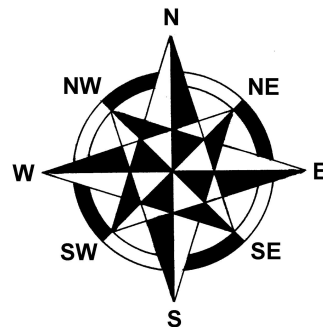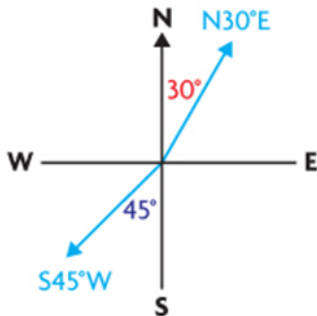# MORE APPLICATIONS... Bearings

NOTE:

Communication | *Tip*

Directions are often stated in terms of north and south on a compass. For example, N30°E means travelling in a direction 30° east of north. S45°W means travelling in a direction 45° west of south.

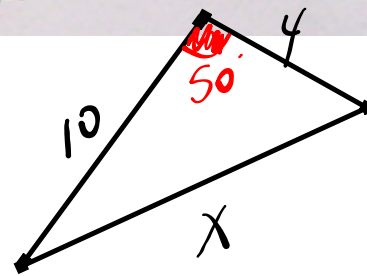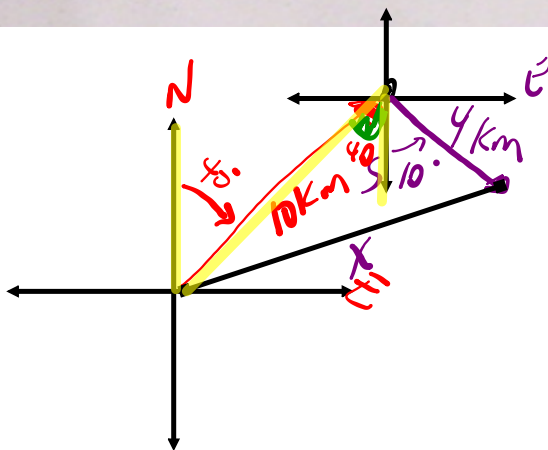# Booklet Questions... 10.12: #11, 12

QUESTIONS???

"40° East of North"

11   Jean is a cross-country skier and skis 10 km in a direction N40°E of the ski lodge. At this point she turns and skis S10°E for 4 km and arrives at a chalet. How far is Jean from the lodge?
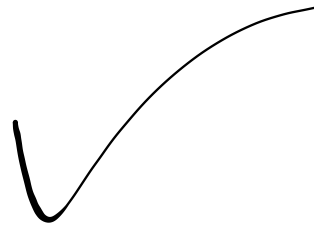
$$x^2 = 10^2 + 4^2 - 2(10)(4)\cos 50°$$

$$x^2 = \boxed{10^2 + 4^2 - 2*10*4\cos(50)}$$

```
10²+4²-2*10*4*co
s(50)
         64.57699123
√(Ans
          8.035981037
```
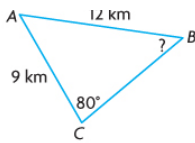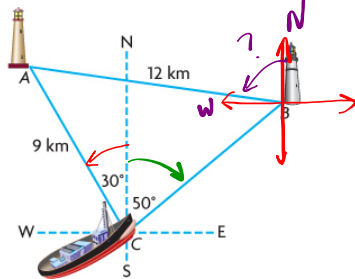
$$x = \boxed{X = 8.0\,km}$$

Practice & Problems #7-9

Applications: Bearings

Ex #1:(p. 122) **Using reasoning to determine the measure of an angle**

The captain of a small boat is delivering supplies to two lighthouses, as shown. His compass indicates that the lighthouse to his left is located at N30°W and the lighthouse to his right is located at N50°E. Determine the compass direction he must follow when he leaves lighthouse B for lighthouse A.

N—W

Compass Rose Animation

I drew a diagram. I labelled the sides of the triangle I knew and the angle I wanted to determine.

I knew AC, AB, and ∠C, and I wanted to determine ∠B. So I used the sine law that includes these four quantities.

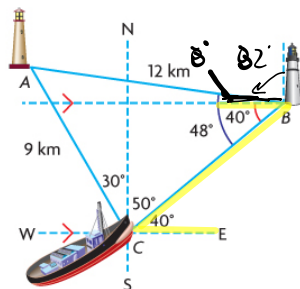I used the proportion with sin B and sin C in the numerators so the unknown would be in the numerator.

$$\frac{\sin B}{AC} = \frac{\sin C}{AB}$$

$$\frac{\sin B}{9} = \frac{\sin 80°}{12}$$

$$9\left(\frac{\sin B}{9}\right) = 9\left(\frac{\sin 80°}{12}\right)$$

$$\sin B = 9\left(\frac{\sin 80°}{12}\right)$$

$$\sin B = 0.7386...$$

$$\angle B = \sin^{-1}(0.7386...)$$
$$\angle B = 47.612...°$$

I substituted the given information and then solved for sin B.

The measure of ∠B is 48°.

The answer seems reasonable. ∠B must be less than 80°, because 9 km is less than 12 km.

I drew a diagram and marked the angles I knew. I knew east-west lines are all parallel, so the alternate interior angle at B must be 40°.
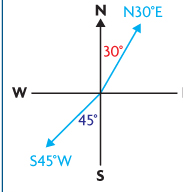
The captain must head N82°W from lighthouse B.

The line segment from lighthouse B to lighthouse A makes an 8° angle with west-east. I subtracted this from 90° to determine the direction west of north.
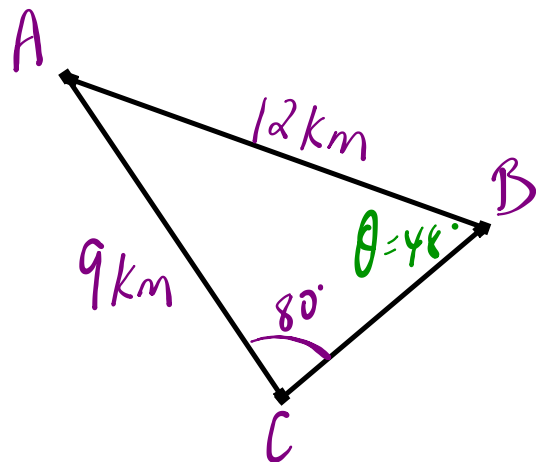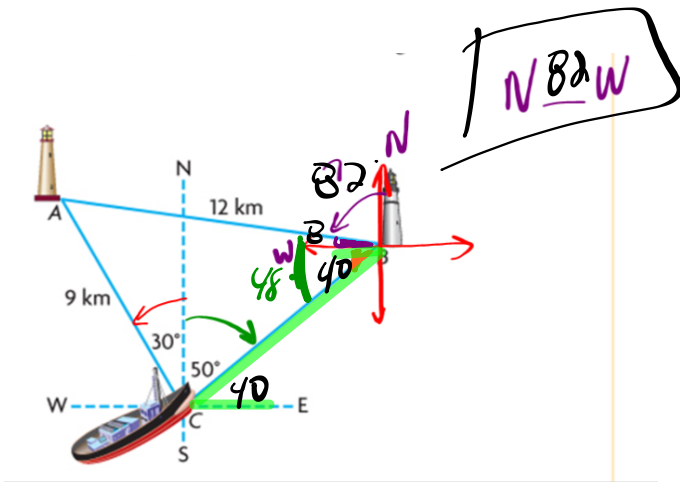
N 82 W

A

12 km

B

9 km

80°

θ = 48°

C

$9 \dfrac{\sin\theta}{9} = 9 \dfrac{\sin 80°}{12}$

$\sin^{-1}\sin\theta = (0.7386)$

$\sin^{-1}$

$\theta = 48°$

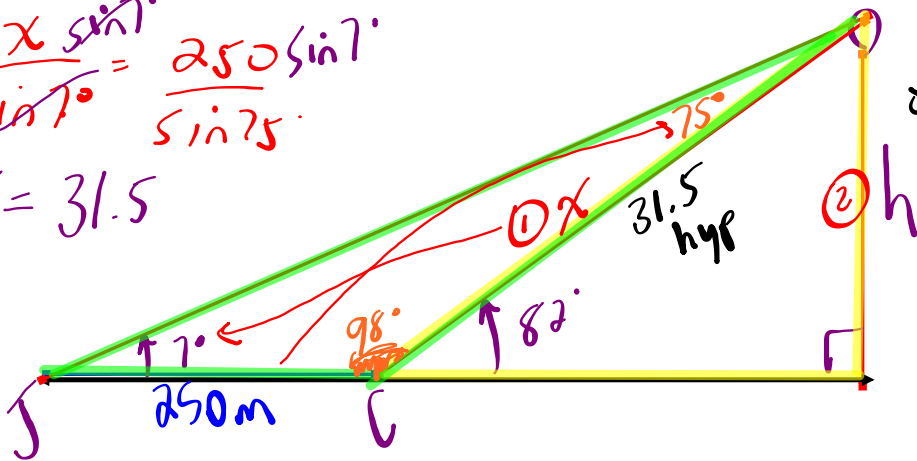# EX #2: Solving an application question...

(p. 166)

Colleen and Juan observed a tethered balloon advertising the opening of a new fitness centre. They were 250 m apart, joined by a line that passed directly below the balloon, and were on the same side of the balloon. Juan observed the balloon at an angle of elevation of 7° while Colleen observed the balloon at an angle of elevation of 82°. Determine the height of the balloon to the nearest metre.

① $\dfrac{x \sin 7°}{\sin 7°} = \dfrac{250 \sin 7°}{\sin 75°}$

$X = 31.5$

② $31.5 \sin 82° = \dfrac{h^{(31.5)}}{31.5}$

$\boxed{31.2\,m = h}$

opp

② h

① x

31.5 hyp

$75°$

$98°$

$7°$

$82°$

250 m

J

C

HOMEWORK: **More Applications/Word Problems**

Page 154 #5, 6, 9, 10, 11 (bearings - see example from Friday)
Page 172 #9, 10, 12, 13, 14