Section 8.4 The Tangent Ratio, Build Your Skills, p511-513
Student Resource p359-360

## Build Your Skills

1. 


$\tan \mathrm{X}=\frac{x}{h}$
$\tan 4^{\circ}=\frac{x}{1620}$
$x=1620 \tan 4^{\circ}$
Multiply both sides by 1620 .
$x \approx 113.3 \mathrm{~m}$
The difference in elevation is 113.3 m .
2.

$\tan \mathrm{F}=\frac{x}{d}$
$\tan 25^{\circ}=\frac{x}{1}$
$x=1 \tan 25^{\circ} \quad$ Multiply both sides by 1 .
$x \approx 0.466 \mathrm{~km}$
$x \approx 466 \mathrm{~m}$
The helicopter is 466 m above the ground.
3. a) $\tan 25^{\circ} \approx 0.466$

Therefore, the height of the cliff is approximately $\frac{466}{1000}$ of the distance to the boat.
b) $\tan 25^{\circ}=\frac{70}{d}$
d $\tan 25^{\circ}=70$
$d=\frac{70}{\tan 25^{\circ}}$
$d \approx 150 \mathrm{~m}$
The boat is 150 m from the cliff.

4.

$\tan \mathrm{L}=\frac{l}{d}$
$\tan 41^{\circ}=\frac{l}{50}$
Multiply both sides by 50 .
$50 \tan 41^{\circ}=l$
$43.5 \approx l$
Maximum banner height $=l+1.9$
Maximum banner height $=43.5+1.9$
Maximum banner height $=45.4 \mathrm{~m}$
The maximum banner height is 45.4 m .
5.
a) His house is farthest away. See diagram.
b) $\tan 60^{\circ}=\frac{j}{400}$
$j=400 \tan 60^{\circ}$
$j \approx 693 \mathrm{~m}$
The farthest building is about 693 m away.
c) $\tan 30^{\circ}=\frac{d}{400}$

$d=400 \tan 30^{\circ}$
$d \approx 231 \mathrm{~m}$
The closest object is the field house, which is 231 m away.
6.

a) The CSI needs to know at what height from the ground the bullet was shot from.
b) $\tan 83^{\circ}=\frac{x}{2.4}$
$x=2.4 \tan 83^{\circ}$
$x \approx 19.5 \mathrm{~m}$
He was about 19.5 m away from the wall.
c) $19.5-4=15.5 \mathrm{~m}$

The target would have been 15.5 m from the suspect.
Determine the height above the ground that the bullet would have been at this distance.

$\tan 7^{\circ}=\frac{h}{15.5}$
$h=15.5 \tan 7^{\circ}$
$x \approx 1.9 \mathrm{~m}$
Since the target was only 1.7 m tall, the bullet would have gone over his head.
7.
$\tan 30^{\circ}=\frac{h}{12}$
$h=12 \tan 30^{\circ}$
$h \approx 7 \mathrm{~m}$
The tree is approximately 7 m tall.


## Extend Your Thinking

8. $\tan 55^{\circ}=\frac{h}{x}$
$h=x \tan 55^{\circ}$
$\tan 42^{\circ}=\frac{h}{x+100}$
$h=(x+100) \tan 42^{\circ}$
Do the following calculations.
$x \tan 55^{\circ}=(x+100) \tan 42^{\circ}$
$x \tan 55^{\circ}=x \tan 42^{\circ}+100 \tan 42^{\circ}$
$x \tan 55^{\circ}-x \tan 42^{\circ}=100 \tan 42^{\circ}$
$x\left(\tan 55^{\circ}-\tan 42^{\circ}\right)=100 \tan 42^{\circ}$
$x=\frac{100 \tan 42^{\circ}}{\tan 55^{\circ}-\tan 42^{\circ}}$
$x \approx 170.6$
$h=x \tan 55^{\circ}$
$h=170.6 \tan 55^{\circ}$
$h \approx 243.64 \mathrm{ft}$


The centre is 243.6 ft tall.
You can find out more about the Association francophone de la vallée d'Annapolis (AFVA) at their website: http://www.afva.ca/.

