**4.1 – ANGLES AND ANGLE MEASURE**

**Definition**: 1 radian is the measure of the central angle subtended by an arc equal in length to the radius of the circle.

 



**Arc length of a circle:**

If the angle is expressed in radians, we get: $a=rθ$

Your turn p 174 ( answers: a) $a≈11.4$, b) $r≈2.6$, c) $θ=\frac{13}{5}$ )



Note, if the circle has radius 1 (unit circle), then the angle in radians and the arc length have the same value.

**Conversions to know by heart:**



|  |  |
| --- | --- |
| Degrees | Radians |
| 360o | $$2π$$ |
| 180o | $$π$$ |
| 90o | $$\frac{π}{2}$$ |
| 60o | $$\frac{π}{3}$$ |
| 45o | $$\frac{π}{4}$$ |
| 30o | $$\frac{π}{6}$$ |

**Conversions:**

To convert from radians to degrees or from degrees to radians, we can always use cross multiplication with the reference 180o 🡨🡪 $π$.

But some conversions can be deducted from recognizing the special angles multiples…

Examples:

a) 50o c) $-213^{o}$

b) $\frac{π}{9}$ d) 3.2
 e) 120o  g) $\frac{5π}{4}$

 f) -150o h) $-\frac{11π}{6}$

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When 2 angles in standard position have the same terminal arm, we call them **coterminal angles**.

They differ by full rotations (360o or $2π$ or their multiples depending on the unit used).

Examples: 30o and 750o are coterminal angles

 $\frac{π}{3} $ and $\frac{7π}{3}$ are coterminal angles

Example 2 p 170



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For any angle $θ$, there is an infinity of coterminal angles. When asked for all of them, we give their **general form**:

$θ+360n, n\in Z$ in degrees or $θ+2πn, n\in Z $ in radians

Example 3 p 172



**Hwk: p 175 # 2 – 4, 6 – 11, 13 – 16, …**