-CE-MATHS 2-16]

4. $\dfrac{\sin(\theta - 90°)}{\tan(\theta + 180°)} =$

   A. $\cos\theta$.
   B. $-\cos\theta$.
   C. $\dfrac{\cos^2\theta}{\sin\theta}$.
   D. $-\dfrac{\cos^2\theta}{\sin\theta}$.
   E. $\dfrac{1}{\sin\theta}$.

   [1991-CE-MATHS 2-17]

5. If $A + B + C = 180°$, then $1 + \cos A \cos(B + C) =$

   A. 0 .
   B. $\sin^2 A$.
   C. $1 + \cos^2 A$.
   D. $1 + \sin A \cos A$.
   E. $1 - \sin A \cos A$.

   [1992-CE-MATHS 2-21]

6. $\dfrac{\sin(180° + \theta)}{\cos(90° - \theta)} =$

   A. $\tan\theta$.
   B. $-\tan\theta$.
   C. $\dfrac{1}{\tan\theta}$.
   D. 1 .
   E. -1 .

   [1994-CE-MATHS 2-18]

7. $\dfrac{\cos(90° - A)\sin(180° - A)}{\tan(360° - A)} =$

   A. $-\sin A \cos A$.
   B. $\sin A \cos A$.
   C. $-\cos^2 A$.
   D. $\cos^2 A$.
   E. $\sin^2 A$.

   [1997-CE-MATHS 2-40]

8. $\dfrac{\cos(90° - A)\cos(-A)}{\sin(360° - A)} =$

   A. $-\cos A$.
   B. $\cos A$.
   C. $\sin A$.
   D. $-\dfrac{\cos^2 A}{\sin A}$.
   E. $\dfrac{\cos^2 A}{\sin A}$.

   [1999-CE-MATHS 2-46]

9. If $\cos\theta = \dfrac{1}{k}$ and $0° < \theta < 90°$, then $\tan(\theta - 270°) =$

   A. $-\dfrac{k}{\sqrt{1-k^2}}$.
   B. $-\dfrac{1}{\sqrt{k^2-1}}$.
   C. $\dfrac{1}{\sqrt{k^2-1}}$.
   D. $-\sqrt{k^2-1}$.
   E. $\sqrt{k^2-1}$.

   [2000-CE-MATHS 2-51]

10. If $\sin\theta = \frac{3}{5}$ and θ lies in the first quadrant, then $\sin(90° - \theta) + \sin(180° + \theta) =$

A. $\frac{1}{5}$.
B. $\frac{-1}{5}$.
C. $\frac{7}{5}$.
D. $\frac{-7}{5}$.

[2002-CE-MATHS 2-46]

11. $[1 + \cos(180° + \theta)][1 - \cos(180° - \theta)] =$

A. $\sin^2\theta$.
B. $(1 - \cos\theta)^2$.
C. $(1 + \cos\theta)^2$.
D. $(1 - \cos\theta)(1 - \sin\theta)$.

[2002-CE-MATHS 2-47*]

12. $\frac{\tan(180° - \theta)}{\cos(90° - \theta)} =$

A. $\frac{1}{\cos\theta}$.
B. $\frac{-1}{\cos\theta}$.
C. $\frac{\sin\theta}{\cos^2\theta}$.
D. $\frac{-\sin\theta}{\cos^2\theta}$.

[2003-CE-MATHS 2-46]

13. If $A + B = 180°$, which of the following must be true?

(1) $\sin A = \sin B$
(2) $\cos A = \sin B$
(3) $\cos A = \cos B$

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

[2004-CE-MATHS 2-47*]

14. $\sin(90° - x) + \cos(x + 180°) =$

A. 0 .
B. $-2\cos x$.
C. $\sin x + \cos x$.
D. $\sin x - \cos x$.

[2005-CE-MATHS 2-45]

15. $2\sin(90° - \theta)\sin 60° - \cos 0°\cos\theta =$

A. $\sin\theta$.
B. $\sqrt{3}\sin\theta$.
C. $\sqrt{3}\cos\theta$.
D. $(\sqrt{3} - 1)\cos\theta$.

[2006-CE-MATHS 2-21]

16. If x and y are acute angles such that $x + y = 90°$, which of the following must be true?

(1) $\sin x = \cos y$
(2) $\sin(90° - x) = \cos(90° - y)$
(3) $\tan x \tan y = 1$

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

[2007-CE-MATHS 2-20]

17. $\frac{\cos A}{\tan(90° - A)} =$

A. $\sin A$.
B. $\cos A$.
C. $\frac{1}{\sin A}$.
D. $\frac{1}{\cos A}$.

[2008-CE-MATHS 2-23]

18. If A and B are acute angles such that $A + B = 90°$, then $\cos^2 A + \sin^2 B =$

A. 1 .
B. $2\sin^2 A$.
C. $2\cos^2 A$.
D. $2\cos^2 B$.

[2009-CE-MATHS 2-24]

19. If θ is an acute angle, then $\tan\theta + \tan(90° - \theta) =$

A. $2\tan\theta$.
B. $\sin\theta + \cos\theta$.
C. $\frac{1}{\tan\theta}$.
D. $\frac{1}{\sin\theta\cos\theta}$.

[2010-CE-MATHS 2-22]

20. If x, y and z are the angles of a triangle with $x + y = 90°$, which of the following are true?

(1) $\tan x \tan y = \sin z$
(2) $\cos y + \cos z = \sin x$
(3) $\sin^2 x + \sin^2 y = \sin^2 z$

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

[2011-CE-MATHS 2-20]

Trigonometric Relationships (2)

21. If the expression $\dfrac{\dfrac{\cos x}{\sin x}-\dfrac{\sin x}{\cos x}}{\dfrac{\cos x}{\sin x}+\dfrac{\sin x}{\cos x}}$ is simplified, it becomes

A. $\cos^2 x - \sin^2 x$.
B. $(\cos x - \sin x)^2$.
C. $(\cos x + \sin x)^2$.
D. $\dfrac{\cos^2 x - \sin^2 x}{2\sin x\cos x}$.
E. $\left(\dfrac{\cos x - \sin x}{\cos x + \sin x}\right)^2$.

[1972-CE-MATHS B1-6]

22. $\dfrac{1}{1+\tan^2\theta} =$

A. $\sin^2\theta$.
B. $\cos^2\theta$.
C. $\tan^2\theta$.
D. $1+\cos^2\theta$.
E. $1+\dfrac{1}{\tan^2\theta}$.

[SP-CE-MATHS 2-26]

23. $\left(\dfrac{1}{\sin\theta}+\dfrac{1}{\tan\theta}\right)(1-\cos\theta) =$

A. $\sin\theta$.
B. $\cos\theta$.
C. $\sin^2\theta$.
D. $\cos\theta + 1$.
E. $\sin\theta + \tan\theta$.

[1978-CE-MATHS 2-3]

24. $\dfrac{1}{1-\sin\theta}+\dfrac{1}{1+\sin\theta} =$

A. $2\sin^2\theta$.
B. $2\cos^2\theta$.
C. $2\tan^2\theta$.
D. $\dfrac{2}{\sin^2\theta}$.
E. $\dfrac{2}{\cos^2\theta}$.

[1979-CE-MATHS 2-6]

25. $\tan\theta + \dfrac{1}{\tan\theta} =$

A. 1 .
B. $2\tan\theta$.
C. $\dfrac{2}{\tan\theta}$.
D. $\sin\theta\cos\theta$.
E. $\dfrac{1}{\sin\theta\cos\theta}$.

[1979-CE-MATHS 2-30]

26. $\dfrac{1}{\dfrac{1}{\sin\theta}-1}-\dfrac{1}{\dfrac{1}{\sin\theta}+1} =$

A. $2\tan\theta$.
B. $2\tan^2\theta$.
C. $\dfrac{2}{\tan^2\theta}$.
D. $\dfrac{2\sin\theta}{\cos^2\theta}$.
E. $\dfrac{2\sin^2\theta}{\cos\theta}$.

[1980-CE-MATHS 2-16]

27. $\tan\theta\sin\theta - \dfrac{1}{\cos\theta} =$

A. 0 .
B. $\cos\theta$.
C. $-\cos\theta$.
D. $\dfrac{-1}{\cos\theta}$.
E. $-\tan\theta\sin\theta$.

[1981-CE-MATHS 2-19]

28. $(\sin\theta+\cos\theta)^2 - 1 =$

A. 0 .
B. 1 .
C. $2\cos^2\theta$.
D. $2\sin\theta\cos\theta$.
E. $-2\sin\theta\cos\theta$.

[1982-CE-MATHS 2-17]

29. $\dfrac{\sin\theta+\cos\theta}{\sin\theta-\cos\theta}+\dfrac{\sin\theta-\cos\theta}{\sin\theta+\cos\theta} =$

A. 2 .
B. $4\sin\theta\cos\theta$.
C. $\dfrac{2\sin\theta\cos\theta}{\sin^2\theta-\cos^2\theta}$.
D. $\dfrac{4\sin\theta\cos\theta}{\sin^2\theta-\cos^2\theta}$.
E. $\dfrac{2}{\sin^2\theta-\cos^2\theta}$.

[1982-CE-MATHS 2-45]

30. $\sin^2\theta - (\sin^2\theta\cos^4\theta + \sin^4\theta\cos^2\theta) =$

A. $\sin^4\theta$.
B. $\cos^4\theta$.
C. $-\sin^4\theta$.
D. $-\cos^4\theta$.
E. $\sin^2\theta\cos^2\theta$.

[1983-CE-MATHS 2-16]

31. $\dfrac{\tan^2\theta}{1+\tan^2\theta} + \cos^2\theta =$

A. 1 .
B. $\dfrac{1}{2} + \cos^2\theta$.
C. $\cos^2\theta$.
D. $1 + \tan^2\theta$.
E. $1 + \cos^2\theta$.

[1984-CE-MATHS 2-17]

32. $\tan\theta\,(\dfrac{1}{\sin\theta} - \sin\theta) =$

A. 1 .
B. $\cos\theta$.
C. $\sin\theta$.
D. $\dfrac{1}{\cos\theta}$.
E. $\dfrac{1}{\sin\theta}$.

[1985-CE-MATHS 2-17]

33. $\sin^4\theta - \cos^4\theta =$

A. -1 .
B. $1 - 2\cos^4\theta$.
C. $\sin\theta - \cos\theta$.
D. $\sin^2\theta - \cos^2\theta$.
E. $2\sin^4\theta - 1$.

[1986-CE-MATHS 2-16]

34. $\dfrac{1}{\dfrac{1}{\cos\theta} - 1} - \dfrac{1}{\dfrac{1}{\cos\theta} + 1} =$

A. $\dfrac{2}{\tan^2\theta}$.
B. $\dfrac{2}{\tan\theta}$.
C. $2\tan^2\theta$.
D. $\dfrac{2\cos\theta}{\sin^2\theta}$.
E. $\dfrac{2\cos^2\theta}{\sin\theta}$.

[1989-CE-MATHS 2-16]

35. $(\dfrac{1}{\cos\theta} + \tan\theta)(1 - \sin\theta) =$

A. $\sin\theta$.
B. $\cos\theta$.
C. $\cos^2\theta$.
D. $1 + \sin\theta$.
E. $\sin\theta\tan\theta$.

[1991-CE-MATHS 2-16]

36. $\dfrac{\cos\theta}{1-\sin^2\theta} \cdot \dfrac{1-\cos^2\theta}{\sin\theta} =$

A. $\sin\theta$.
B. $\cos\theta$.
C. $\tan\theta$.
D. $\dfrac{1}{\sin\theta}$.
E. $\dfrac{1}{\cos\theta}$.

[1993-CE-MATHS 2-19]

37. $\cos^4\theta - \sin^4\theta + 2\sin^2\theta =$

A. 0 .
B. 1 .
C. $(1 - \sin^2\theta)^2$.
D. $(1 - \cos^2\theta)^2$.
E. $(\cos^2\theta - \sin^2\theta)^2$.

[1993-CE-MATHS 2-20]

38. $\dfrac{\cos\theta}{\sin\theta + 1} - \dfrac{\cos\theta}{\sin\theta - 1} =$

A. $\dfrac{2}{\cos\theta}$.
B. $-\dfrac{2}{\cos\theta}$.
C. 0 .
D. $2\tan\theta$.
E. $-2\tan\theta$.

[1994-CE-MATHS 2-16]

39. $\dfrac{\cos^2\theta}{1+\sin\theta} - 1 =$

A. $-\sin\theta$.
B. $\sin\theta$.
C. $\sin\theta - 2$.
D. $-\dfrac{\sin\theta(1-\sin\theta)}{1+\sin\theta}$.
E. $\dfrac{\sin\theta(1-\sin\theta)}{1+\sin\theta}$.

[1995-CE-MATHS 2-16]

40. $\dfrac{\dfrac{1}{\cos\theta} - \cos\theta}{\tan^2\theta} =$

A. $\sin\theta$.
B. $\cos\theta$.
C. $\cos^2\theta$.
D. $\dfrac{1}{\cos\theta}$.
E. $\dfrac{1}{\tan\theta}$.

[1996-CE-MATHS 2-20]

41. $\dfrac{1+\sin\theta}{\cos\theta} + \dfrac{\cos\theta}{1+\sin\theta} =$

A. 1 .
B. $2(1+\sin\theta)$.
C. $\dfrac{2}{\cos\theta}$.
D. $\dfrac{2}{\cos\theta\,(1+\sin\theta)}$.
E. $\dfrac{1+\sin\theta+\cos\theta}{\cos\theta\,(1+\sin\theta)}$.

[1998-CE-MATHS 2-44]

42. If $\tan(90° - \theta) = 2$, then $\dfrac{\sin^3\theta + \sin\theta\cos^2\theta}{\cos\theta}$ =

A. 2 .
B. $\dfrac{1}{2}$.
C. $\dfrac{1}{\sqrt{5}}$.
D. $-\dfrac{1}{2}$.
E. -2 .

[2001-CE-MATHS 2-43]

43. $\dfrac{\cos\theta - \dfrac{1}{\cos\theta}}{\sin\theta} =$

A. $-\tan\theta$.
B. $\tan\theta$.
C. $\dfrac{-\sin^3\theta}{\cos\theta}$.
D. $\dfrac{\cos\theta - 1}{\sin\theta\cos\theta}$.

[2004-CE-MATHS 2-46]

44. $\dfrac{\cos A}{\sin A} + \dfrac{\sin A}{\cos A} =$

A. 1 .
B. $1 + \tan^2 A$.
C. $\sin A \cos A$.
D. $\dfrac{1}{\sin A\cos A}$.

[2007-CE-MATHS 2-21]

Harder Trigonometric Relationships

45. If $R\sin\theta = 2$ and $R\cos\theta = 3$, then $R^2 =$

A. 1 .
B. 5 .
C. 6 .
D. 13 .
E. 25 .

[1978-CE-MATHS 2-10]

46. Given that $\sin\theta - \cos\theta = \frac{1}{2}$, what is the value of $\sin\theta\cos\theta$?

A. $\frac{1}{2}$
B. $\frac{1}{4}$
C. $\frac{3}{8}$
D. $\frac{3}{4}$
E. it cannot be determined

[1981-CE-MATHS 2-43]

47. If $\sin\theta\cos\theta = \frac{1}{4}$, then $(\sin\theta + \cos\theta)^2 =$

A. 2 .
B. $\frac{3}{2}$.
C. 1 .
D. $\frac{1}{2}$.
E. $\frac{1}{4}$.

[1986-CE-MATHS 2-14]

48. $\cos 90° + \cos 180° + \cos 270° + \cos 360° + \dots + \cos 1800° =$

A. 0 .
B. 1 .
C. -1 .
D. 10 .
E. -10 .

[1991-CE-MATHS 2-47*]

49. $\sin^2 1° + \sin^2 3° + \sin^2 5° + ... + \sin^2 87° + \sin^2 89° =$

A. 22 .
B. 22.5 .
C. 44.5 .
D. 45 .

[2005-CE-MATHS 2-46]

50. $\cos^2 1° + \cos^2 2° + \cos^2 3° + ... + \cos^2 89° + \cos^2 90° =$

A. 44 .
B. 44.5 .
C. 45 .
D. 45.5 .

[2010-CE-MATHS 2-46]

HKDSE Problems

51. $\dfrac{\sin\theta}{\cos 60°} + \dfrac{\cos(270° - \theta)}{\tan 45°} =$

A. $\sin\theta$.
B. $3\sin\theta$.
C. $2\sin\theta - \cos\theta$.
D. $2\sin\theta + \cos\theta$.

[SP-DSE-MATHS 2-19]

52. $\dfrac{\cos 60°}{1 - \cos(90° - \theta)} + \dfrac{\cos 240°}{1 - \cos(270° - \theta)} =$

A. $\dfrac{1}{\cos^2\theta}$.
B. $\dfrac{\cos\theta}{\tan\theta}$.
C. $\dfrac{\tan\theta}{\cos\theta}$.
D. $\dfrac{1}{\cos\theta\tan\theta}$.

[2012-DSE-MATHS 2-19]

53. For $0° < x < 90°$, which of the following must be true?

(1) $\tan x \tan(90° - x) = 1$
(2) $\sin x - \sin(90° - x) < 0$
(3) $\cos x + \cos(90° - x) > 0$

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

[2013-DSE-MATHS 2-23]

54. $(\cos(90° + \theta) + 1)(\sin(360° - \theta) - 1) =$

A. $-\cos^2\theta$.
B. $-\sin^2\theta$.
C. $\cos^2\theta$.
D. $\sin^2\theta$.

[2014-DSE-MATHS 2-19]

55. $\dfrac{\cos 180°}{1 + \sin(90° + \theta)} + \dfrac{\cos 360°}{1 + \sin(270° + \theta)} =$

A. 0 .
B. $\dfrac{2}{\cos\theta}$.
C. $\dfrac{2\cos\theta}{\sin^2\theta}$.
D. $\dfrac{2\sin\theta}{\cos^2\theta}$.

[2015-DSE-MATHS 2-19]

Trigonometric Equations

1. The number of solutions of the equation $\cos x = \tan x$ for $0° \le x \le 360°$ is

   A. 0 .
   B. 1 .
   C. 2 .
   D. 3 .
   E. 4 .

   [1972-CE-MATHS B1-7]

2. If $0° \le x° \le 360°$, the solution set of $\cos^2 x° - 3\sin^2 x° = 0$ is

   A. {30, 120} .
   B. {60, 240} .
   C. {30, 120, 210, 300} .
   D. {60, 150, 240, 330} .
   E. {30, 150, 210, 330} .

   [1977-CE-MATHS 2-32]

3. If θ is an acute angle, and $\cos\theta \doteq 0.4300$, then $\theta =$

   A. 64.42° .
   B. 64.47° .
   C. 64.50° .
   D. 64.53° .
   E. 64.58° .

   [1978-CE-MATHS A2-46*]

4. If $0° \le \theta \le 90°$ and $\sin\theta = \cos 5\theta$, then θ could be

   A. 15° .
   B. 22½° .
   C. 30° .
   D. 45° .
   E. 60° .

   [SP-CE-MATHS 2-49]

5. What is the solution of the equation

   $$\sin\theta(\sin\theta - \sqrt{2}) = 0,$$

   where $0° \le \theta \le 90°$?

   A. $\theta = 0°$ only
   B. $\theta = 30°$ only
   C. $\theta = 45°$ only
   D. $\theta = 0°$ or $\theta = 30°$
   E. $\theta = 0°$ or $\theta = 45°$

   [1978-CE-MATHS 2-21]

6. Given that $0° \le \theta \le 360°$, if $\sqrt{2}\sin\theta = 1$ and $\sqrt{2}\cos\theta = -1$, then $\theta =$

   A. 45° only .
   B. 135° only .
   C. 225° only .
   D. 315° only .
   E. 45° or 135° or 225° or 315° .

   [1978-CE-MATHS 2-22]

7. What is the solution of the equation

   $$(\sin\theta - 2)(\cos\theta + 1) = 0,$$

   where $0° \le \theta \le 360°$?

   A. $\theta = 30°$ only
   B. $\theta = 90°$ only
   C. $\theta = 180°$ only
   D. $\theta = 30°$ or 150°
   E. $\theta = 30°$ or 150° or 180°

   [1979-CE-MATHS 2-31]

8. If $0° \le \theta < 360°$, which of the following equations has exactly one root?

   A. $\sin\theta = -1$
   B. $\sin\theta = -\frac{1}{2}$
   C. $\sin\theta = 0$
   D. $\sin\theta = \frac{1}{2}$
   E. $\sin\theta = 2$

   [1980-CE-MATHS 2-18]

9. If $0° \le \theta \le 360°$, the number of roots of the equation

   $$2\sin\theta\cos\theta - \cos\theta = 0$$

   is

   A. 0 .
   B. 1 .
   C. 2 .
   D. 3 .
   E. 4 .

   [1981-CE-MATHS 2-20]

10. How many roots has the equation

    $$\sin\theta + \sin^2\theta = \cos^2\theta$$

    where $0° \le \theta \le 360°$?

    A. 0
    B. 1
    C. 2
    D. 3
    E. 4

    [1982-CE-MATHS 2-48]

11. If $0° \le \theta < 360°$, the number of roots of the equation

$$4\sin^2\theta\cos\theta = \cos\theta$$

is

A. 2.
B. 3.
C. 4.
D. 5.
E. 6.

[1983-CE-MATHS 2-48]

12. If $0° \le \theta < 360°$, the number of roots of the equation

$$2\sin\theta + \frac{1}{\sin\theta} = 3$$

is

A. 0.
B. 1.
C. 2.
D. 3.
E. 4.

[1984-CE-MATHS 2-45]

13. Let p be a positive constant such that $p\sin\theta = \sqrt{3}$ and $p\cos\theta = 1$. Find all the values of θ in the interval $0°$ to $360°$.

A. $60°$
B. $30°$
C. $60°$, $240°$
D. $30°$, $210°$
E. cannot be determined

[1986-CE-MATHS 2-44*]

14. How many different values of x between $0°$ and $360°$ will satisfy the equation $(\sin x + 1)(2\sin x + 1) = 0$?

A. 0
B. 1
C. 2
D. 3
E. 4

[1987-CE-MATHS 2-49]

15. If $0° \le x < 360°$, the number of points of intersection of the graphs of $y = \sin x$ and $y = 1 + \cos x$ is

A. 0.
B. 1.
C. 2.
D. 3.
E. 4.

[1987-CE-MATHS 2-50]

16. Given that $\sin\theta\cos\theta > 0$, which of the following is/are true?

(1) $0° < \theta < 90°$
(2) $90° < \theta < 180°$
(3) $180° < \theta < 270°$

A. (1) only
B. (2) only
C. (3) only
D. (1) and (2) only
E. (1) and (3) only

[1988-CE-MATHS 2-14]

17. Given that $0° \le \theta \le 180°$, how many roots has the equation $(\sin\theta + 1)(\tan\theta + 3) = 0$?

A. 0
B. 1
C. 2
D. 3
E. 4

[1989-CE-MATHS 2-18]

18. If $2\sin^2\theta - \sin\theta\cos\theta - \cos^2\theta = 0$, then $\tan\theta =$

A. 1 or $\frac{1}{2}$.
B. -1 or $\frac{1}{2}$.
C. 1 or $-\frac{1}{2}$.
D. -1 or $-\frac{1}{2}$.
E. 1 or -2.

[1989-CE-MATHS 2-46]

19. If $0° \le x < 360°$, which of the following equations has only one root?

A. $\sin x = 0$
B. $\sin x = \frac{1}{2}$
C. $\sin x = 2$
D. $\cos x = 0$
E. $\cos x = -1$

[1990-CE-MATHS 2-17]

20. If $\sin\theta$ and $\cos\theta$ are the roots of the equation $x^2 + k = 0$, then $k =$

A. -1.
B. $-\frac{1}{2}$.
C. $-\frac{1}{4}$.
D. $\frac{1}{4}$.
E. $\frac{1}{2}$.

[1990-CE-MATHS 2-44]

21. If $0° \le \theta < 360°$, how many roots does the equation $\tan\theta + 2\sin\theta = 0$ have?

A. 1
B. 2
C. 3
D. 4
E. 5

[1991-CE-MATHS 2-18*]

22. In which two quadrants will the solution(s) of $\sin\theta\cos\theta < 0$ lie?

A. In quadrants I and II only
B. In quadrants I and III only
C. In quadrants II and III only
D. In quadrants II and IV only
E. In quadrants III and IV only

[1992-CE-MATHS 2-20]

23. Which of the following equations has/have solutions?

(1) $2\cos^2\theta - \sin^2\theta = 1$
(2) $2\cos^2\theta - \sin^2\theta = 2$
(3) $2\cos^2\theta - \sin^2\theta = 3$

A. (1) only
B. (2) only
C. (3) only
D. (1) and (2) only
E. (2) and (3) only

[1992-CE-MATHS 2-23]

24. Solve $\tan^4\theta + 2\tan^2\theta - 3 = 0$ for $0° \le \theta < 360°$.

A. 45°, 135° only
B. 45°, 225° only
C. 45°, 60°, 225°, 240°
D. 45°, 120°, 225°, 300°
E. 45°, 135°, 225°, 315°

[1993-CE-MATHS 2-45]

25. If $0° \le x \le 360°$, how many roots does the equation $\sin x(\cos x + 2) = 0$ have?

A. 0
B. 1
C. 2
D. 3
E. 4

[1994-CE-MATHS 2-47]

26. If $0° < x < 360°$, solve $\sin x = \frac{1}{3}$ correct to 3 significant figures.

A. 18.7° or 161°
B. 18.7° or 199°
C. 19.5° or 160°
D. 19.5° or 199°
E. 19.5° or 340°

[1995-CE-MATHS 2-17*]

27. If $0° \le x \le 360°$, the number of points of intersection of the graphs of $y = \sin x$ and $y = \tan x$ is

A. 1 .
B. 2 .
C. 3 .
D. 4 .
E. 5 .

[1995-CE-MATHS 2-49]

28. If $0° \le \theta \le 360°$, solve $2\sin\theta = -\sqrt{3}$.

A. 120° or 240°
B. 120° or 300°
C. 150° or 330°
D. 210° or 330°
E. 240° or 300°

[1996-CE-MATHS 2-19]

29. If $0° \le x \le 180°$, solve $2\sin x + 3\cos x = 0$ correct to 3 significant figures.

A. 33.7°
B. 56.3°
C. 124°
D. 146°
E. no solution

[1996-CE-MATHS 2-22*]

30. For $0° \le \theta \le 360°$, how many roots does the equation $\tan\theta(\tan\theta - 2) = 0$ have?

A. 1
B. 2
C. 3
D. 4
E. 5

[1997-CE-MATHS 2-43*]

31. For $0° \le x \le 360°$, how many roots does the equation $3\sin^2 x + 2\sin x - 1 = 0$ have?

A. 0
B. 1
C. 2
D. 3
E. 4

[1998-CE-MATHS 2-47]

32. If $0° \le \theta \le 360°$, solve $(\cos\theta - 3)(3\sin\theta - 2) = 0$ correct to 3 significant figures.

A. 41.8° or 70.5°
B. 41.8° or 138°
C. 41.8° or 222°
D. 41.8° or 356°
E. 42.0° or 138°

[1999-CE-MATHS 2-47*]

33. For $0° \le x \le 360°$, how many roots does the equation $\cos^3 x = \cos x$ have?

A. 2
B. 3
C. 4
D. 5
E. 6

[2001-CE-MATHS 2-42]

34. For $0° \le x \le 360°$, how many roots does the equitation $\tan x = 2\sin x$ have?

A. 2
B. 3
C. 4
D. 5

[2002-CE-MATHS 2-48]

35. For $0° \le \theta < 360°$, how many roots does the equation $2\cos^2\theta - 5\sin\theta - 4 = 0$ have?

A. 1
B. 2
C. 3
D. 4

[2003-CE-MATHS 2-45]

36. For $0° \le x \le 360°$, how many distinct roots does the equation $\cos x(\sin x - 1) = 0$ have?

A. 2
B. 3
C. 4
D. 5

[2005-CE-MATHS 2-44]

37. For $0° < x < 360°$, how many roots does the equation $3\cos^2 x - 4\cos x + 1 = 0$ have?

A. 2
B. 3
C. 4
D. 5

[2006-CE-MATHS 2-44]

38. Solve the equation $\sin\theta = \sqrt{3}\cos\theta$, where $0° \le \theta \le 90°$.

A. $\theta = 0°$
B. $\theta = 30°$
C. $\theta = 45°$
D. $\theta = 60°$

[2007-CE-MATHS 2-22]

39. For $0° \le \theta < 360°$, how many roots does the equation $3\sin^2\theta + 2\sin\theta - 1 = 0$ have?

A. 2
B. 3
C. 4
D. 5

[2008-CE-MATHS 2-45]

40. For $0° \le x \le 360°$, how many roots does the equation $\cos^2 x - \sin^2 x = 1$ have?

A. 2
B. 3
C. 4
D. 5

[2009-CE-MATHS 2-45]

HKDSE Problems

41. For $0° \le x \le 360°$, how many roots does the equation $7\sin^2 x = \sin x$ have?

A. 2
B. 3
C. 4
D. 5

[2014-DSE-MATHS 2-39]

42. For $0° \le x < 360°$, how many roots does the equation $\cos^2 x - \sin x = 1$ have?

A. 2
B. 3
C. 4
D. 5

[2015-DSE-MATHS 2-38]

43. For $0° \le \theta \le 360°$, how many roots does the equation $5\sin^2\theta + \sin\theta - 4 = 0$ have?

A. 2
B. 3
C. 4
D. 5

[2016-DSE-MATHS 2-38]

44. For $0° \leq x < 360°$, how many roots does the equation $6\cos^2 x = \cos x + 5$ have?

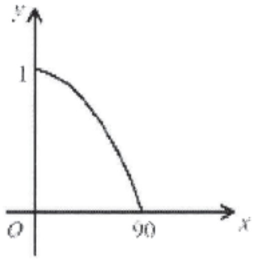
A. 2
B. 3
C. 4
D. 5

[2018-DSE-MATHS 2-38]

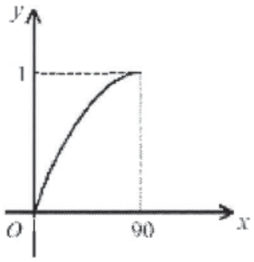
Trigonometric Graphs

1. Which of the following may represent the graph of $y = \cos x°$ for $0 \le x \le 90$?

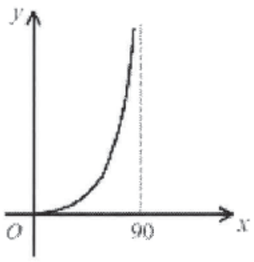
A.



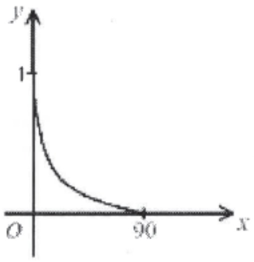
B.



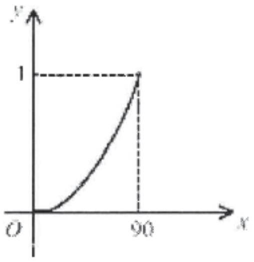
C.



D.



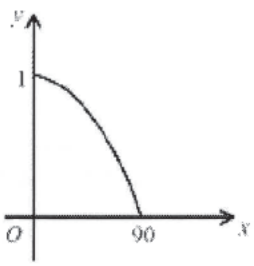
E.



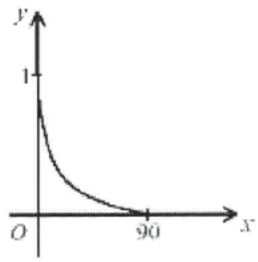
[1999-CE-MATHS 2-16]

2. Which of the following may represent the graph of $y = \tan x°$ for $0 \le x \le 90$?

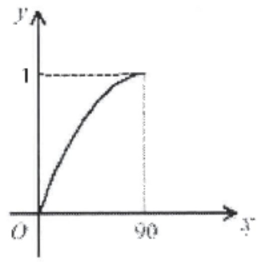
A.



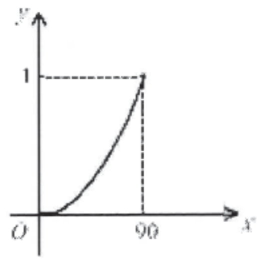
B.



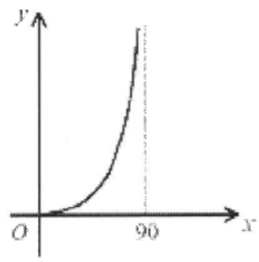
C.



D.



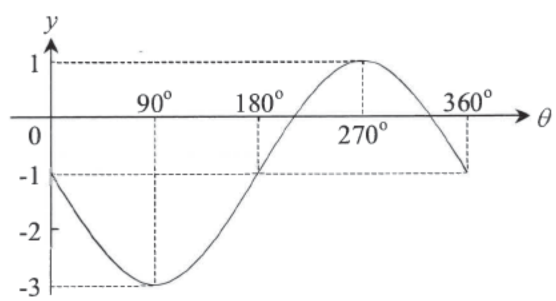
E.



[2000-CE-MATHS 2-11]

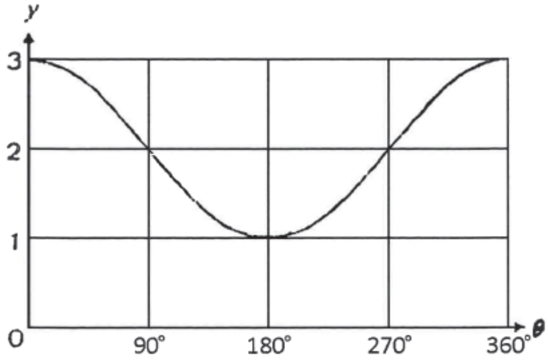
Vertical Transformations of Graphs

3. The figure shows the graph of $y = a \sin\theta + c$. Find a.



A. −3
B. −2
C. −1
D. 1
E. 2

[1977-CE-MATHS 2-25]

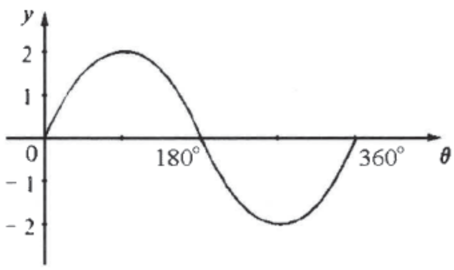
4. 

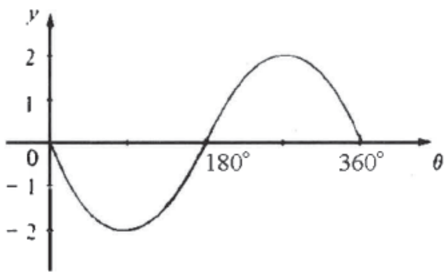
The sketch above could be the graph of

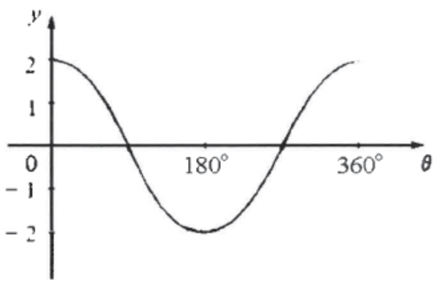
A. $y = 2 + \sin\theta$.
B. $y = 3 + \sin\theta$.
C. $y = 2 + \cos\theta$.
D. $y = 3 + \cos\theta$.
E. $y = 3\cos\theta$.

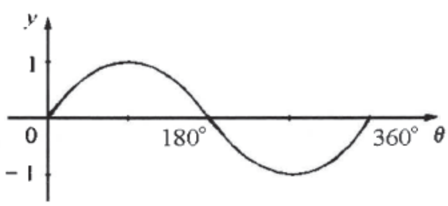
[1978-CE-MATHS 2-34*]

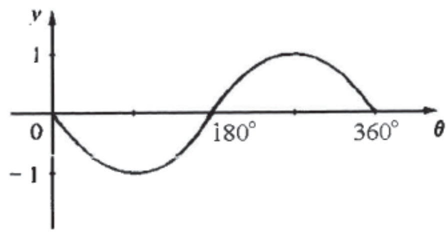
5. Which of the following is the graph of $y = 2\sin\theta$ for $0° \le \theta \le 360°$?

A. 

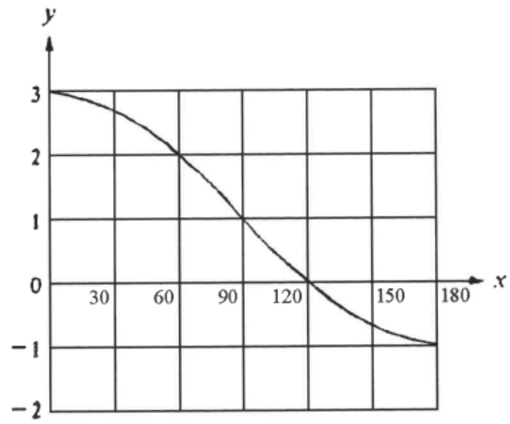
B. 

C. 

D. 

E. 

[1980-CE-MATHS 2-46*]

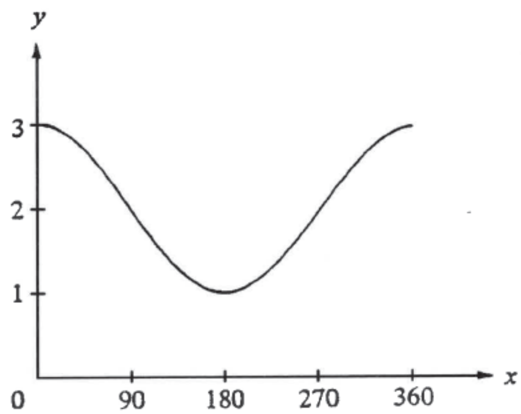
6. 

The above figure shows the graph of $y = a\cos x° + 1$ for $0 \le x \le 180$. $a =$

A. -1.
B. 0.
C. 1.
D. 2.
E. 3.

[1982-CE-MATHS 2-44*]

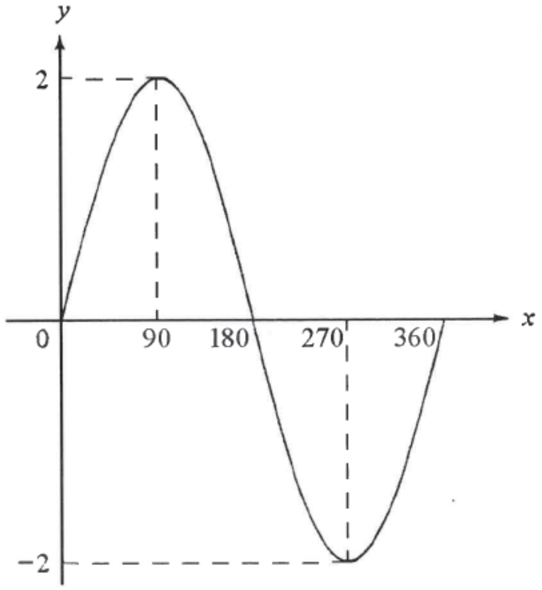
7. The figure shows the graph of



A. $y = 3\cos x°$, $0 \le x \le 360$.
B. $y = 3\sin x°$, $0 \le x \le 360$.
C. $y = 2 + \sin x°$, $0 \le x \le 360$.
D. $y = 2 + \cos x°$, $0 \le x \le 360$.
E. $y = 3 + \sin x°$, $0 \le x \le 360$.

[1985-CE-MATHS 2-45]

8.



Which of the following functions may be represented by the above graph in the interval 0 to 360?

A. $y = \cos 2x°$

B. $y = 2\cos x°$

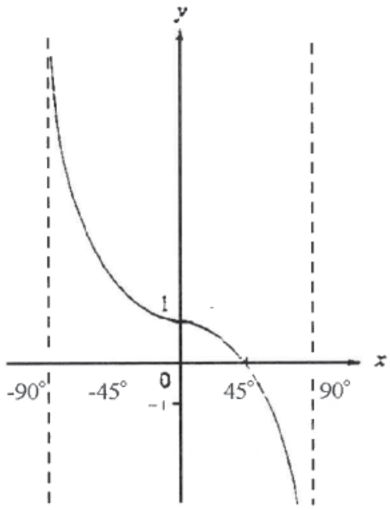
C. $y = \frac{1}{2}\cos 2x°$

D. $y = \sin 2x°$

E. $y = 2\sin x°$

[1986-CE-MATHS 2-15*]

9. The figure shows the graph of the function



A. $y = -\tan x$.

B. $y = 1 - \tan x$.

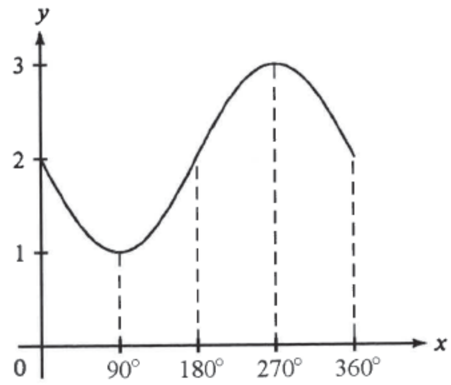
C. $y = 1 + \tan x$.

D. $y = \cos x - \sin x$.

E. $y = \cos x + \sin x$.

[1988-CE-MATHS 2-48*]

10. The figure shows the graph of the function



A. $y = 2\cos x$.

B. $y = 2 - \sin x$.

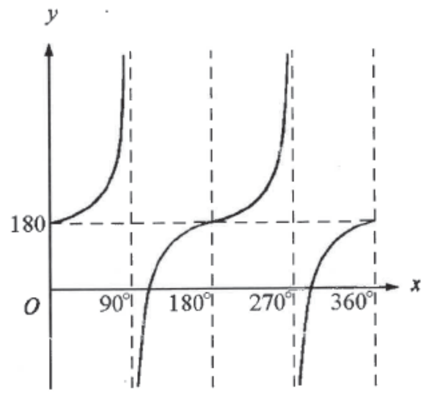
C. $y = 2 + \sin x$.

D. $y = 2 - \cos x$.

E. $y = 2 + \cos x$.

[1991-CE-MATHS 2-48*]

11. The figure shows the graph of the function



A. $\tan(x + 180°)$.

B. $\tan(x - 180°)$.

C. $180\tan x$.

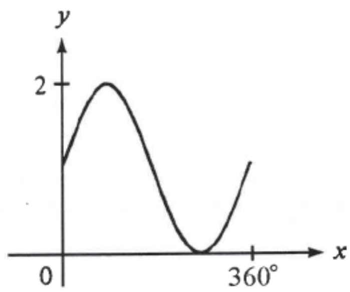
D. $180 + \tan x$.

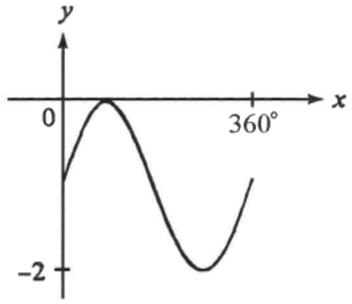
E. $180 - \tan x$.

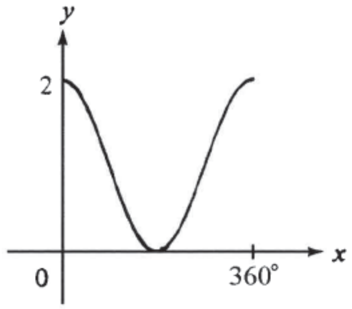
[1992-CE-MATHS 2-22*]

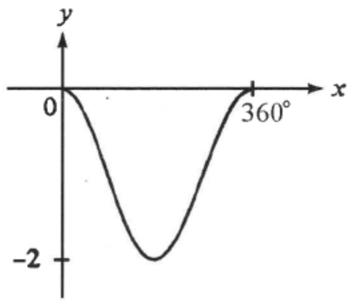
12. Which of the following figures shows the graph of $y = 1 + \sin x$?

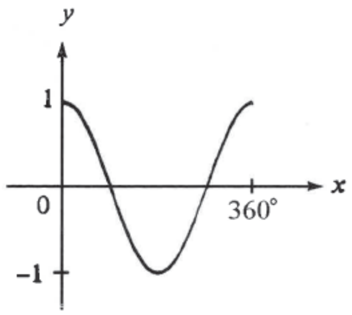
A.



B.


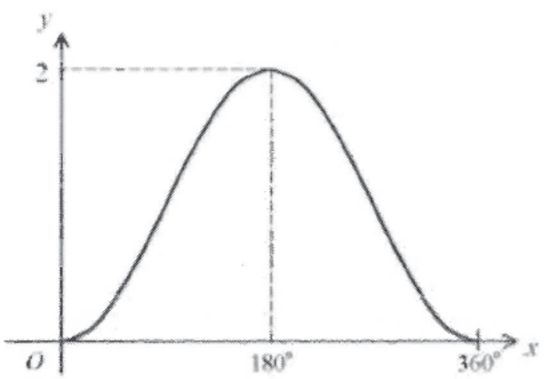
C.


D.


E.


[1994-CE-MATHS 2-17*]

13. The figure shows the graph of the function



A. $y = \sin\frac{x}{2}$.

B. $y = 2\sin x$.

C. $y = 1 + \sin x$.

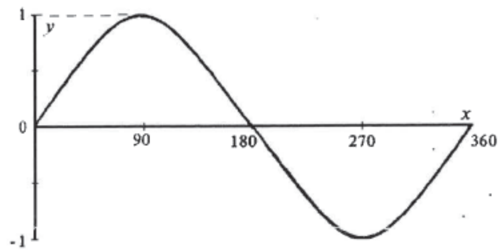
D. $y = 1 + \cos x$.

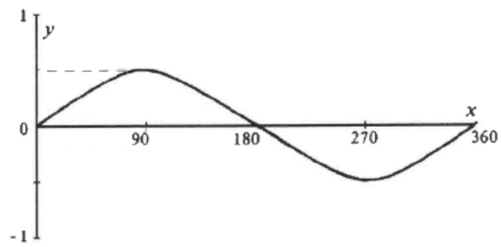
E. $y = 1 - \cos x$.

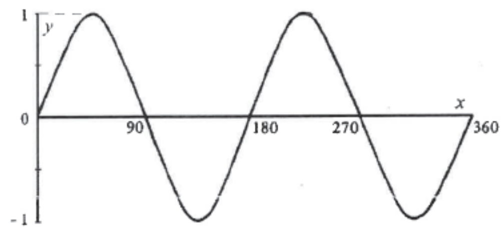
[2001-CE-MATHS 2-44*]

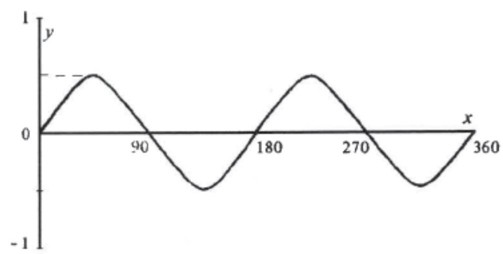
Horizontal Transformations of Graphs

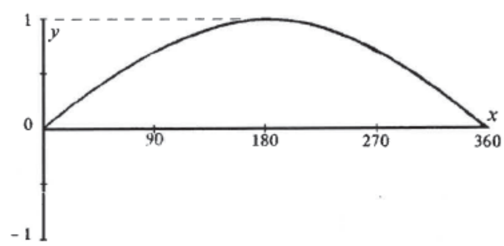
14. Which one of the following sketches is the graph of $y = \sin\frac{x^{\circ}}{2}$?

A.


B.


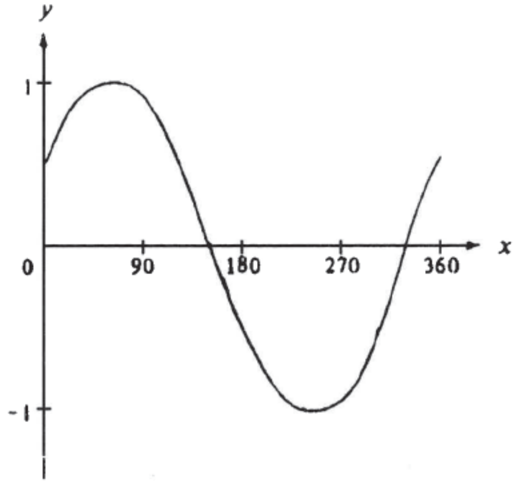
C.


D.


E.


[SP-CE-MATHS 2-28]

15.

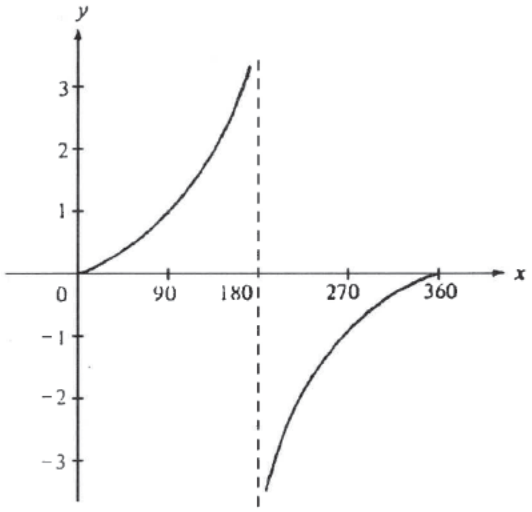


The figure above shows the graph of

A. $y = \sin(x^\circ + 30^\circ)$.
B. $y = \sin(x^\circ - 30^\circ)$.
C. $y = \sin(x^\circ + 150^\circ)$.
D. $y = \sin(x^\circ - 150^\circ)$.
E. $y = \sin(x^\circ + 60^\circ)$.

[1981-CE-MATHS 2-45]

16.

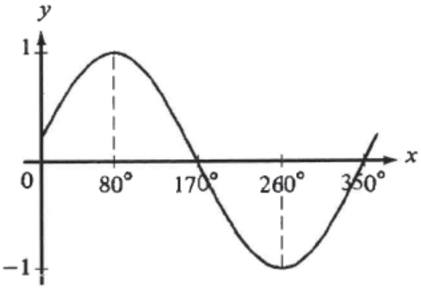


The figure above shows the graph of a tangent function from 0° to 360°. The function is

A. $y = \tan \frac{x^\circ}{2}$.
B. $y = \tan x^\circ$.
C. $y = \tan 2x^\circ$.
D. $y = \tan (x - 90)^\circ$.
E. $y = \tan (x + 90)^\circ$.

[1983-CE-MATHS 2-50]

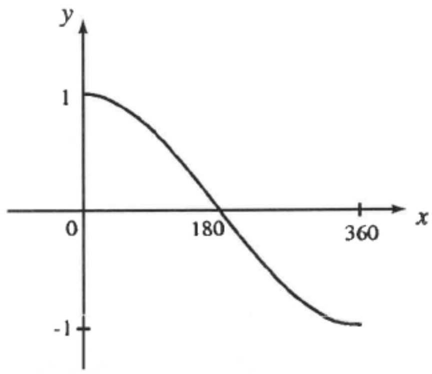
17. The figure shows the graph of the function



A. $y = \sin(350^\circ - x)$.
B. $y = \sin(x + 10^\circ)$.
C. $y = \cos(x + 10^\circ)$.
D. $y = \sin(x - 10^\circ)$.
E. $y = \cos(x - 10^\circ)$.

[1993-CE-MATHS 2-46]

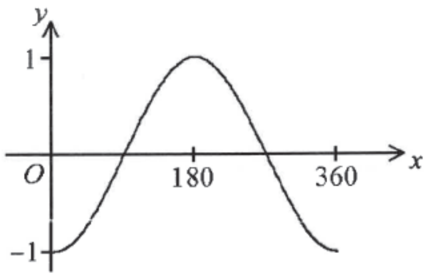
18. The figure shows the graph of the function



A. $y = \cos \frac{x^\circ}{2}$.
B. $y = \frac{1}{2} \cos x^\circ$.
C. $y = \cos x^\circ$.
D. $y = 2 \cos x^\circ$.
E. $y = \cos 2x^\circ$.

[1995-CE-MATHS 2-50]

19. The figure shows the graph of the function

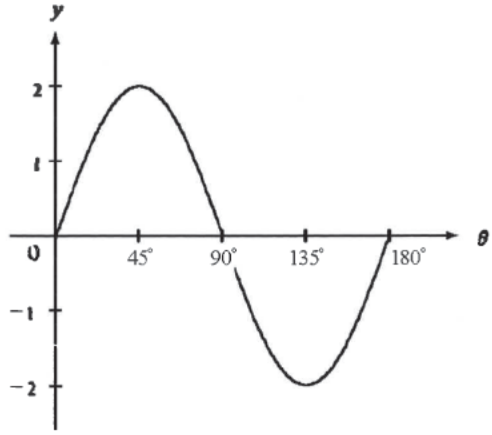


A. $y = \cos x^\circ$.
B. $y = \cos(-x^\circ)$.
C. $y = \cos(90^\circ - x^\circ)$.
D. $y = \cos(90^\circ + x^\circ)$.
E. $y = \cos(180^\circ - x^\circ)$.

[1998-CE-MATHS 2-45*]

Miscellaneous Transformations of Graphs

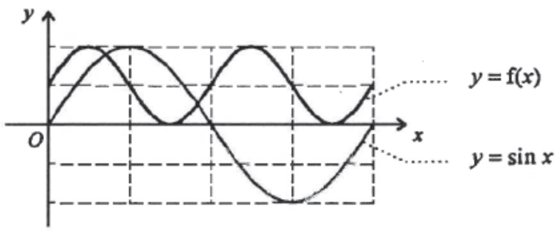
20. The figure shows the graph of $y = a \sin k\theta$. What are the values of the constants a and k?



A. $a = 1$ and $k = 1$
B. $a = 1$ and $k = 2$
C. $a = 1$ and $k = \frac{1}{2}$
D. $a = 2$ and $k = 2$
E. $a = 2$ and $k = \frac{1}{2}$

[1984-CE-MATHS 2-51*]

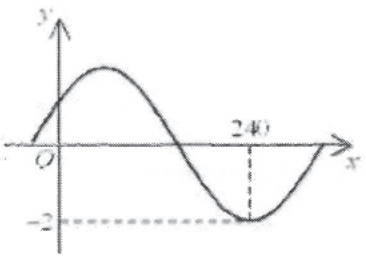
21. In the figure, $f(x) =$



A. $\sin\frac{x}{2} + \frac{1}{2}$.
B. $\sin 2x + \frac{1}{2}$.
C. $\frac{1}{2}\sin\frac{x}{2} + \frac{1}{2}$.
D. $\frac{1}{2}\sin x + \frac{1}{2}$.
E. $\frac{1}{2}\sin 2x + \frac{1}{2}$.

[1997-CE-MATHS 2-44]

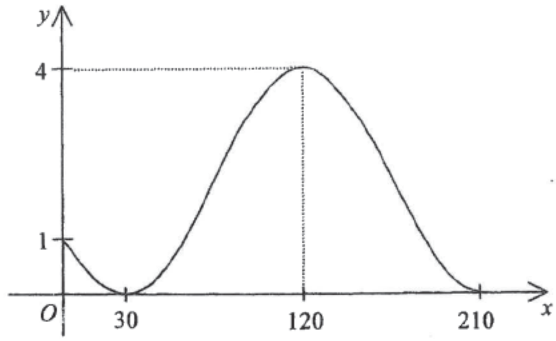
22. Let k be a constant and $-90° < \theta < 90°$. If the figure shows the graph of $y = k\sin(x° + \theta)$, then



A. $k = -2$ and $\theta = -30°$.
B. $k = -2$ and $\theta = 30°$.
C. $k = 2$ and $\theta = -30°$.
D. $k = 2$ and $\theta = 30°$.

[2007-CE-MATHS 2-46]

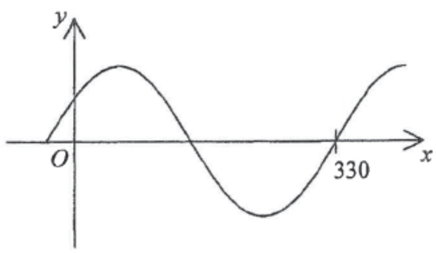
23. Let a and b be constants. If the figure shows the graph of $y = a\cos(2x° + 120°) + b$, then



A. $a = 1$ and $b = 3$.
B. $a = 2$ and $b = 2$.
C. $a = 3$ and $b = 1$.
D. $a = 4$ and $b = 0$.

[2008-CE-MATHS 2-46]

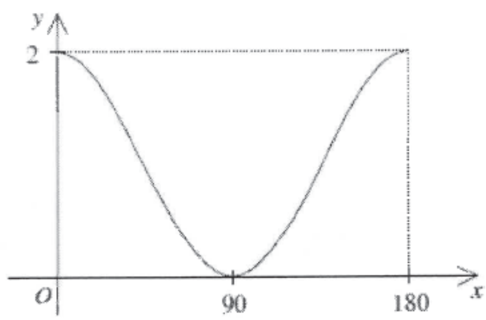
24. Let $-90° \le \theta < 90°$. If the figure shows the graph of $y = 7\sin(x° + \theta)$, then



A. $\theta = -60°$.
B. $\theta = -30°$.
C. $\theta = 30°$.
D. $\theta = 60°$.

[2009-CE-MATHS 2-46]

25. The figure shows



A. the graph of $y = 1 + \cos\dfrac{x^\circ}{2}$.

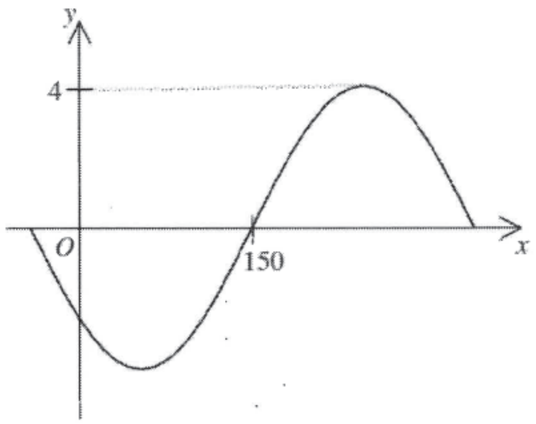
B. the graph of $y = 1 + \cos 2x^\circ$.

C. the graph of $y = 2 + \sin\dfrac{x^\circ}{2}$.

D. the graph of $y = 2 + \sin 2x^\circ$.

[2010-CE-MATHS 2-45]

26. Let a be a constant and $-90^\circ < \theta < 90^\circ$. If the figure shows the graph of $y = a\cos(x^\circ + \theta)$, then

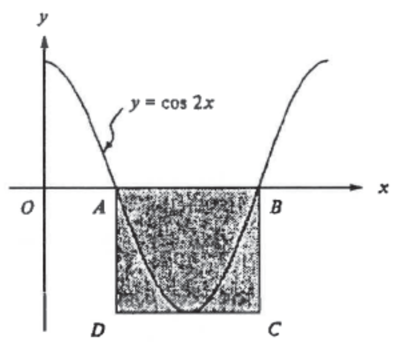


A. $a = 4$ and $\theta = 60^\circ$.
B. $a = 4$ and $\theta = -60^\circ$.
C. $a = -4$ and $\theta = 60^\circ$.
D. $a = -4$ and $\theta = -60^\circ$.

[2011-CE-MATHS 2-46]

Coordinates / Area in Graphs

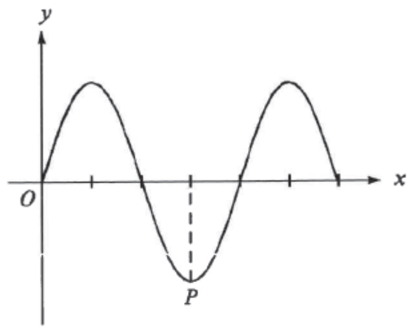
27. The figure shows the graph of $y = \cos 2x^\circ$, where $0 \le x \le 180$. The area of the rectangle $ABCD$ is



A. 90.
B. 45.
C. 180.
D. 135.
E. 360.

[1989-CE-MATHS 2-17*]

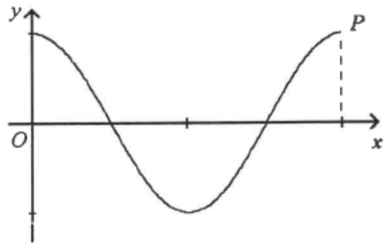
28. The figure shows the graph of $y = 3\sin 2x^\circ$. The point P is



A. $(240, -3)$.
B. $(135, -3)$.
C. $(240, -1)$.
D. $(135, -1)$.
E. $(270, -1)$.

[1990-CE-MATHS 2-45*]

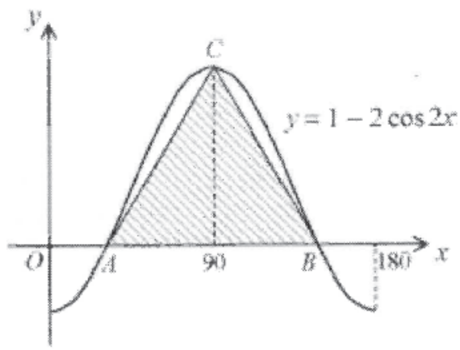
29. The figure shows the graph of $y = \dfrac{1}{2}\cos 2x^\circ$. The point P is



A. $(90, 2)$.
B. $(180, \frac{1}{2})$.
C. $(180, 1)$.
D. $(360, \frac{1}{2})$.
E. $(360, 1)$.

[1996-CE-MATHS 2-21*]

30. In the figure, the area of ΔABC is

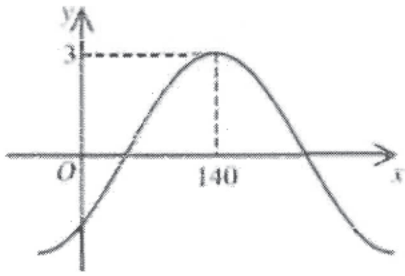


A. 60.
B. 120.
C. 180.
D. 240.
E. 360.

[2000-CE-MATHS 2-53*]

HKDSE Problems

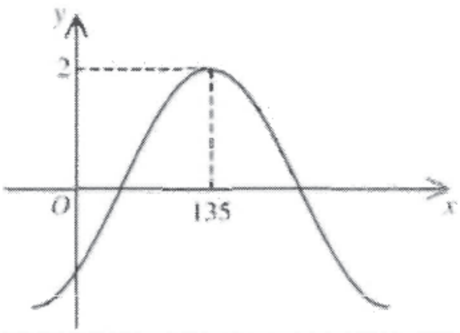
31. Let a be a constant and $-90° < b < 90°$. If the figure shows the graph of $y = a\cos(x° + b)$, then



A. $a = -3$ and $b = -40°$.
B. $a = -3$ and $b = 40°$.
C. $a = 3$ and $b = -40°$.
D. $a = 3$ and $b = 40°$.

[SP-DSE-MATHS 2-42]

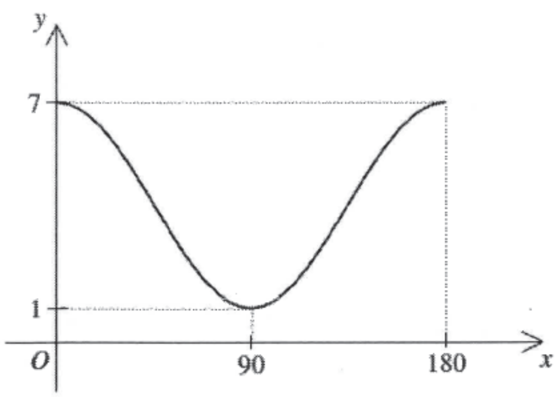
32. Let a be a constant and $-90° < \theta < 90°$. If the figure shows the graph of $y = a\sin(x° + \theta)$, then



A. $a = -2$ and $\theta = -45°$.
B. $a = -2$ and $\theta = 45°$.
C. $a = 2$ and $\theta = -45°$.
D. $a = 2$ and $\theta = 45°$.

[PP-DSE-MATHS 2-38]

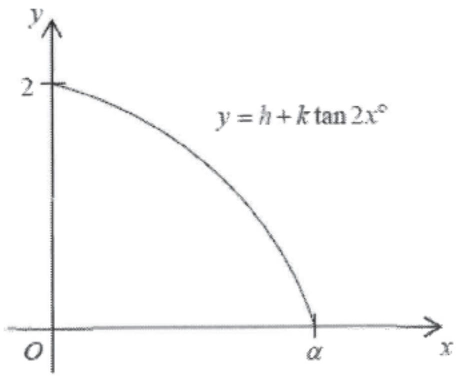
33. The figure shows



A. the graph of $y = 1 + 3\cos\frac{x°}{2}$.
B. the graph of $y = 1 + 3\cos 2x°$.
C. the graph of $y = 4 + 3\cos\frac{x°}{2}$.
D. the graph of $y = 4 + 3\cos 2x°$.

[2012-DSE-MATHS 2-39]

34.



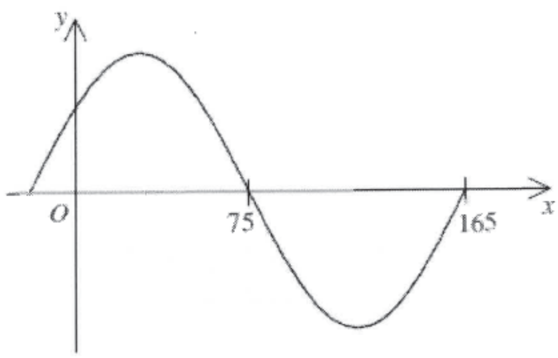
Let h and k be constants. The figure shows the graph of $y = h + k\tan 2x°$, where $0 \le x \le \alpha$. Which of the following are true?

(1) $h > 0$
(2) $k < 0$
(3) $\tan\alpha° = \frac{1}{k}$

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

[2013-DSE-MATHS 2-39]

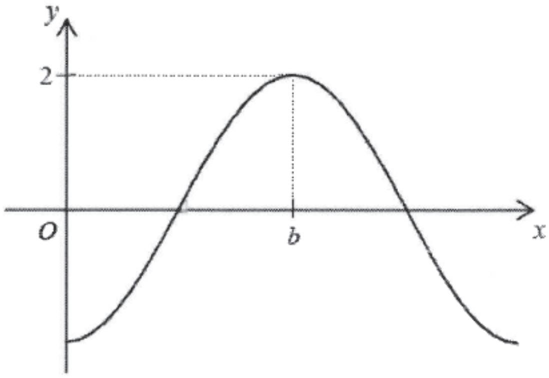
35. Let k be a positive constant and $-180° < \theta < 180°$. If the figure shows the graph of $y = \sin(kx° + \theta)$, then



A. $k = \frac{1}{2}$ and $\theta = -30°$.
B. $k = \frac{1}{2}$ and $\theta = 30°$.
C. $k = 2$ and $\theta = -30°$.
D. $k = 2$ and $\theta = 30°$.

[2015-DSE-MATHS 2-39]

36. Let a and b be constants. If the figure shows the graph of $y = a\cos 2x°$, then

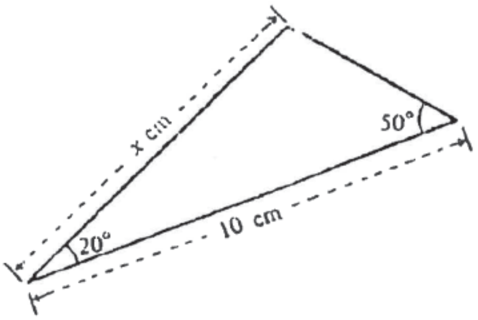


A. $a = -2$ and $b = 90$.
B. $a = -2$ and $b = 360$.
C. $a = 2$ and $b = 90$.
D. $a = 2$ and $b = 360$.

[2016-DSE-MATHS 2-37]

Sine Formula

1. In the figure, $x =$

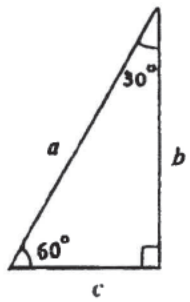


A. $10 \sin 20°$.
B. $10 \dfrac{\sin 20°}{\sin 70°}$.
C. $10 \dfrac{\sin 20°}{\sin 50°}$.
D. $10 \dfrac{\sin 50°}{\sin 20°}$.
E. $10 \dfrac{\sin 50°}{\sin 70°}$.

[1978-CE-MATHS A2-51]

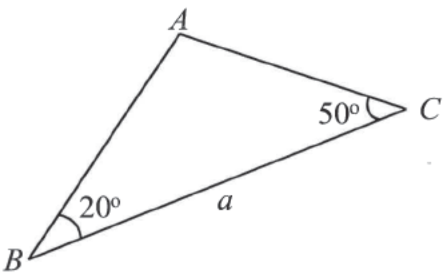
2. In the figure, $a : b : c =$

A. $3 : 2 : 1$.
B. $9 : 4 : 1$.
C. $2 : \sqrt{3} : 1$.
D. $\sqrt{3} : \sqrt{2} : 1$.
E. $\sqrt{3} : 2 : 1$.



[1980-CE-MATHS 2-19]

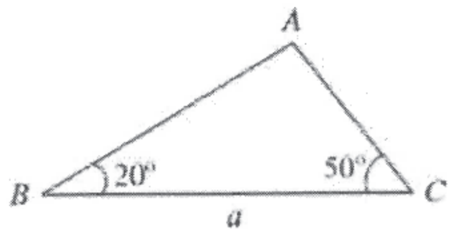
3. In the figure, $BC = a$, $AB =$



A. $a \sin 20°$.
B. $\dfrac{a \sin 20°}{\sin 70°}$.
C. $\dfrac{a \sin 20°}{\sin 50°}$.
D. $\dfrac{a \sin 50°}{\sin 20°}$.
E. $\dfrac{a \sin 50°}{\sin 70°}$.

[1983-CE-MATHS 2-46]

4. In the figure, $BC = a$. $AB =$

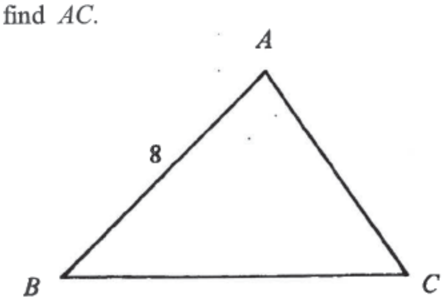


A. $\dfrac{5}{11} a$.
B. $a \sin 50°$.
C. $\dfrac{a \sin 70°}{\sin 50°}$.
D. $\dfrac{a \sin 50°}{\sin 70°}$.
E. $\dfrac{a \sin 50°}{\sin 20°}$.

[1988-CE-MATHS 2-23]

5. In the figure, $\sin A : \sin B : \sin C = 4 : 5 : 6$. If $AB = 8$, find AC.

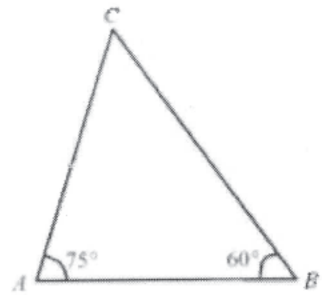
A. $5\frac{1}{3}$
B. $6\frac{2}{3}$
C. $9\frac{3}{5}$
D. 10
E. 12



[1994-CE-MATHS 2-49]

6. In the figure, $\dfrac{AC}{AB} =$

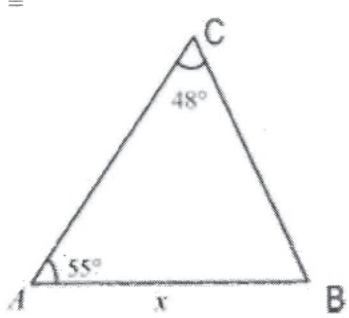
A. $\dfrac{4}{3}$.
B. $\dfrac{5}{4}$.
C. $\dfrac{\sqrt{2}}{2}$.
D. $\dfrac{\sqrt{6}}{2}$.
E. $\dfrac{\sqrt{6}}{3}$.



[1999-CE-MATHS 2-18]

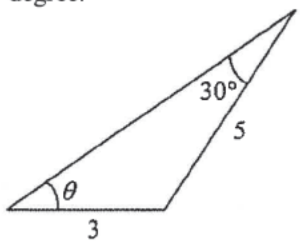
7. In the figure, $AC =$

A. $\dfrac{x \sin 77°}{\sin 48°}$.
B. $\dfrac{x \sin 55°}{\sin 48°}$.
C. $\dfrac{x \sin 48°}{\sin 77°}$.
D. $\dfrac{x \sin 77°}{\sin 55°}$.



[2002-CE-MATHS 2-16]

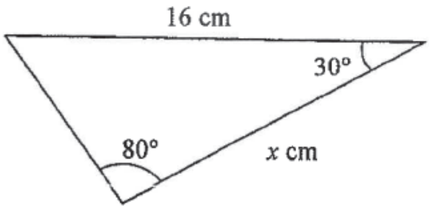
8. In the figure, θ is an acute angle. Find θ correct to the nearest degree.



A. 35°
B. 50°
C. 56°
D. 57°

[2005-CE-MATHS 2-21]

9. In the figure, find x correct to the nearest integer.

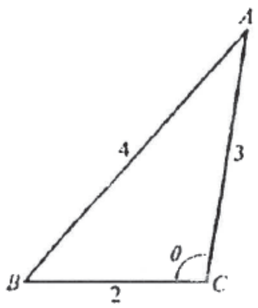


A. 14
B. 15
C. 16
D. 17

[2007-CE-MATHS 2-47]

Cosine Formula

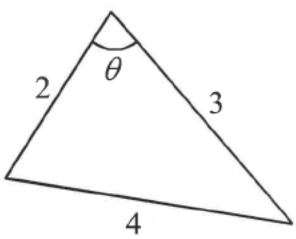
10. In ΔABC, $AB = 4$, $BC = 2$ and $CA = 3$. $\cos\theta =$



A. $-\frac{1}{4}$.
B. $-\frac{1}{2}$.
C. $\frac{1}{4}$.
D. $\frac{1}{2}$.
E. $\frac{3}{4}$.

[1978-CE-MATHS A2-52]

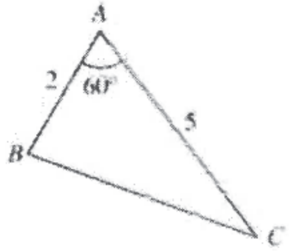
11. In the figure, $\cos\theta =$



A. $-\frac{1}{4}$.
B. $-\frac{1}{2}$.
C. $\frac{1}{4}$.
D. $\frac{1}{2}$.
E. $\frac{3}{4}$.

[1984-CE-MATHS 2-19]

12. In the figure, $AB = 2$ and $AC = 5$, $BC =$



A. $\sqrt{39}$.
B. $\sqrt{29}$.
C. $\sqrt{24}$.
D. $\sqrt{20}$.
E. $\sqrt{19}$.

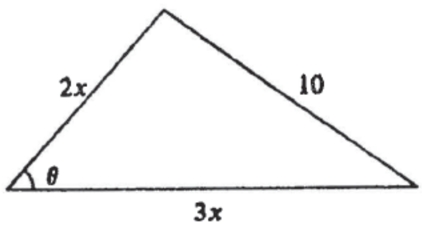
[1985-CE-MATHS 2-19]

13. In ΔABC, if $AB : BC : CA = 4 : 5 : 6$, then $\cos A =$

A. $\frac{1}{8}$.
B. $\frac{1}{5}$.
C. $\frac{3}{10}$.
D. $\frac{9}{16}$.
E. $\frac{3}{4}$.

[1987-CE-MATHS 2-51]

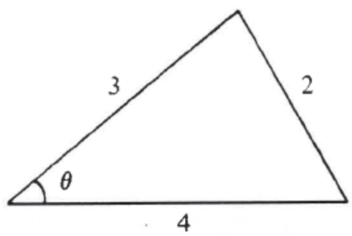
14. In the figure, if $\cos\theta = \frac{3}{4}$, find the value of x.



A. 2
B. 3
C. 4
D. 5
E. 6

[1989-CE-MATHS 2-48]

15. In the figure, find $\cos\theta$.

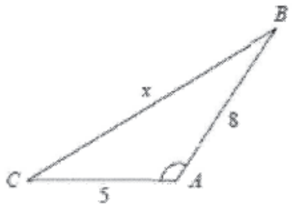


A. $-\frac{1}{4}$
B. $\frac{11}{16}$
C. $\frac{3}{4}$
D. $\frac{7}{8}$
E. $\frac{\sqrt{77}}{9}$

[1992-CE-MATHS 2-19]

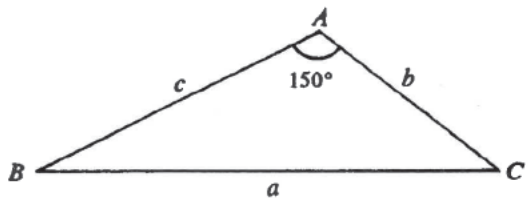
16. In the figure, $\cos A = -\frac{4}{5}$. Find a.

A. $\sqrt{153}$
B. $\sqrt{137}$
C. $\sqrt{89}$
D. $\sqrt{41}$
E. $\sqrt{25}$



[1993-CE-MATHS 2-21]

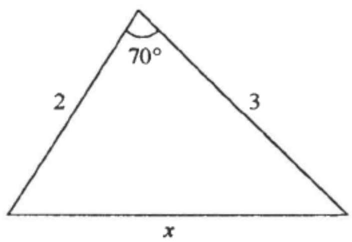
17. According to the figure, which of the following must be true?



A. $a^2 = b^2 + c^2 - \sqrt{3}bc$
B. $a^2 = b^2 + c^2 - bc$
C. $a^2 = b^2 + c^2 + \frac{\sqrt{3}}{2}bc$
D. $a^2 = b^2 + c^2 + bc$
E. $a^2 = b^2 + c^2 + \sqrt{3}bc$

[1995-CE-MATHS 2-19]

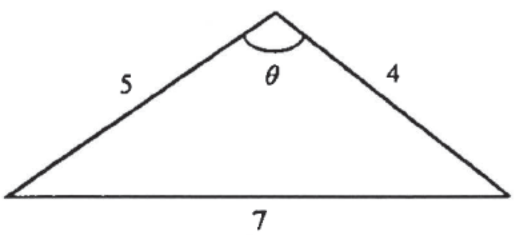
18. In the figure, find x correct to 3 significant figures.



A. 2.71
B. 2.98
C. 3.31
D. 3.88
E. 4.14

[1996-CE-MATHS 2-24]

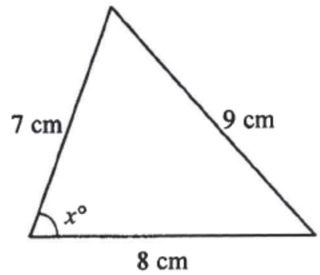
19. In the figure, find θ correct to the nearest degree.



A. 78°
B. 91°
C. 102°
D. 114°
E. 125°

[1997-CE-MATHS 2-13]

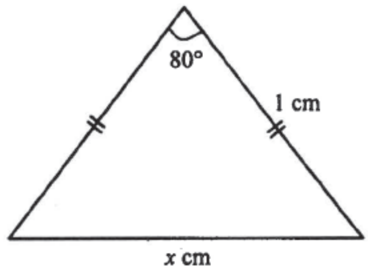
20. In the figure, find x correct to 3 significant figures.



A. 48.2
B. 55.1
C. 58.4
D. 67.5
E. 73.4

[1998-CE-MATHS 2-25]

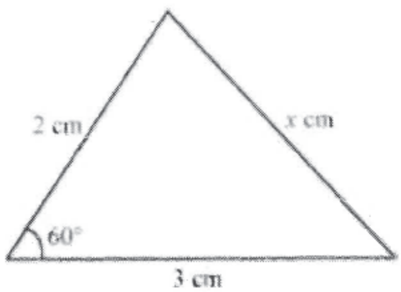
21. In the figure, find x correct to 3 significant figures.



A. 1.28
B. 1.29
C. 1.35
D. 1.53
E. 1.65

[1999-CE-MATHS 2-17]

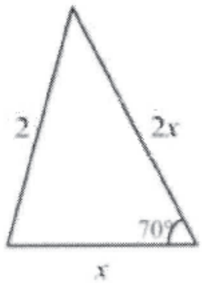
22. In the figure, find x correct to 3 significant figures.



A. 2.65
B. 2.79
C. 3.16
D. 4.00
E. 4.36

[2001-CE-MATHS 2-7]

23. In the figure, find x correct to 3 significant figures.

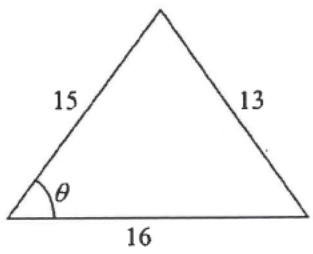


A. 0.963
B. 1.05
C. 1.10
D. 1.57

[2002-CE-MATHS 2-23]

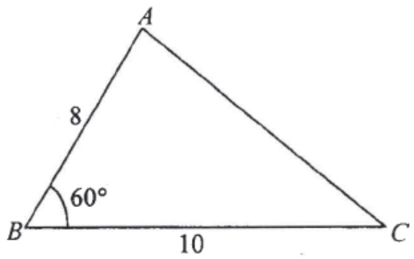
24. In the figure, $\cos\theta =$

A. $\frac{15}{16}$.
B. $\frac{13}{20}$.
C. $\frac{25}{52}$.
D. $\frac{23}{65}$.



[2003-CE-MATHS 2-24]

25. In the figure, find AC correct to 2 decimal places.

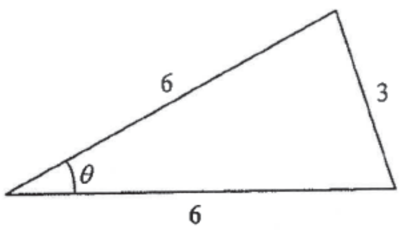


A. 5.04
B. 9.17
C. 11.14
D. 15.62

[2004-CE-MATHS 2-21]

26. In the figure, $\cos\theta =$

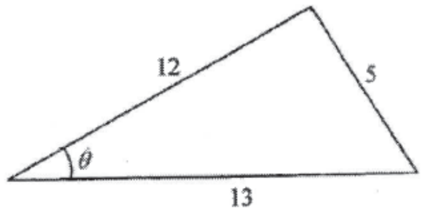
A. $\frac{1}{8}$.
B. $\frac{1}{4}$.
C. $\frac{7}{8}$.
D. $\frac{7}{4}$.



[2005-CE-MATHS 2-22]

27. In the figure, $\tan\theta =$

A. $\frac{5}{12}$.
B. $\frac{5}{13}$.
C. $\frac{12}{13}$.
D. $\frac{13}{12}$.



[2008-CE-MATHS 2-24]

Solving Triangles

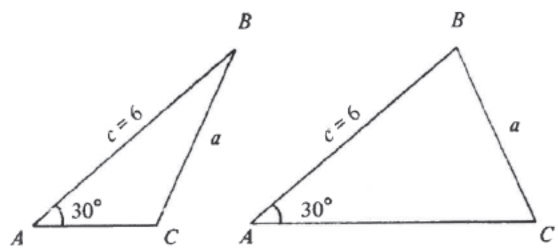
28. In ΔABC, $BC = a$, $AC = b$, $AB = c$ and $a > b > c$. Which of the following must be true?

(1) $\angle A > \angle B > \angle C$
(2) $b + c > a$
(3) $\angle B + \angle C > \angle A$

A. (1) only
B. (2) only
C. (1) and (2) only
D. (2) and (3) only
E. (1), (2) and (3)

[1984-CE-MATHS 2-52]

29. In ΔABC, $\angle A = 30°$, $c = 6$. If it is possible to draw two distinct triangles as shown in the figure, find the range of values of a.



A. $0 < a < 3$
B. $0 < a < 6$
C. $3 < a < 6$
D. $a > 3$
E. $a > 6$

[1992-CE-MATHS 2-49]

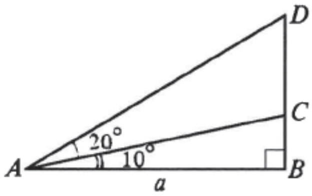
30. How many different triangles can be constructed so that the lengths of the three sides are x cm, $2x$ cm and 12 cm, where x is an integer?

A. 5
B. 7
C. 9
D. 11

[2002-CE-MATHS 2-42]

Area of Plane Figures

31. In the figure, $AB = a$. The area of ΔADC is



A. $\frac{1}{2}a^2 \sin 20°$.

B. $\frac{1}{2}a^2 \tan 20°$.

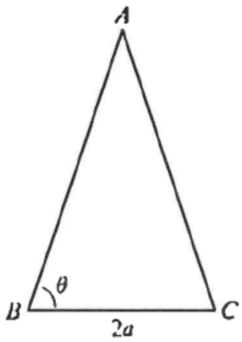
C. $\frac{1}{2}a^2 \tan 30°$.

D. $\frac{1}{2}a^2 (\sin 30° - \sin 10°)$.

E. $\frac{1}{2}a^2 (\tan 30° - \tan 10°)$.

[SP-CE-MATHS 2-32]

32. In ΔABC, $AB = AC$ and $BC = 2a$. What is the area of ΔABC?



A. $\frac{1}{2}a^2 \tan\theta$

B. $a^2 \tan\theta$

C. $2a^2 \tan\theta$

D. $\frac{a^2}{\tan\theta}$

E. $a^2 \sin\theta \cos\theta$

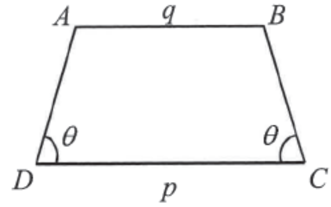
[1978-CE-MATHS 2-20]

33. A side of a rhombus is 10 cm and one of its angle is 150°. What is its area?

A. 25 cm^2
B. 50 cm^2
C. 100 cm^2
D. 150 cm^2
E. 200 cm^2

[1979-CE-MATHS 2-15]

34. In the figure, $ABCD$ is a trapezium in which $AB // DC$ and $\angle C = \angle D = \theta$. If $CD = p$ and $AB = q$, then the area of the trapezium is



A. $\frac{1}{2}(p+q)^2 \tan\theta$.

B. $\frac{1}{4}(p^2+q^2) \tan\theta$.

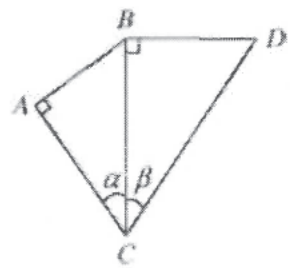
C. $\frac{1}{2}(p^2-q^2) \tan\theta$.

D. $\frac{1}{4}(p^2-q^2) \tan\theta$.

E. $\frac{(p^2-q^2)}{4\tan\theta}$.

[1983-CE-MATHS 2-44]

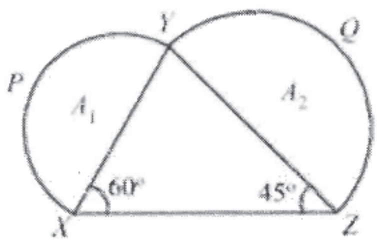
35. In the figure, $\angle CAB = \angle CBD = 90°$. $BC = 2$. The area of quadrilateral $ABCD$ =



A. $2\sin(\alpha+\beta)$.
B. $2(\tan\alpha + \tan\beta)$.
C. $2(\sin\alpha\cos\alpha + \sin\beta\cos\beta)$.
D. $2(\tan\alpha + \sin\beta\cos\beta)$.
E. $2(\sin\alpha\cos\alpha + \tan\beta)$.

[1985-CE-MATHS 2-49]

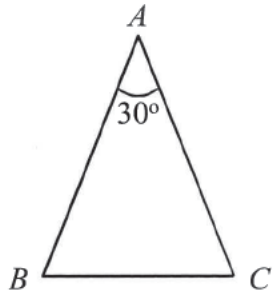
36. In the figure, XPY and YQZ are semi-circles with areas A_1 and A_2 respectively. $\angle YXZ$ = 60° and $\angle YZX = 45°$. The ratio $A_1 : A_2$ =



A. $\sqrt{2} : \sqrt{3}$.
B. $\sqrt{2} : 3$.
C. $2 : 3$.
D. $2 : \sqrt{3}$.
E. $\sqrt{3} : \sqrt{2}$.

[1991-CE-MATHS 2-19]

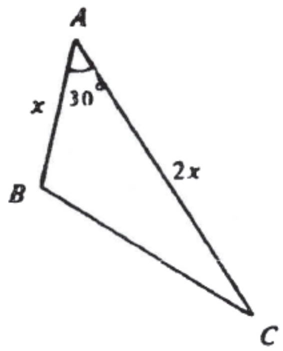
37. In the figure, $AB = AC$. If the area of ΔABC is 64 cm^2, then $AB =$



A. 32 cm .
B. $16\sqrt{2}$ cm .
C. 16 cm .
D. $8\sqrt{2}$ cm .
E. 4 cm .

[1983-CE-MATHS 2-21]

38. In the figure, $AB = x$ and $AC = 2x$. The area of ΔABC is 16. x (correct to 2 decimal places) is



A. 2.83 .
B. 4.00 .
C. 4.30 .
D. 5.66 .
E. 6.08 .

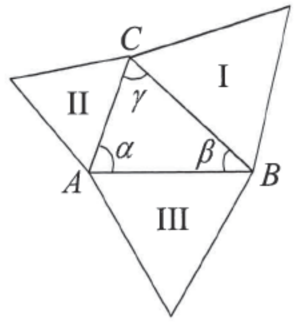
[1984-CE-MATHS 2-21]

39. In ΔABC, $\angle A = 30°$, $AB = 6$ cm. If the area of ΔABC is 15 cm^2, $AC =$

A. 2.5 cm
B. 5 cm
C. 10 cm
D. 12 cm
E. 15 cm

[1985-CE-MATHS 2-20]

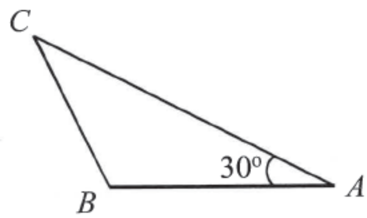
40. In the figure, I, II and III are equilateral triangles. Area of I : Area of II : Area of III =



A. $\alpha : \beta : \gamma$.
B. $\sin\alpha : \sin\beta : \sin\gamma$.
C. $\sin^2\alpha : \sin^2\beta : \sin^2\gamma$.
D. $\cos\alpha : \cos\beta : \cos\gamma$.
E. $\cos^2\alpha : \cos^2\beta : \cos^2\gamma$.

[1987-CE-MATHS 2-25]

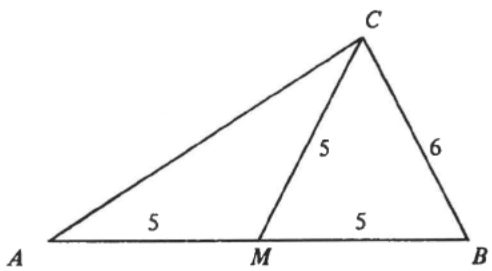
41. In the figure, the area of ΔABC is 15 cm^2 and $\angle A = 30°$. AC is longer than AB by 4 cm. $AC =$



A. 6 cm .
B. 8.8 cm .
C. 10 cm .
D. 11.5 cm .
E. 14 cm .

[1988-CE-MATHS 2-19]

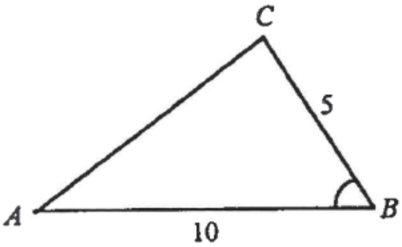
42. In the figure, $AM = MB = MC = 5$ and $BC = 6$. The area of triangle ABC =



A. 12 .
B. 16 .
C. 24 .
D. 30 .
E. 48 .

[1990-CE-MATHS 2-39]

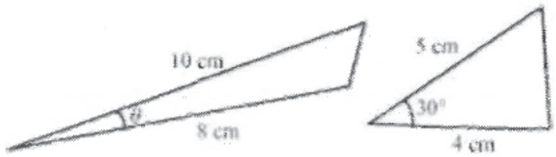
43. In the figure, the area of ΔABC is 18. Find $\angle ABC$ correct to the nearest degree.



A. 30°
B. 44°
C. 46°
D. 60°
E. 69°

[1997-CE-MATHS 2-15]

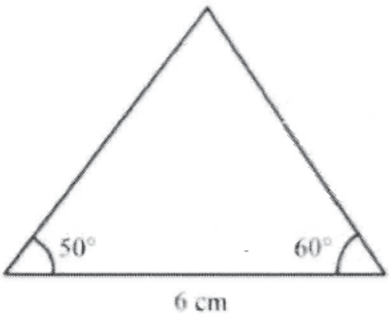
44. In the figure, the areas of the two triangles are equal. Find θ.



A. 7.2° (correct to the nearest 0.1°)
B. 7.5° (correct to the nearest 0.1°)
C. 14.5° (correct to the nearest 0.1°)
D. 15°
E. 30°

[2000-CE-MATHS 2-13]

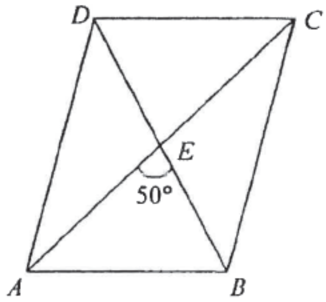
45. In the figure, find the area of the triangle correct to the nearest 0.1 cm^2.



A. 7.3 cm^2
B. 10.7 cm^2
C. 12.7 cm^2
D. 15.0 cm^2
E. 19.1 cm^2

[2000-CE-MATHS 2-26]

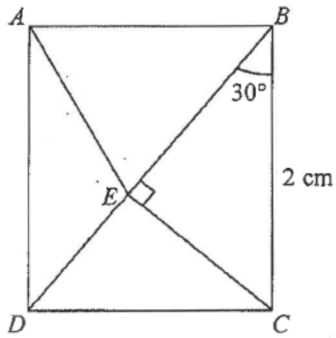
46. The figure shows a parallelogram $ABCD$ with its diagonals meeting at E. If $AE = 3$ cm and $BE = 2$ cm, find the area of the parallelogram correct to the nearest 0.1 cm^2.



A. 2.3 cm^2
B. 7.7 cm^2
C. 9.2 cm^2
D. 18.3 cm^2

[2002-CE-MATHS 2-18]

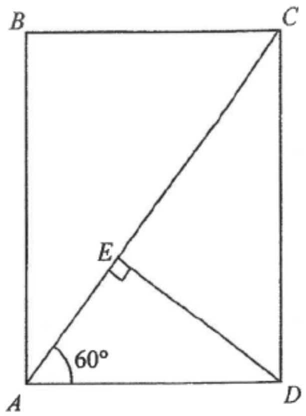
47. In the figure, $ABCD$ is a rectangle. If BED is a straight line, then the area of ΔABE is



A. $\frac{\sqrt{3}}{6}$ cm^2.
B. $\frac{\sqrt{3}}{2}$ cm^2.
C. $\frac{2\sqrt{3}}{3}$ cm^2.
D. $\sqrt{3}$ cm^2.

[2005-CE-MATHS 2-23]

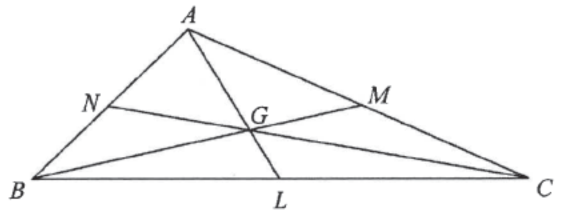
48. In the figure, $ABCD$ is a rectangle. It is given that E is the foot of the perpendicular from D to AC. If the area of ΔADE is 1 cm^2, then the area of ΔABC is



A. 3 cm^2 .
B. 4 cm^2 .
C. 5 cm^2 .
D. $2\sqrt{3}\text{ cm}^2$.

[2009-CE-MATHS 2-22]

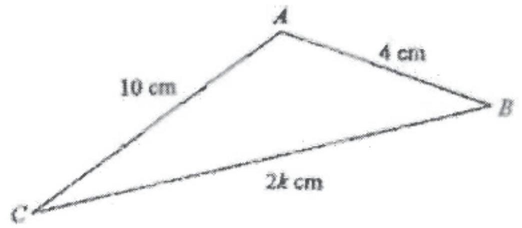
49. In the figure, G is the centroid of ΔABC. AG, BG and CG are produced to meet BC, AC and AB at L, M and N respectively. If $BL = 13$ cm, $BN = 5$ cm and $CM = 12$ cm, find the area of ΔABC.



A. 60 cm^2
B. 120 cm^2
C. 180 cm^2
D. 240 cm^2

[2009-CE-MATHS 2-51]

50. In the figure, the area of ΔABC =

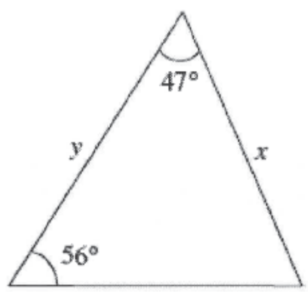


A. $\sqrt{(k^2-9)(49-k^2)}\text{ cm}^2$.
B. $\sqrt{(k^2-9)(49+k^2)}\text{ cm}^2$.
C. $\sqrt{(k^2+9)(49-k^2)}\text{ cm}^2$.
D. $\sqrt{(k^2+9)(49+k^2)}\text{ cm}^2$.

[2011-CE-MATHS 2-47]

HKDSE Problems

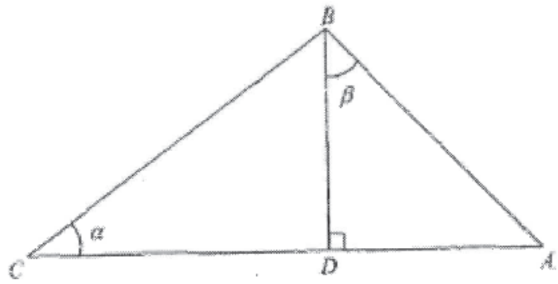
51. In the figure, y =



A. $\dfrac{x\sin 77^\circ}{\sin 56^\circ}$.
B. $\dfrac{x\sin 47^\circ}{\sin 56^\circ}$.
C. $\dfrac{x\sin 56^\circ}{\sin 77^\circ}$.
D. $\dfrac{x\sin 77^\circ}{\sin 47^\circ}$.

[SP-DSE-MATHS 2-38]

52. In the figure, D is a point lying on AC such that BD is perpendicular to AC. If $BC = \ell$, then AB =



A. $\dfrac{\ell\sin\alpha}{\cos\beta}$.
B. $\dfrac{\ell\sin\beta}{\cos\alpha}$.
C. $\dfrac{\ell\cos\alpha}{\sin\beta}$.
D. $\dfrac{\ell\cos\beta}{\sin\alpha}$.

[2012-DSE-MATHS 2-18]

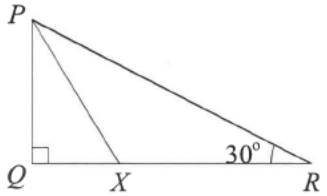
53. In ΔABC, $AB : BC : AC = 8 : 15 : 17$. Find $\cos A : \cos C$.

A. 8 : 15
B. 8 : 17
C. 15 : 8
D. 15 : 17

[2013-DSE-MATHS 2-22]

Simple Problems with Right Angles

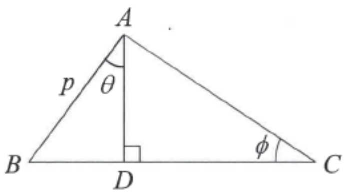
1. In the figure, ΔPQR is a right-angled triangle, and PX bisects $\angle QPR$. $QX : XR =$



A. $1 : \sqrt{3}$.
B. $1 : 1$.
C. $1 : 2$.
D. $\sqrt{3} : 2$.
E. $1 : 3$.

[1977-CE-MATHS 2-20]

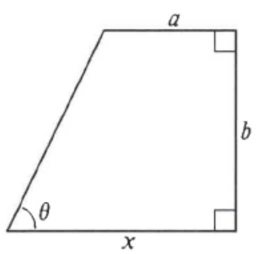
2. In ΔABC, $AD \perp BC$ and $AB = p$. Find AC in terms of p, θ and ϕ.



A. $\dfrac{p\cos\theta}{\sin\phi}$
B. $\dfrac{p\cos\theta}{\cos\phi}$
C. $p\cos\theta\tan\phi$
D. $p\sin\theta\tan\phi$
E. $p\cos\theta\cos\phi$

[1977-CE-MATHS 2-23]

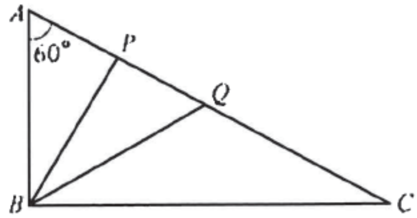
3. In the figure, $x =$



A. $a + b\sin\theta$.
B. $a + b\cos\theta$.
C. $a + b\tan\theta$.
D. $a + \dfrac{b}{\cos\theta}$.
E. $a + \dfrac{b}{\tan\theta}$.

[SP-CE-MATHS 2-25]

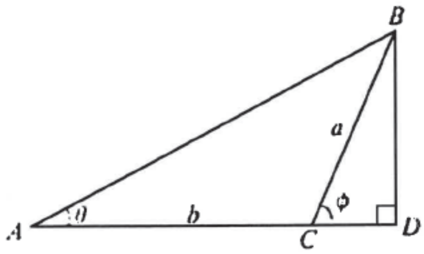
4. In ΔABC, $\angle ABC = 90°$ and $\angle A = 60°$. If BP and BQ divide $\angle ABC$ into 3 equal parts, then $AP : PQ : QC =$



A. $1 : 1 : \sqrt{3}$.
B. $1 : 1 : 2$.
C. $1 : \sqrt{3} : \sqrt{3}$.
D. $1 : \sqrt{3} : 2$.
E. $1 : 2 : 2$.

[1978-CE-MATHS 2-27]

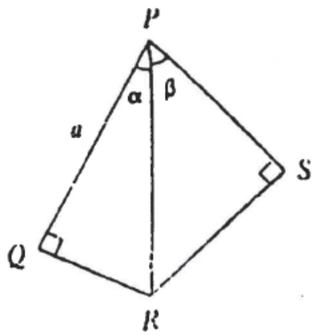
5. C is a point on the side AD of ΔABD which is right-angled at D. If $BC = a$ and $AC = b$, then $\tan\theta =$



A. $\dfrac{a}{b}$.
B. $\dfrac{a\tan\phi}{b}$.
C. $\dfrac{a\sin\phi}{b + a\cos\phi}$.
D. $\dfrac{a\sin\phi}{b - a\cos\phi}$.
E. $\dfrac{a\sin\phi}{a\cos\phi - b}$.

[1978-CE-MATHS 2-35]

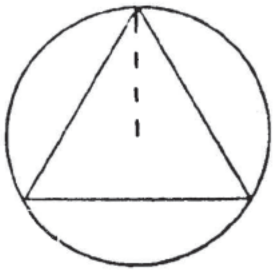
6. In quadrilateral $PQRS$, $\angle Q = \angle S = 90°$ and $PQ = a$. Then $RS =$



A. $\dfrac{a\sin\beta}{\cos\alpha}$.
B. $\dfrac{a\cos\alpha}{\sin\beta}$.
C. $\dfrac{a\cos\beta}{\sin\alpha}$.
D. $\dfrac{a\sin\beta}{\sin\alpha}$.
E. $\dfrac{a\tan\beta}{\cos\alpha}$.

[1979-CE-MATHS 2-29]

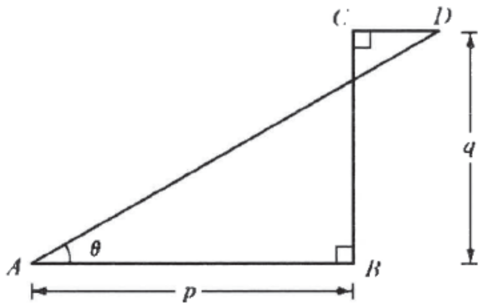
7. The radius of the circumcircle of an equilateral triangle is r cm. What is the length of a side of the triangle?



A. $r(1 + \sin 30°)$ cm
B. $r \sin 30°$ cm
C. $r \cos 30°$ cm
D. $2r \sin 30°$ cm
E. $2r \cos 30°$ cm

[1979-CE-MATHS 2-41]

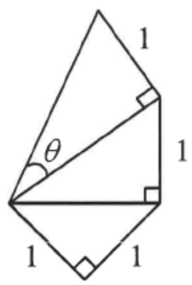
8. In the figure, $\angle B = \angle C = 90°$. If $AB = p$ and $BC = q$, then $CD =$



A. $p + q \tan\theta$.
B. $p + \dfrac{q}{\tan\theta}$.
C. $p + q \cos\theta$.
D. $-p + q \tan\theta$.
E. $-p + \dfrac{q}{\tan\theta}$.

[1980-CE-MATHS 2-43]

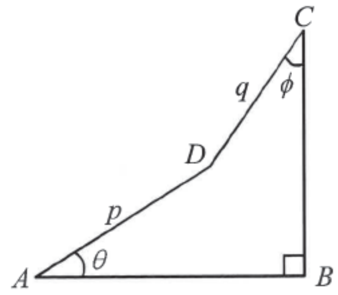
9. In the figure, $\cos\theta =$



A. $\frac{1}{2}$.
B. $\frac{2}{3}$.
C. $\frac{3}{4}$.
D. $\frac{\sqrt{3}}{2}$.
E. $\frac{\sqrt{3}}{4}$.

[1981-CE-MATHS 2-22]

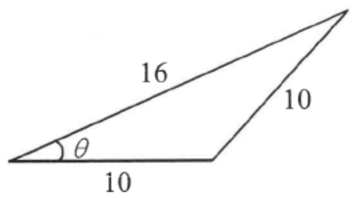
10. In the figure, $AD = p$, $DC = q$, $\angle B = 90°$. $AB =$



A. $p \sin\theta + q \sin\phi$.
B. $p \cos\theta + q \cos\phi$.
C. $p \sin\theta + q \cos\phi$.
D. $p \cos\theta + q \sin\phi$.
E. $(p + q)(\cos\theta + \cos\phi)$.

[1981-CE-MATHS 2-23]

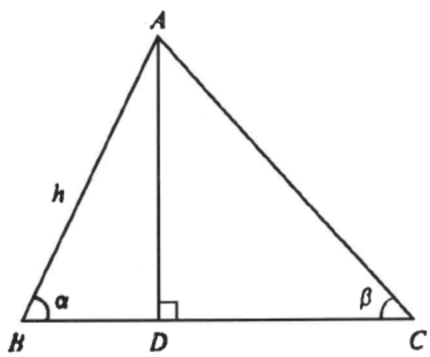
11. In the figure, $\sin\theta =$



A. 0.5.
B. 0.6.
C. 0.625.
D. 0.75.
E. 0.8.

[1981-CE-MATHS 2-48]

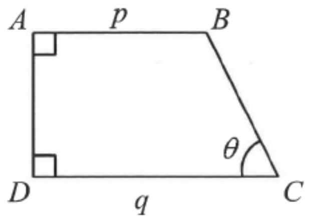
12. In the figure, $AD \perp BC$. $CD =$



A. $h \sin\alpha \tan\beta$.
B. $h \cos\alpha \tan\beta$.
C. $h \tan\alpha \sin\beta$.
D. $\dfrac{h \cos\alpha}{\tan\beta}$.
E. $\dfrac{h \sin\alpha}{\tan\beta}$.

[1981-CE-MATHS 2-49]

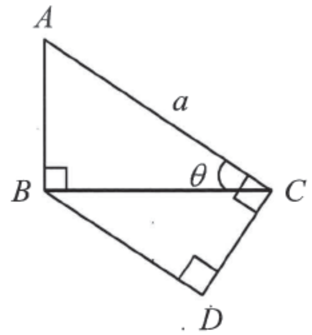
13. In the figure, $AB = p$, $DC = q$ and $\angle A = \angle D = 90°$. $BC =$



A. $(q-p)\sin\theta$.
B. $(q-p)\cos\theta$.
C. $(q-p)\tan\theta$.
D. $\dfrac{q-p}{\sin\theta}$.
E. $\dfrac{q-p}{\cos\theta}$.

[1983-CE-MATHS 2-18]

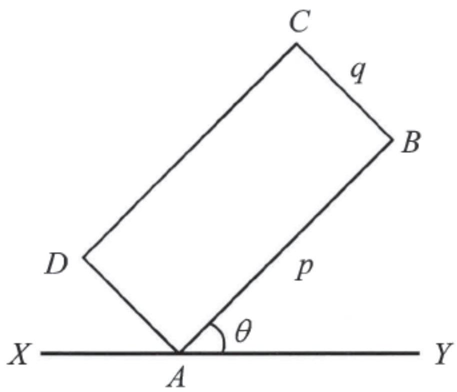
14. In the figure, $\angle ABC = \angle ACD = \angle BDC = 90°$. $AC = a$, $CD =$



A. $a\sin^2\theta$.
B. $a\cos^2\theta$.
C. $a\tan\theta$.
D. $a\sin\theta\cos\theta$.
E. $\dfrac{a\cos\theta}{\sin\theta}$.

[1983-CE-MATHS 2-19]

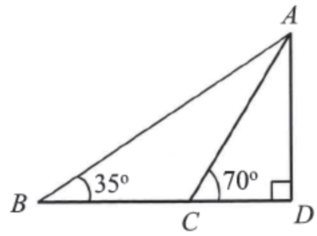
15. In the figure, $ABCD$ is a rectangle. $AB = p$ and $BC = q$. If $\angle BAY = \theta$, the distance of C from the line XAY is



A. $(p+q)\sin\theta$.
B. $(p+q)\cos\theta$.
C. $\sqrt{p^2+q^2}\sin\theta$.
D. $p\cos\theta + q\sin\theta$.
E. $p\sin\theta + q\cos\theta$.

[1983-CE-MATHS 2-47]

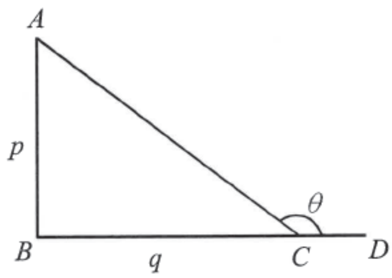
16. In the figure, BCD is a straight line. $\angle ADC = 90°$ and $BC = 10$. $AD =$



A. $10\cos 70°$.
B. $10\sin 70°$.
C. $10\tan 70°$.
D. $\dfrac{10\sin 20°}{\sin 55°}$.
E. $\dfrac{10\tan 20°}{\sin 55°}$.

[1984-CE-MATHS 2-18]

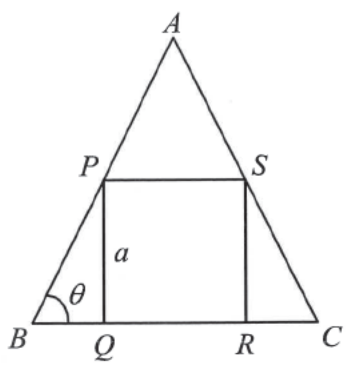
17. In the figure, $\angle B = 90°$ and BCD is a straight line. If $AB = p$ and $BC = q$, then $\cos\theta =$



A. $\dfrac{p}{q}$.
B. $\dfrac{p}{\sqrt{p^2+q^2}}$.
C. $\dfrac{q}{\sqrt{p^2+q^2}}$.
D. $\dfrac{-p}{\sqrt{p^2+q^2}}$.
E. $\dfrac{-q}{\sqrt{p^2+q^2}}$.

[1984-CE-MATHS 2-46]

18. In the figure, $PQRS$ is a square inscribed in ΔABC. $AB = AC$ and $PQ = a$. $AB =$



A. $a(\sin\theta + \frac{1}{2}\cos\theta)$.

B. $a(\cos\theta + \frac{1}{2}\sin\theta)$.

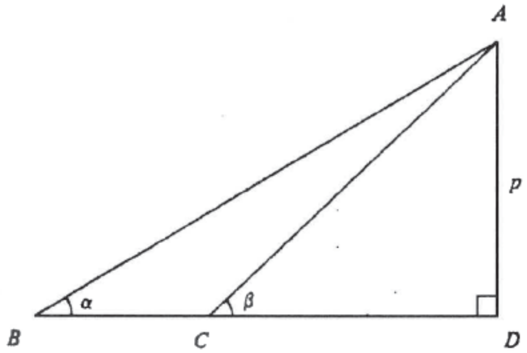
C. $a(\frac{1}{\sin\theta} + \frac{1}{2\cos\theta})$.

D. $a(\frac{1}{\cos\theta} + \frac{1}{2\sin\theta})$.

E. $\frac{2a}{\sin\theta}$.

[1984-CE-MATHS 2-48]

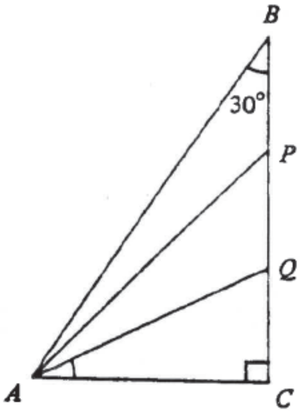
19. In the figure, BCD is a straight line. $AD \perp BD$. If $AD = p$, then $BC =$



A. $p\tan(\beta - \alpha)$.
B. $p(\tan\alpha - \tan\beta)$.
C. $p(\tan\beta - \tan\alpha)$.
D. $p(\frac{1}{\tan\alpha} - \frac{1}{\tan\beta})$.
E. $p(\frac{1}{\tan\beta} - \frac{1}{\tan\alpha})$.

[1985-CE-MATHS 2-47]

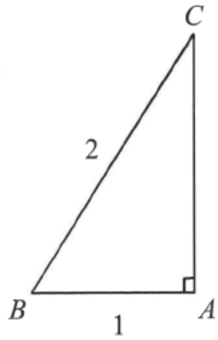
20. In the figure, $\angle C = 90^\circ$. P and Q are points on BC such that $BP = PQ = QC$. $\angle CAQ =$



A. 30° .
B. 25° .
C. 22° .
D. 20° .
E. 15° .

[1985-CE-MATHS 2-50]

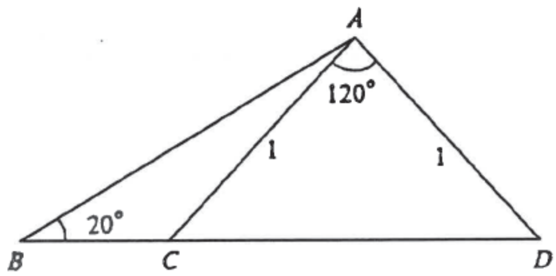
21. In the figure, $\angle A : \angle B : \angle C =$



A. $2 : \sqrt{3} : 1$.
B. $4 : 3 : 1$.
C. $3 : 2 : 1$.
D. $\sqrt{3} : \sqrt{2} : 1$.
E. $1 : 2 : \sqrt{3}$.

[1986-CE-MATHS 2-17]

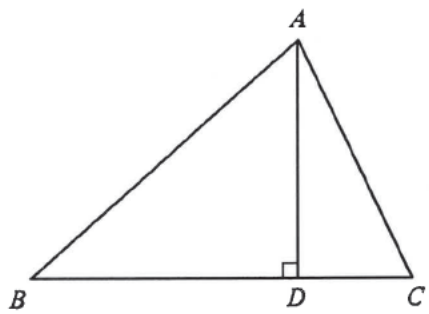
22. In the figure, $AC = AD = 1$, $\angle ABD = 20^\circ$ and $\angle CAD = 120^\circ$, find AB.



A. $2\cos 20^\circ$.
B. $\frac{1}{2\sin 20^\circ}$.
C. $\frac{\sqrt{3}}{2\sin 20^\circ}$.
D. $\sqrt{3}\cos 20^\circ$.
E. $2\sin 20^\circ$.

[1986-CE-MATHS 2-19]

23. In the figure, $BD : DC =$



A. $\sin C : \sin B$.
B. $\cos C : \cos B$.
C. $\tan C : \tan B$.
D. $\sin B : \sin C$.
E. $\cos B : \cos C$.

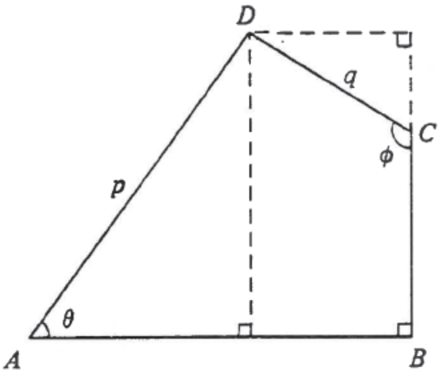
[1986-CE-MATHS 2-46]

24. A rectangle is 6 cm long and 8 cm wide. The acute angle between its diagonals, correct to the nearest degree, is

A. 37°.
B. 41°.
C. 49°.
D. 74°.
E. 83°.

[1987-CE-MATHS 2-19]

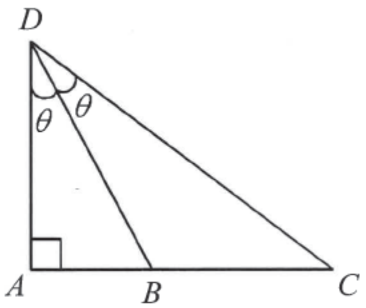
25. In the figure, $AD = p$, $CD = q$ and $\angle B = 90°$. $BC =$



A. $p\sin\theta - q\sin\phi$.
B. $p\sin\theta - q\cos\phi$.
C. $p\cos\theta - q\sin\phi$.
D. $p\sin\theta + q\cos\phi$.
E. $p\cos\theta + q\sin\phi$.

[1987-CE-MATHS 2-46]

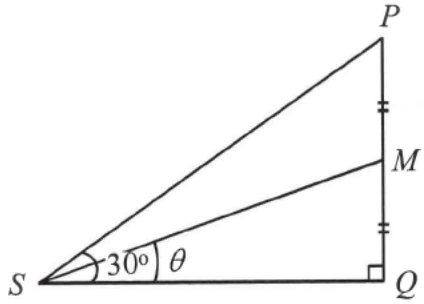
26. In the figure, $\frac{AC}{AB} =$



A. 2
B. $\tan\theta$
C. $\frac{\tan 2\theta}{\tan\theta}$
D. $\frac{\sin 2\theta}{\sin\theta}$
E. $\frac{\cos 2\theta}{\cos\theta}$

[1988-CE-MATHS 2-17]

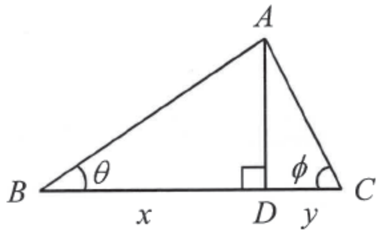
27. In the figure, M is the mid-point of PQ and $\angle PSQ = 30°$. Find $\tan\theta$.



A. 0.268
B. $\frac{\sqrt{3}}{6}$
C. $\frac{\sqrt{3}}{2}$
D. $\frac{\sqrt{3}}{4}$
E. $\frac{\sqrt{3}}{8}$

[1988-CE-MATHS 2-20]

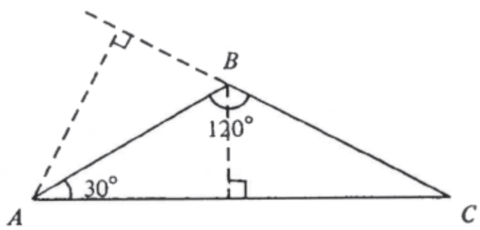
28. In the figure, $AD \perp BC$. Find $\frac{x}{y}$.



A. $\frac{\sin\phi}{\sin\theta}$
B. $\frac{\cos\phi}{\cos\theta}$
C. $\frac{\tan\phi}{\tan\theta}$
D. $\frac{\cos\theta}{\cos\phi}$
E. $\frac{\tan\theta}{\tan\phi}$

[1989-CE-MATHS 2-19]

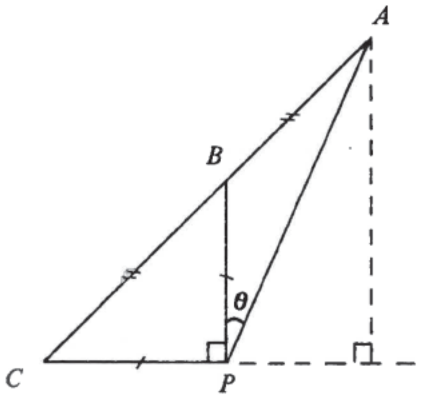
29. In the figure, $\angle A = 30°$ and $\angle B = 120°$. The ratio of the altitudes of the triangle ABC from A and from B is



A. $2:1$.
B. $\sqrt{3}:1$.
C. $\sqrt{2}:1$.
D. $1:\sqrt{2}$.
E. $1:\sqrt{3}$.

[1991-CE-MATHS 2-20]

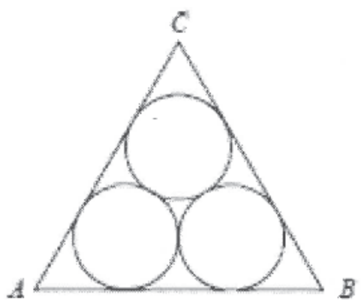
30. In the figure, $AB = BC$, $BP = CP$ and $BP \perp CP$. Find $\tan\theta$.



A. $\frac{1}{4}$
B. $\frac{1}{3}$
C. $\frac{1}{2}$
D. $\frac{1}{\sqrt{3}}$
E. $\frac{\sqrt{3}}{2}$

[1993-CE-MATHS 2-23]

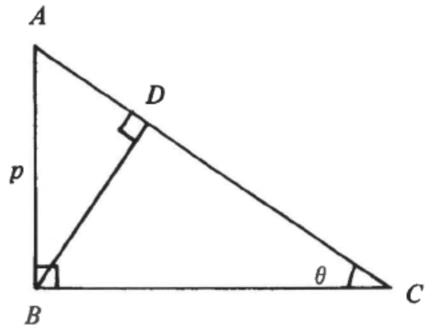
31. In the figure, ABC is an equilateral triangle and the radii of the three circles are each equal to 1. Find the perimeter of the triangle.



A. 12
B. $3(1+\tan 30°)$
C. $6(1+\tan 30°)$
D. $3(1+\frac{1}{\tan 30°})$
E. $6(1+\frac{1}{\tan 30°})$

[1993-CE-MATHS 2-47]

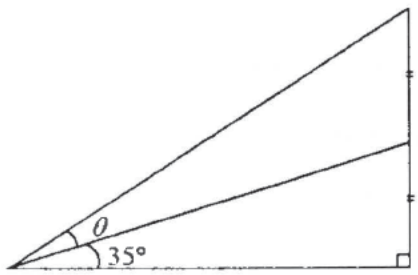
32. In the figure, $AB = p$, $\angle ACB = \theta$. Find CD.



A. $p\sin\theta$
B. $p\cos\theta$
C. $\frac{p\sin\theta}{\cos^2\theta}$
D. $\frac{p\sin^2\theta}{\cos\theta}$
E. $\frac{p\cos^2\theta}{\sin\theta}$

[1994-CE-MATHS 2-50]

33. In the figure, find θ correct to the nearest degree.

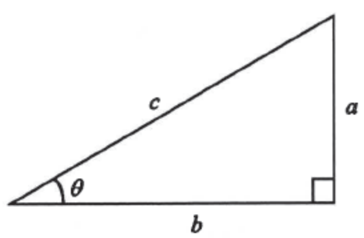


A. 16°
B. 19°
C. 26°
D. 35°
E. 36°

[1996-CE-MATHS 2-47]

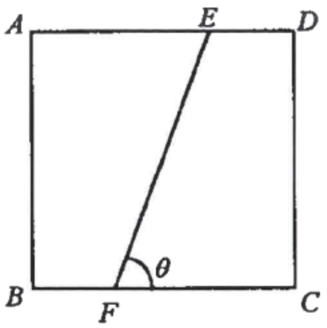
34. In the figure, $\sin\theta + \tan\theta =$

A. $\frac{a}{c}+\frac{a}{b}$.
B. $\frac{a}{c}+\frac{b}{a}$.
C. $\frac{b}{c}+\frac{a}{b}$.
D. $\frac{b}{c}+\frac{b}{a}$.
E. $\frac{c}{a}+\frac{a}{b}$.



[1997-CE-MATHS 2-12]

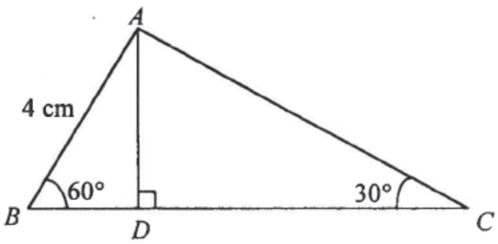
35. In the figure, the square sandwich $ABCD$ is cut into two equal halves along EF so that $AE : ED = 2 : 1$. Find θ correct to the nearest degree.



A. 56°
B. 63°
C. 64°
D. 71°
E. 72°

[1997-CE-MATHS 2-14]

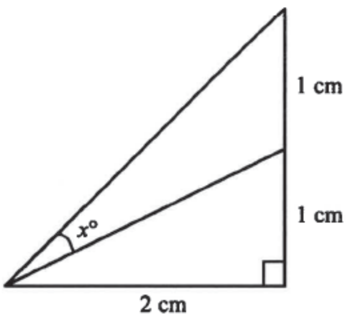
36. In the figure, find CD.



A. 6 cm
B. 4 cm
C. $4\sqrt{3}$ cm
D. $2\sqrt{3}$ cm
E. $\frac{2\sqrt{3}}{3}$ cm

[1998-CE-MATHS 2-24]

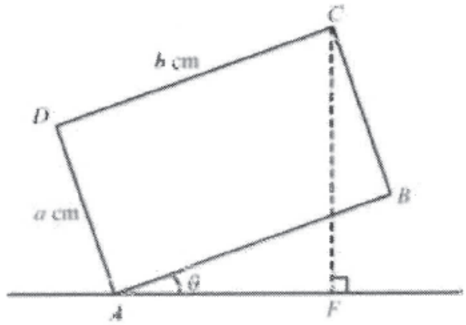
37. In the figure, find x correct to 1 decimal place.



A. 15.0
B. 18.4
C. 22.5
D. 24.1
E. 26.6

[1999-CE-MATHS 2-19]

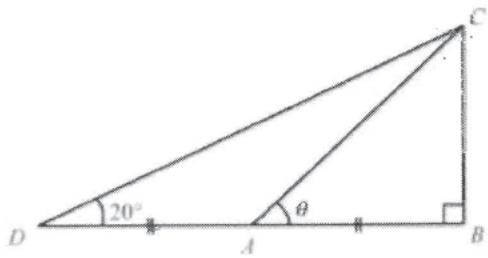
38. In the figure, $ABCD$ is a rectangle. Find CF.



A. $(a + b) \sin\theta$ cm
B. $(a + b) \cos\theta$ cm
C. $(a \sin\theta + b \cos\theta)$ cm
D. $(a \cos\theta + b \sin\theta)$ cm
E. $\sqrt{a^2 + b^2} \sin 2\theta$ cm

[2000-CE-MATHS 2-28]

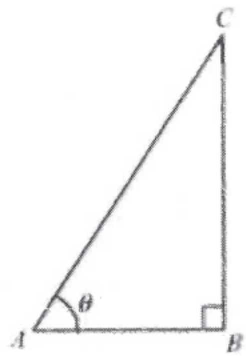
39. In the figure, DAB is a straight line. $\tan\theta =$



A. $2 \tan 20°$.
B. $\frac{1}{2} \tan 20°$.
C. $\frac{2}{\tan 20°}$.
D. $\frac{1}{2 \tan 20°}$.
E. $\tan 40°$.

[2000-CE-MATHS 2-29]

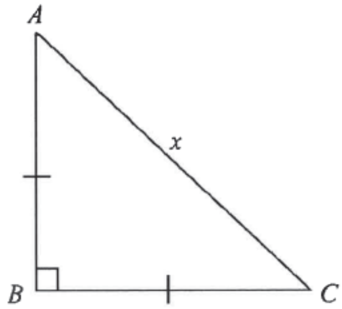
40. The figure shows a right-angled triangle where $AB : BC = 3 : 4$. Find $\sin\theta$.



A. $\frac{5}{3}$
B. $\frac{3}{4}$
C. $\frac{5}{4}$
D. $\frac{3}{5}$
E. $\frac{4}{5}$

[2001-CE-MATHS 2-4]

41. In the figure, $AB =$



A. $\frac{x}{2}$.

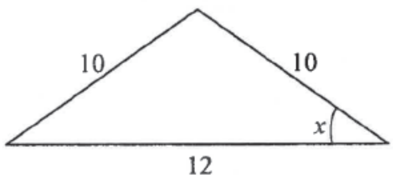
B. $\frac{\sqrt{2}}{2}x$.

C. $\frac{\sqrt{3}}{2}x$.

D. $\sqrt{2}x$.

[2003-CE-MATHS 2-26]

42. In the figure, $\sin x =$



A. $\frac{4}{3}$.

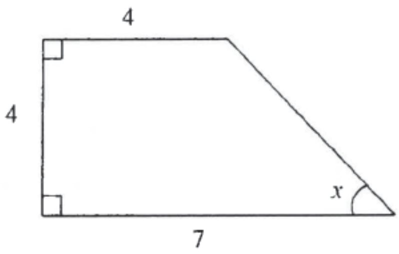
B. $\frac{3}{4}$.

C. $\frac{3}{5}$.

D. $\frac{4}{5}$.

[2004-CE-MATHS 2-22]

43. In the figure, $\sin x =$



A. $\frac{3}{7}$.

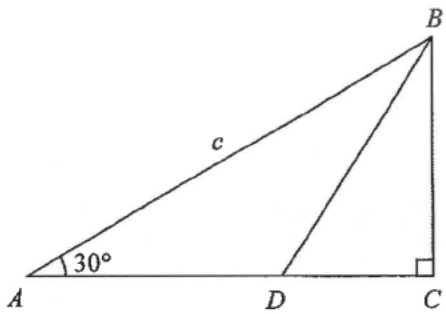
B. $\frac{3}{5}$.

C. $\frac{4}{5}$.

D. $\frac{4}{3}$.

[2006-CE-MATHS 2-23]

44. In the figure, ABC is a right-angled triangle. BD is the angle bisector of $\angle ABC$. If $AB = c$, then $CD =$



A. $\frac{c}{\sqrt{3}}$.

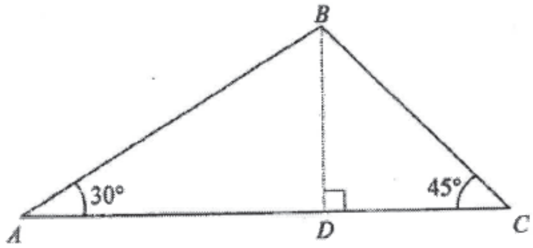
B. $\frac{c}{2\sqrt{3}}$.

C. $\frac{\sqrt{3}c}{2}$.

D. $\frac{\sqrt{3}c}{4}$.

[2007-CE-MATHS 2-23]

45. In the figure, D is a point lying on AC such that BD is perpendicular to AC. Find $AD : DC$.



A. $1 : \sqrt{2}$

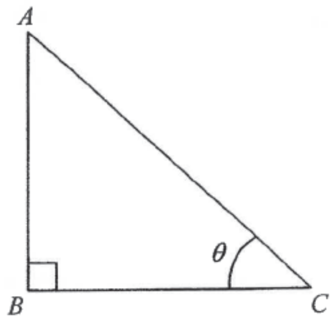
B. $\sqrt{2} : 1$

C. $\sqrt{3} : 1$

D. $\sqrt{3} : \sqrt{2}$

[2008-CE-MATHS 2-22]

46. In the figure, $2AB = 3BC$. Find θ correct to the nearest degree.



A. 34°

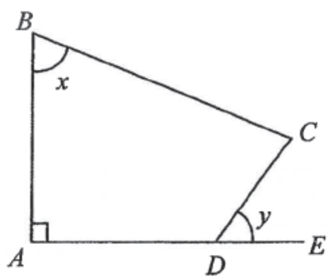
B. 42°

C. 48°

D. 56°

[2009-CE-MATHS 2-21]

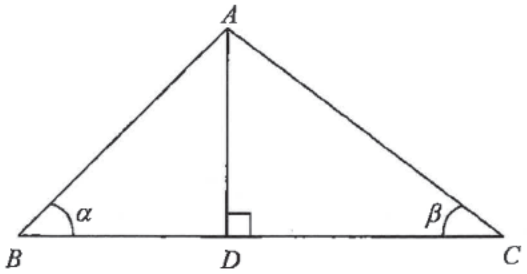
47. In the figure, ADE is a straight line. If $\angle ABC = x$ and $\angle CDE = y$, then $AD =$



A. $BC \sin x - CD \sin y$.
B. $BC \sin x - CD \cos y$.
C. $BC \cos x - CD \sin y$.
D. $BC \cos x - CD \cos y$.

[2009-CE-MATHS 2-23]

48. In the figure, D is a point lying on BC such that AD is perpendicular to BC. Find $\frac{AC}{BD}$.

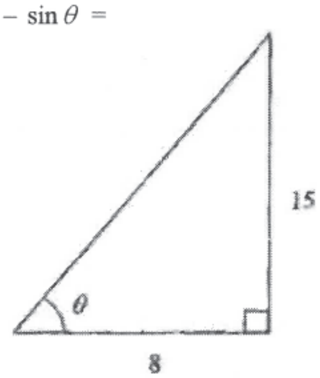


A. $\frac{\tan\beta}{\tan\alpha}$.
B. $\frac{\tan\alpha}{\sin\beta}$.
C. $\tan\alpha \tan\beta$.
D. $\tan\alpha \sin\beta$.

[2010-CE-MATHS 2-21]

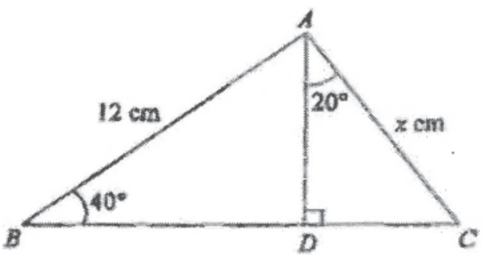
49. In the figure, $\cos\theta - \sin\theta =$

A. $\frac{3}{5}$.
B. $\frac{-3}{5}$.
C. $\frac{7}{17}$.
D. $\frac{-7}{17}$.



[2011-CE-MATHS 2-21]

50. In the figure, D is a point lying on BC such that AD is perpendicular to BC. Find x correct to 2 decimal places.

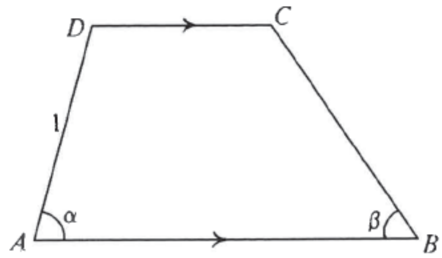


A. 6.86
B. 7.25
C. 8.21
D. 9.78

[2011-CE-MATHS 2-22]

2-Dimensional Problems

51. In trapezium $ABCD$, $AB // DC$. If $AD = 1$, then $BC =$

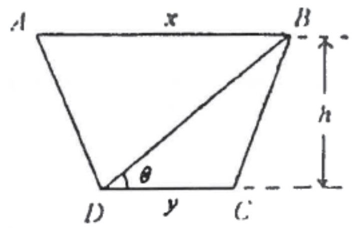


A. $\frac{\sin\alpha}{\sin\beta}$.
B. $\frac{\sin\beta}{\sin\alpha}$.
C. $\sin\alpha \sin\beta$.
D. $\frac{\cos\alpha}{\cos\beta}$.
E. $\frac{\cos\beta}{\cos\alpha}$.

[SP-CE-MATHS A2-43]

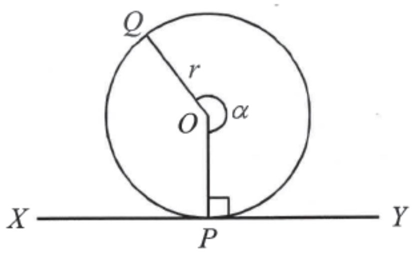
52. In the figure, $ABCD$ is an isosceles trapezium in which $AB > DC$. The height of the trapezium is h, $AB = x$ and $DC = y$. Then $\tan\theta =$

A. $\frac{h}{x+y}$.
B. $\frac{x+y}{h}$.
C. $\frac{2h}{x+y}$.
D. $\frac{x+y}{2h}$.
E. $\frac{h}{2x+2y}$.



[1979-CE-MATHS 2-42]

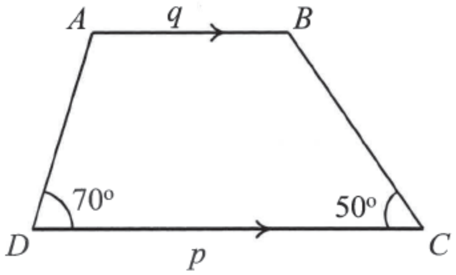
53. In the figure, O is the centre of the circle and its radius is r. XY touches the circle at P. Find the distance of Q from XY.



A. $r(1 - \sin\alpha)$
B. $r(1 + \sin\alpha)$
C. $r(1 - \cos\alpha)$
D. $r(1 + \cos\alpha)$
E. $r(2 - \sin\alpha)$

[1980-CE-MATHS 2-45]

54. In the figure, $AB \parallel DC$. $AB = q$ and $DC = p$. $BC =$



A. $\dfrac{(p+q)\sin 50^\circ}{2\sin 70^\circ}$.

B. $\dfrac{(p+q)\sin 70^\circ}{2\sin 50^\circ}$.

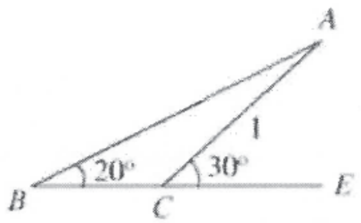
C. $\dfrac{(p-q)\sin 70^\circ}{\sin 60^\circ}$.

D. $\dfrac{(p-q)\sin 70^\circ}{\sin 50^\circ}$.

E. $\dfrac{(p-q)\sin 50^\circ}{\sin 70^\circ}$.

[1984-CE-MATHS 2-49]

55. In the figure, BCX is a straight line. $AC = 1$, $AB =$



A. $2\sin 20^\circ$.

B. $2\cos 20^\circ$.

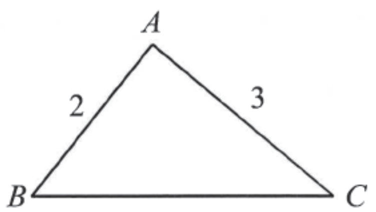
C. $\sqrt{2}\cos 20^\circ$.

D. $\dfrac{1}{2\sin 20^\circ}$.

E. $\dfrac{\sqrt{3}}{2\sin 20^\circ}$.

[1985-CE-MATHS 2-21]

56. In the figure, $AB = 2$, $AC = 3$ and $\sin B = \dfrac{3}{4}$, then $\cos^2 C =$



A. $\dfrac{9}{16}$.

B. $\dfrac{9}{13}$.

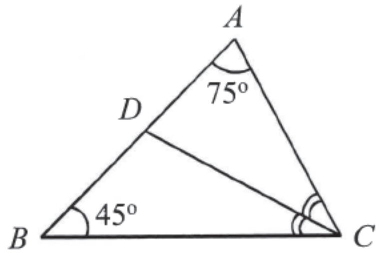
C. $\dfrac{1}{4}$.

D. $\dfrac{1}{2}$.

E. $\dfrac{3}{4}$.

[1986-CE-MATHS 2-45]

57. In the figure, $\angle A = 75^\circ$, $\angle B = 45^\circ$ and CD bisects $\angle ACB$. $\dfrac{BD}{CD} =$



A. $\dfrac{2}{3}$.

B. $\dfrac{1}{\sqrt{2}}$.

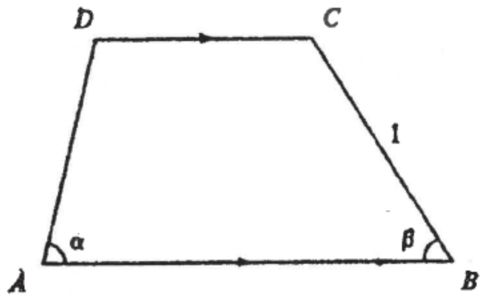
C. $\sqrt{2}$.

D. $\sqrt{\dfrac{2}{3}}$.

E. $\sqrt{\dfrac{3}{2}}$.

[1987-CE-MATHS 2-18]

58. In the figure, $ABCD$ is a trapezium with $AB \parallel DC$. If $BC = 1$, then $AD =$



A. $\dfrac{\sin\beta}{\sin\alpha}$.

B. $\dfrac{\sin\alpha}{\sin\beta}$.

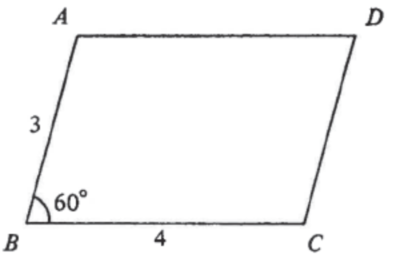
C. $\sin\alpha\sin\beta$.

D. $\dfrac{\cos\beta}{\cos\alpha}$.

E. $\dfrac{\cos\alpha}{\cos\beta}$.

[1989-CE-MATHS 2-50]

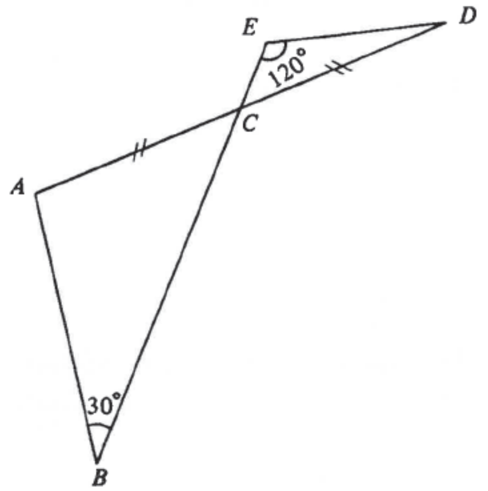
59. In the figure, $ABCD$ is a parallelogram. $BD =$



A. 5 .
B. 7 .
C. $\sqrt{13}$.
D. $\sqrt{27}$.
E. $\sqrt{37}$.

[1990-CE-MATHS 2-46]

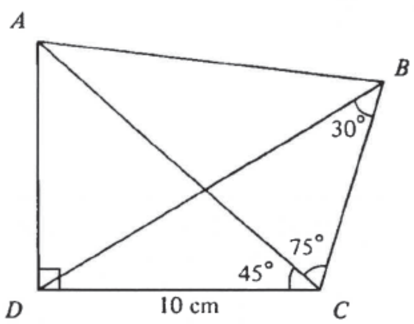
60. In the figure, $AC = CD$, $\angle ABC = 30°$ and $\angle CED = 120°$. $\dfrac{AB}{DE} =$



A. $\dfrac{1}{\sqrt{2}}$.
B. $\dfrac{1}{\sqrt{3}}$.
C. $\sqrt{2}$.
D. $\sqrt{3}$.
E. 2 .

[1990-CE-MATHS 2-49]

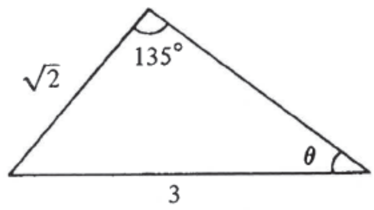
61. In the figure, find the length of AB, correct to nearest cm.



A. 14 cm
B. 15 cm
C. 16 cm
D. 17 cm
E. 18 cm

[1991-CE-MATHS 2-50]

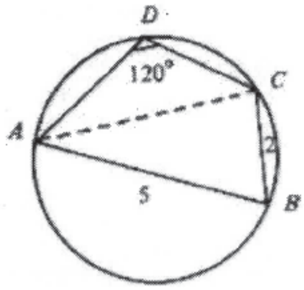
62. In the figure, find $\tan\theta$.



A. $\dfrac{1}{3}$
B. $\dfrac{1}{\sqrt{8}}$
C. $\dfrac{3}{8}$
D. $\sqrt{\dfrac{2}{7}}$
E. $\dfrac{1}{\sqrt{2}}$

[1992-CE-MATHS 2-46]

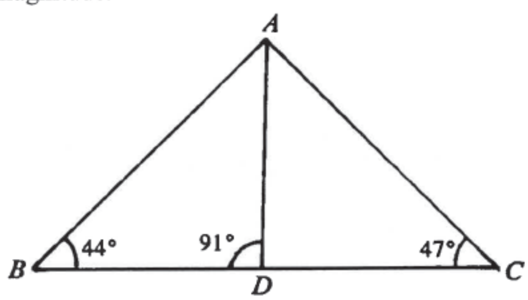
63. In the figure, $ABCD$ is a cyclic quadrilateral with $AB = 5$, $BC = 2$ and $\angle ADC = 120°$. Find AC.



A. $\sqrt{19}$
B. $\sqrt{21}$
C. $2\sqrt{6}$
D. $\sqrt{34}$
E. $\sqrt{39}$

[1994-CE-MATHS 2-19]

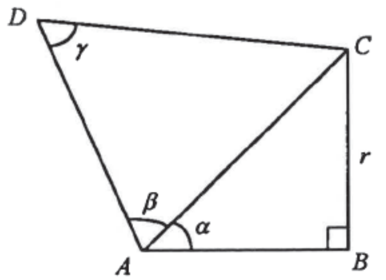
64. In the figure, BDC is a straight line. Arrange AD, BD and DC in ascending order of magnitude.



A. $AD < BD < DC$
B. $AD < DC < BD$
C. $DC < AD < BD$
D. $DC < BD < AD$
E. $BD < AD < DC$

[1995-CE-MATHS 2-21]

65. In the figure, $CD =$



A. $\dfrac{r \sin\beta}{\sin\alpha \sin\gamma}$.

B. $\dfrac{r \sin\beta}{\cos\alpha \sin\gamma}$.

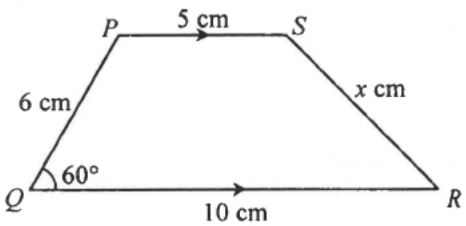
C. $\dfrac{r \sin\alpha \sin\beta}{\sin\gamma}$.

D. $\dfrac{r \cos\alpha \sin\beta}{\sin\gamma}$.

E. $\dfrac{r \sin\beta}{\sin\alpha}$.

[1997-CE-MATHS 2-42]

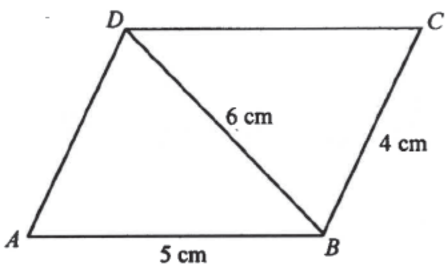
66. In the figure, $PQRS$ is a trapezium. Find x correct to 3 significant figures.



A. 3.01
B. 5.57
C. 5.77
D. 6.00
E. 9.54

[1998-CE-MATHS 2-26]

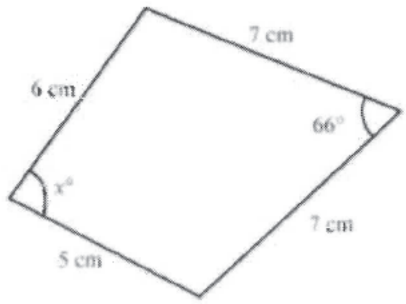
67. In the figure, $ABCD$ is a parallelogram. Find $\angle ABC$ correct to the nearest degree.



A. 83°
B. 97°
C. 104°
D. 124°
E. 139°

[1999-CE-MATHS 2-20]

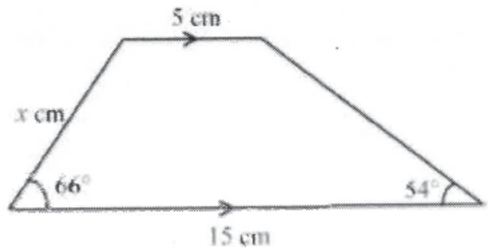
68. In the figure, find x correct to 3 significant figures.



A. 63.8
B. 78.5
C. 84.5
D. 87.3
E. 89.1

[2000-CE-MATHS 2-27]

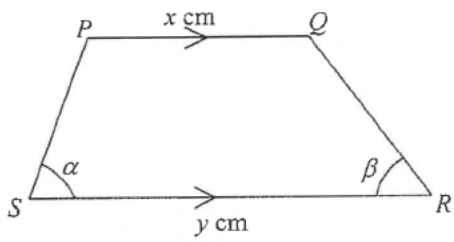
69. In the figure, find x correct to 3 significant figures.



A. 8.86
B. 9.34
C. 9.48
D. 10.7
E. 11.3

[2001-CE-MATHS 2-30]

70. In the figure, $PQ = x$ cm and $SR = y$ cm. Find PS.



A. $\dfrac{y-x}{2\cos\alpha}$ cm

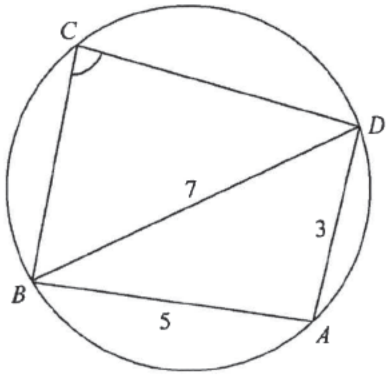
B. $\dfrac{y}{2\cos(\alpha+\beta)}$ cm

C. $\dfrac{x\sin\beta}{\sin\alpha}$ cm

D. $\dfrac{(y-x)\sin\beta}{\sin(\alpha+\beta)}$ cm

[2003-CE-MATHS 2-49]

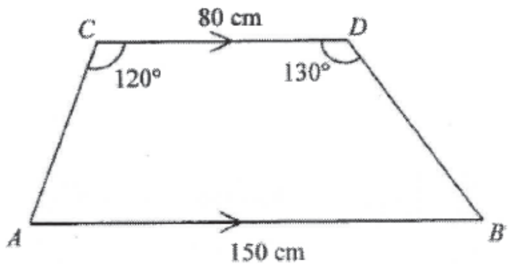
71. In the figure, A, B, C and D are points lying on the circle. If $AB = 5$, $AD = 3$ and $BD = 7$, then $\angle BCD =$



A. $60°$.
B. $85°$.
C. $95°$.
D. $120°$.

[2007-CE-MATHS 2-48]

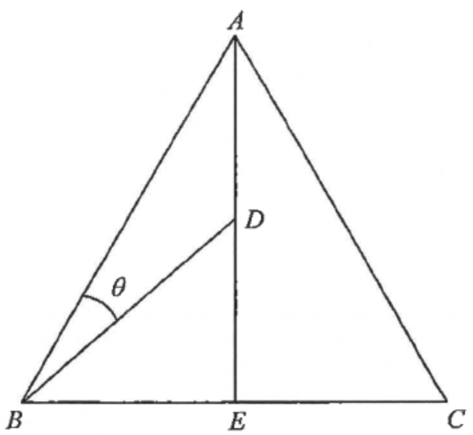
72. In the figure, $AB // CD$, $AB = 150$ cm and $CD = 80$ cm. Find BD correct to the nearest cm.



A. 60 cm
B. 62 cm
C. 64 cm
D. 65 cm

[2008-CE-MATHS 2-48]

73. In the figure, AD is produced to meet BC at E. If $AB = BC = AC$, $BE = CE$ and $AD = DE$ find $\sin\theta$.



A. $\frac{\sqrt{3}}{5}$

B. $\frac{\sqrt{3}}{10}$

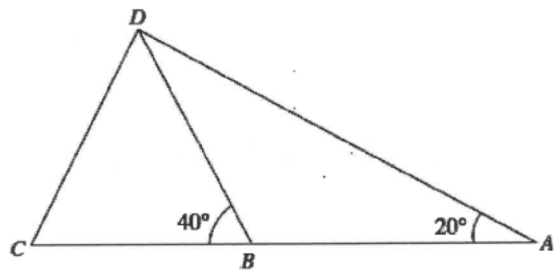
C. $\frac{\sqrt{21}}{7}$

D. $\frac{\sqrt{21}}{14}$

[2010-CE-MATHS 2-47]

HKDSE Problems

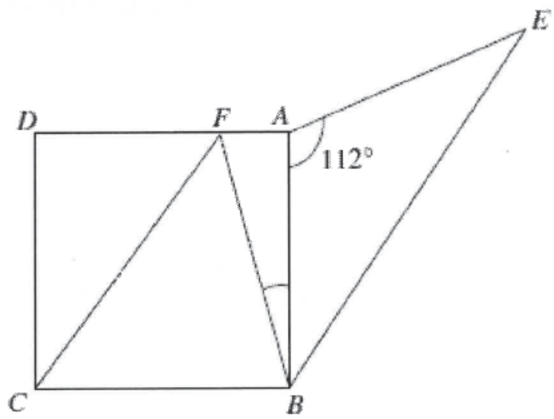
74. In the figure, ABC is a straight line. If $BD = CD$ and $AB = 10$ cm, find BC correct to the nearest cm.



A. 8 cm
B. 13 cm
C. 14 cm
D. 15 cm

[SP-DSE-MATHS 2-24]

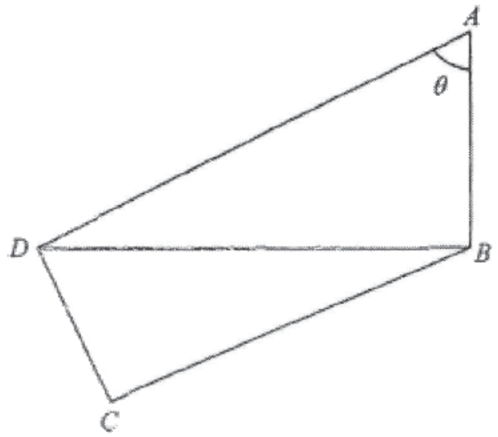
75. In the figure, $ABCD$ is a square. F is a point lying on AD such that $CF // BE$. If $AB = AE$, find $\angle ABF$ correct to the nearest degree.



A. $17°$
B. $18°$
C. $22°$
D. $26°$

[PP-DSE-MATHS 2-22]

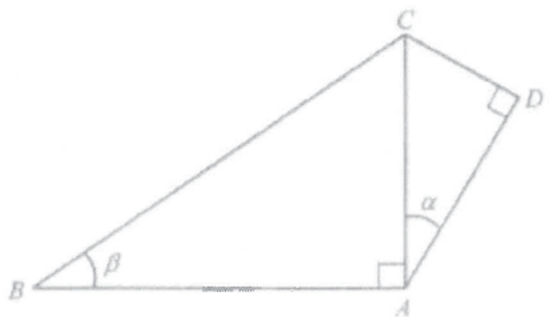
76. In the figure, $\angle ABD = \angle ADC = \angle BCD = 90^\circ$. If $AB = \ell$, then $CD =$



A. $\ell \sin\theta$.
B. $\ell \cos\theta$.
C. $\ell \sin\theta \tan\theta$.
D. $\dfrac{\ell \tan\theta}{\cos\theta}$.

[2014-DSE-MATHS 2-18]

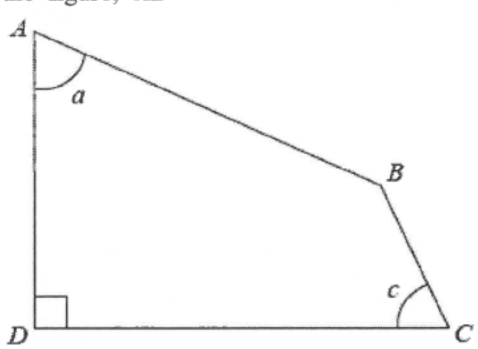
77. In the figure, $\dfrac{AD}{AB} =$



A. $\cos\alpha \tan\beta$.
B. $\sin\alpha \tan\beta$.
C. $\dfrac{\cos\alpha}{\tan\beta}$.
D. $\dfrac{\sin\alpha}{\tan\beta}$.

[2015-DSE-MATHS 2-18]

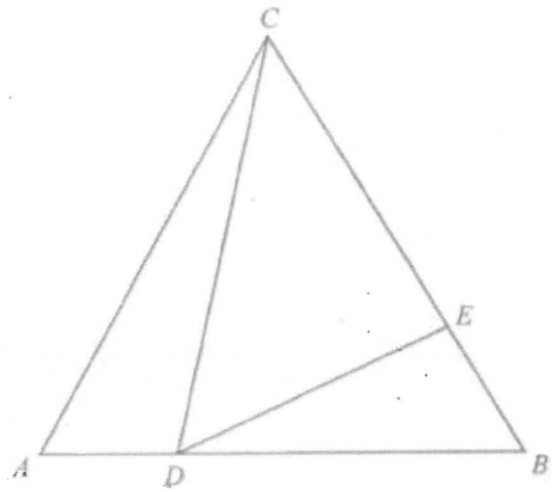
78. In the figure, $AD =$



A. $AB \cos a + BC \cos c$.
B. $AB \cos a + BC \sin c$.
C. $AB \sin a + BC \cos c$.
D. $AB \sin a + BC \sin c$.

[2016-DSE-MATHS 2-21]

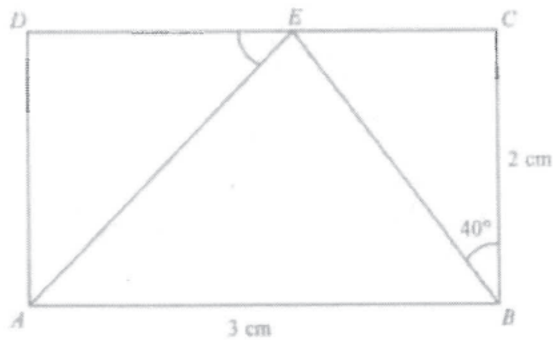
79. In the figure, ABC is an equilateral triangle of side 16 cm. D and E are points lying on AB and BC respectively such that $AD = 4$ cm and $\angle CDE = 60^\circ$. Find CE.



A. 9 cm
B. 10 cm
C. 12 cm
D. 13 cm

[2017-DSE-MATHS 2-17]

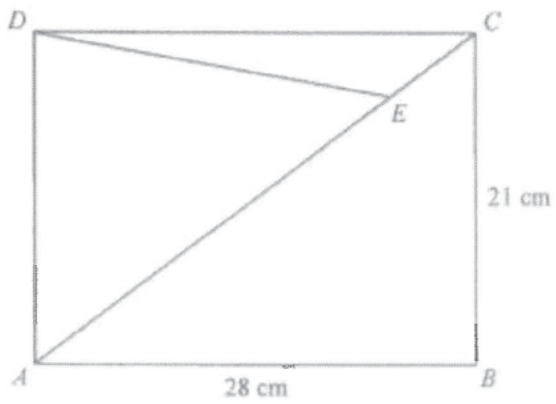
80. In the figure, $ABCD$ is a rectangle. If E is a point lying on CD such that $\angle CBE = 40^\circ$, find $\angle AED$ correct to the nearest degree.



A. 33°
B. 43°
C. 47°
D. 57°

[2017-DSE-MATHS 2-22]

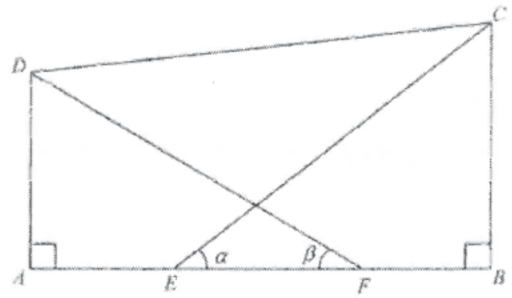
81. In the figure, $ABCD$ is a rectangle. If E is a point lying on AC such that $AE = 30$ cm, then $DE =$



A. $3\sqrt{65}$ cm.
B. $5\sqrt{29}$ cm.
C. $\sqrt{641}$ cm.
D. $\sqrt{697}$ cm.

[2017-DSE-MATHS 2-38]

82. In the figure, $ABCD$ is a trapezium with $\angle ABC = \angle BAD = 90°$. E and F are points lying on AB such that E and F divide AB into three equal parts. Which of the following must be true?



I. $AF \sin\alpha = BE \sin\beta$

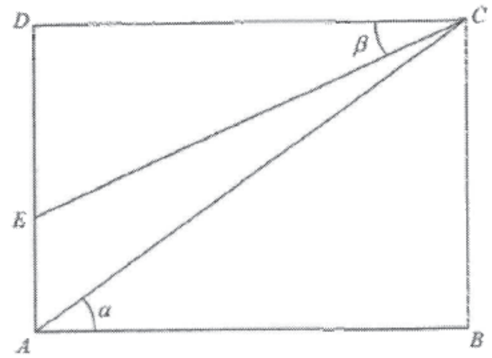
II. $CE \cos\alpha = DF \cos\beta$

III. $AD \tan\alpha = BC \tan\beta$

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

[2018-DSE-MATHS 2-21]

83. In the figure, $ABCD$ is a rectangle. E is a point lying on AD. Find $\frac{CE}{AC}$.



A. $\frac{\sin\alpha}{\sin\beta}$
B. $\frac{\cos\alpha}{\cos\beta}$
C. $\sin\alpha \sin\beta$
D. $\cos\alpha \cos\beta$

[2019-DSE-MATHS 2-22]

Bearings

1. If the bearing of B from A is S30°W, then the bearing of A from B is

   A. N30°E.
   B. N60°W.
   C. N60°E.
   D. S30°W.
   E. S30°E.

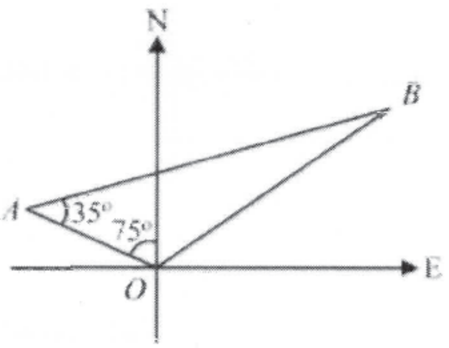
   [1980-CE-MATHS 2-15]

2. The bearing of a lighthouse as observed from an ocean liner is N37°E, the bearing of the ocean linear as observed from the light house is

   A. N37°E.
   B. N53°W.
   C. S37°E.
   D. S37°W.
   E. S53°W.

   [1986-CE-MATHS 2-20]

3. In the figure, A and B are the positions of two boats. The bearing of B from A is



   A. N55°E.
   B. N70°E.
   C. N20°E.
   D. S35°E.
   E. S75°E.

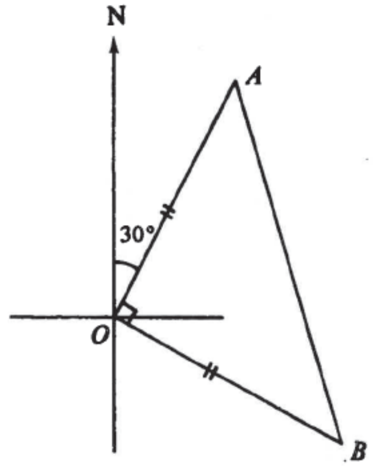
   [1991-CE-MATHS 2-29]

4. The bearing of A from B is 075°. What is the bearing of B from A?

   A. 015°
   B. 075°
   C. 105°
   D. 195°
   E. 255°

   [1994-CE-MATHS 2-11]

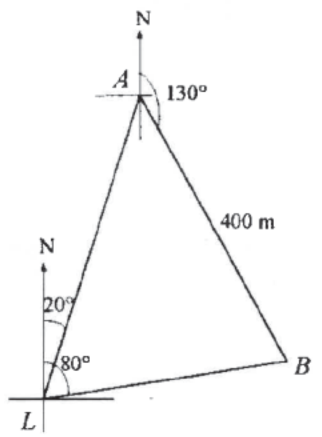
5. In the figure, the bearing of B from A is



   A. 015°.
   B. 045°.
   C. 075°.
   D. 165°.
   E. 345°.

   [1995-CE-MATHS 2-20]

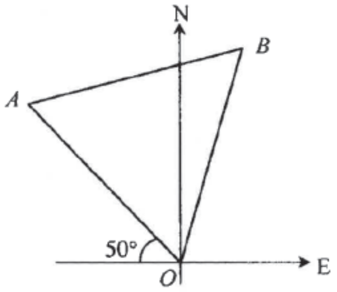
6. In the figure, the bearings of two ships A and B from a lighthouse L are 020° and 080° respectively. B is 400 m and at a bearing of 130° from A. Find the distance of B from L.



   A. 400 m
   B. $\dfrac{400}{\sin 60°}$ m
   C. $\dfrac{400 \sin 50°}{\sin 60°}$ m
   D. $\dfrac{400 \sin 70°}{\sin 60°}$ m
   E. $\dfrac{400 \sin 70°}{\sin 80°}$ m

   [1996-CE-MATHS 2-48]

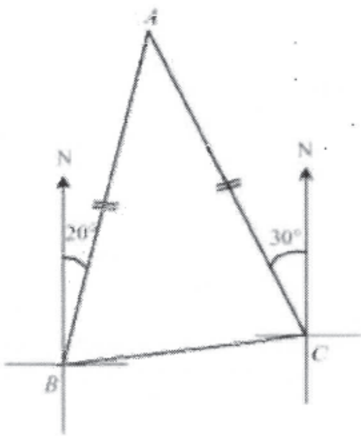
7. In the figure, OAB is an equilateral triangle. Find the bearing of B from A.



A. 10°.
B. 80°.
C. 170°.
D. 260°.
E. 350°.

[1998-CE-MATHS 2-18]

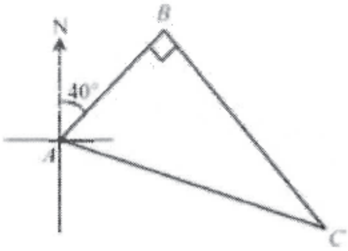
8. In the figure, the bearing of B from C is



A. N 5° E.
B. N 65° E.
C. N 85° E.
D. S 5° W.
E. S 85° W.

[1999-CE-MATHS 2-15]

9. According to the figure, the bearing of B from C is



A. 050°.
B. 130°.
C. 140°.
D. 310°.
E. 320°.

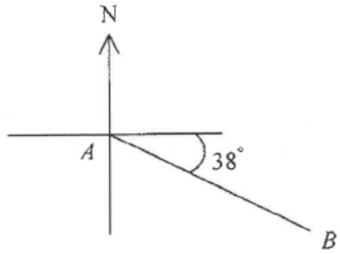
[2000-CE-MATHS 2-30]

10. Ship A is 8 km due north of a light house L and ship B is 6 km due east of L. Find the bearing of B from A.

A. N 53.1° W (correct to the nearest 0.1°)
B. N 36.9° W (correct to the nearest 0.1°)
C. N 36.9° E (correct to the nearest 0.1°)
D. S 53.1° E (correct to the nearest 0.1°)
E. S 36.9° E (correct to the nearest 0.1°)

[2001-CE-MATHS 2-31]

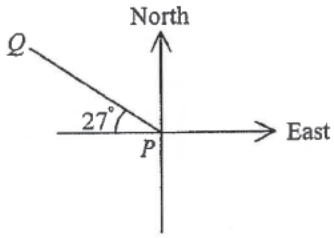
11. In the figure, the bearing of A from B is



A. N 38° W.
B. N 52° W.
C. S 38° E.
D. S 52° E.

[2003-CE-MATHS 2-23]

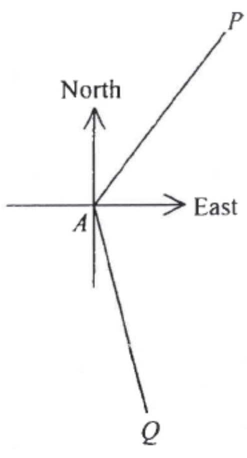
12. In the figure, the bearing of P from Q is



A. N 27° W.
B. S 27° E.
C. N 63° W.
D. S 63° E.

[2005-CE-MATHS 2-15]

13. In the figure, $PA = QA$. If the bearings of P and Q from A are N 42° E and S 28° E respectively, then the bearing of P from Q is



A. N 7° E .
B. N 27° E .
C. N 35° E .
D. N 55° E .

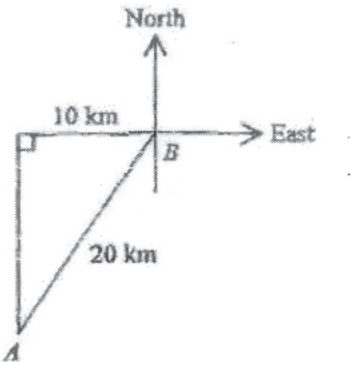
[2006-CE-MATHS 2-16]

14. A and B are two points on a map. If the bearing of A from B is 110°, then the bearing of B from A is

A. 070° .
B. 250° .
C. 290° .
D. 340° .

[2007-CE-MATHS 2-15]

15. In the figure, the bearing of B from A is



A. 030° .
B. 060° .
C. 210° .
D. 240° .

[2011-CE-MATHS 2-15]

Elevation & Depression

16. A vertical flagstaff of length h metres casts a shadow of $\frac{h}{3}$ metres on the horizontal ground. The elevation of the sun is

A. 18.43° .
B. 19.47° .
C. 53.13° .
D. 70.53° .
E. 71.57° .

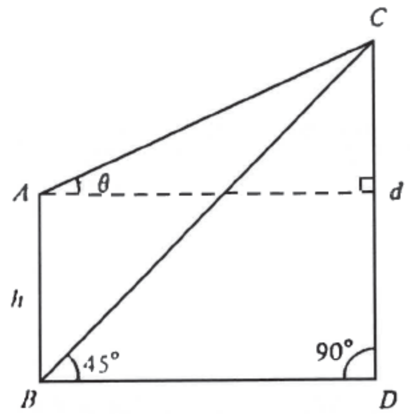
[1977-CE-MATHS 2-27]

17. From the top of a lighthouse, h metres high, the angle of depression of a boat is 20°. How far is the boat from the base of the lighthouse, which is at sea-level?

A. $h \sin 20°$ m
B. $h \cos 20°$ m
C. $h \tan 20°$ m
D. $\frac{h}{\sin 20°}$ m
E. $\frac{h}{\tan 20°}$ m

[1982-CE-MATHS 2-20]

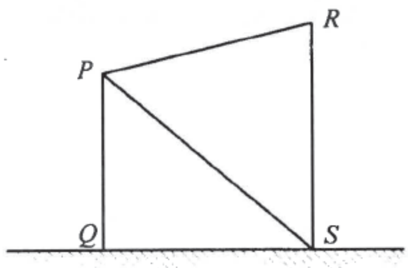
18. AB and CD are two buildings of heights h and d respectively. The angles of elevation of C from A and B are respectively θ and 45°. $d =$



A. $h(1 - \tan\theta)$.
B. $h(1 + \tan\theta)$.
C. $h \tan\theta$.
D. $\frac{h}{1 + \tan\theta}$.
E. $\frac{h}{1 - \tan\theta}$.

[1982-CE-MATHS 2-46]

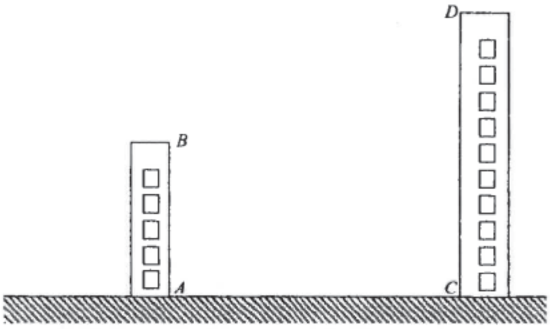
19. In the figure, PQ and RS are two vertical poles standing on the horizontal ground. The angle of elevation of R from P is 20° and the angle of depression of S from P is 40°. If $RS = 5$ m, then $PR =$



A. $\frac{5 \sin 40°}{\sin 70°}$ m .
B. $\frac{5 \sin 50°}{\sin 60°}$ m .
C. $\frac{5 \sin 60°}{\sin 50°}$ m .
D. $\frac{5 \sin 70°}{\sin 40°}$ m .
E. $\frac{5}{\sin 50° \sin 60°}$ m .

[1998-CE-MATHS 2-27]

20. In the figure, AB and CD are the heights of two buildings on the same level ground. If $AB = 9$ m, $AC = 20$ m and the angle of depression of A from D is 50°, find the angle of elevation of D from B correct to the nearest 0.1°.



A. 21.3°
B. 24.2°
C. 36.6°
D. 53.4°

[2002-CE-MATHS 2-24]

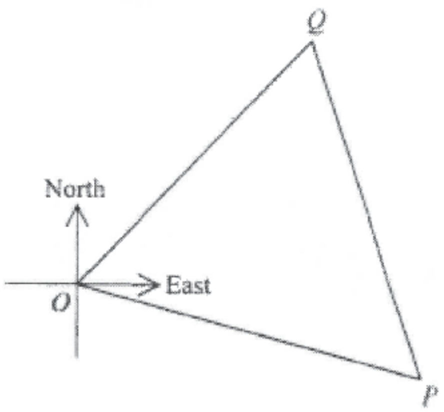
21. If the angle of elevation of P from Q is 40°, then the angle of depression of Q from P is

A. 40° .
B. 50° .
C. 130° .
D. 140° .

[2009-CE-MATHS 2-16]

HKDSE Problems

22. In the figure, the bearing of P from O is S 86° E and the bearing of Q from O is N 32° E. If P and Q are equidistant from O, then the bearing of P from Q is



A. N 24° W .
B. N 27° W .
C. S 24° E .
D. S 27° E .

[2013-DSE-MATHS 2-20]

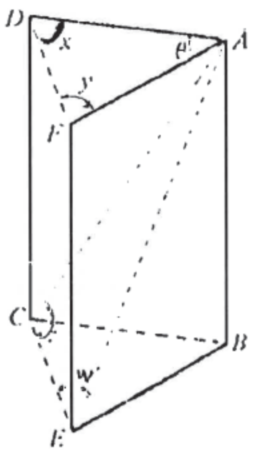
23. A ship is 50 km due west of a lighthouse. If the ship moves in the direction $S60°E$, find the shortest distance between the ship and the lighthouse.

A. 20 km
B. 25 km
C. 43 km
D. 87 km

[2020-DSE-MATHS 2-23]

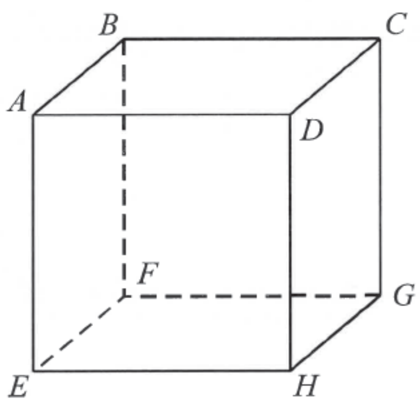
Angles & Lines in 3-Dimensional Figures

1. The figure represents a rectangular door $ABCD$ turning through an angle θ and coming to a new position $ABEF$. Which of the angles x, y, z and w is a right angle?



A. x (i.e. $\angle ADF$)
B. y (i.e. $\angle AFD$)
C. z (i.e. $\angle ACE$)
D. w (i.e. $\angle AEC$)
E. None of them

[1978-CE-MATHS 2-9]

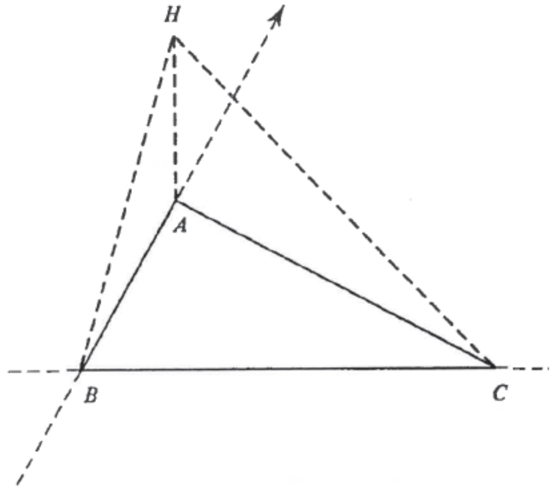
2. 

In the figure, $ABCDEFGH$ is a cube. Which of the following is a right angle / are right angles?

(1) $\angle DHG$
(2) $\angle AHG$
(3) $\angle BEH$

A. (1) only
B. (2) only
C. (3) only
D. (1) and (3) only
E. (1), (2) and (3)

[1988-CE-MATHS 2-15]

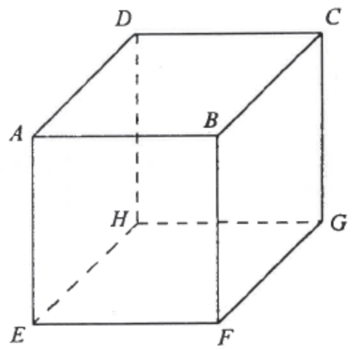
3. 

In the figure, A, B and C are three points on the same horizontal plane. A is due north of B, C is due east of B and H is a point vertically above A. Which of the following angles is/are 90°?

(1) $\angle HAC$
(2) $\angle ABC$
(3) $\angle HBC$

A. (1) only
B. (2) only
C. (1) and (2) only
D. (1) and (3) only
E. (1), (2) and (3)

[1990-CE-MATHS 2-47]

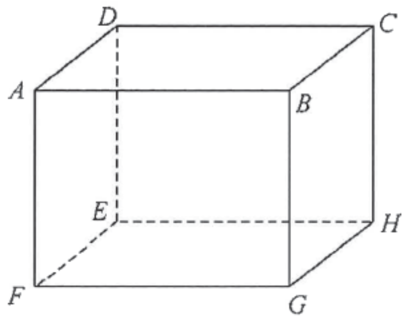
4. 

The figure shows a cube. Which of the following is/are equal to $\angle AGE$?

(1) $\angle AGF$
(2) $\angle BDF$
(3) $\angle DEG$

A. (1) only
B. (2) only
C. (3) only
D. (1) and (2) only
E. (2) and (3) only

[1996-CE-MATHS 2-23]

5. 

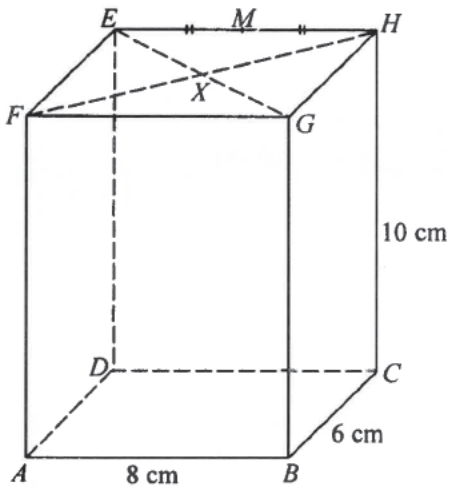
The figure shows a cuboid. Which of the following are right angles?

(1) $\angle CAF$
(2) $\angle DHG$
(3) $\angle AGC$

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

[2003-CE-MATHS 2-48]

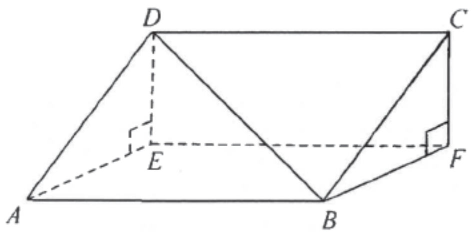
6. In the figure, $ABCDEFGH$ is a rectangular block. EG and FH meet at X. M is the mid-point of EH. Which of the following makes the greatest angle with the plane $ABCD$?



A. AG
B. AH
C. AM
D. AX

[2004-CE-MATHS 2-49]

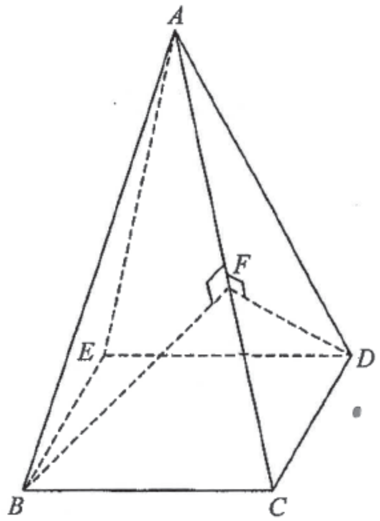
7. The figure shows a right prism $ABCDEF$ with a right-angled triangle as the cross-section. The angle between BD and the plane $CDEF$ is



A. $\angle BDE$.
B. $\angle BDF$.
C. $\angle DBE$.
D. $\angle DBF$.

[2006-CE-MATHS 2-24]

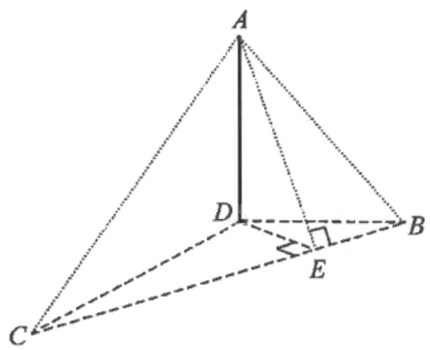
8. In the figure, $ABCDE$ is a right pyramid with the square base $BCDE$. F is a point lying on AC such that BF and DF are perpendicular to AC. The angle between the plane ABC and the plane ACD is



A. $\angle ACB$.
B. $\angle BAD$.
C. $\angle BCD$.
D. $\angle BFD$.

[2007-CE-MATHS 2-24]

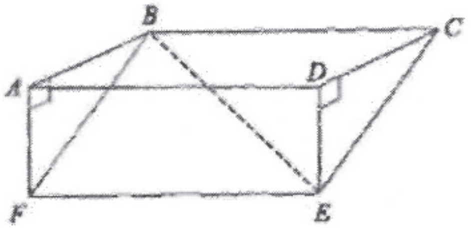
9. In the figure, AD is a vertical pole standing on the horizontal ground BCD. If E is a point lying on BC such that DE and AE are perpendicular to BC, then the angle between the plane ABC and the horizontal ground is



A. $\angle ABD$.
B. $\angle ABE$.
C. $\angle ACD$.
D. $\angle AED$.

[2010-CE-MATHS 2-28]

10. The figure shows a right prism $ABCDEF$ with a right-angled triangle as the cross-section. The angle between BE and the plane $ABCD$ is



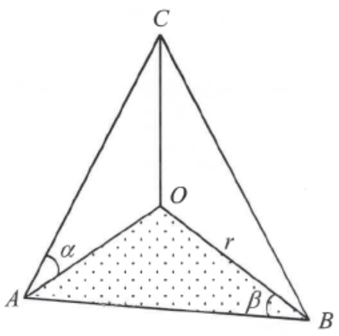
A. $\angle ABE$.
B. $\angle CBE$.
C. $\angle DBE$.
D. $\angle EBF$.

[2011-CE-MATHS 2-24]

3-Dimensional Problems

11. In the figure, OAB is a right-angled triangle in a horizontal plane with $\angle AOB = 90°$. OC is a vertical line. If $OB = r$, $AC =$

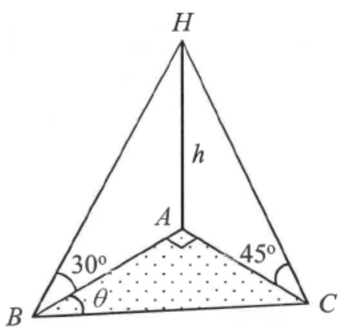
A. $\dfrac{r \sin\beta}{\tan\alpha}$.
B. $\dfrac{r \tan\alpha}{\cos\beta}$.
C. $\dfrac{r \sin\beta}{\sin\alpha}$.
D. $\dfrac{r \cos\beta}{\tan\alpha}$.
E. $\dfrac{r \tan\beta}{\cos\alpha}$.



[1982-CE-MATHS 2-21]

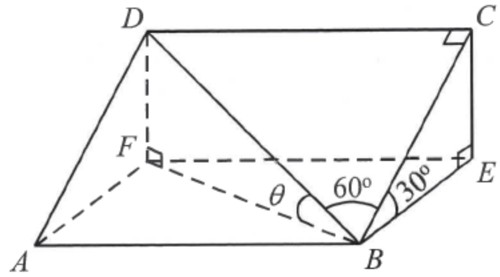
12. In the figure, ΔABC lies in a horizontal plane. $\angle BAC = 90°$. HA is vertical and $HA = h$. $\tan\theta =$

A. 1 .
B. $\tan 30°$.
C. $\dfrac{1}{\tan 30°}$.
D. $h \tan 30°$.
E. $\dfrac{h}{\tan 30°}$.



[1984-CE-MATHS 2-20]

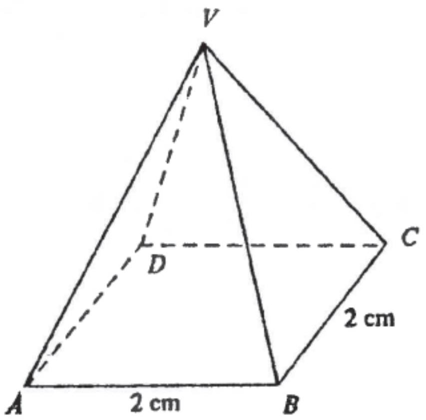
13. In the figure, $ABCD$ is a rectangle inclined at an angle of 30° to the horizontal plane $ABEF$. $\angle CBD = 60°$. Let θ be the inclination of BD to the horizontal plane. $\sin\theta =$



A. $\dfrac{1}{4}$.
B. $\dfrac{1}{2}$.
C. $\dfrac{\sqrt{3}}{2}$.
D. $\dfrac{\sqrt{3}}{3}$.
E. $\dfrac{\sqrt{3}}{4}$.

[1987-CE-MATHS 2-48]

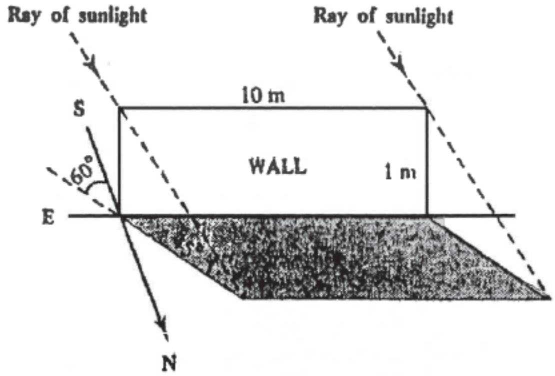
14. In the figure, $VABCD$ is a right pyramid of height 3 cm. The base $ABCD$ is a square of side 2 cm. Let θ be the angle between the face VBC and the base. Find $\tan\theta$.



A. $\dfrac{1}{3}$
B. $\dfrac{\sqrt{2}}{3}$
C. $\dfrac{3}{2}$
D. $\dfrac{3\sqrt{2}}{2}$
E. 3

[1989-CE-MATHS 2-47]

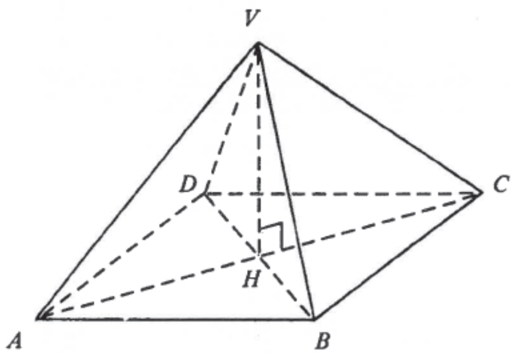
15. A vertical rectangular wall on the horizontal ground, 1 m high and 10 m long, runs east and west as shown in the figure. If the sun bears S60°E at an elevation of 45°, find the area of the shadow of the wall on the ground.



A. $\frac{5}{2}$ m^2
B. 5 m^2
C. $5\sqrt{2}$ m^2
D. $5\sqrt{3}$ m^2
E. 10 m^2

[1989-CE-MATHS 2-49]

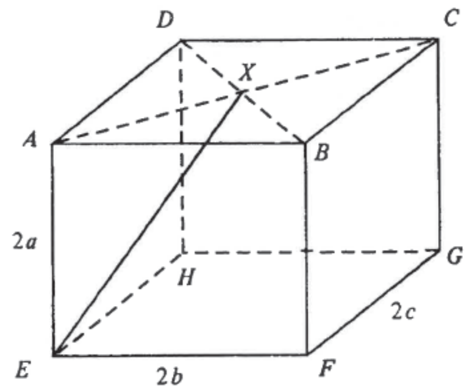
16. The figure shows a right pyramid with a square base. VAB, VBC, VCD and VDA are equilateral triangles. Find $\sin \angle VAH$.



A. $\frac{1}{2}$
B. $\frac{1}{4}$
C. $\frac{1}{\sqrt{2}}$
D. $\frac{1}{\sqrt{3}}$
E. $\frac{\sqrt{3}}{2}$

[1990-CE-MATHS 2-19]

DIRECTIONS : Questions 17 and 18 refer to the figure below, which shows a cuboid $ABCDEFGH$ with $AE = 2a$, $EF = 2b$ and $FG = 2c$. AC and BD intersect at X.



17. $XE =$

A. $\sqrt{a^2+b^2+c^2}$.
B. $\sqrt{a^2+b^2+(2c)^2}$.
C. $\sqrt{a^2+(2b)^2+c^2}$.
D. $\sqrt{(2a)^2+b^2+c^2}$.
E. $2\sqrt{a^2+b^2+c^2}$.

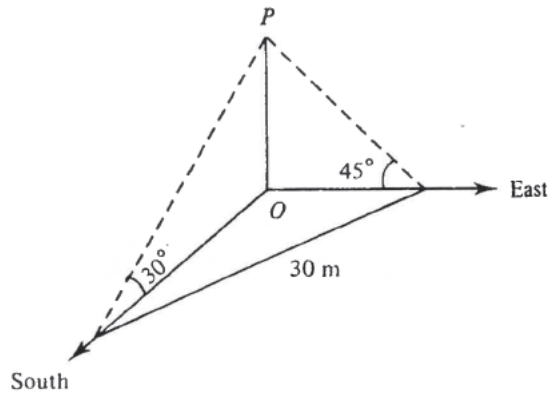
[1991-CE-MATHS 2-45]

18. If the angle between XE and the plane $EFGH$ is θ, then $\tan\theta =$

A. $\frac{a}{b}$.
B. $\frac{2a}{b}$.
C. $\frac{\sqrt{(2a)^2+c^2}}{b}$.
D. $\frac{a}{\sqrt{b^2+c^2}}$.
E. $\frac{2a}{\sqrt{b^2+c^2}}$.

[1991-CE-MATHS 2-46]

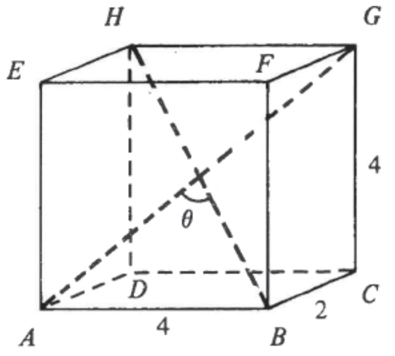
19. In the figure, the height of the vertical pole PO is



A. 7.5 m .
B. 15 m .
C. $15\sqrt{2}$ m .
D. $15\sqrt{3}$ m .
E. 45 m .

[1991-CE-MATHS 2-49]

20. In the figure, if θ is the angle between the diagonals AG and BH of the cuboid, then



A. $\sin\frac{\theta}{2}=\frac{2}{3}$.

B. $\sin\frac{\theta}{2}=\frac{3}{4}$.

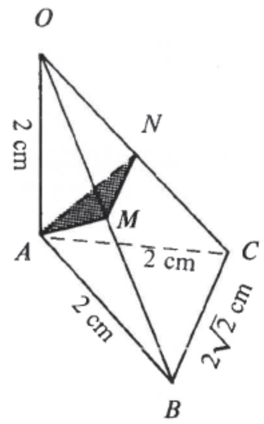
C. $\sin\frac{\theta}{2}=\frac{1}{3}$.

D. $\sin\theta=\frac{2}{3}$.

E. $\sin\theta=\frac{3}{4}$.

[1992-CE-MATHS 2-47]

21. In the figure, OA is perpendicular to the plane ABC. $OA = AB = AC = 2$ cm and $BC = 2\sqrt{2}$ cm. If M and N are the mid-points of OB and OC respectively, find the area of ΔAMN.



A. $\frac{1}{2}$ cm^2

B. 1 cm^2

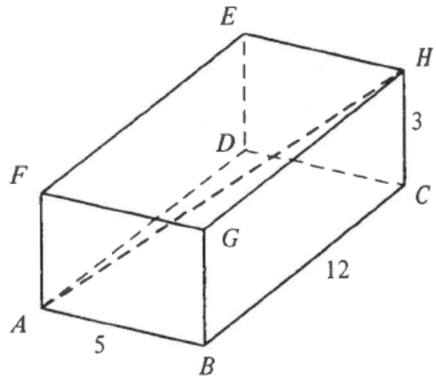
C. $\sqrt{2}$ cm^2

D. $\frac{\sqrt{3}}{2}$ cm^2

E. $\sqrt{3}$ cm^2

[1992-CE-MATHS 2-48]

22. In the figure, $ABCDEFGH$ is a cuboid. The diagonal AH makes an angle θ with the base $ABCD$. Find $\tan\theta$.



A. $\frac{3}{5}$

B. $\frac{3}{12}$

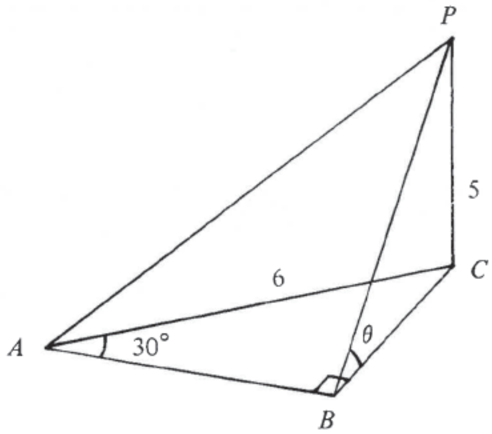
C. $\frac{3}{13}$

D. $\frac{3}{\sqrt{178}}$

E. $\frac{\sqrt{153}}{5}$

[1993-CE-MATHS 2-48]

23. In the figure, PC is a vertical pole standing on the horizontal plane ABC. If $\angle ABC = 90°$, $\angle BAC = 30°$, $AC = 6$ and $PC = 5$, find $\tan\theta$.



A. $\frac{3}{5}$

B. $\frac{5}{6}$

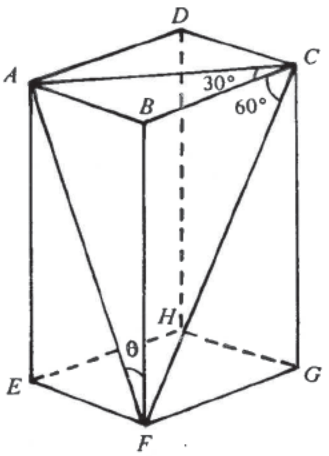
C. $\frac{5}{3}$

D. $\frac{3\sqrt{3}}{5}$

E. $\frac{5\sqrt{3}}{9}$

[1994-CE-MATHS 2-20]

24. In the figure, $ABCDEFGH$ is a cuboid. $\tan\theta =$



A. $\frac{1}{3}$.

B. $\frac{1}{\sqrt{3}}$.

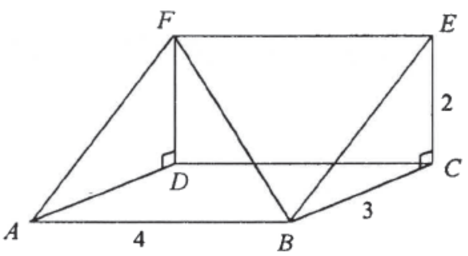
C. 1 .

D. $\sqrt{3}$.

E. 3 .

[1995-CE-MATHS 2-51]

25. The figure shows a right prism with a right-angled triangle as the cross-section. Find the angle between the line BF and the plane $ABCD$ correct to the nearest degree.



A. 22°

B. 34°

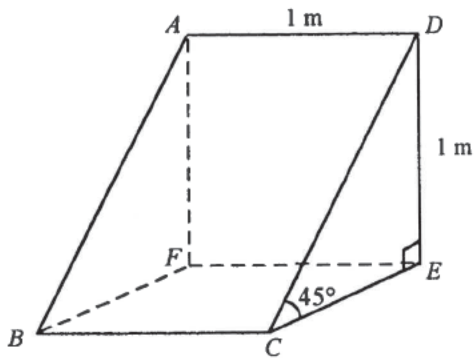
C. 37°

D. 42°

E. 56°

[1996-CE-MATHS 2-49]

26. In the figure, $ABCD$ is a rectangle inclined at an angle of 45° to the horizontal plane $BCEF$. Find the inclination of AC to the horizontal plane correct to the nearest degree.



A. 27°

B. 30°

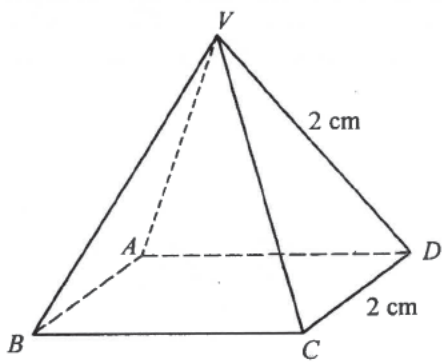
C. 35°

D. 45°

E. 55°

[1997-CE-MATHS 2-41]

27. The figure shows a right pyramid with a square base $ABCD$. Let θ be the angle between the planes VAB and VCD. Find $\sin\frac{\theta}{2}$.



A. $\frac{1}{2}$

B. $\frac{\sqrt{3}}{2}$

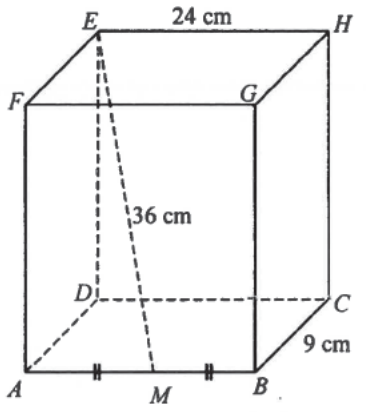
C. $\frac{1}{\sqrt{3}}$

D. $\frac{1}{\sqrt{5}}$

E. $\frac{2}{\sqrt{5}}$

[1998-CE-MATHS 2-48]

28. In the figure, $ABCDEFGH$ is a rectangular block. Find the inclination of EM to the plane $ABCD$ correct to the nearest degree.



A. 23°

B. 25°

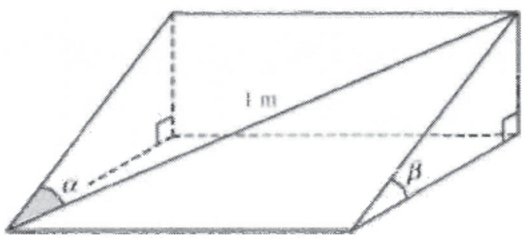
C. 65°

D. 71°

E. 75°

[1999-CE-MATHS 2-49]

29. The figure shows a right triangular prism. Find its volume.



A. $\frac{1}{3}\sin^2\alpha\cos\alpha\sin\beta\cos\beta\text{ m}^3$

B. $\frac{1}{3}\sin\alpha\cos^2\alpha\sin\beta\cos\beta\text{ m}^3$

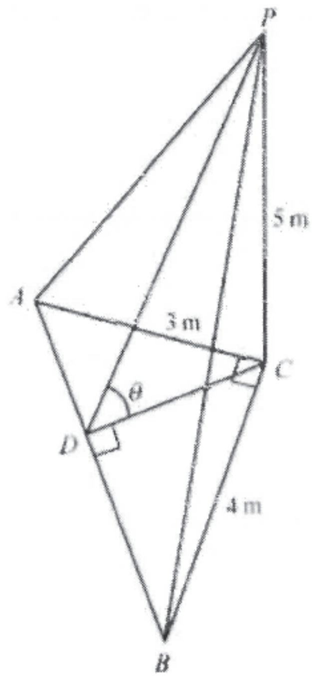
C. $\frac{1}{2}\sin\alpha\cos\alpha\sin\beta\cos\beta\text{ m}^3$

D. $\frac{1}{2}\sin^2\alpha\cos\alpha\sin\beta\cos\beta\text{ m}^3$

E. $\frac{1}{2}\sin\alpha\cos^2\alpha\sin\beta\cos\beta\text{ m}^3$

[2000-CE-MATHS 2-52]

30. In the figure, PC is a vertical pole standing on the horizontal ground ABC. D is a point on line AB. If $\angle BCA = \angle CDB = 90°$, $AC = 3$ m, $BC = 4$ m and $PC = 5$ m, find $\tan\theta$.



A. $\frac{12}{25}$

B. $\frac{16}{25}$

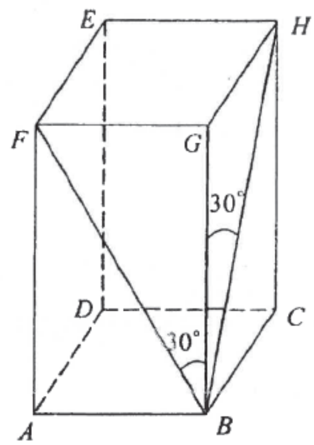
C. $\frac{25}{16}$

D. $\frac{25}{12}$

E. $\frac{25}{9}$

[2001-CE-MATHS 2-51]

31. In the figure, $ABCDEFGH$ is a rectangular block with a square base $ABCD$. Find $\angle FBH$ correct to the nearest degree.



A. 21°

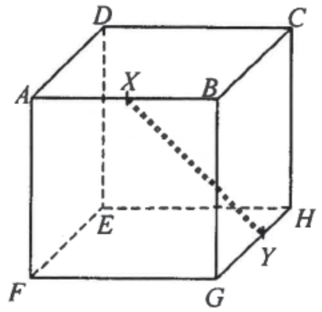
B. 41°

C. 45°

D. 60°

[2002-CE-MATHS 2-49]

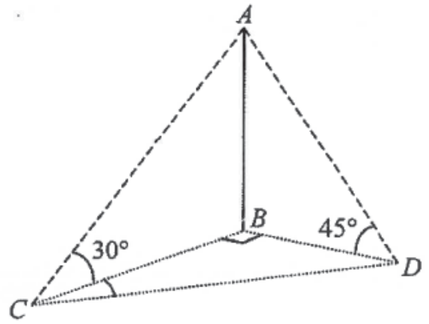
32. The figure shows the cube $ABCDEFGH$ of side 2 cm. X and Y are the mid-points of AB and GH respectively. Find XY.



A. 3 cm
B. $2\sqrt{2}$ cm
C. $\sqrt{5}$ cm
D. $\sqrt{6}$ cm

[2004-CE-MATHS 2-48]

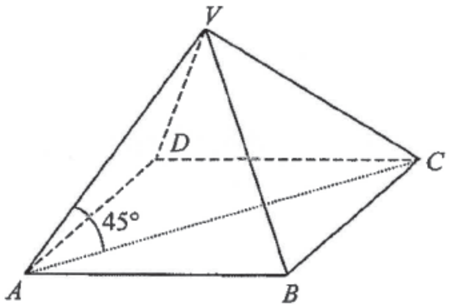
33. In the figure, B, C and D are three points on a horizontal plane such that $\angle CBD = 90°$. If AB is a vertical pole, then $\angle BCD =$



A. 15°.
B. 30°.
C. 45°.
D. 60°.

[2005-CE-MATHS 2-47]

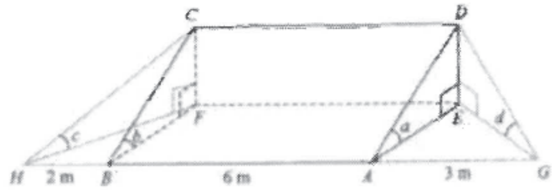
34. In the figure, $VABCD$ is a right pyramid with a square base. If the angle between VA and the base is 45°, then $\angle AVB =$



A. 45°.
B. 60°.
C. 75°.
D. 90°.

[2005-CE-MATHS 2-48]

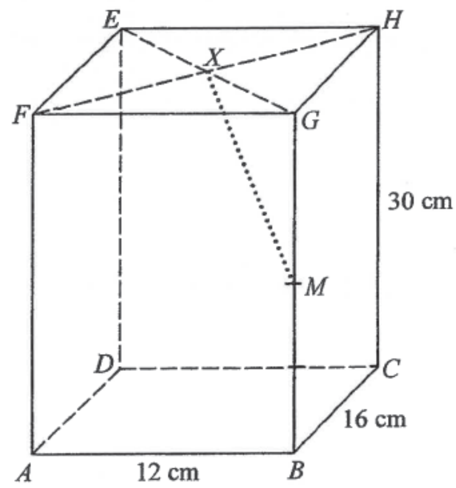
35. The figure shows a right prism $ABCDEF$ with a right-angled triangle as the cross-section. A, B, E and F lie on the horizontal ground. G and H are two points on the horizontal ground so that G, A, B and H are collinear. It is given that $AB = 6$ m, $AG = 3$ m and $BH = 2$ m. If $\angle DAE = a$, $\angle CBF = b$, $\angle CHF = c$ and $\angle DGE = d$, which of the following must be true?



A. $a < d < c$
B. $c < a < d$
C. $c < d < b$
D. $d < c < b$

[2008-CE-MATHS 2-49]

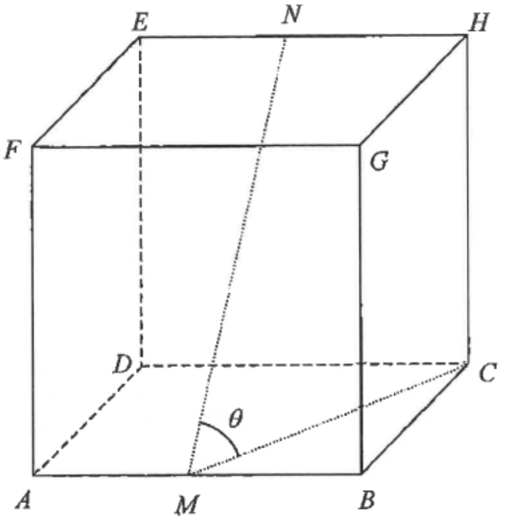
36. In the figure, $ABCDEFGH$ is a rectangular block. EG and FH intersect at X. M is the mid-point of BG. If the angle between MX and the plane $BCHG$ is θ, then $\tan\theta =$



A. $\frac{2}{3}$.
B. $\frac{6}{17}$.
C. $\frac{2}{\sqrt{29}}$.
D. $\frac{8}{\sqrt{261}}$.

[2009-CE-MATHS 2-47]

37. In the figure, $ABCDEFGH$ is a cube. If M and N are the mid-points of AB and EH respectively, then $\cos\theta =$



A. $\frac{\sqrt{6}}{4}$.

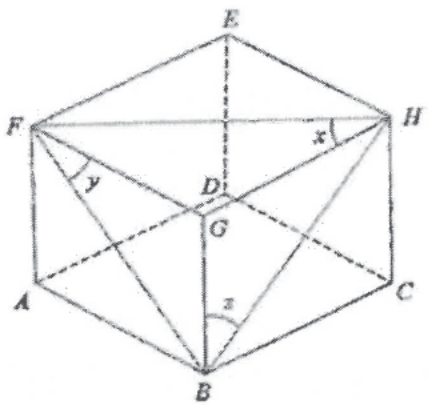
B. $\frac{\sqrt{6}}{5}$.

C. $\frac{\sqrt{10}}{4}$.

D. $\frac{\sqrt{10}}{5}$.

[2010-CE-MATHS 2-48]

38. In the figure, $ABCDEFGH$ is a cuboid. If $\angle FHG = x$, $\angle BFG = y$ and $\angle HBG = z$, then $\tan z =$



A. $\tan x \tan y$.

B. $\frac{1}{\tan x \tan y}$.

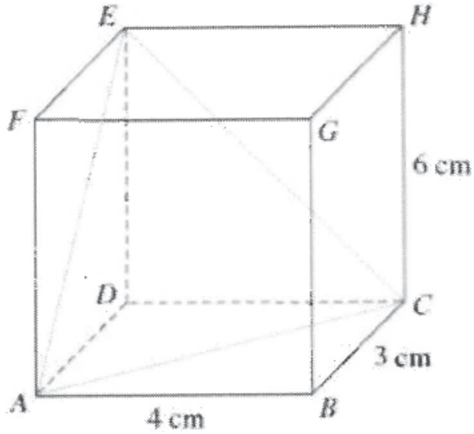
C. $\frac{\tan x}{\tan y}$.

D. $\frac{\tan y}{\tan x}$.

[2011-CE-MATHS 2-50]

HKDSE Problems

39. The figure shows a cuboid $ABCDEFGH$. If the angle between the triangle ACE and the plane $ABCD$ is θ, then $\tan\theta =$



A. 2.

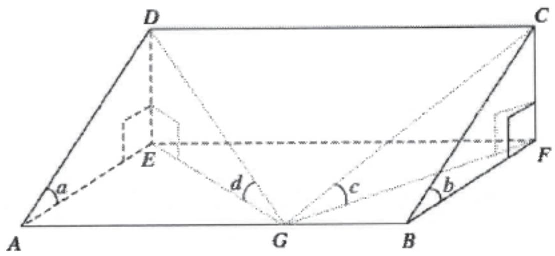
B. $\frac{3}{2}$.

C. $\frac{5}{2}$.

D. $\frac{12}{5}$.

[SP-DSE-MATHS 2-40]

40. The figure shows a right prism $ABCDEF$ with a right-angled triangle as the cross-section. A, B, E and F lie on the horizontal ground. G is a point lying on AB such that $AG : GB = 5 : 3$. If $\angle DAE = a$, $\angle CBF = b$, $\angle CGF = c$ and $\angle DGE = d$, which of the following is true?



A. $a > c > d$

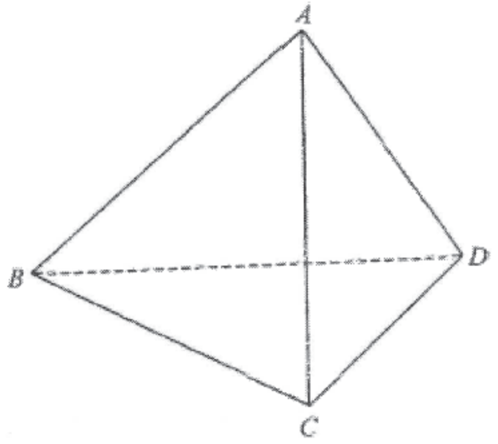
B. $a > d > c$

C. $c > b > d$

D. $c > d > b$

[PP-DSE-MATHS 2-39]

41. The figure shows a regular tetrahedron $ABCD$. Find the angle between the plane ABC and the plane BCD correct to the nearest degree.



A. 48°

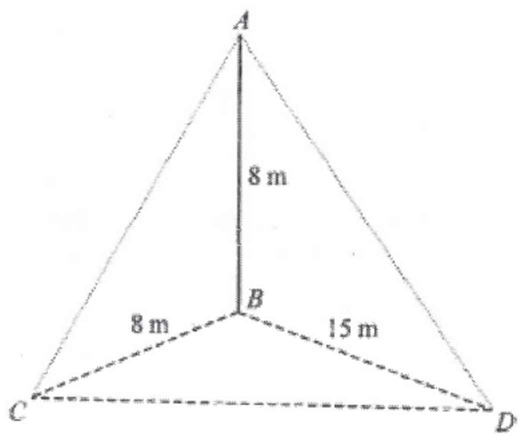
B. 53°

C. 60°

D. 71°

[2012-DSE-MATHS 2-40]

42. In the figure, AB is a vertical pole standing on the horizontal ground BCD, where $\angle CBD = 90°$. If the angle between the plane ACD and the horizontal ground is θ, then $\tan\theta =$



A. $\frac{8}{15}$.

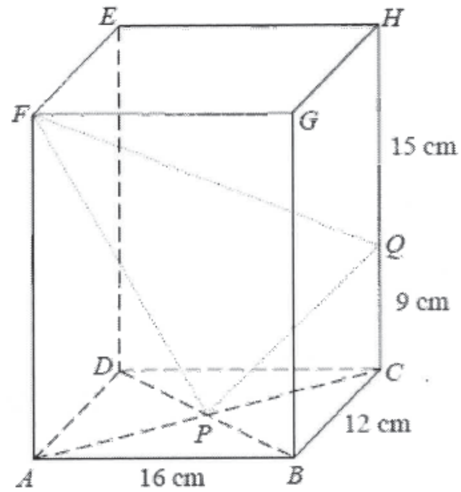
B. $\frac{15}{8}$.

C. $\frac{15}{17}$.

D. $\frac{17}{15}$.

[2014-DSE-MATHS 2-40]

43. In the figure, $ABCDEFGH$ is a rectangular block. AC and BD intersect at P. Q is a point lying on CH such that $CQ = 9$ cm and $QH = 15$ cm. Find $\sin\angle PFQ$.



A. $\frac{33}{65}$

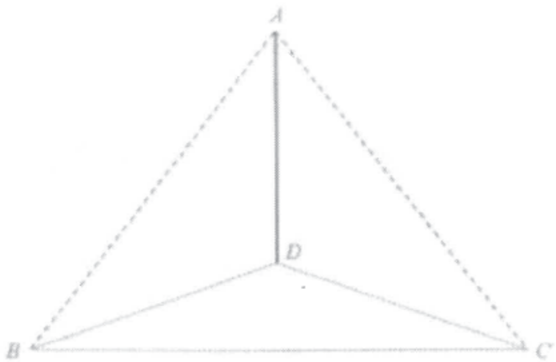
B. $\frac{56}{65}$

C. $\frac{13}{5\sqrt{181}}$

D. $\frac{58}{13\sqrt{181}}$

[2016-DSE-MATHS 2-39]

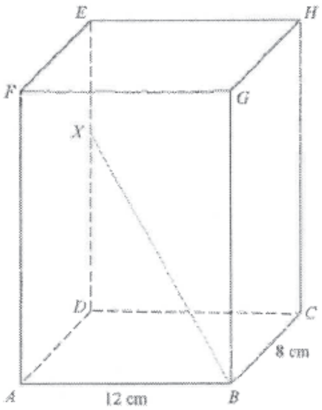
44. In the figure, AD is a vertical pole standing on the horizontal ground BCD. If $AB = 25$ m, $AD = 15$ m, $BC = 29$ m and $CD = 21$ m, find the angle between AB and the plane ACD correct to the nearest degree.



A. 53°
B. 54°
C. 69°
D. 70°

[2017-DSE-MATHS 2-39]

45. In the figure, $ABCDEFGH$ is a rectangular block. Let X be a point lying on DE such that DX = 9 cm and EX = 4 cm. Denote the angle between BX and the plane ABGF by θ. Find $\cos\theta$.



A. $\frac{3}{5}$

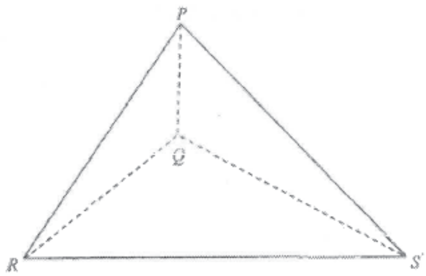
B. $\frac{4}{5}$

C. $\frac{8}{17}$

D. $\frac{15}{17}$

[2018-DSE-MATHS 2-41]

46. The figure shows a tetrahedron PQRS with the base QRS lying on the horizontal ground. It is given that Q is vertically below P. If $\angle PRQ = 47°$, $\angle PSQ = 53°$ and $\angle RQS = 120°$, find $\angle RPS$ correct to the nearest degree.



A. 52°

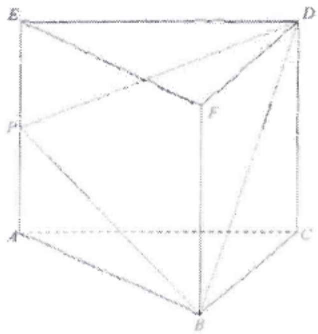
B. 60°

C. 68°

D. 76°

[2019-DSE-MATHS 2-40]

47. In the figure, ABCDEF is a right triangular prism. P is point lying on AE. If AB = AC = 12 cm, AP = 9cm, EP = 5 cm and BD = 2k cm, find the area of ΔBDP.



A. $\sqrt{(k^2-1)(196-k^2)}$ km

B. $\sqrt{(k^2-1)(196+k^2)}$ km

C. $\sqrt{(k^2+1)(196-k^2)}$ km

D. $\sqrt{(k^2+1)(196+k^2)}$ km\

[2020-DSE-MATHS 2-38]