Questions

$s = \dfrac{d}{t} \cdot t$
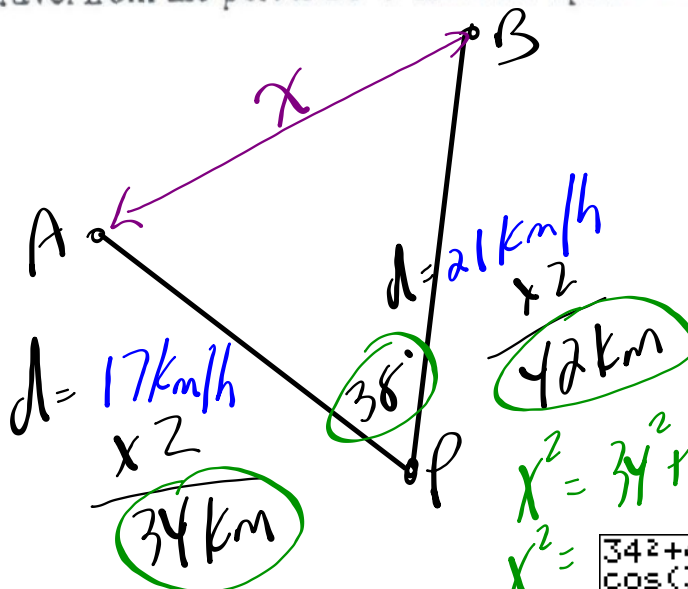
14. Two ships leave a port sailing 17km/h and 21 km/h. The angle between their directions of travel from the port is 38°. How far apart are the ships after 2 h?   ⓪
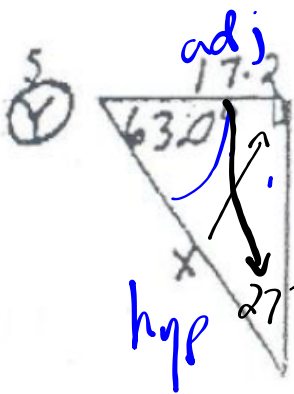
$d = st$

x

$d = 21 \, km/h$
$\times 2$
$42 \, km$

$d = 17 \, km/h$
$\times 2$
$34 \, km$

$38°$

$x^2 = 34^2 + 42^2 - 2(34)(42)\cos 38°$

$x^2 = $
```
34²+42²−2*34*42*
cos(38)
         669.4412877
√(Ans
         25.87356349
```

$x = $

$x = 25.9 \, km$

5
(Y)

adj.
17.2

63.0

x

hyp

27°

$$\frac{x}{\sin 90°} = \frac{17.2}{\sin 27°}$$

(1)

$$\boxed{x = 37.9}$$

OR

SOH CAH TOA

$$\cos 63° = \frac{17.2}{x}$$
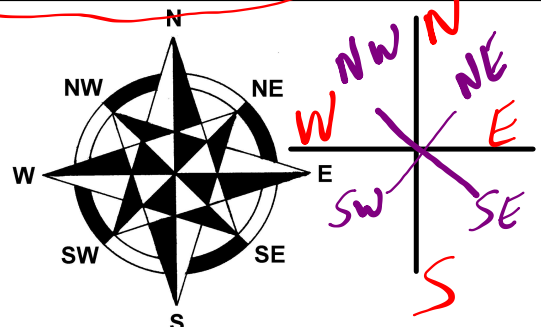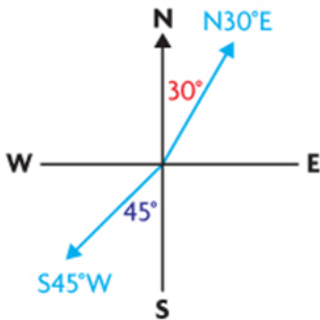
$$x = \frac{17.2}{\cos 63°}$$

$$\boxed{x = 37.9}$$

MORE APPLICATIONS... Bearings

NOTE:

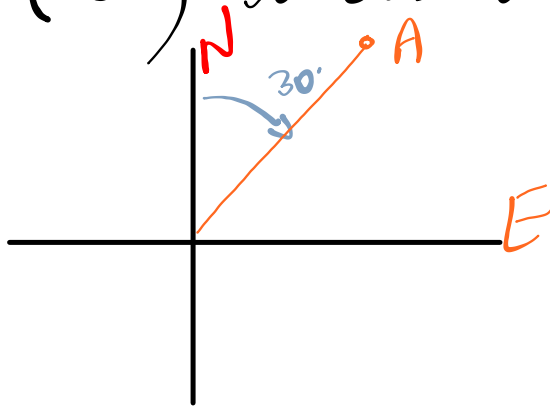### Communication | *Tip*

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.
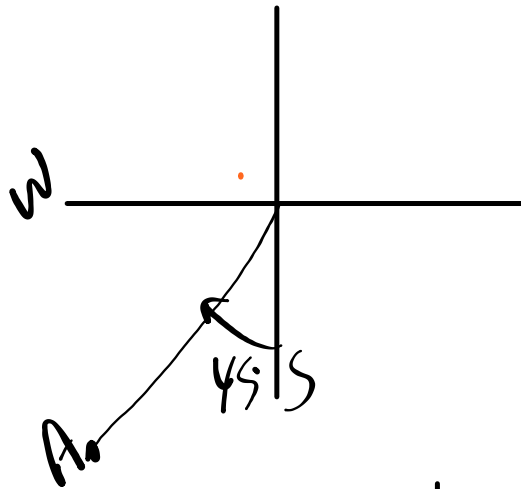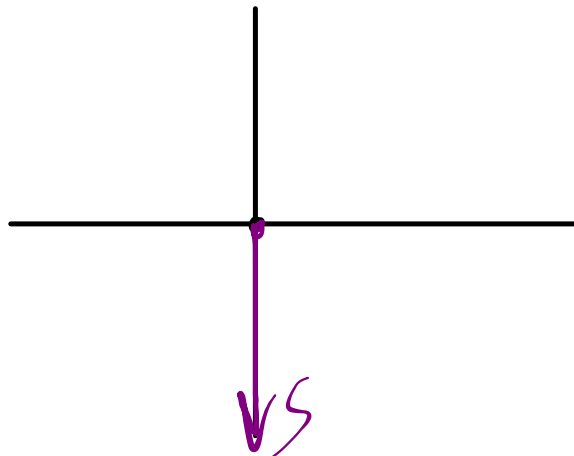
Example → Draw a bearing

1) N30°E (say 30° East of North)

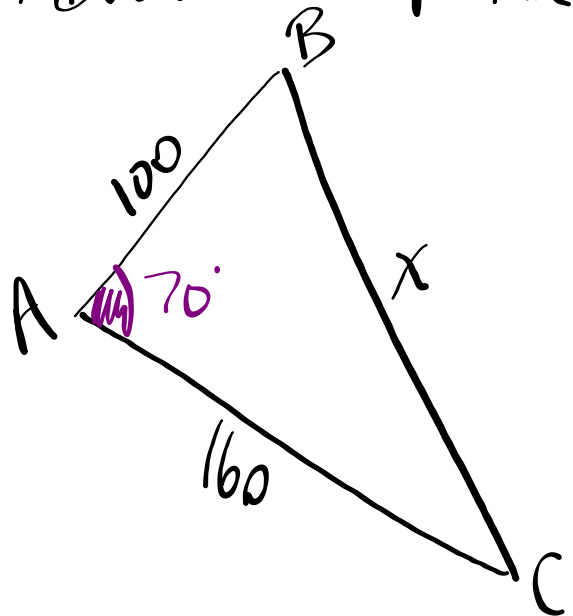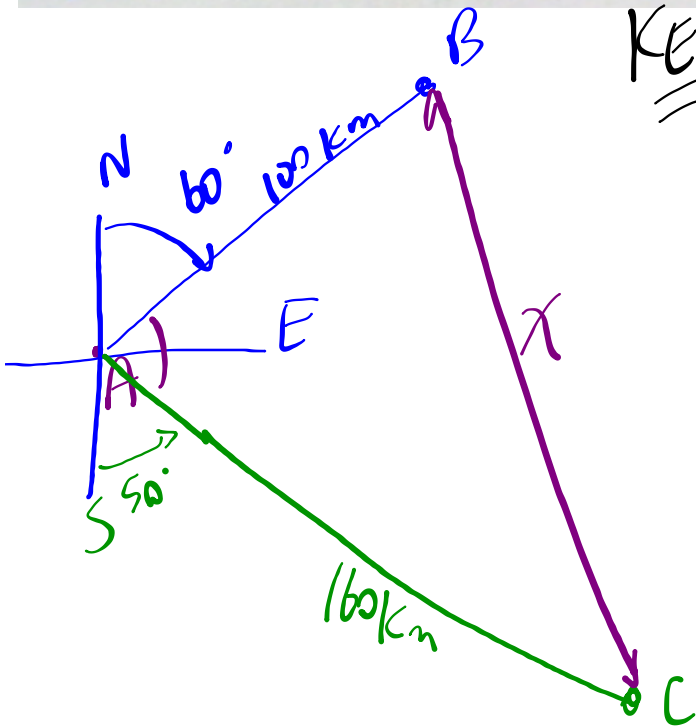2) S45°W (say 45° West of South)

3) Due South

Booklet Questions... 10.12:   #8 - 12

Let's do #8 TOGETHER...

8   In an airport control tower A, 2 planes at B and C are located at the same altitude on a radar screen. The range finder determines one plane to bear N60°E at 100 km while the other bears S50°E at 160 km. How far apart are the planes from each other?

KEY: Draw a 2nd picture
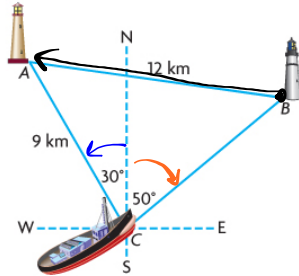
$$x^2 = 100^2 + 160^2 - 2(100)(160)\cos 70°$$

$$x = \sqrt{24655.4}$$

$$x = 157.0 \text{ km}$$

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*.

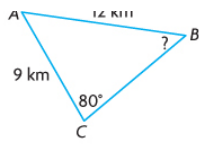N _ W ?

N   12 km
A   B
9 km
30°
50°
W — — — — E
C
S

Compass Rose Animation

A   12 km   B
?
9 km
80°
C

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

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

> 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.

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

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

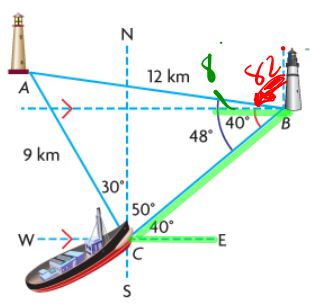$$\sin B = 9\left(\frac{\sin 80°}{12}\right)$$

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

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

> 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.

N
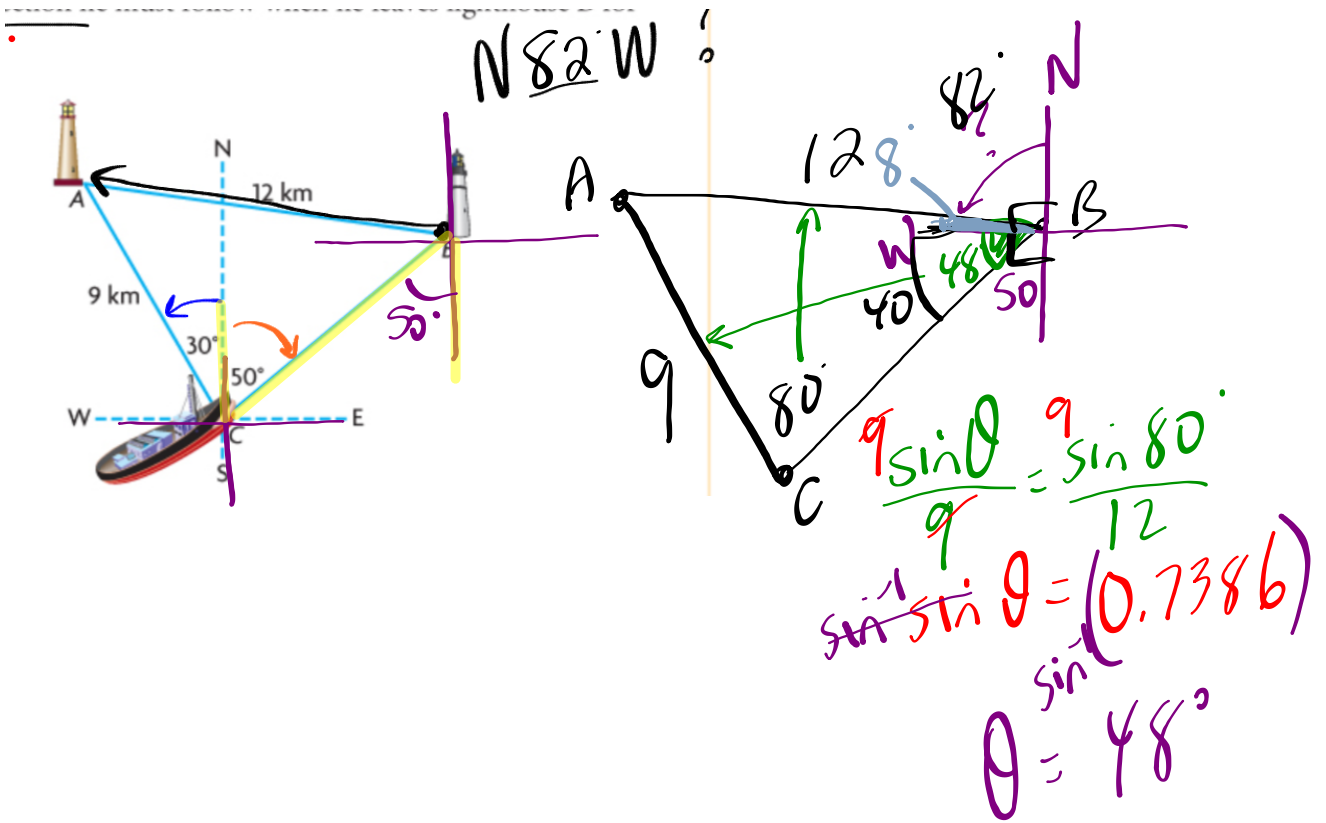12 km   82
A
48°   40° B
9 km
30°
50°
W — 40° — E
C
S

N82 W

> 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.

N82°W ?

A 12 km

9 km

30°

50°

50°

W — E

N S

128°

82°

N

A

B

48°

40°

50°

9

80°

C

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

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

$$\theta = \sin^{-1} 48°$$

$$\theta = 48°$$

10,12   # 9 – 12

Assignment

HW

* Thurs

Text [p. 152 # 3
       p. 154 # 11, 12