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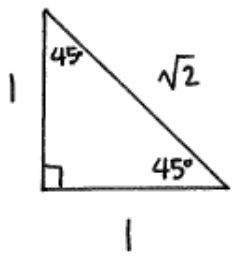
Unit 7 - Chapter 6 Trigonometry Review

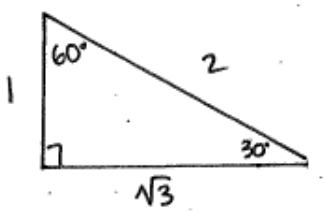
[6.1 – 6.2] – Angles in Standard Position

1. Draw and label your two special triangles. Label all three sides and angles.

45-45-90



30-60-90

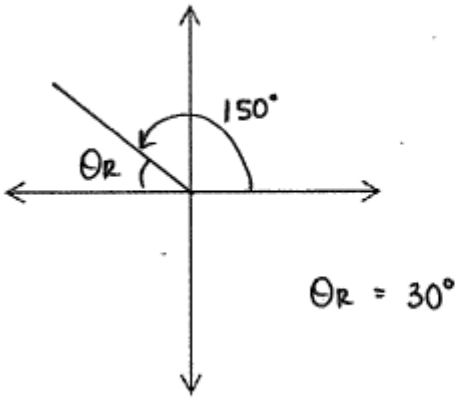


2. Match each term with its definition from the choices below.

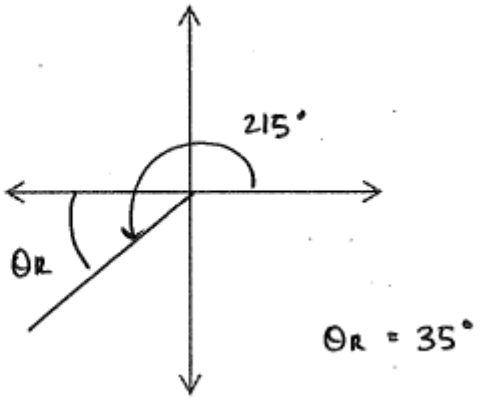
reference angle **D**	**A** a formula that relates the lengths of the sides of a triangle to the sine values of its angles
exact value **B**	**B** a value that is not an approximation and may involve a radical
sine law **A**	**C** the final position of the rotating arm of an angle in standard position
cosine law **F**	**D** the acute angle formed by the terminal arm and the x-axis
terminal arm **C**	**E** an angle whose vertex is at the origin and whose arms are the x-axis and the terminal arm
ambiguous case **G**	**F** a formula that relates the lengths of the sides of a triangle to the cosine value of one of its angles
angle in standard position **E**	**G** a situation that is open to two or more interpretations

3. Sketch the following angles in standard position and find their reference angles.

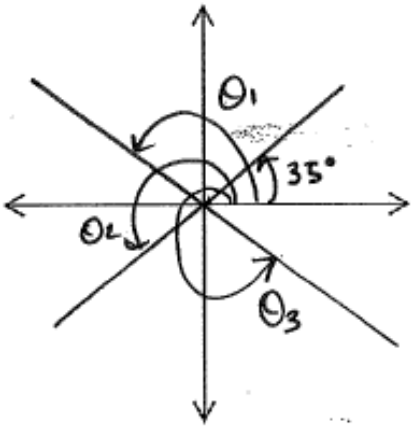
a) $\theta = 150^\circ$



b) $\theta = 215^\circ$



4. Determine the measure of the three other angles in standard position, $0^\circ \leq \theta \leq 360^\circ$, that have a reference angle of 35°.

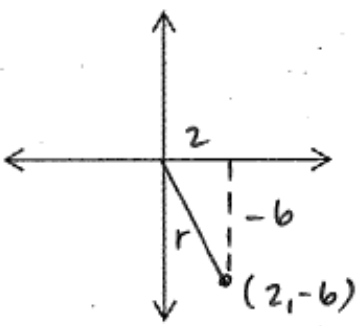


$\theta_1 = 180^\circ - 35^\circ = 145^\circ$

$\theta_2 = 180 + 35^\circ = 215^\circ$

$\theta_3 = 360 - 35^\circ = \mathbf{325^\circ}$

5. Point $P\,(2, -6)$ lies on the terminal arm of angle θ, in standard position. Determine the exact trig ratios for $\sin\theta$, $\cos\theta$, and $\tan\theta$.



$2^2 + (-6)^2 = r^2$

$40 = r^2$

$r = \sqrt{40}$

$\sin\theta = \frac{-6}{\sqrt{40}}$

$\cos\theta = \frac{2}{\sqrt{40}}$

$\tan\theta = \frac{-6}{2} = -3$

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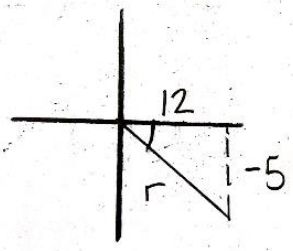
6. Point $P\ (12\ ,-5)$ lies on the terminal arm of angle θ, in standard position. Determine the exact trig ratios for $\sin\theta$, $\cos\theta$, and $\tan\theta$.



$r=\sqrt{(12)^2+(-5)^2}$

$r=13$

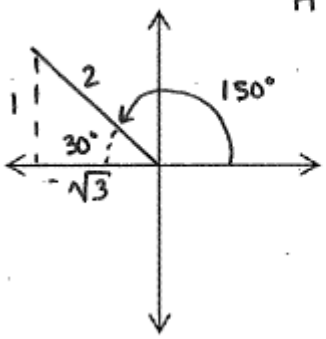
$\sin\theta=\frac{-5}{13}$

$\cos\theta=\frac{12}{13}$

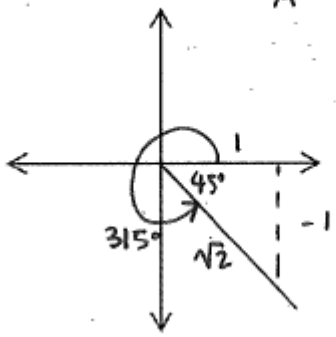
$\tan\theta=\frac{-5}{12}$

7. Determine the exact value of the following angles:

a) $\sin 150^\circ = \frac{O}{H} = \frac{1}{2}$

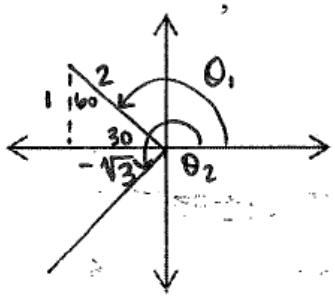


b) $\tan 315^\circ = \frac{O}{A} = \frac{-1}{1}$



8. Solve for θ. (Find the values of angle θ, $0^\circ \le \theta \le 360^\circ$)

a) $\cos\theta = -\frac{\sqrt{3}}{2}$ cos is neg. in quad. II & III



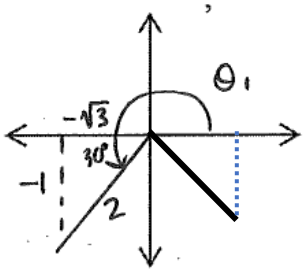
$\theta_1 = 180^\circ - 30^\circ$

$\theta_1 = 150^\circ$

$\theta_2 = 180^\circ + 30^\circ$

$\theta_2 = 210^\circ$

b) $\sin\theta = -\frac{1}{2}$ sine is neg in quad III & IV



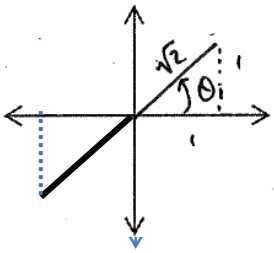
$\theta_1 = 180^\circ + 30^\circ$

$\theta_1 = 210^\circ$

$\boldsymbol{\theta_2 = 360^o - 30^o}$

$\boldsymbol{\theta_2 = 330^o}$

c) $\tan\theta = 1$ tan is positive in quad I & III

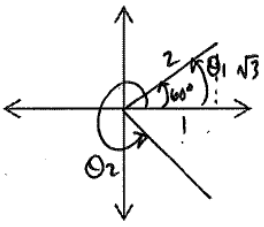


$\theta_1 = 45^\circ$

$\boldsymbol{\theta_2 = 180^o + 45^o}$

$\boldsymbol{\theta_2 = 225^o}$

d) $\cos\theta = \frac{1}{2}$ cosine is positive in quad I & IV



$\theta_1 = 60^\circ$

$\theta_2 = 360^\circ - 60^\circ$

$\theta_2 = 300^\circ$

9. The point Q(-3, 6) is on the terminal arm of an angle, θ.

a) Draw this angle in standard position.

b) Determine the exact distance from the origin to point Q.

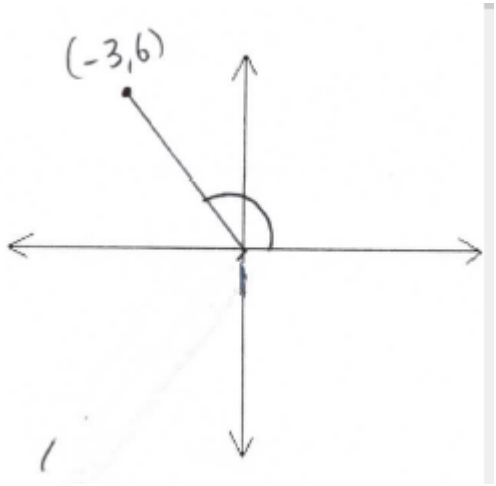
c) Determine the exact values for sin θ, cos θ, and tan θ.

d) Determine the value of θ.

b) $r = \sqrt{(-3)^2 + (6)^2}$
$= \sqrt{45} = 3\sqrt{5}$

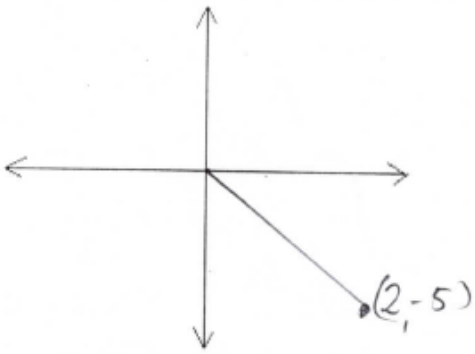
c) $\sin\theta = \frac{2}{\sqrt{5}}$
$\cos\theta = \frac{-1}{\sqrt{5}}$
$\tan\theta = -2$

d) $\theta_R = \tan^{-1}(2)$
$= 63^\circ$
$\therefore \theta = 180^\circ - 63^\circ$
$= 117^\circ$



10. A reference angle has a terminal arm that passes through the point P(2, -5). Identify the coordinates of a corresponding point on a different terminal arm for three angles in standard position that have the same reference angle.

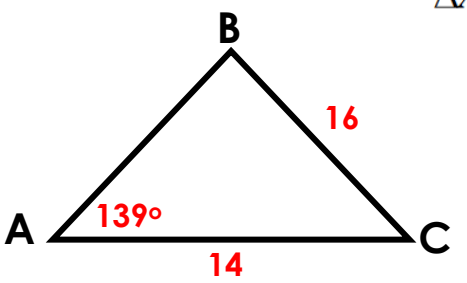
(2, 5)
(-2, 5)
(-2, -5)



[6.3 – 6.4] – Sine Law and The Ambiguous Case

11. Determine the number of possible triangles for the following:

$\Delta ABC \ \angle A = 139^\circ, a = 16\ cm,\ b = 14\ cm$



$sinA = Sin(139^o) = 0.65$

$\frac{BC}{AB} = \frac{16}{14} = 1.14$

$\frac{BC}{AB} > 1$
$1.14 > 1$
$\therefore$ *We have* ***one*** *possible triangle*

12. Solve the triangle: $\Delta ABC\ \angle A = 30^\circ, a = 24\ cm,\ b = 42\ cm$

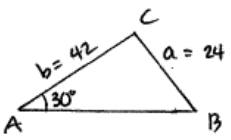
Round your answers to the nearest unit.

Check:
$sinA = Sin(30^\circ) = 0.5$
$\frac{BC}{AC} = \frac{24}{42} = 1.14$

$SinA < \frac{BC}{AC} < 1$
$0.5 < 0.57 < 1$

$\therefore$ *We have **two** triangles*

case 1 : $\angle B$ is acute



$\frac{\sin B}{b} = \frac{\sin A}{a}$

$\sin B = \frac{(42)\sin 30}{24}$

$= 0.875$

$\angle B = \sin^{-1}(0.875)$

$\angle B = 61^\circ$

② $\angle C = 180^\circ - 30^\circ - 61^\circ$

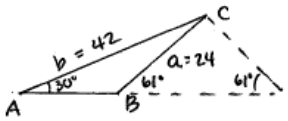
$\angle C = 89^\circ$

③ $\frac{c}{\sin C} = \frac{a}{\sin A}$

$c = \frac{(24)(\sin 89)}{\sin 30}$

$c = 48\ cm$

case 2 : $\angle B$ is obtuse



① $\angle B = 180^\circ - 61^\circ$

$\angle B = 119^\circ$

② $\angle C = 180^\circ - 30^\circ - 119^\circ$

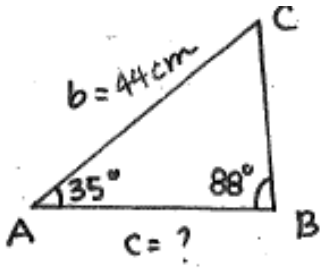
$\angle C = 31^\circ$

③ $\frac{c}{\sin C} = \frac{a}{\sin A}$

$c = \frac{(24)(\sin 31)}{\sin 30}$

$c = 24.7\ cm$

13. Find side c if, in $\Delta ABC\ \angle A = 35^\circ, \angle B = 88^\circ,\ b = 44cm$



① $\angle C = 180^\circ - 35^\circ - 88^\circ$

$\angle C = 57^\circ$

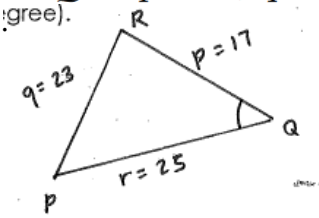
$\frac{b}{\sin B} = \frac{c}{\sin C}$

$c = \frac{(44)(\sin 57^\circ)}{\sin 88^\circ}$

$c = 37\ cm$

[6.5] – Cosine Law

14. In triangle PQR: $p = 17,\ q = 23,$ and $r = 25$. Find the measure of angle Q to the nearest degree.



$\cos Q = \frac{q^2 - p^2 - r^2}{-2pr}$

$= \frac{23^2 - 17^2 - 25^2}{-2(17)(25)}$

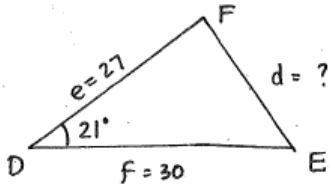
$= \frac{-385}{-850}$

$= +0.4529$

$\angle Q = \cos^{-1}(0.4529)$

$\angle Q = 63^\circ$

15. In triangle DEF: $\angle D = 21^\circ,\ e = 27,$ and $f = 30$, Find the measure of side d, to the nearest tenth.



$d^2 = e^2 + f^2 - 2ef\cos D$

$= 27^2 + 30^2 - 2(27)(30)\cos 21$

$= 729 + 900 - 1512.40$

$= 116.6$

$d = \sqrt{116.6}$

$d = 10.8$

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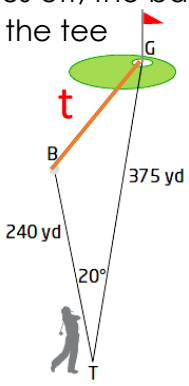
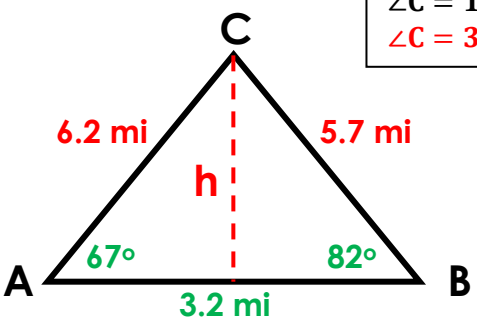
16. The 12th hole at a golf course is a 375-yd straightaway par 4. When Darla tees off, the ball travels 20° to the left of the line from the tee to the hole. The ball stops 240 yd from the tee (point B). Determine how far the ball is from the centre of the hole.



$t^2 = b^2 + g^2 - 2ab\cos T$

$t = 171\text{ yd}.$

17. Two radar stations are tracking the same plane. The angle of elevation from Station A to the plane is 67°, the angle of elevation to the plane from Station B is 82°. Station A is 3.2 miles from Station B. Find the distances from each station to the plane. What is the altitude of the plane?



$\angle C = 180 - 82 - 67$

$\angle C = 31$

$$\frac{a}{\text{Sin}A} = \frac{c}{SinC}$$

$$a = \frac{c\,\text{Sin}A}{SinC}$$

$a = 5.7$ mi

$$\frac{b}{\text{Sin}b} = \frac{c}{SinC}$$

$$b = \frac{c\,\text{Sin}B}{SinC}$$

$b = 6.2$ mi

Altitude of the plane (h)

$$sin(82) = \frac{h}{5.7}$$

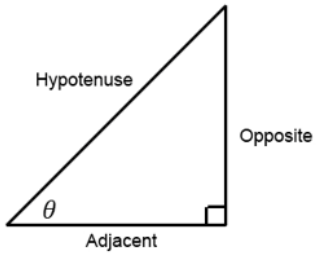
$$h = 5.7 \cdot \text{Sin}(82)$$

$h = 5.6\ mi$

Practice Test: Pg. 498 - 506

Textbook Review: Pg. 510 – 515

Formula Sheet



$$sin\,\theta = \frac{Opp}{Hyp}$$

$$cos\,\theta = \frac{Adj}{Hyp}$$

$$tan\,\theta = \frac{Opp}{Adj}$$

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

$$c^2 = a^2 + b^2 - 2ab\cos C$$