1) +2

pg. 18 Problems 1.3:

10. 482,300

4.82×10^5

12. 0.00224

2.24×10^{-3}

16. 0.00000009

9.00×10^{-7}

20. 0.000000000000000618

6.18×10^{-16}

2) +1

a) 1 hour → seconds

$1\,\text{hour} \times \frac{60\,\text{min}}{1\,\text{hour}} \times \frac{60\,\text{s}}{1\,\text{min}} = 3600\,\text{s}$

b) 5.0g → kg = 0.005 kg

(move decimal 3 to the left)

c) 22.5cm → m = 0.225 m

(move decimal 2 to the right)

d) 1 mile → cm

$1\,\text{mile} \times \frac{5280\,\text{ft}}{1\,\text{mile}} \times \frac{12\,\text{in}}{1\,\text{ft}} \times \frac{2.54\,\text{cm}}{1\,\text{in}} = 160{,}934.4\,\text{cm}$

+2

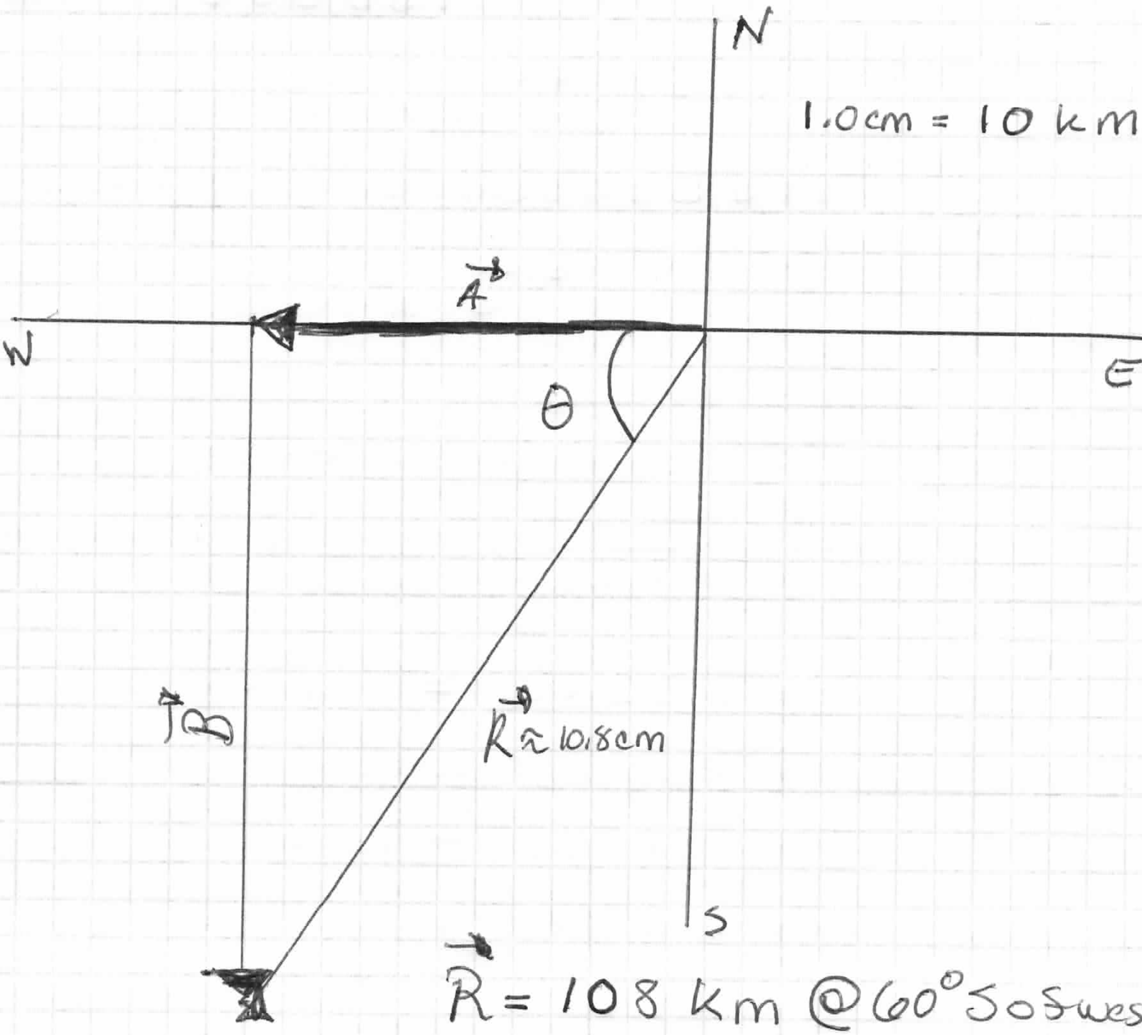
3. 1.0 century → seconds

$$1.0\ \cancel{cent} \times \frac{100\ \cancel{years}}{1\ \cancel{cent}} \times \frac{365\ \cancel{days}}{1\ \cancel{year}} \times \frac{24\ \cancel{h}}{1\ \cancel{day}} \times \frac{3600\ s}{1\ \cancel{h}}$$

$$= \underline{3.15 \times 10^9\ s}$$

4. pg. 87-89 Problems 3.3

2. $\vec{A}$ = 60 km due west
$\vec{B}$ = 90 km due south



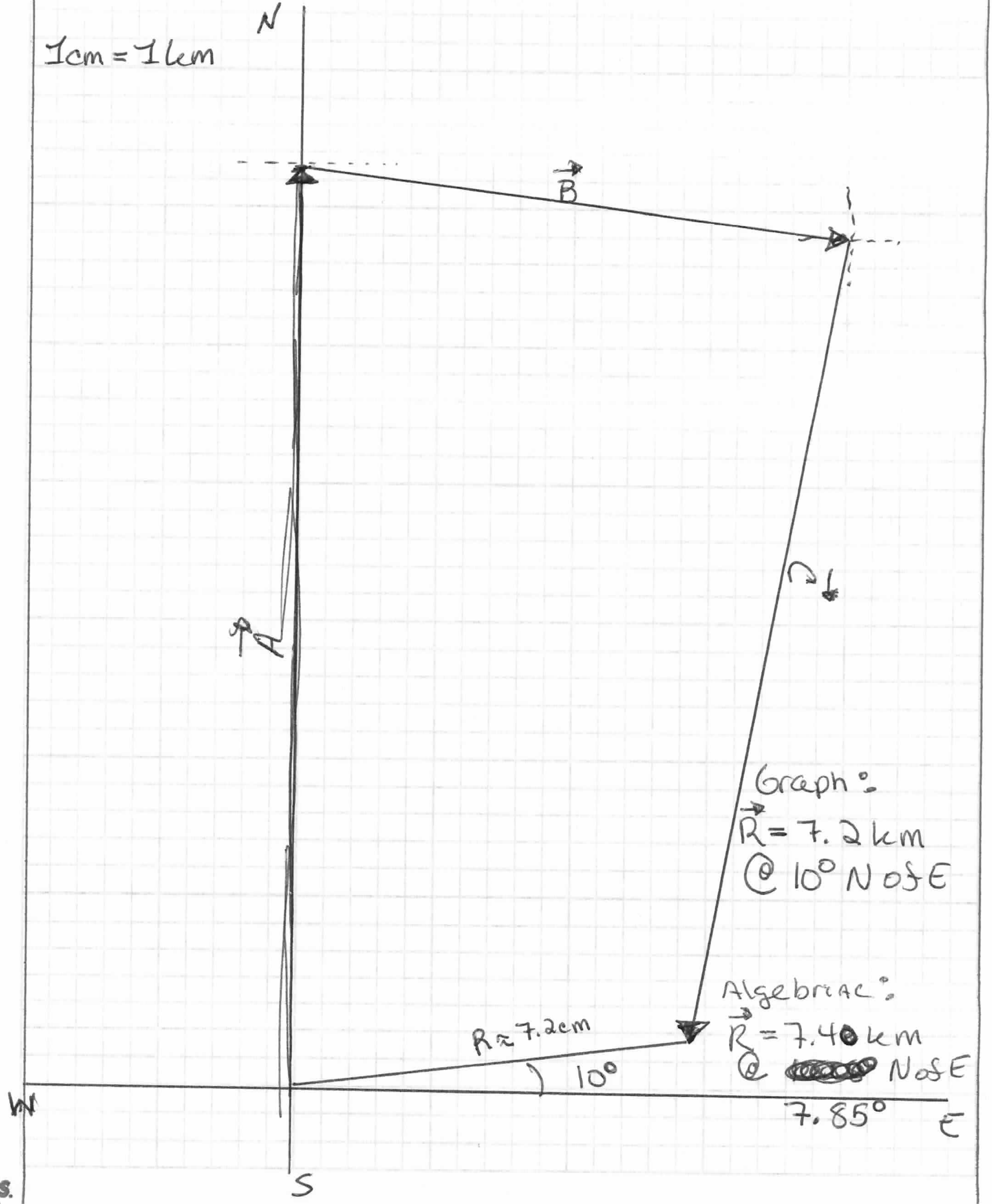
$\vec{R}$ = 108 km @ 60° S of west

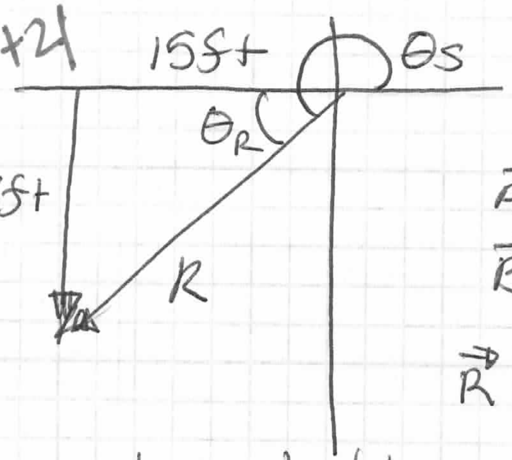
→ Algebraically: R = 108.2 km
@ 56.3 S of west

12. $\vec{A} = 17\text{ km N}$ +2

$\vec{B} = 10\text{ km}$ @ 7° South of EAST

$\vec{C} = 15\text{ km}$ @ 10° West of South



32. 

$\vec{A} = -15 ft$

$\vec{B} = -45.5 ft$

$\vec{R} = \vec{A} + \vec{B}$

	X	Y
A	-15	0
B	0	-45
R	-15	-45

$\vec{R} = \sqrt{R_x^2 + R_y^2} = \sqrt{(-15)^2 + (-45)^2}$

$= \sqrt{225 + 2025}$

$= \sqrt{2250} = \underline{47.4 ft}$

$\theta_R = \tan^{-1} \frac{R_y}{R_x} = \tan^{-1} \frac{45}{15} = \tan^{-1} 3$

$\theta_R = 71.56$ S of W

$\theta_S = 180° + 71.56 = 251.56$

$\boxed{\vec{R} = 47.4 ft \ @ \ 251.56}$

This problem specifically asked for <u>standard</u> <u>position</u>

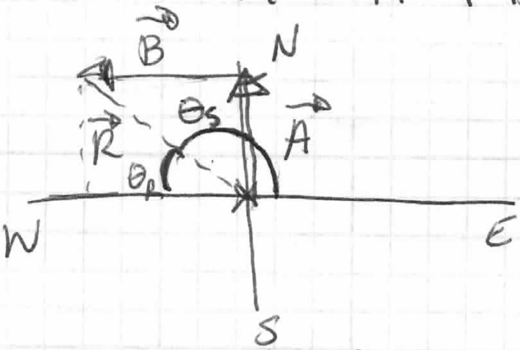
44. +3

$\vec{A} = 350\,m$ N

$\vec{B} = 275\,m$ W

WANT displacement so . . . .

$\vec{R} = \vec{A} + \vec{B}$ where $\vec{R}$ is displacement



	X	Y
A	0	350
B	-275	0
R	-275	350

$$\vec{R} = \sqrt{R_x^2 + R_y^2} = \sqrt{(-275)^2 + (350)^2}$$

$$= \sqrt{75625 + 122500}$$

$$= \sqrt{198125}$$

distance $= \boxed{445.11\ m}$

$$\theta_R = \tan^{-1}\frac{R_y}{R_x} = \tan^{-1}\frac{350}{275}$$

$$= \tan^{-1} 1.273$$

$= \underline{51.84^\circ}$ North of west

In standard position

$$\theta_S = 180 - \theta_R = 180 - 51.84^\circ$$

$\boxed{\vec{R} = 445.11\,m \text{ @ } 128.16}$ $\theta_S = 128.16$

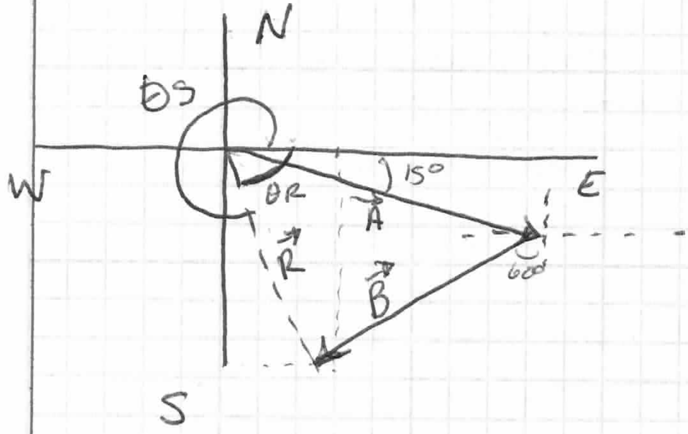
46. +4

$\vec{A}$ = 50.0 miles @ 15° S of E

$\vec{B}$ = 85.5 miles @ 60° W of S

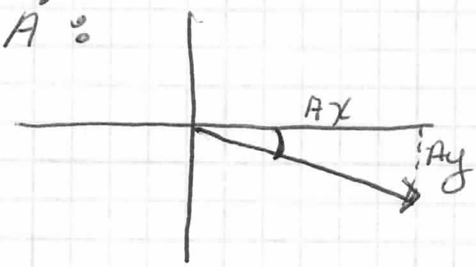
Find displacement so . . . . .

$\vec{R} = \vec{A} + \vec{B}$ where $\vec{R}$ = displacement



	x	y
A	48.29	-12.94
B	-74.05	-42.75
R	-25.76	-55.69

$\vec{A}$:



$A_x = A \cos\theta$

$= 50 \text{ miles} \cos 15°$

$= 50(.9659)$

$= 48.29$ miles

$A_y = A \sin\theta$

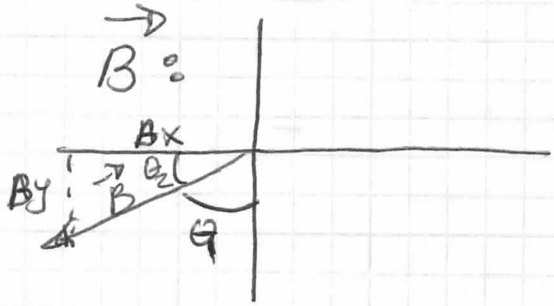
$= 50 \text{ miles} \sin 15°$

$= 50(.2588)$

$= {}^{-}12.94$ miles

{ Negative because the Y-component is found below the x-axis in Quad. IV }

46. Cont.



B - component can be found two ways.

Use $\theta_1 = 60°$ and

$B_x = B \sin 60°$

$B_y = B \cos 60°$

or Use $30° = \theta_2$

$B_x = B \cos \theta_2$

$= 85.5 \text{ miles} \cos 30°$

$= 85.5 \text{ miles} (.8660)$

$= -74.05$ miles (Neg. b/c Quad III)

$B_y = B \sin \theta_2$

$= 85.5 \text{ miles} \sin 30°$

$= 85.5 (.5)$

$= -42.75$ miles (Neg. b/c Quad III)

$R_x = A_x + B_x = 48.29 + (-74.05) = -25.76$ miles

$R_y = A_y + B_y = -12.94 + (-42.75) = -55.69$ miles

$\vec{R} = \sqrt{R_x^2 + R_y^2} = \sqrt{(-25.76)^2 + (-55.69)^2}$

$= \sqrt{663.6 + 3101.4} = \sqrt{3764.97}$

$= \boxed{61.36 \text{ miles}}$

$\theta_R = \tan^{-1} \frac{R_Y}{R_X} = \tan^{-1} \frac{55.69}{25.76} = 65.2°$ S of E

$\theta_S = 360 - 65.2 = \boxed{294.8°}$