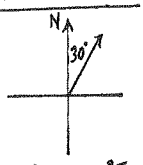
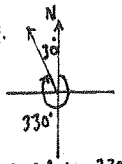
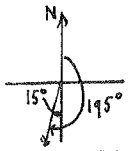
EXERCISES 16·2

1. (a) i. 

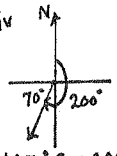
N.30°E. = 030°T

ii. 

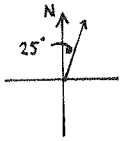
N.30°W. = 330°T

iii 

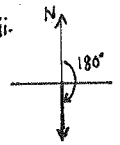
S.15°W. = 195°T.

iv 

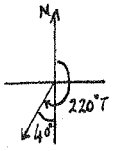
W.70°S. = 200°T

(b) i. 

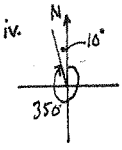
025°T = N.25°E.

ii. 

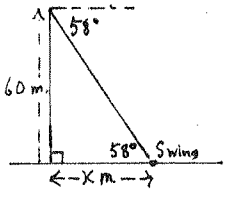
180°T. = S.

iii 

220°T. = S.40°W.

iv. 

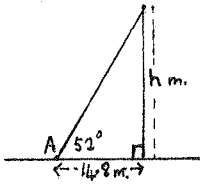
350°T. = N.10°W

2. 

$\frac{60}{x} = \tan 58°$.

$\therefore x = \frac{60}{\tan 58°} \simeq 37.49$

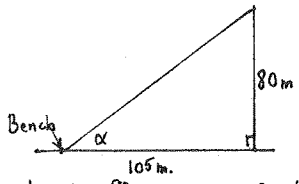
Distance is approx. 37.49 m.

3. 

$\frac{h}{14·8} = \tan 52°$

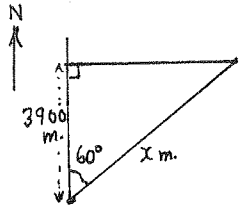
$\therefore h = 14·8 \tan 52° \simeq 18·94$

Height of tree is approx. 18·94 m.

4. 

$\tan\alpha = \frac{80}{105}$, $\therefore \alpha \simeq 37° 18'$.

Angle of elevation is $37°18'$

5. 

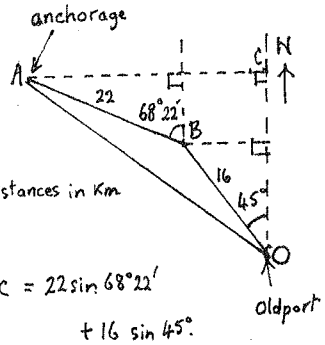
$\frac{3900}{x} = \cos 60°$.

$\therefore x = \frac{3900}{\cos 60°} = 7800$.

$\therefore$ Patrick runs 7800 m.

His average speed = $\frac{7800}{45 \times 60}$ m.s.$^{-1}$

$= \frac{26}{9}$ m.s.$^{-1}$

6. 

$AC = 22 \sin 68°22' + 16 \sin 45°$.

$\simeq 31·76408$

$CO = 22 \cos 68°22' + 16 \cos 45°$.

$\simeq 19·42435$

$AO^2 = AC^2 + CO^2$ (Pythagoras)

$\therefore AO \simeq \sqrt{AC^2 + CO^2} \simeq 37·233$.

6. (continued)

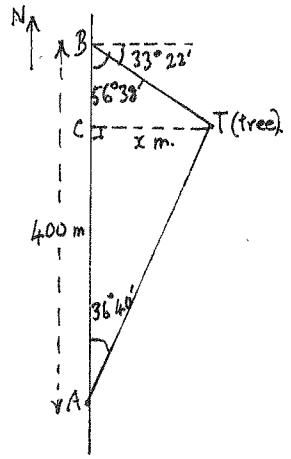
Ship's distance from Oldport is approx. 37·23 Km.

$\tan A\hat{O}C = \frac{AC}{CO} \simeq \frac{31.76408}{19.42435}$

$\therefore A\hat{O}C \simeq 58°33'$.

Ship's bearing from Oldport is N. 58°33' W.

7.



$BC = \frac{x}{\tan 56°38'}$

$CA = \frac{x}{\tan 36°40'}$

$BC + CA = BA = 400$.

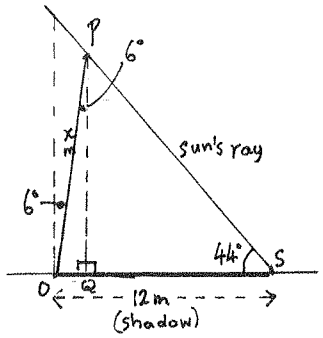
$\therefore x\left\{\frac{1}{\tan 56°38'} + \frac{1}{\tan 36°40'}\right\} = 400$

$\therefore x = \frac{400}{\frac{1}{\tan 56°38'} + \frac{1}{\tan 36°40'}}$

$\simeq 199.82$

Shortest distance from tree to road is approx. 199·82 m.

8.



$PQ = x\cos 6°$

$OQ = x\sin 6°$

$QS = 12 - x\sin 6°$

$\frac{PQ}{QS} = \tan 44°$

$\therefore \frac{x\cos 6°}{12 - x\sin 6°} = \tan 44°$

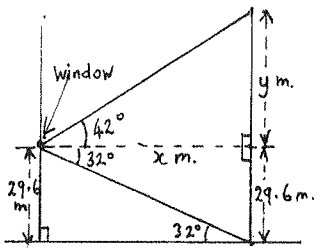
$\therefore x\cos 6° = 12\tan 44° - x\sin 6°\tan 44°$

$\therefore x = \frac{12\tan 44°}{\cos 6° + \sin 6°\tan 44°}$

$\simeq 10.578$

Length of pole $\simeq$ 10·58 m.

9.



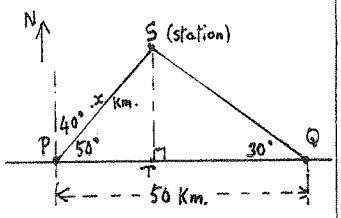
$\frac{29.6}{x} = \tan 32°, \therefore x = \frac{29.6}{\tan 32°}$

$y = x\tan 42° = \frac{29.6\tan 42°}{\tan 32°}$

Height of building $= (y + 29.6)$ m

$\simeq$ 72·25 m.

10.



$PT = x \cos 50°$.

$ST = x \sin 50°$.

$TQ = \dfrac{ST}{\tan 30°} = \dfrac{x \sin 50°}{\tan 30°}$.

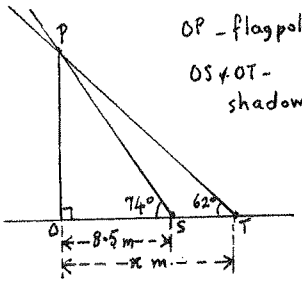
$PT + TQ = PQ = 50$.

$\therefore x\left(\cos 50° + \dfrac{\sin 50°}{\tan 30°}\right) = 50$

$\therefore x = \dfrac{50}{\cos 50° + \dfrac{\sin 50°}{\tan 30°}} \simeq 25.39$

Distance of station from P is approx. 25.39 Km.

11.



OP – flagpole.

OS & OT – shadows

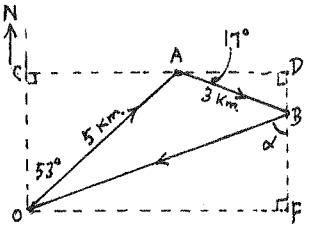
$OP = 8.5 \tan 74°$.

$\dfrac{OP}{x} = \tan 62°$.

$\therefore x = \dfrac{8.5 \tan 74°}{\tan 62°} \simeq 15.76$

When sun is 62° above horizon length of shadow is approx. 15.76 m.

12.



(a) On first part of hike (OA)

distance hiker travels N. (OC)

$= (5 \cos 53°)$ Km. $\simeq$ 3.01 Km;

distance she travels E. (CA)

$= (5 \sin 53°)$ Km. $\simeq$ 3.99 Km.

(b) On second part of hike (AB),

distance hiker travels S. (DB)

$= (3 \sin 17°)$ Km. $\simeq$ 0.88 Km;

distance she travels E. (AD)

$= (3 \cos 17°)$ Km. $\simeq$ 2.87 Km.

(c) Total distance she is N. of O

$= (5 \cos 53° - 3 \sin 17°)$ Km.

$\simeq$ 2.13 Km. (BF)

Distance she is E. of O

$= (5 \sin 53° + 3 \cos 17°)$ Km.

$\simeq$ 6.86 Km. (OF).

(d) $\tan \alpha = \dfrac{OF}{BF} = \dfrac{5 \sin 53° + 3 \cos 17°}{5 \cos 53° - 3 \sin 17°}$

$\therefore \alpha \simeq 72.74°$.

$\therefore$ she should walk on bearing of $(180 + 73)° = 253°$ T. (to nearest degree)

Distance she will have to walk

$= BO$

$= \sqrt{BF^2 + OF^2}$

$\simeq$ 7.19 Km.