Angles in standard position

Date _____ Topic 1/7

CUES · QUESTIONS

1. Initial arm of an angle in standard position?
2. Reference angle of 315°?
3. How do you get coterminal angles?
4. Which direction is a negative angle?

Cover the notes. Answer each cue from memory.

NOTES

1 · Worked example Copy one example from the page. Next to each line write WHY in a few words.

2 · Fill in the blanks Cover the steps and redo it. Leave a gap where you are unsure.

3 · Your turn A new question. Then check it against the answer.

SUMMARY — IN MY OWN WORDS, TWO SENTENCES

Special angles & the unit circle

Date _____ Topic 2/7

CUES · QUESTIONS

1. Sides of a 30-60-90 triangle?
2. Sides of a 45-45-90 triangle?
3. Unit-circle point for angle θ?
4. CAST: which ratio is positive in Q III?

Cover the notes. Answer each cue from memory.

NOTES

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3 · Your turn A new question. Then check it against the answer.

SUMMARY — IN MY OWN WORDS, TWO SENTENCES

Trig ratios of any angle

Date _____ Topic 3/7

CUES · QUESTIONS

1. $\sin\theta$, $\cos\theta$, $\tan\theta$ from $P(x, y)$?
2. CAST from Q I to Q IV?
3. $\sin\theta > 0$, $\cos\theta < 0$. Quadrant?
4. Can r be negative?

Cover the notes. Answer each cue from memory.

NOTES

1 · Worked example Copy one example from the page. Next to each line write WHY in a few words.

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3 · Your turn A new question. Then check it against the answer.

SUMMARY — IN MY OWN WORDS, TWO SENTENCES

Simple trig equations

Date _____ Topic 4/7

CUES · QUESTIONS

1. How many solutions of $\sin\theta = 0.3$ in $0°$–$360°$?
2. Solve $\cos\theta = -1$.
3. Solve $\sin\theta = 1.2$.
4. Tangent negative: which quadrants?

Cover the notes. Answer each cue from memory.

NOTES

1 · Worked example Copy one example from the page. Next to each line write WHY in a few words.

2 · Fill in the blanks Cover the steps and redo it. Leave a gap where you are unsure.

3 · Your turn A new question. Then check it against the answer.

SUMMARY — IN MY OWN WORDS, TWO SENTENCES

The sine law

Date _____ Topic 5/7

CUES · QUESTIONS

1. Sine law?
2. When can you use the sine law?
3. Finding an angle — which way up?
4. Biggest angle faces…?

Cover the notes. Answer each cue from memory.

NOTES

1 · Worked example Copy one example from the page. Next to each line write WHY in a few words.

2 · Fill in the blanks Cover the steps and redo it. Leave a gap where you are unsure.

3 · Your turn A new question. Then check it against the answer.

SUMMARY — IN MY OWN WORDS, TWO SENTENCES

The ambiguous case (SSA)

Date _____ Topic 6/7

CUES · QUESTIONS

1. Which given data can be ambiguous?
2. Acute A: when are there two triangles?
3. Acute A, $a = h$?
4. Obtuse A and $a \leq b$?

Cover the notes. Answer each cue from memory.

NOTES

1 · Worked example Copy one example from the page. Next to each line write WHY in a few words.

2 · Fill in the blanks Cover the steps and redo it. Leave a gap where you are unsure.

3 · Your turn A new question. Then check it against the answer.

SUMMARY — IN MY OWN WORDS, TWO SENTENCES

CUES · QUESTIONS

1. Cosine law (side)?
2. Cosine law (angle)?
3. SAS or SSS — which law?
4. $\cos C < 0$ means?

Cover the notes. Answer each cue from memory.

NOTES

1 · Worked example Copy one example from the page. Next to each line write WHY in a few words.

2 · Fill in the blanks Cover the steps and redo it. Leave a gap where you are unsure.

3 · Your turn A new question. Then check it against the answer.

SUMMARY — IN MY OWN WORDS, TWO SENTENCES

Trigonometry · Formula and trap sheet

Everything you need before a test, on the fewest pages. Fold it and keep it in your binder.

Angles in standard position

FORMULAS

$\theta_{\text{coterminal}} = \theta + 360°n,\ n \in \mathbb{Z}$ — Coterminal angles

$\theta_R = 180° - \theta,\ \ \theta - 180°,\ \ 360° - \theta$ — Reference angle in quadrants II, III, IV

REMEMBER

- Start on the positive x-axis; counterclockwise is $+$, clockwise is $-$.
- Reference angle: acute angle to the x-axis. QII $180° - \theta$, QIII $\theta - 180°$, QIV $360° - \theta$.

WATCH OUT

- Reference angle of $240°$ as $30°$ (to the y-axis) → $60°$ (to the x-axis).
- $-45°$ coterminal with $45°$ → with $315°$.

Special angles & the unit circle

FORMULAS

$\sin 30° = \frac{1}{2},\ \cos 30° = \frac{\sqrt{3}}{2},\ \tan 30° = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$ — 30°

$\sin 45° = \cos 45° = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2},\ \tan 45° = 1$ — 45°

$\sin 60° = \frac{\sqrt{3}}{2},\ \cos 60° = \frac{1}{2},\ \tan 60° = \sqrt{3}$ — 60°

REMEMBER

- 45-45-90: $1, 1, \sqrt{2}$. 30-60-90: $1, \sqrt{3}, 2$ (1 opposite $30°$).
- Value = reference-angle value with the CAST sign (All, Sin, Tan, Cos in QI to QIV).

WATCH OUT

- $\cos 120° = \frac{1}{2}$ → $-\frac{1}{2}$ (cos negative in QII).
- $\sin 60° = \frac{1}{2}$ → $\frac{\sqrt{3}}{2}$ (side 1 is opposite $30°$).

Trig ratios of any angle

FORMULAS

$r = \sqrt{x^2 + y^2}$ — Distance from the origin

$\sin\theta = \dfrac{y}{r},\quad \cos\theta = \dfrac{x}{r},\quad \tan\theta = \dfrac{y}{x}$ — Primary trig ratios of any angle

REMEMBER

- $r = \sqrt{x^2 + y^2} > 0$; $\sin\theta = \frac{y}{r},\ \cos\theta = \frac{x}{r},\ \tan\theta = \frac{y}{x}$.
- One ratio + quadrant: draw the triangle, find the third side, give x, y their quadrant signs.

WATCH OUT

- $P(-6, -8)$: $r = -10$ → $r = 10$; only x, y carry signs.
- $\tan^{-1}\left(\frac{4}{-3}\right) = -53.1°$ given as θ → in QII: $180° - 53.1° = 126.9°$.

Simple trig equations

FORMULAS

QI: θ_R QII: $180° - \theta_R$ QIII: $180° + \theta_R$ QIV: $360° - \theta_R$ — Angles from the reference angle

REMEMBER

- Isolate the ratio first; $|\sin\theta|$ or $|\cos\theta| > 1$ → no solution.
- Reference angle from the POSITIVE value; the sign picks two quadrants (CAST).

WATCH OUT

- $\cos\theta = -0.3$: only $107.5°$ → also $252.5°$.
- $\sin^{-1}(-0.6) = -36.9°$ used as the reference → reference is $36.9°$.

The sine law

FORMULAS

$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$ — Sine law (finding sides)

$\dfrac{\sin A}{a} = \dfrac{\sin B}{b} = \dfrac{\sin C}{c}$ — Sine law (finding angles)

REMEMBER

- $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$; side a is opposite angle A.
- Needs a complete pair (side + opposite angle): AAS, ASA, SSA. SAS or SSS → cosine law.

WATCH OUT

- Rounding $\sin B$ to 2 decimals midway → keep the full calculator value to the end.
- Calculator in radians ($\sin 40 \approx 0.745$) → degrees: $\sin 40° \approx 0.643$.

The ambiguous case (SSA)

FORMULAS

$h = b\sin A$ — Height to compare with a

$B_2 = 180° - B_1$ — The second possible angle

REMEMBER

- SSA ($\angle A$, a, b): height $h = b\sin A$.
- Acute A: $a < h$ none; $a = h$ one; $h < a < b$ TWO; $a \geq b$ one.

WATCH OUT

- Stopping at B_1 → test $180° - B_1$ (valid if $A + B_2 < 180°$).
- $h = a\sin A$ → $h = b\sin A$ (the side next to A).

The cosine law

FORMULAS

$c^2 = a^2 + b^2 - 2ab\cos C$ — Cosine law (find a side)

$\cos C = \dfrac{a^2 + b^2 - c^2}{2ab}$ — Cosine law (find an angle)

REMEMBER

- $c^2 = a^2 + b^2 - 2ab\cos C$ (c opposite C); $C = 90^\circ$ gives Pythagoras.
- SAS → third side; SSS → angle from $\cos C = \dfrac{a^2 + b^2 - c^2}{2ab}$.

WATCH OUT

- $49 + 64 - 112\cos 50^\circ$ as $(49 + 64 - 112)\cos 50^\circ$ → multiply first, then subtract.
- Reporting $c^2 = 62.1$ as $c \to c = \sqrt{62.1} \approx 7.9$.