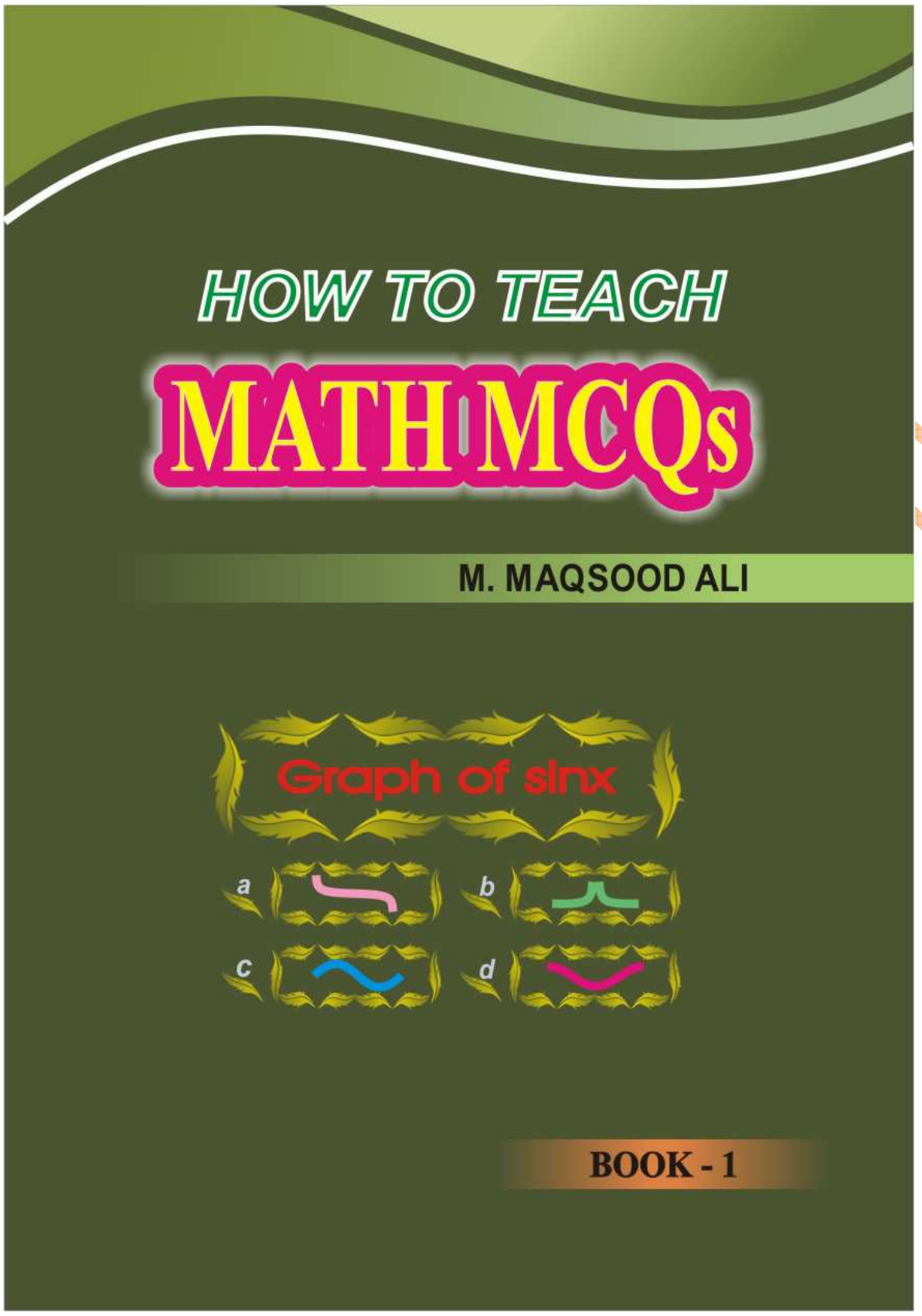
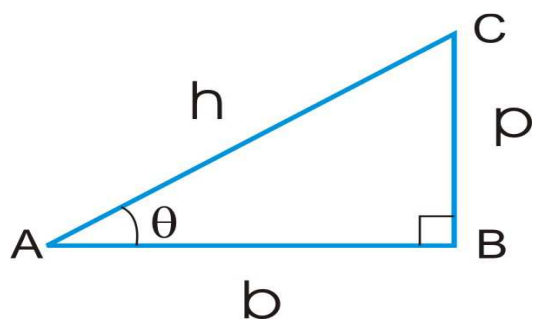

HOW TO TEACH
MATH MCQs
M. MAQSOOD ALI
Graph of sinx
a
b
c
d
BOOK - 1

Chapter 16

SOLUTIONS OF TRIANGLES

TRIGONOMETRIC RATIOS



ABC is a rightangled triangle and $C\hat{A}B = \theta$

perpendicular: BC $= p$

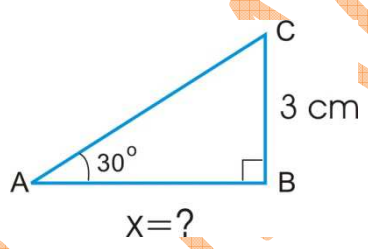
base: AB $= b$

hypotenuse: AC $= h$

The trigonometric ratios are

$i)$ $\sin\theta = \frac{p}{h}$ ii) $\cos\theta = \frac{b}{h}$ iii) $\tan\theta = \frac{p}{b}$

MCQ- 1:



(a) $3\sqrt{3}$ (b) $\sqrt{3}$ (c) 6 (d) $\frac{1}{3\sqrt{3}}$

Solution:

$$b = x = ?$$
$$p = 3cm$$

$$\tan\theta = \frac{p}{b}$$

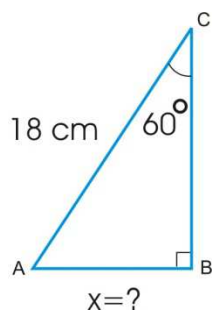
$$\tan 30^0 = \frac{3}{x}$$

$$\frac{1}{\sqrt{3}} = \frac{3}{x}$$

$$x = 3\sqrt{3}\ \text{cm}$$

The answer is (a).

MCQ-2 :



(a) $12\sqrt{3}$ (b) $18\sqrt{3}$ (c) $9\sqrt{3}$ (d) $\frac{6}{\sqrt{3}}$

Solution:

In this case perpendicular is x (opposite side to the angle 60^0).

$p = x = ?$

$h = 18$

$\sin\theta = \frac{p}{h}$

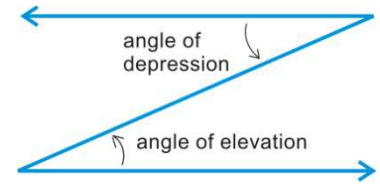
$$\sin 60^0 = \frac{x}{18}$$

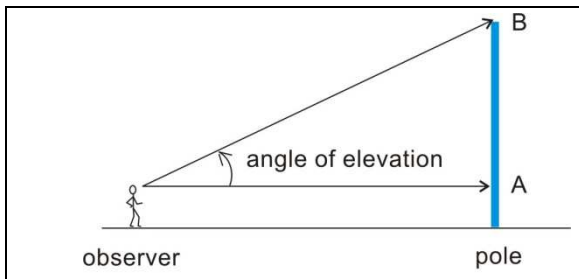
$$\frac{\sqrt{3}}{2} = \frac{x}{18}$$

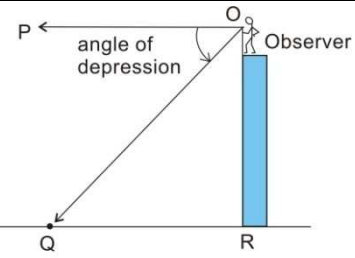
$$x = 9\sqrt{3}$$

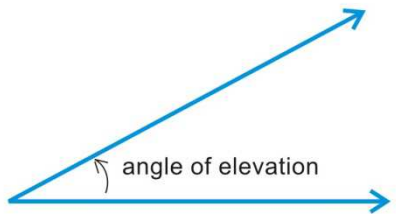
The answer is (c).

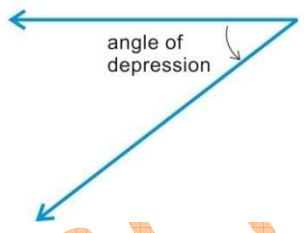
ANGLE OF ELEVATION AND DEPRESSION





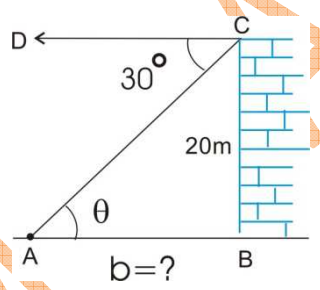






MCQ-3 :

The angle of depression from the top of a building 20m high to a car on the ground is 30^o. What is the distance between the building and the car?



(a) $10\sqrt{3}\ m$ (b) $40\ m$ (c) $20\sqrt{3}\ m$ (d) $\frac{40}{\sqrt{3}}\ m$

Solution:

$\because C\hat{A}B = A\hat{C}D = 30^0$

$\therefore \theta = 30^0$

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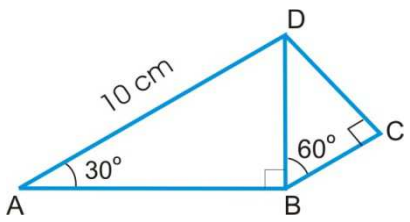
(4) BC = ?



(a) 5cm (b) $\frac{5\sqrt{3}}{2}$cm (c) 2.5cm (d) $5\sqrt{3}$m

(5) A ladder of length 6 m and angle 30^o with the ground. What is the height of the top of the ladder from the ground?

(a) $2\sqrt{3}$ m (b) 2 m (c) $3\sqrt{3}$ m (d) 3 m

(6) A cyclist travels heading east 12 km and then 5 km heading south. How far is he from his initial position?

(a) 10 km (b) 13 km (c) $\sqrt{119}$ km (d) 18 m

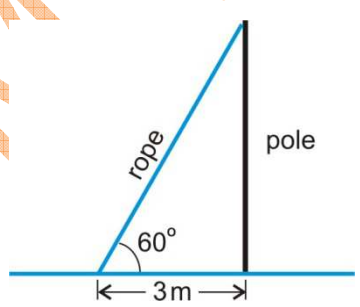
(7) A tower is erected at 16 m from a point on the ground. The angle of elevation of top of tower from the point is 45^o. What is the height, in metres, of the tower?

(a) 12.5 (b) $16\sqrt{2}$ (c) $16/\sqrt{2}$ (d) 16

(8) The angle of depression from the top of an apartment 70 feet high to the base of a house is 45^o. how far is the house from the foot of the apartment?

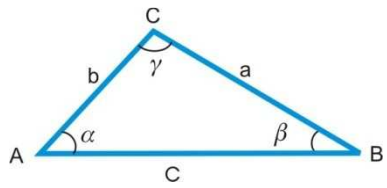
(a) $35\sqrt{3}$ ft (b) 35 ft (c) 70 ft (d) 100 ft

(9) A vertical pole is supported by a rope makes an angle 60^o. What is the length of the rope?



(a) $3\sqrt{3}$ m (b) 3 m (c) 6 m (d) $3\sqrt{3}/2$ m

LAWS OF SINE



Suppose that α, β and γ are the angles opposite to the sides of lengths a , b and c respectively.

$$\frac{a}{sin\alpha} = \frac{b}{sin\beta} = \frac{c}{sin\gamma}$$

so that

i) $\frac{a}{sin\propto} = \frac{b}{sin\beta}$

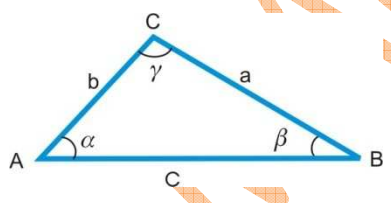
ii) $\frac{b}{sin\beta} = \frac{c}{sin\gamma}$

iii) $\frac{a}{sin\propto} = \frac{c}{sin\gamma}$

Condition:

This law is used when angle and the length of its opposite side are given.

LAWS OF COSINE



i) $a^2 = b^2 + c^2 - 2bc\cos\propto$

ii) $b^2 = a^2 + c^2 - 2ac\cos\beta$

iii) $c^2 = a^2 + b^2 - 2ab\cos\gamma$

Conditions:

This law is used when

i) Two sides and included angle are given.

ii) Three sides are given.

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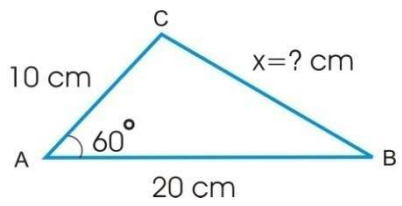
$$\theta = 180^0 - 150^o$$
$$\theta = 30^0$$
$$\frac{x}{sin30^0} = \frac{12}{sin30^0}$$
$$x = 12 \text{ cm}$$

The answer is (c).

MCQ-6 :



(a) $18\sqrt{2}$ (b) 30 (c) 20 (d) $10\sqrt{3}$

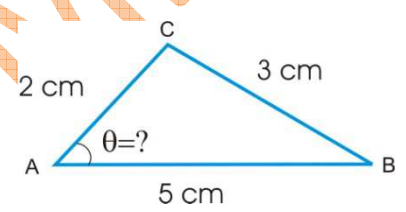
Solution:

Use law of cosine, because two sides and included angle are given.

$$x^2 = 10^2 + 20^2 - 2 \times 10 \times 20\, cos60^0$$
$$= 500 - 200$$
$$= 300$$
$$x = \sqrt{300}$$
$$= \sqrt{3 \times 100}$$
$$= 10\sqrt{3} \text{ cm}$$

The answer is (d).

MCQ- 7:



(a) 0^0 (b) 30^0 (c) 45^0 (d) 60^0

Solution:

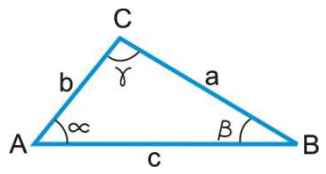
Use law of cosine, because three sides are given.

$$cos\theta = \frac{5^2+2^2-3^2}{2\times5\times2}$$
$$cos\theta = 1$$
$$\theta = 0^0$$

The answer is (a).

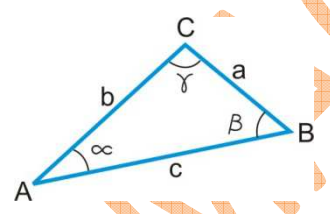
EXERCISE-2

(1) α =?



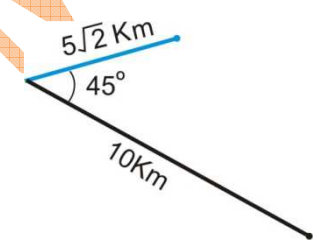
$(a)\ \ sin^{-1}\left(\frac{b}{a}\ sin\beta\right)$ $(b)\ \frac{a}{b}\ sin\beta$ $(c)\ sin^{-1}(\frac{a}{b\ sin\beta})$ $(d)\ sin^{-1}(\frac{a}{b}\ sin\beta)$

(2) $\cos\beta$ =?



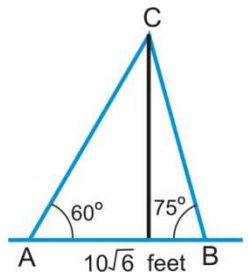
(a) $\frac{a^2+b^2+c^2}{2ac}$ (b) $\frac{a^2+b^2-c^2}{2ac}$ (c) $\frac{a^2-b^2+c^2}{2ac}$ (d) $\frac{2ac}{a^2+b^2-c^2}$

(3) Two cars start from the same point make an angle 45^o. What is the distance between the cars if they cover distance of 10 km and $5\sqrt{2}$ km respectively?



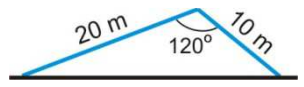
(a) 8 km (b) 22 km (c) 50 km (d) $5\sqrt{2}$ km

(4) two ropes support a pole making angle 75^o and 60^o with the horizontal at a distance $10\sqrt{6}$ feet. What is the length of smaller rope?



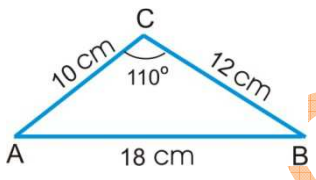
(a) 15 ft (b) 30 ft (c) 35 ft (d) 20 ft

(5) Two sides of length 10 m and 20 m are joined at and angle 120^o. What is the distance between other two ends?



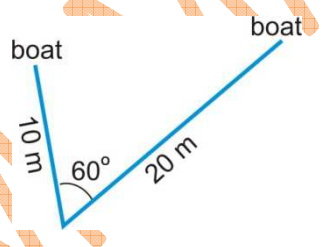
(a) 17 m (b) $10\sqrt{7}$ m (c) $10\sqrt{3}$ m (d) 22 m

(6) Which is the smallest angle of the triangle ABC? (sin $110^o = 0.9$)



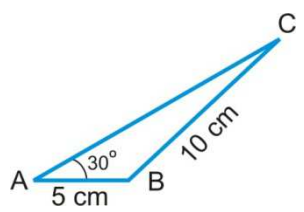
(a) 20^o (b) 30^o (c) 60^o (d) 15^o

(7) Two boats are tied by two ropes, as shown in the figure. What is the distance between the boats?



(a) 300 m (b) $10\sqrt{3}$ m (c) 30 m (d) 25 m

(8) A$\hat{C}B$ =?



(a) $cos^{-1}0.25$ (b) $sin^{-1}0.25$ (c) $sin^{-1}0.5$ (d) $cos^{-1}0.5$

AREA OF TRIANGLE

Area of a traingle is denoted by Δ.

There are three cases:

Case-1: Two sides and included angle are given:

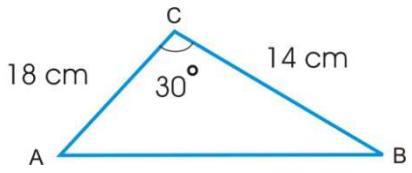
1) $\Delta = \frac{1}{2}\, bc\, sin \propto$

2) $\Delta = \frac{1}{2}\, ac\, sin\beta$

3) $\Delta = \frac{1}{2}\, ab\, sin\gamma$

MCQ- :

What is the area of the triangle ABC ?



(a) $48\ cm^2$ (b) $63\ cm^2$ (c) $84\ cm^2$ (d) $36\ cm^2$

Solution:

Two sides and included angle are given.

$$\Delta = \frac{1}{2}\,.\,18\,.14\ sin30^0$$

$$= 63\ cm^2$$

The answer is (b).

Case-2: One side and two angles are given:

$$(1)\quad \Delta = \frac{a^2 sin\beta sin\gamma}{2sin\alpha}$$

$$(2)\quad \Delta = \frac{b^2 sin \propto sin\gamma}{2sin\beta}$$

$$(3)\quad \Delta = \frac{c^2 sin\propto sin\beta}{2sin\gamma}$$

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MCQ- 9:

What is the area of the triangle ABC of lengths 5 cm, 7 cm and 10 cm?

(a) $6\sqrt{31}$ (b) $7\sqrt{21}$ (c) $9\sqrt{23}$ (d) $2\sqrt{61}$

Solution:

Firstly, calculate s, by adding three sides and dividing by 2.

$$s = \frac{5+7+10}{2}$$

$$s = 11cm$$

Now calculate $s-a$, $s-b$ and $s-c$ and use formula case-3

$$\Delta = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\Delta = \sqrt{11 \,.6.4 \,.1}$$

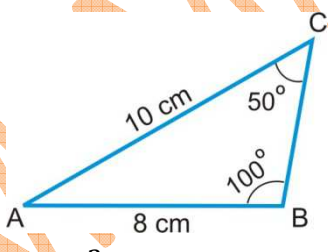
$$= \sqrt{264}$$

$$= 2\sqrt{61}\ cm^2$$

The answer is (d).

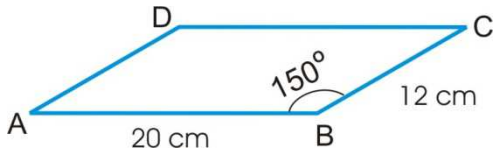
EXERCISE-3

(1) What is the area of the triangle ABC?



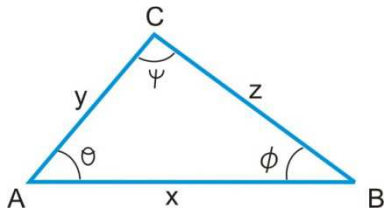
(a) 35 cm^2 (b) 30 cm^2 (c) 20 cm^2 (d) 40 cm^2

(2) What is the area of the parallelogram ABCD?



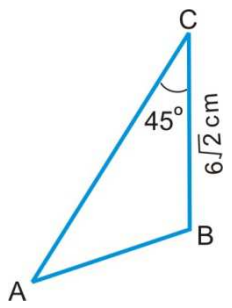
(a) 60 cm^2 (b) 150 cm^2 (c) 208 cm^2 (d) 120 cm^2

(3) What is the area of the triangle ABC?



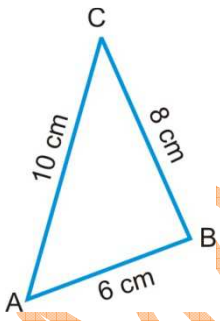
(a) 1/2 $yz\ sin\theta$ (b) ½ $xz\ sin\Psi$ (c) ½ $yz\ sin\Psi$ (d) ½ $xy \sin\varphi$

(4) The area of the triangle ABC is 60 cm^2. What is the length of side $\overline{AC}$?



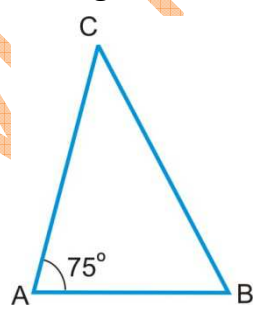
(a) 16 cm (b) 20 cm (c) 10 cm (d) 32 cm

(5) What is the area of triangle ABC?



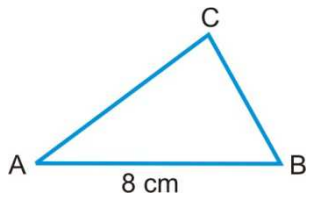
(a) 24 cm^2 (b) 30 cm^2 (c) 18 cm^2 (d) 576 cm^2

(6) What is the area of isosceles triangle ABC such that AC=BC=12 cm?



(a) 64 cm^2 (b) 36 cm^2 (c) 24 cm^2 (d) 32 cm^2

(7) What is the area of equilateral triangle ABC whose length of a side is 8 cm?

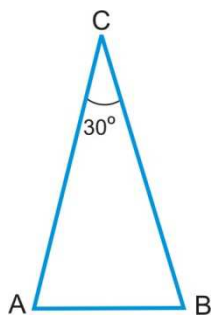


(a) $32\sqrt{3}\ cm^2$ (b) $20\sqrt{3}\ cm^2$ (c) $12\sqrt{3}\ cm^2$ (d) $16\sqrt{3}\ cm^2$

(8) What is the length of an equilateral triangle whose area is $36\sqrt{3}\ cm^2$?

(a) 12 cm (b) 8 cm (c) 9 cm (d) 18 cm

(9) The area of an isosceles triangle ABC is 9 cm^2. Given that AC=BC. What is the length of side $\overline{BC}$?

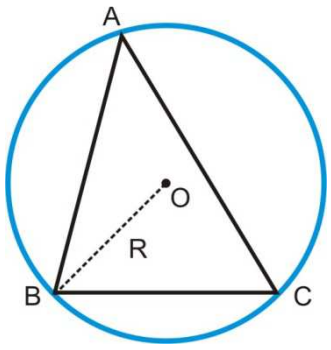


(a) 12 cm (b) 6 cm (c) 9 cm (d) 15 cm

(10) What is the length of a side of an equilateral triangle whose area is $36\sqrt{3}\ cm^2$

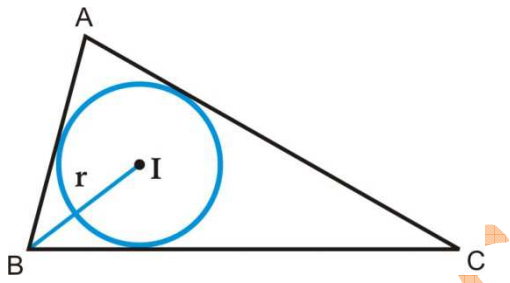
(a) 18 cm (b) $15\sqrt{3}$ cm (c) 12 cm (d) 6 cm

CIRCUM RADIUS



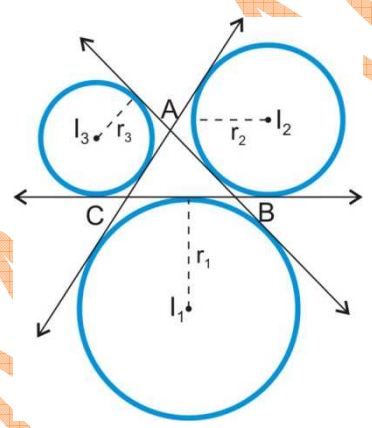
$$R = \frac{abc}{4\Delta}$$

IN-RADIUS



$$r = \frac{\Delta}{s}$$

ESCRIBED-RADII



$$i)\ r_1 = \frac{\Delta}{s-a}$$

$$ii)\ r_2 = \frac{\Delta}{s-b}$$

$$iii)\ r_3 = \frac{\Delta}{s-c}$$

Note: All above formulae of radius are in term of Δ (area of triangle).

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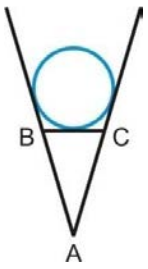
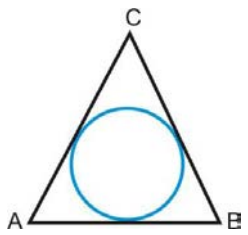
ASSISTANT PROFESSOR OF MATHEMATICS

(7) AB=12 cm, BC=6 cm, AC=14 cm and ΔABC=36 cm^2. What is the radius in cm of the circle?



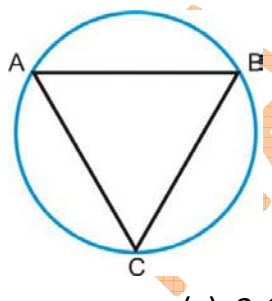
(a) 2.25 (b) 9 (c) 3.6 (d) 7

(8) AB=3 cm, BC=4 cm, AC=5 cm and ΔABC=6 cm^2. What is the radius in cm of the circle?



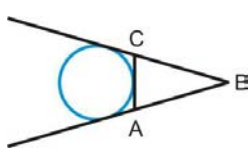
(a) 2.5 (b) 1 (c) 2 (d) 3

(9) AB=12 cm, BC=6 cm, AC=14 cm and ΔABC=36 cm^2. What is the radius in cm of the circle?



(a) 2.25 (b) 9 (c) 3.6 (d) 7

(10) AB=3 cm, BC=4 cm, AC=5 cm and ΔABC=6 cm^2. What is the radius in cm of the circle?



(a) 6 (b) 2.5 (c) 1 (d) 2

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