

EXERCISE SECTION 13.

9 $A = (8x)^\circ$ and $D = (9x - 15)^\circ$ Find A and D

A and D are vertical angles

so they are equal.

$$8x^\circ = 9x - 15$$

$$-x^\circ = -15$$

$$x = 15^\circ$$

$$A = 8(15) = 120^\circ$$

$$D = 9(15) - 15 = 130^\circ$$

$$A = 120^\circ$$

$$D = 120^\circ$$

11 $A = (12x + 14)^\circ$ and $G = (9x - 2)^\circ$ Find A and G

A and G add up to 180°

$$12x + 14 + 9x - 2 = 180$$

$$21x + 12 = 180$$

$$21x = 180 - 12$$

$$\frac{21x}{21} = \frac{168}{21}$$

$$x = 8 \quad A = 12(8 + 14) = 110$$

$$G = 9(8) - 2 = 70$$

$$A = 110^\circ \quad G = 70^\circ$$

13 Equilateral triangle

b

14 Isosceles triangle (nonright)

a.

17 Obtuse scalene triangle.

d.

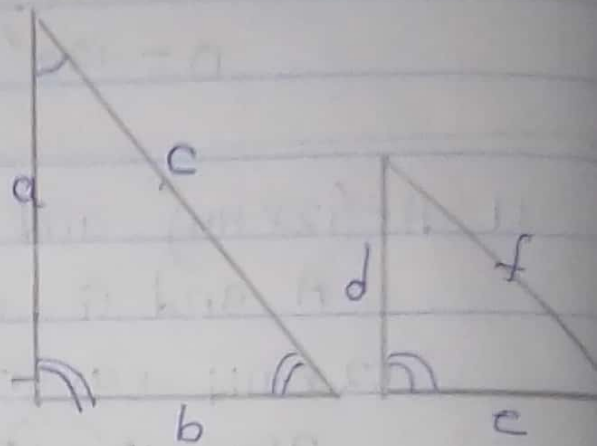
19 $a=4, c=6, d=2$ $F=$

4 — 6

~~2~~ ~~X~~ f

$$\frac{2 \times 6}{4} = \frac{12}{4} = 3$$

$F=3.$



21 $d=5, e=3.5, b=7.5, a=$

5 — 3.5

~~a~~ ~~X~~ 7.5

$$a = \frac{5 \times 7.5}{2+7.5} = 1.5$$

23 $d = 1.1 \text{ m}$, $f = 2.5 \text{ m}$, $c = 26.25 \text{ km}$ $a =$

$1 \text{ km} = 1000 \text{ m}$

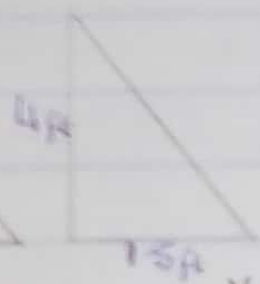
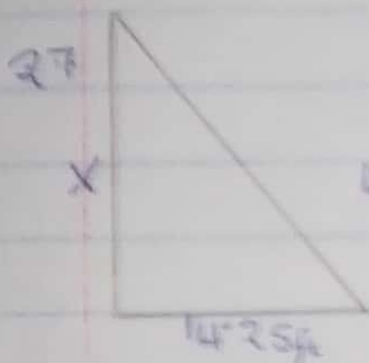
~~26.25~~

$26.25 \times 1000 = 26250 \text{ m}$

1.1 2.5
 ~~$a = \frac{1.1 \times 26250}{2.5}$~~

$a = \frac{1.1 \times 26250}{2.5}$

$a = 1155 \text{ m}$ or 1.16 km



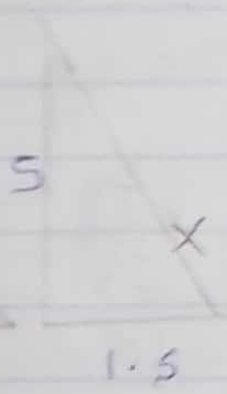
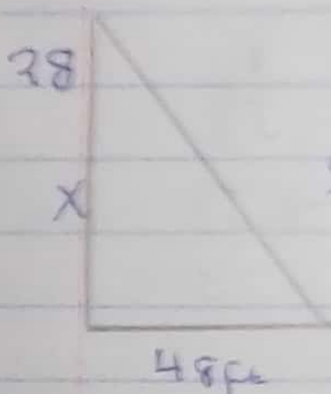
1.5 — 4

~~$14.25 \times x$~~

14.25×4

$1.5 = 38$

$x = 38 \text{ ft}$



1.5 — 5

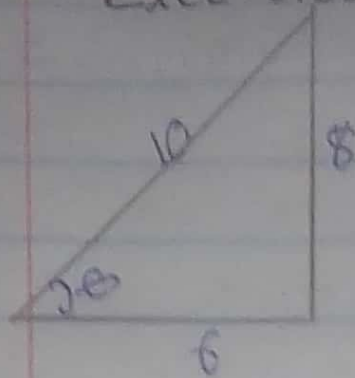
~~$48 \times$~~

$\frac{48 \times 5}{1.5}$

$= 160$

$x = 160 \text{ ft}$

EXERCISE SECTION 1.3.



① $\sin \theta$

$$\sin = \frac{O}{H} = \frac{8}{10}$$

SOHCAHTOA

$$= 0.8$$

3. $\csc \theta$

$$\csc \theta = \frac{H}{O} = \frac{10}{8}$$

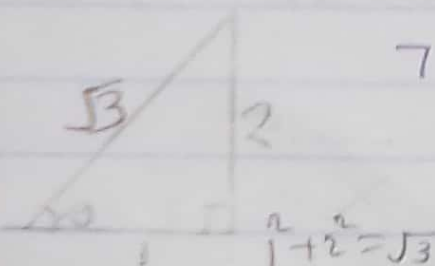
$$= 1.25$$

5. $\tan \theta$

$$\tan \theta = \frac{8}{6}$$

$$= 1.3333$$

7.



7. $\cos \theta$

$$\cos = \frac{A}{H} = \frac{1}{\sqrt{3}}$$

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

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

9 Sec θ

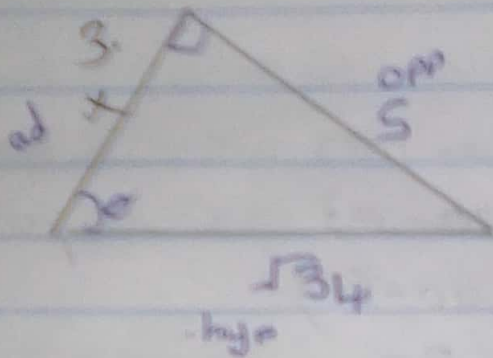
$$\sec \theta = \frac{H}{A} \cdot \frac{\sqrt{3}}{1} = 1.732$$

$$= \sqrt{3}$$

11 Tan θ

$$\tan \theta = \frac{O}{A} \cdot \frac{2}{1}$$

$$= 2$$



$$x^2 + 5^2 = (\sqrt{34})^2$$

$$x^2 + 25 = 34$$

$$\begin{array}{r} x^2 + 25 = 34 \\ - 25 \\ \hline 9 \end{array}$$

$$\sqrt{x^2} = \sqrt{9}$$

$$x = 3$$

13 sin θ

$$\sin \theta = \frac{O}{H} = \frac{5}{\sqrt{34}} \cdot \frac{\sqrt{34}}{\sqrt{34}} = \frac{5\sqrt{34}}{34}$$

15 Tan θ

$$\text{Tan } \theta = \frac{O}{A} = \frac{5}{3} = \frac{5}{3}$$

$$= 1.667$$

17 Sec θ

$$\text{sec } \theta = \frac{H}{A} = \frac{\sqrt{34}}{3}$$

$$= \frac{\sqrt{34}}{3}$$

19 $\sin 60^\circ = \cos$

$$\sin \theta = \cos (90 - \theta)$$

$$\sin 60 = \cos (90 - 60)$$

$$30^\circ$$

$$\sin 60 = \cos 30^\circ$$

21 $\cos x = \sin$

$$\cos \theta = \sin (90 - \theta)$$

$$\cos x = \sin (90 - x)$$

$$23 \quad \csc 30^\circ = \sec$$

$$\csc \theta = \sec (90 - \theta)$$

$$\csc 30 = \sec (90 - 30)$$

$$\csc 30 = \sec 60$$

$$25 \quad \sin (x+y)$$

$$\sin \theta = \cos (90 - \theta)$$

$$\sin (x+y) = \cos (90 - (x+y))$$

$$\sin (x+y) = \cos (90 - x - y)$$

$$27 \quad \cos (30^\circ + A)$$

$$\cos \theta = \sin (90 - \theta)$$

$$\cos (30 + A) = \sin (90 - (30 + A))$$

$$90 - 30 - A$$

$$= \cos (30 + A) = \sin (60 - A)$$

$$29 \quad \cot (45^\circ - x)$$

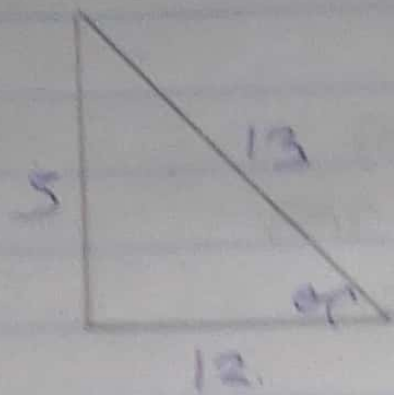
$$\cot \theta = \tan (90 - \theta)$$

$$\cot (45 - x) = \tan (90 - (45 - x))$$

$$\cot (45 - x) = \tan 90 - 45 + x$$

$$\cot (45 - x) = \tan (45 + x)$$

33



$$\sin \theta$$

$$\sin \theta = \frac{O}{H} = \frac{5}{13}$$

$$\sin \theta = 0.3846$$

$$\theta = 22.62^\circ$$

EXERCISE SECTION 1.4

1 $\sin 30^\circ$

$$\sin 30^\circ = \frac{1}{2}$$
$$= a.$$

5 $\sin 45^\circ$

$$\sin 45^\circ = \frac{\sqrt{2}}{2}$$
$$= c.$$

7 $\tan 30^\circ$

$$\tan \theta = \frac{\sin \theta}{\cos \theta} \quad \frac{1/2}{\sqrt{3}/2}$$

$$\tan 30 = \frac{1/2}{\frac{\sqrt{3}}{2}}$$

$$= \frac{1}{2} \div \frac{\sqrt{3}}{2}$$

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

$$\frac{2}{2\sqrt{3}} \times \frac{2\sqrt{3}}{2\sqrt{3}} = \frac{4\sqrt{3}}{4 \times 3}$$

$$= \frac{4\sqrt{3}}{12} = \frac{\sqrt{3}}{3}$$

98 $\tan 60^\circ$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\sin 60 = \frac{\sqrt{3}}{2}$$

$$\cos 60 = \frac{1}{2}$$

$$\tan 60 = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}}$$

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

$$= \sqrt{3}$$

$$13 \csc 60^\circ$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\csc 60 = \frac{1}{\sin 60} = \frac{1}{\frac{\sqrt{3}}{2}}$$

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

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

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

$$15 \cot 60^\circ$$

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

$$\begin{aligned}\cot 60 &= \frac{1}{\sqrt{3}} = \frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} \\ &= \frac{\sqrt{3}}{3}\end{aligned}$$

17 $\sec 45^\circ$

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\begin{aligned}\sec 45 &= \frac{1}{\cos 45} \\ \cos 45 &= \frac{\sqrt{2}}{2}\end{aligned}$$

$$\sec 45 = \frac{1}{\frac{\sqrt{2}}{2}} = 1 \div \frac{\sqrt{2}}{2} = 1 \times \frac{2}{\sqrt{2}} = \frac{2}{\sqrt{2}}$$

$$= \frac{2}{\sqrt{2}} \quad \frac{2}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{2}$$

$$= \sqrt{2}$$

91 $\cos 82^\circ$

$$= 0.1392$$

23 $\tan 54^\circ$

$$= 1.3764$$

Q5 Sec 8th

1-00983.

83 $\angle B + \angle C$.

$$\angle B = 63^\circ 28' 35'' \quad \angle C = 16^\circ 11' 30''$$

$$\begin{array}{r} 63^\circ \quad 28' \quad 35'' \\ + 16^\circ \quad 11' \quad 30'' \\ \hline 79 \quad 39 \quad 65 \\ \quad \quad + 1 \quad - 60 \\ \hline \end{array}$$

$$= 79^\circ 40' 5''$$

$$= 79^\circ 40' 5''$$

85 $\angle B - \angle C$

$$\angle B = 63^\circ 28' 35'' \quad \angle C = 16^\circ 11' 30''$$

$$\begin{array}{r} 63^\circ \quad 28' \quad 35'' \\ - 16^\circ \quad 11' \quad 30'' \\ \hline 67 \quad 17 \quad 05 \end{array}$$

$$= 67^\circ 17' 05''$$

$$37 \quad 90^\circ - \angle A$$

$$\angle A = 5^\circ 17' 29''$$

$$\begin{array}{r} 89^\circ \quad 59' \quad 59'' \\ 90 \quad 00 \quad 00 \\ - \quad 5 \quad 17 \quad 29 \\ \hline \end{array}$$

$$\begin{array}{r} 89^\circ \quad 59' \quad 59'' \\ - \quad 5 \quad 17 \quad 29 \\ \hline 84 \quad 42 \quad 31 \end{array}$$

$$= 84^\circ 42' 31''$$

EXERCISE SECTION 1-5

$$1 \quad \theta = 37.5^\circ$$

3

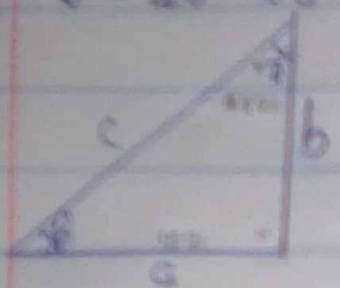
$$3 \quad a = 0.37 \text{ km}$$

2

$$9 \quad \tan \theta = 8.235$$

$$= 83.08^\circ$$

$$19 \quad \theta = 48.25^\circ, \quad a = 15.31 \text{ cm} \quad \text{Find } c.$$



$$19. \quad a = c \sin \theta$$

$$\frac{15.31}{\sin 48.25} = \frac{c \sin 48.25}{\sin 48.25}$$

$$c = \frac{15.31}{\sin 48.25}$$

$$\sin 48.25$$

$$c = 20.60 \text{ cm.}$$

$$21 \quad a = 29 \text{ mm}, \quad c = 38 \text{ mm} \quad \text{find } \theta$$

$$a = c \sin \theta$$

$$\frac{29 \text{ mm}}{38 \text{ mm}} = \frac{38 \text{ mm}}{38 \text{ mm}} \sin \theta$$

$$\frac{29}{38} = \sin \theta$$

$$0.7632 = \sin \theta$$

$$\theta = 49.7^\circ$$

23 $b = 2.3 \text{ m}$, $c = 4.9 \text{ m}$ find θ

$$b = c \cos \theta$$

$$\frac{2.3 \text{ m}}{4.9 \text{ m}} = \frac{4.9 \text{ m}}{4.9 \text{ m}} \cos \theta$$

$$\frac{2.3 \text{ m}}{4.9 \text{ m}} = \cos \theta$$

$$0.4694 = \cos \theta$$

$$\theta = 62^\circ$$

25 $\theta = 21^\circ 17'$, $b = 210.8 \text{ yd}$ Find a

$$1^\circ = 60'$$

$$\times 17'$$

$$\begin{array}{r} 21 \\ + 0.28 \\ \hline \end{array}$$

$$\frac{1 \times 17}{60} = 0.28' = 21.08^\circ$$

$$\alpha = 21.08 \quad b = 210 \text{ yd} \quad a =$$

$$\alpha + \beta = 90$$

$$21.08 + \beta = 90 \quad 90 - 21.08$$

$$\beta = 68.92$$

$$\tan 21.08 = \frac{a}{210}$$

$$a = 210 \times \tan 21.08$$

$$a = 80.98 \text{ yd}$$

37 $\beta = 72^\circ$ and $c = 9.7 \text{ mm}$.

$$\alpha + \beta = 90$$

$$\alpha + 72 = 90$$

$$\frac{72}{18}$$

$$\alpha = 18^\circ$$

$$b = c \sin \beta$$

$$b = 9.7 \sin 72^\circ$$

$$b = 9.2 \text{ mm}$$

$$a = c \sin \alpha$$

$$a = 9.7 \sin 18^\circ$$

$$= 3.097$$

$$a = 3 \text{ mm}$$

39 $\alpha = 54.2$ and $a = 111 \text{ mi}$

$$\alpha + \beta = 90^\circ$$

$$54.2 + \beta = 90$$

$$\beta = 35.8^\circ$$

$$a = c \sin \alpha$$

$$111 = c \sin 54.2$$

$$\frac{111}{\sin 54.2} = \frac{c}{\sin 54.2}$$

$$c = 136.87 \text{ mi}$$

41 $\beta = 45^\circ$, $b = 10.2 \text{ km}$

$$\alpha + \beta = 90$$

$$\alpha + 45 = 90 \rightarrow 45$$

$$\alpha = 45^\circ$$

$$b = c \sin \beta$$

$$10.2 \text{ km} = c \sin 45$$

$$\frac{10.2}{\sin 45} = \frac{c}{\sin 45}$$

$$c = 14.42 \text{ km}$$

$$10.2^2 + a^2 = 14.42^2$$

$$a^2 = 14.42^2 - 10^2$$

$$\sqrt{a^2} = \sqrt{103.896}$$

$$a = 10.19 \text{ Km.}$$