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| --- | --- | --- | --- |
| **PRINCIPAL ACUTE ANGLE**    An angle is in **standard position** in a rectangular Cartesian coordinate system if:   * the vertex is at the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * the initial arm is on the \_\_\_\_\_\_\_\_\_\_\_\_\_   The measure of angle θ is the amount of rotation from the initial arm to the terminal arm. One complete rotation is equal to \_\_\_\_\_\_\_\_\_\_\_.  The angle has a positive measure (θ ≥ 0°) if the terminal arm rotates in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ direction.  The angle has a negative measure (θ < 0°) if the terminal arm rotates in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ direction.  **PRINCIPAL OBTUSE ANGLE**  It is the counter clockwise angle between the initial arm and the terminal arm of an angle in standard position. Its value is between 0o and 360o.  **RELATED ACUTE ANGLE**  It is the angle between the terminal arm of an angle in standard position and the **X - AXIS** when the terminal arm lies in quadrants 2, 3 or 4. The related acute angle is **always positive.**   |  |  |  | | --- | --- | --- | |  |  |  |   **COTERMINAL ANGLE**  These are the angles that share the same terminal and initial arm.  If you draw 45o and 405o, they will have the same terminal arm. |

**PRINCIPAL ANGLE (ACUTE/ OBTUSE) PRACTICE**

|  |  |  |
| --- | --- | --- |
| 1. ***Standard Position of an Angle*** | 2. | 3. |
| 4. | 5. | 6. |
| 7. | 8. | 9. |
| 10. | 11. | 12. |

Answers: 1. 160° 2. 215° 3. 290° 4. 102° 5. 346° 6. 267° 7. 93° 8. 90° 9. 270° 10. 113° 11. 229° 12. 315°

**RELATED ACUTE ANGLE PRACTICE**

For each given angle, draw the angle ***as a solid arc*** as shown in the example for #1. For each diagram, also draw ***as a dotted arc*** and label the angle between the terminal arm and the ***x*‑axis.**

|  |  |  |
| --- | --- | --- |
| 1. 240° | 2. 305° | 3. 150° |
| 4. 100° | 5. 300° | 6. 210° |
| 7. 340° | 8. 160° | 9. 125° |
| 10. 260° | 11. 345° | 12. 190° |

**COTERMINAL ANGLE PRACTICE**

|  |  |  |
| --- | --- | --- |
| 1. | 2. | 3. |
| 4. | 5. | 6. |
| 7. | 8. | 9. |

10. In each case below, find the positive or negative angle which is coterminal to the one given.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| # | Original  Angle | Additional  Rotations | Coterminal  Angle |  | # | Original  Angle | Additional  Rotations | Coterminal  Angle |
| a | 60° | +2 |  |  | g | –25° | +2 |  |
| b | 130° | +3 |  |  | h | –1285° | +3 |  |
| c | 200° | +1 |  |  | i | –157° | –2 |  |
| d | 310° | +4 |  |  | j | 255° | –3 |  |
| e | 42° | +2 |  |  | k | 800° | –5 |  |
| f | 734° | –2 |  |  | l | –1440° | +4 |  |

11. Given the angle  which is ***coterminal*** to each of the following angles. Include one middle step, then give the quadrant of the angle.

a) 500° b) 670° c) 415° d) 905° e) 2000° f) 1234°

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12. Give the angle  which is ***coterminal*** to each of the following angles. Include one middle step, then give the quadrant of the angle.

a) –70° b) –200° c) –400° d) –700° e) –820° f) –2000°

θ = θ = θ = θ = θ = θ =

= = = = = =

(Q\_\_) (Q\_\_) (Q\_\_) (Q\_\_) (Q\_\_) (Q\_\_)

13. After each given angle, write the quadrant number in the brackets, then state the first quadrant angle which is the ***related angle*** to each of the following angles.

a) 125° (Q\_\_) b) 169° (Q\_\_) c) 241° (Q\_\_) d) 318° (Q\_\_) e) 276° (Q\_\_) f) 267° (Q\_\_)

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14. Find the angle  which is ***coterminal*** to each of the following angles, then the ***related acute angle***  which matches that angle.

a) 490° b) 685° c) 820° d) –756° e) –263° f) –2000°

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***Answers:***

4. –505° 5. –865° 6. –790° 7. –642° 8. 1170° 9. –990°

10. a) 780° b) 1210° c) 560° d) 1750° e) 762° f) 14°

g) 695° h) –205° i) –877° j) –825° k) –1000° l) 0°

11. a) 140°;Q2 b) 310°;Q4 c) 55°;Q1 d) 185°;Q3 e) 200°;Q3 f) 154°;Q2

12. a) 290°;Q4 b) 160°;Q2 c) 320°;Q4 d) 20°;Q1 e) 260°;Q3 f) 160°;Q2

13. a) Q2 ; 55° b) Q2 ; 11° c) Q3 ; 61° d) Q4 ; 42° e) Q3 ; 84° f) Q2 ; 26°

14. a) 50° b) 35° c) 80° d) 36° e) 83° f) 20