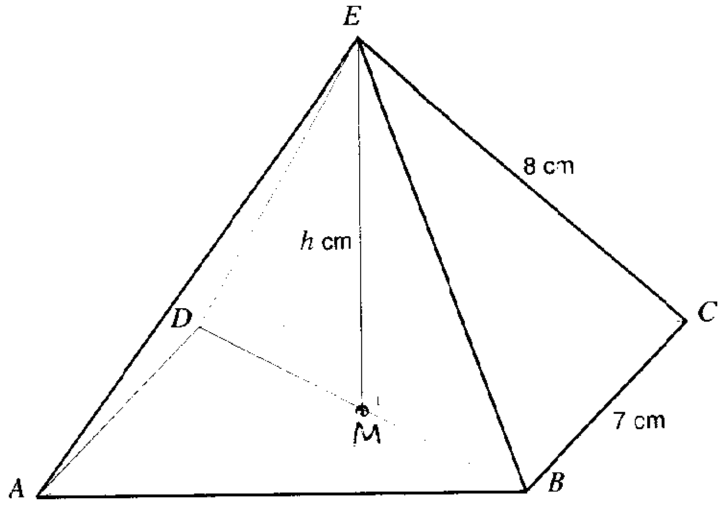
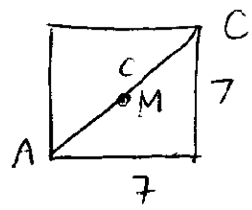
PRACTICE TEST : MULTIPLE CHOICE

SOLUTIONS.

Question 1

For the square-based right pyramid, *ABCDE*, shown below, the sides of the base are 7 cm and the slant edges are 8 cm in length.





$c^2 = 7^2 + 7^2$

$c^2 = 98$

$c = \sqrt{98}$

$c \simeq 9.899...$

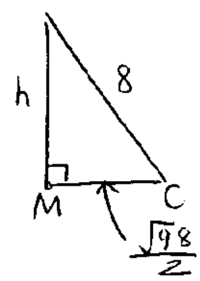
The vertical height, h cm, of this pyramid is closest to

- **A.** 3.9 cm
- **B.** 6.3 cm
- **C.** 7.2 cm
- **D.** 10.6 cm
- **E.** 12.7 cm

$h^2 = 8^2 - \left(\frac{9.899}{2}\right)^2$

$\therefore h^2 = 39.5$

$h = \sqrt{39.5} \simeq 6.3$



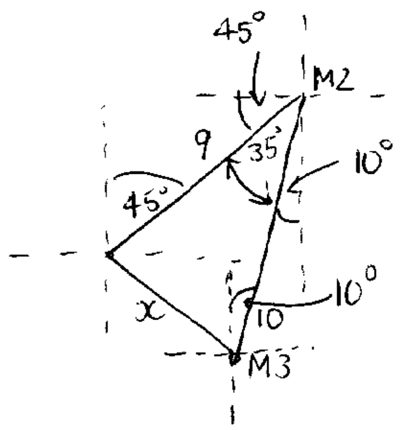
The following information relates to Questions 2 and 3.

In a race, a yacht rounds the first marker, $M1$, and then travels a distance of nine kilometres on a bearing of 045° true to a second marker, $M2$. From this marker, it sets off on a bearing of 190° true and travels a further ten kilometres to a third marker, $M3$.

Question 2

The bearing of marker $M2$ from $M3$ is

- **A.** 10° true
- **B.** 35° true
- **C.** 55° true
- **D.** 145° true
- **E.** 190° true



Question 3

The minimum distance the yacht will have to travel to get back from marker $M3$ to the first marker, $M1$, is closest to

- **A.** 4.4 km
- **B.** 5.8 km
- **C.** 12.0 km
- **D.** 17.0 km
- **E.** 18.5 km

$x^2 = 9^2 + 10^2 - 2 \times 9 \times 10 \cos(35°)$

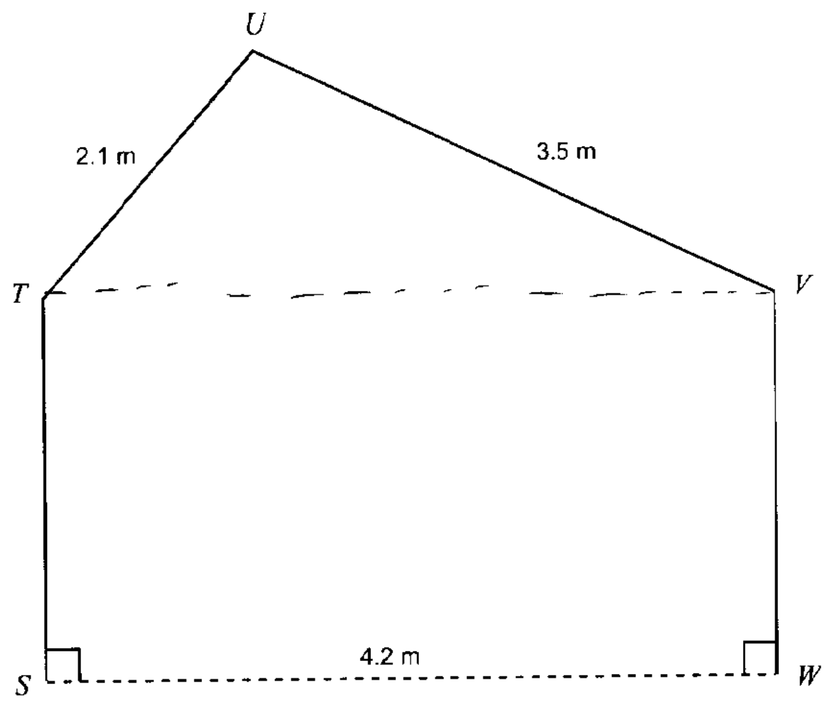
$\therefore x = \sqrt{9^2 + 10^2 - 2 \times 9 \times 10 \cos(35°)}$

$x = 5.79$

SECTION B – continued

Question 4

A cross-section of a glass greenhouse is shown in the diagram below. The sides of the glass panels *TU* and *UV* are 2.1 metres and 3.5 metres long respectively. The greenhouse is 4.2 metres wide. The walls *ST* and *WV* are vertical and equal in height.



The size of $\angle TUV$ is

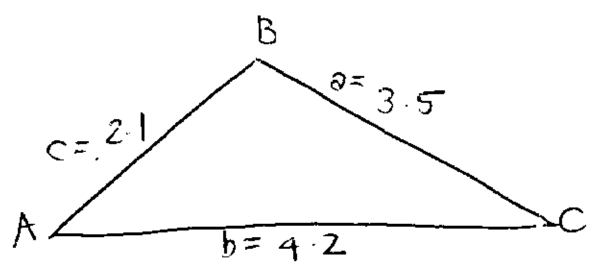
A. 44.4°

B. 45.6°

C. 86.2°

D. 93.8°

E. 109.6°

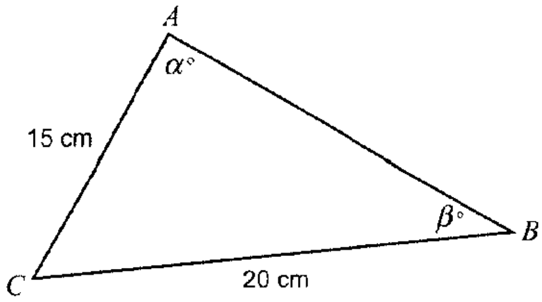


$$\cos(B) = \frac{a^2 + c^2 - b^2}{2ac}$$

$$B = \cos^{-1}\left(\frac{3.5^2 + 2.1^2 - 4.2^2}{2 \times 3.5 \times 2.1}\right)$$

$$B = 93.8^\circ$$

Question 5



In triangle ABC, $\sin \alpha° = 0.8$

$\sin \beta°$ is equal to

A. 0.5

B. 0.6

C. 0.75

D. 0.8

E. 0.9375

$$\frac{\sin(\alpha)}{20} = \frac{\sin(\beta)}{15}$$

$$\therefore \frac{0.8}{20} = \frac{\sin(\beta)}{15}$$

$$\sin(\beta) = \frac{15 \times 0.8}{20} = 0.6$$

Question 6

A factory floor is rectangular in shape with an area of $1440\,\text{m}^2$. One of the linear dimensions of the original floor is 36 m.

It is to be enlarged to a similar shape with an area of $2250\ \text{m}^2$.

When the area of the floor is enlarged, the corresponding linear dimension will be

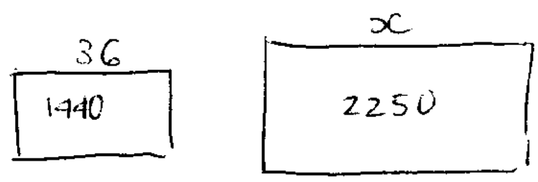
A. 40 m

B. 45 m

C. 50 m

D. 56.25 m

E. 62.5 m



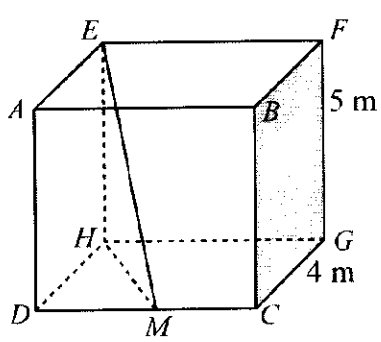
$$k^2 = \frac{2250}{1440}$$

$$\therefore k = \sqrt{\frac{2250}{1440}} = 1.25$$

$$\therefore x = 36 \times 1.25$$

$$x = 45$$

Question 7



The rectangular prism above has a square base of sidelength four metres and a height of 5 metres. M is the midpoint of DC. The angle EMH is closest to

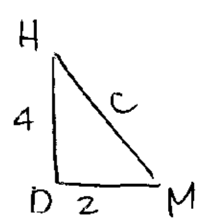
A. 51.3°

B. 63.4°

C. 23.6°

D. 55.3°

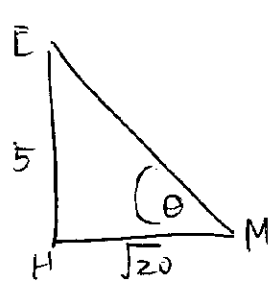
E. 48.2°



$$c^2 = 4^2 + 2^2$$

$$\therefore c^2 = 20$$

$$\therefore c = \sqrt{20}$$



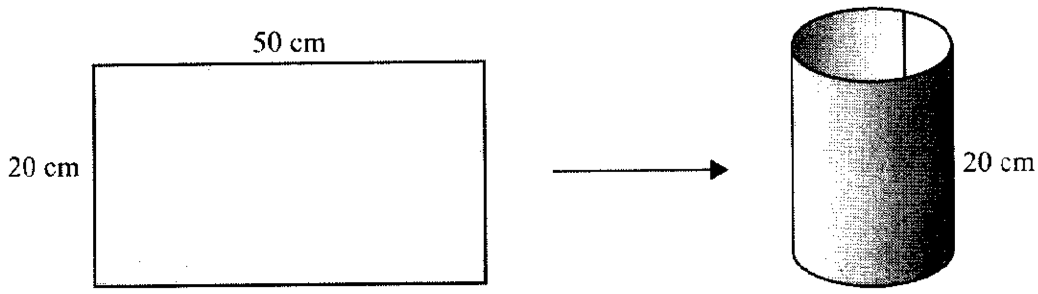
$$\tan(\theta) = \frac{5}{\sqrt{20}} \quad \therefore \theta = \tan^{-1}\left(\frac{5}{\sqrt{20}}\right)$$

$$\theta = 48.2°$$

Question 8

A rectangular sheet of cardboard has length 50 cm and width 20 cm.

This sheet of cardboard is made into an open-ended cylinder by joining the two shorter sides, with no overlap. This is shown in the diagram below.



The radius of this cylinder, in cm, is closest to

A. 6.4

B. 8.0

C. 15.6

D. 15.9

E. 17.8

$2\pi r = 50$

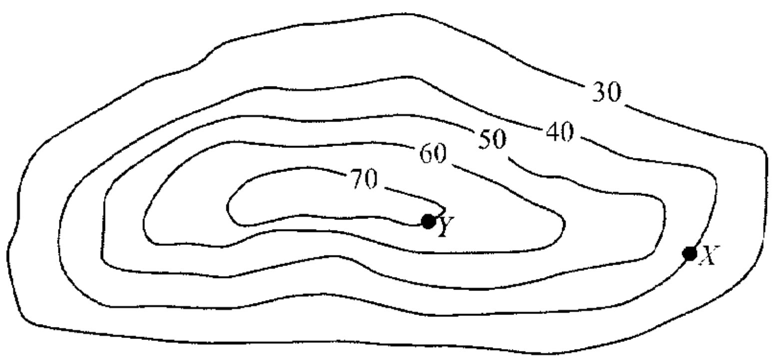
$r = \frac{50}{2\pi}$

$r = 7.96$

Question 9

On the contour map below, the contour interval is 10 m.

The horizontal distance between the points X and Y is 1300 m.



The average slope between X and Y is closest to

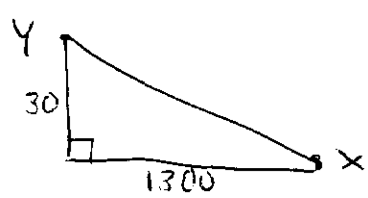
A. 0.054

B. 0.038

C. 0.031

D. 0.023

E. 1.32

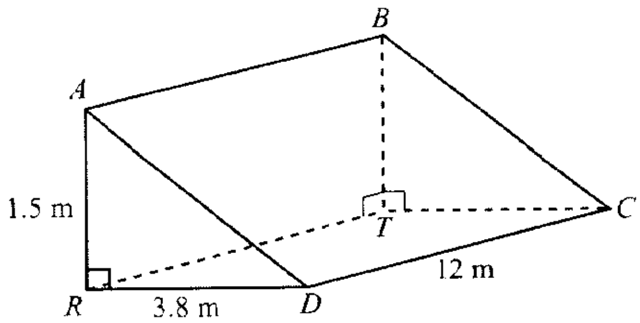


Av. slope $= \frac{\text{Rise}}{\text{Run}}$

$= \frac{30}{1300}$

≈ 0.023

The following information relates to Questions 10 and 11.



ABCD is a sloping rectangular roof above a horizontal rectangular ceiling, *TCDR*.

AB = *DC* = 12 metres

RD = *TC* = 3.8 metres

AR = *BT* = 1.5 metres

Question 10

The angle of depression of *D* from *A* is closest to

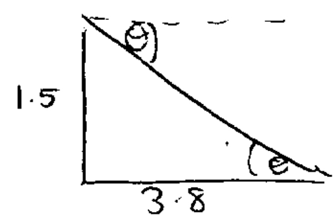
A. 21.5°

B. 23.3°

C. 66.7°

D. 68.5°

E. 111.5°



$\tan(\theta) = \frac{1.5}{3.8}$

$\theta = \tan^{-1}\left(\frac{1.5}{3.8}\right)$

$\theta = 21.5°$

Question 11

The angle *ACR* is closest to

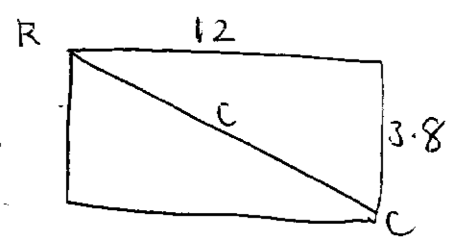
A. 6.80°

B. 6.84°

C. 7.13°

D. 18.80°

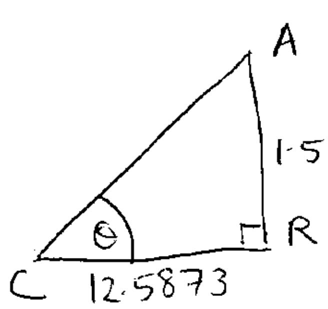
E. 21.54°



$c^2 = 12^2 + 3.8^2$

$c = \sqrt{12^2 + 3.8^2}$

$c \approx 12.5873$



$\tan(\theta) = \frac{1.5}{12.5873}$

$\theta = \tan^{-1}\left(\frac{1.5}{12.5873}\right)$

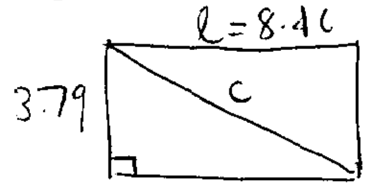
$\theta = 6.796°$

Question 12

A rectangle is 3.79 m wide and has a perimeter of 24.50 m.

Correct to one decimal place, the length of the diagonal of this rectangle is

A. 9.2 m
B. 9.3 m
C. 12.2 m
D. 12.3 m
E. 12.5 m



$l + 3.79 = 12.25$

$\therefore l = 8.46$

$c^2 = 8.46^2 + 3.79^2$

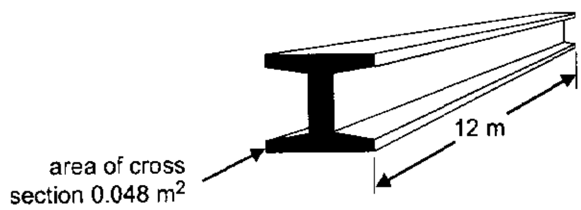
$c = \sqrt{8.46^2 + 3.79^2}$

$c = 9.27$

Question 13

A steel beam used for constructing a building has a cross-sectional area of 0.048 m^2 as shown.

The beam is 12 m long.



In cubic metres, the volume of this steel beam is closest to

A. 0.576
B. 2.5
C. 2.63
D. 57.6
E. 2 500

$V = AH$

$= 0.048 \times 12$

$= 0.576 \text{ m}^3$

Question 14

A block of land has an area of 4000 m^2.

When represented on a map, this block of land has an area of 10 cm^2.

On the map 1 cm would represent an actual distance of

A. 10 m
B. 20 m
C. 40 m
D. 400 m
E. 4000 m

$4000 \text{ m}^2 = 4000 \times 100 \times 100 \text{ cm}^2$

$\therefore k^2 = 4000 \times 100 \times 100 \div 10$

$k^2 = 400 \times 100 \times 100 \quad \therefore k = \sqrt{400 \times 100^2}$

$\therefore k = 20 \times 10 \times 10 = 2000$

$\therefore$ 1 cm represents:

$1 \times 2000 \text{ cm}$

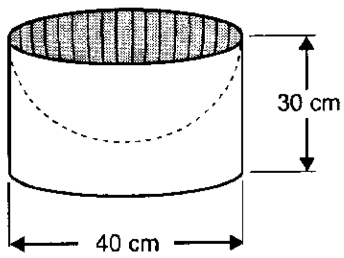
$= 2000 \div 100 \text{ m}$

$= 20 \text{ m}$

Question 15

A solid cylinder has a height of 30 cm and a diameter of 40 cm.

A hemisphere is cut out of the top of the cylinder as shown below.



$$T.S.A = \text{Base} + \text{Tube} + \text{Hemispherical surface}$$

$$= \pi r^2 + 2\pi r h + \frac{4\pi r^2}{2}$$

$$= 3\pi r^2 + 2\pi r h$$

In square centimetres, the total surface area of the remaining solid (including its base) is closest to

A. 1 260

B. 2 510

C. 6 280

D. 7 540

E. 10 050

$$\therefore T.S.A = 3\pi \times 20^2 + 2\pi \times 20 \times 30$$

$$= 7539.82 \text{ cm}^2$$

Question 16

A closed cubic box of side length 36 cm is to contain a thin straight metal rod. The maximum possible length of the rod is closest to

A. 36 cm

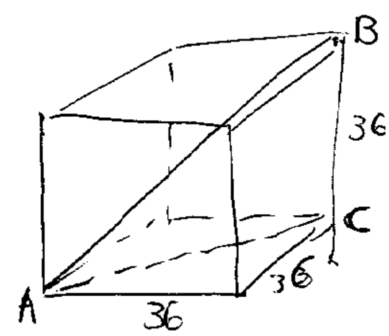
B. 51 cm

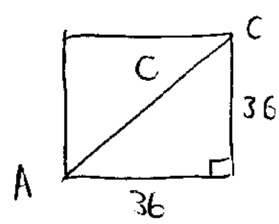
C. 62 cm

D. 108 cm

E. 216 cm

Find $\overline{AB}$.

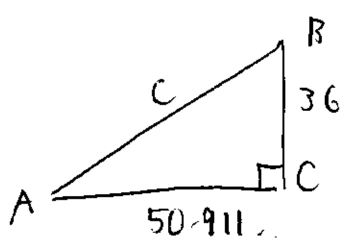




$c^2 = 36^2 + 36^2$

$c = \sqrt{36^2 + 36^2}$

$c = 50.911\ldots$

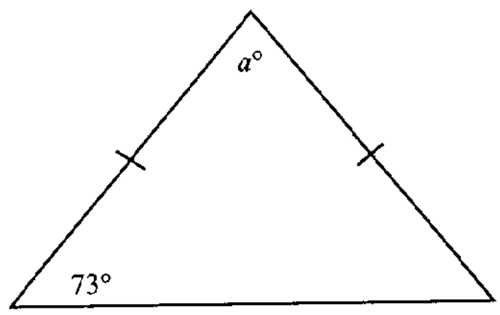


$c^2 = 36^2 + (50.911..)^2$

$\therefore c = \sqrt{36^2 + (50.911..)^2}$

$c = 62.35$

Question 17



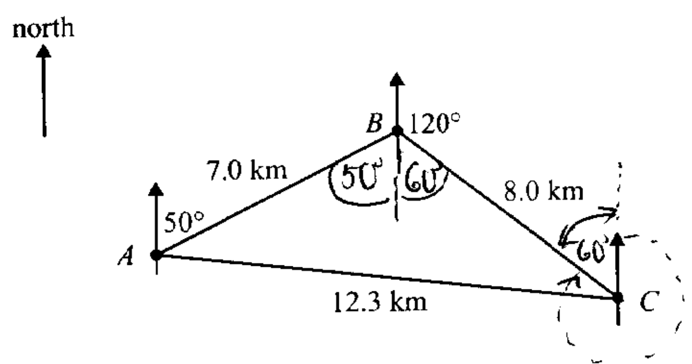
For the isosceles triangle shown above, the value of a is

A. 17
B. 34
C. 73
D. 90
E. 107

$73° + 73° + a° = 180°$
$\therefore a = 180 - 146$
$a = 34$

The following information relates to Questions 18 and 19.

An orienteering course is triangular in shape and is marked by three points, A, B and C, as shown in the diagram below.



Question 18

In this course, the bearing of B from A is 050° and the bearing of C from B is 120°.

The bearing of B from C is

A. 060°
B. 120°
C. 240°
D. 300°
E. 310°

Question 19

In this course, B is 7.0 km from A, C is 8.0 km from B and A is 12.3 km from C.

The area (in km^2) enclosed by this course is closest to

A. 21

B. 24

C. 25

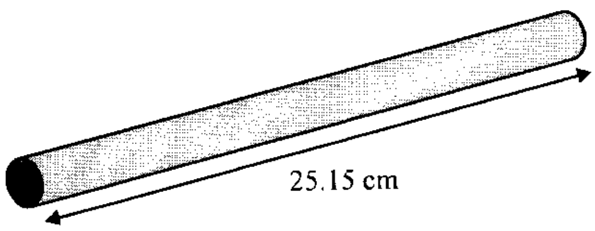
D. 26

E. 28

$A = 0.5 \times 7 \times 8 \times \sin(110^\circ)$

$= 26.31 \ km^2$

Question 20



The solid cylindrical rod shown above has a volume of 490.87 cm^3. The length is 25.15 cm.

The radius (in cm) of the cross-section of the rod, correct to one decimal place, is

A. 2.5

B. 5.0

C. 6.3

D. 12.5

E. 19.6

$\pi r^2 \times 25.15 = 490.87$

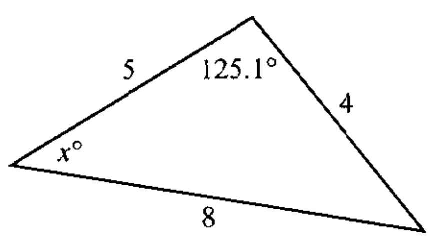
Use solve on CAS OR

$r^2 = \dfrac{490.87}{\pi \times 25.15}$

$\therefore r = \sqrt{\dfrac{490.87}{\pi \times 25.15}}$

$r = 2.495$

Question 21



For the triangle shown, the value of $\sin x^\circ$ is given by

A. $\dfrac{\sin 125.1^\circ}{2}$

B. $\dfrac{5^2 + 4^2 - 8^2}{2 \times 5 \times 4}$

C. $2 \times \sin 125.1^\circ$

D. $\dfrac{5^2 + 8^2 - 4^2}{2 \times 5 \times 8}$

E. $\dfrac{5 \times \sin 125.1^\circ}{8}$

$\dfrac{\sin(x^\circ)}{4} = \dfrac{\sin(125.1^\circ)}{8}$

$\sin(x^\circ) = \dfrac{4\sin(125.1^\circ)}{8}$

$= \dfrac{\sin(125.1^\circ)}{2}$