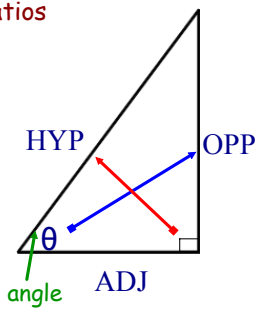
# REVIEW - Trigonometry

- Pythagorean Theorem & Primary Trig Ratios

REMEMBER: "SOH CAH TOA"

$$\sin\theta = \frac{opp}{hyp} \qquad \cos\theta = \frac{adj}{hyp} \qquad \tan\theta = \frac{opp}{adj}$$

$$c^2 = a^2 + b^2$$



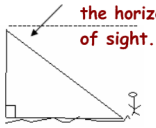

Reference angle

- Applications of Primary Trig

Angle of elevation - is the angle between the ground and the line of sight. (angle of inclination)

Always from the GROUND up

Angle of Depression - is the angle between the horizon and the line of sight.



Always outside the triangle

Also, note that the angle of elevation = angle of depression

- Law of Sines & Its Applications

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \qquad \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

"when looking for a side" "when looking for an angle"

- Ambiguous Case??? (Law of Sines - finding an angle)
  - given a side (a), the angle opposite (A) and another side (b)...

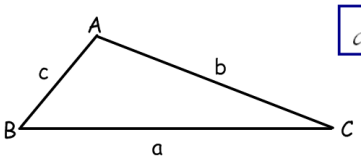
CASE #1: a > b -> only one solution
CASE #2: a = b -> only one solution
CASE #3: a < b ... Determine the altitude length (bsinA)

(i) a < altitude -> no solution
(ii) a = altitude -> one solution (right triangle)
(iii) a > altitude -> two solutions... (Ambiguous Case)
(1) acute angle
(2) obtuse angle (180° - acute)

- Law of Cosines & Its Applications

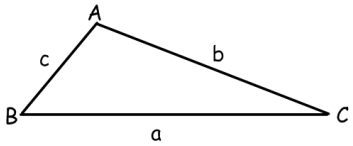
Finding an unknown side...
- 2 sides and a contained angle (SAS)

$$a^2 = b^2 + c^2 - 2bc\cos A$$




Finding an unknown angle...
- 3 known sides (SSS)

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$




- Bearings and Multi-step Word Problems
- "Solving" - find ALL angles & sides

# Review for Test - Lots of Practice from the Textbook!!!

**Chapter Review...**
**(Frequently Asked Questions)**

- Page 128
- Page 153
- Page 174
- Page 199

Chp. 3
Chp. 4

**Practice Questions...**

- Page 129 #1 - 9
- Page 154 #1 - 12
- Page 175 #1 - 9
- Page 200 #1 - 8

Chp 3
Chp 4

* Ambiguous Case → 4.3

Bearing #11, 12

Bearing #8

**Practice Tests...**

- Page 152 #1 - 8
- Page 198 #1 - 7

Chp. 3
Chp. 4

Assignment - Solutions

#1 a) $\tan 52^\circ = \frac{14}{x}$ (1)

$x = \frac{14}{\tan 52^\circ}$

$\boxed{x = 10.9}$ (1)

b) $c^2 = (4.5)^2 + (7.1)^2 - 2(4.5)(7.1)\cos 110^\circ$ (1)

$c^2 = 92.515$

$c = \sqrt{92.515}$

$\boxed{c = 9.62}$ (1)

c) $x^2 = 20^2 - 6^2$ (1)

$x^2 = 400 - 36$

$x^2 = 364$

$x = \sqrt{364}$ (1)

$\boxed{x = 19.1}$

d) $\frac{x}{\sin 62^\circ} = \frac{13.4}{\sin 35^\circ}$ (1)

$x = \frac{13.4}{\sin 35^\circ} \times \sin 62^\circ$

$\boxed{x = 20.63}$ (1)

8

#2. a) $\cos\theta = \frac{11^2 + 8^2 - 17^2}{2(11)(8)}$ (1)

$\cos\theta = \frac{-104}{176}$

$\theta = \cos^{-1}(-104/176)$

$\boxed{\theta = 126.2^\circ}$ (1)

b) $\cos\theta = \frac{12}{13}$ (1)

$\theta = \cos^{-1}(12/13)$

$\boxed{\theta = 22.6^\circ}$ (1)

c) $\frac{\sin\theta}{26} = \frac{\sin 34^\circ}{15}$ (1)

$\sin\theta = \frac{\sin 34^\circ}{15} \times 26$

$\sin\theta = 0.9693$

$\theta = \sin^{-1}(0.9693)$

$\boxed{\theta = 75.8^\circ}$ (1)

6

#3. a) $b^2 = (10.8)^2 + (11.7)^2 - 2(10.8)(11.7)\cos 49^\circ$ (1)

$b^2 = 87.730$

$b = \sqrt{87.730}$

$\boxed{b = 9.37}$ (1)

$\frac{\sin A}{11.7} = \frac{\sin 49^\circ}{9.37}$ (1)

$\sin A = \frac{\sin 49^\circ \times 11.7}{9.37}$

$\sin A = 0.9427$

$\angle A = \sin^{-1}(0.9427)$

$\boxed{\angle A = 70.5^\circ}$ (1)

$\angle C = 180^\circ - 49^\circ - 70.5$

$\boxed{\angle C = 60.5^\circ}$ (1)

b) $\angle C = 180^\circ - 21^\circ - 42^\circ$

$\boxed{\angle C = 117^\circ}$ (1)

10

$\frac{a}{\sin 42^\circ} = \frac{135}{\sin 117^\circ}$ (1)

$a = \frac{135}{\sin 117^\circ} \times \sin 42^\circ$

$\boxed{a = 101.4}$ (1)

$\frac{b}{\sin 21^\circ} = \frac{135}{\sin 117^\circ}$ (1)

$b = \frac{135}{\sin 117^\circ} \times \sin 21^\circ$

$\boxed{b = 54.3}$ (1)

#4. $\frac{\sin B}{343} = \frac{\sin 88.2^\circ}{932}$ (1)

$\sin B = \frac{\sin 88.2^\circ}{932} \times 343$

$\sin B = 0.3678$

$\angle B = \sin^{-1}(0.3678)$

$\angle B = 21.6^\circ$ (1)

$\angle L = 180^\circ - 88.2^\circ - 21.6^\circ$

$\angle L = 70.2^\circ$ (1)

$l^2 = 343^2 + 932^2 - 2(343)(932)\cos 7$

$l^2 = 769\,700.2332$ (1)

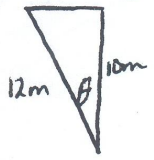
$l = \sqrt{769\,700.2332}$

$l = 877.3$

Distance from Paris to Berlin is...

$\boxed{877.3\text{ km}}$ (1)

#5. 2.5 (1)




$\cos\theta = \frac{12^2+10^2-2.5^2}{2(12)(10)}$ (1)

$\cos\theta = \frac{237.75}{240}$

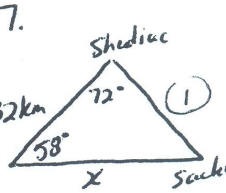
$\cos\theta = 0.9906$

$\theta = \cos^{-1}(0.9906)$

/3

ngle must be... $\boxed{\theta = 7.9^\circ}$ (1)

#7.




(1)

$\frac{x}{\sin 72^\circ} = \frac{32}{\sin 50^\circ}$ (1)

$x = \frac{32}{\sin 50^\circ} \times \sin 72^\circ$

$x = 39.7$ (1)

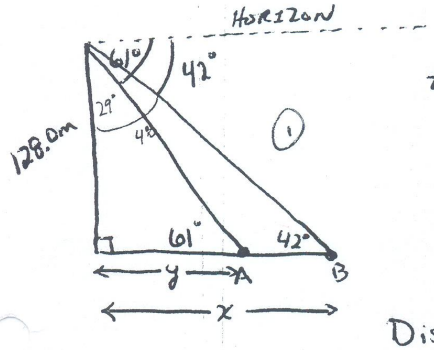
∠ @ Sackville = $180^\circ - 58^\circ - 72^\circ$

$= 50^\circ$ (1)

/4

Distance between Moncton and Sackville is.

$\boxed{39.7\ km}$ (1)




(1)

$\tan 42^\circ = \frac{128.0}{x}$

$x = \frac{128.0}{\tan 42^\circ}$

$x = 142.158$ (1)

$\tan 61^\circ = \frac{128.0}{y}$

$y = \frac{128.0}{\tan 61^\circ}$

$y = 70.951$ (1)

/4

Distance Apart = 142.158 − 70.951

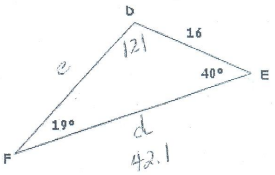
= 71.21

Fires are $\boxed{71.21\ m}$ apart

(1)

Practice Test Solutions

1. Find the perimeter of ΔDEF. [4]




$\frac{d}{\sin 121} = \frac{16}{\sin 19}$

$d = 42.1$

$\frac{e}{\sin 40} = \frac{16}{\sin 19}$

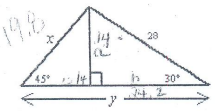
$e = 31.6$

Perimeter

$16 + 42.1 + 31.6$

89.7

2. Find the value of $x$ and $y$. [4]




$\sin 45° = \frac{14}{x}$

$x = \frac{14}{\sin 45}$

$x = 19.8$

$\sin 30° = \frac{a}{28}$

$14 = a$

$\cos 30° = \frac{b}{28}$

$24.2 = b$

$y = 38.2$

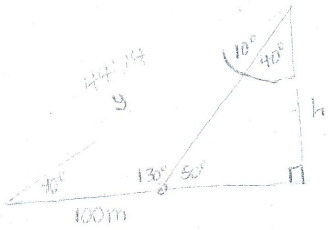
$\tan 45 = \frac{14}{c}$

$c = \frac{14}{\tan 45}$

$c = 14$

10

3. Bill determines that the angle of elevation to the top of a building measures 40°. If he walks 100 m closer to the building, the measure of the new angle of elevation will be 50°. Find the height of the building. [4]
(must draw a diagram)



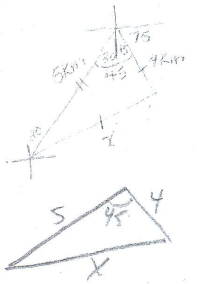

$\frac{y}{\sin 130} = \frac{100}{\sin 10}$

$y = 441.14$

$\sin 40° = \frac{h}{441.14}$

$283.6 = h$

4. In Outdoor Pursuits, Mr. MacKinnon's class head out on a walking trail in a direction N 30° E. They travel 5km and then make camp. The next morning they walk 4km to their next camp at a direction of E 75° S. How far will they be from their original starting point? (must draw a diagram) [5]

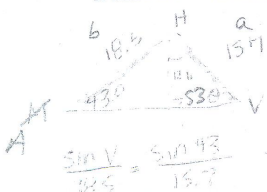



$x^2 = 5^2 + 4^2 - 2(5)(4)\cos 45°$

$x^2 = 12.71$

$x = 3.6$

5. Solve the following triangle… $\Delta MVH$ ; $m = 15.7\ cm$, $\angle M = 43°$ and $v = 18.5\ cm$.
**Must include a sketch.**
**If more than one answer exists, sketch both triangles with all measurements included.** [5]




$\frac{\sin V}{18.5} = \frac{\sin 43}{15.7}$

$\angle V = 53.5°$

$\angle V = 53°$

$\angle H = 84°$

ASS

$\angle A = 43$

altitude $= b \sin A$

$= 18.5 \sin 43$

$= 12.6$

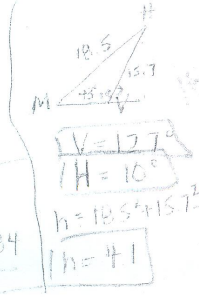
$a$ vs $h$

$15.7 > 12.6$

2 ambiguous

$h = 18.5^2 + 15.7^2 - 2(18.5)(15.7)\cos 84$

$h = 22.8$




$\angle V = 127°$

$\angle H = 10°$

$h = 18.5^2 + 15.7^2 - 2(18.5)(15.7)$

$\angle h = 41$