

*Angles, Circles and Tangents***Answers****1 Angles and Circles 1**

1. (a) $a = 90^\circ, b = 65^\circ$
 (b) $a = 72^\circ, b = 90^\circ$
 (c) $a = 90^\circ, b = 76^\circ, c = 90^\circ, d = 74^\circ$
 (d) $a = 90^\circ, b = 58^\circ, c = 90^\circ, d = 32^\circ$
 (e) $a = 90^\circ, b = 49^\circ, c = 60^\circ, d = 60^\circ, e = 30^\circ, f = 30^\circ, g = 120^\circ$
 (f) $a = 40^\circ, b = 100^\circ, c = 50^\circ, d = 50^\circ, e = 80^\circ$
 (g) $a = 44^\circ, b = 44^\circ, c = 46^\circ, d = 46^\circ, e = 88^\circ, f = 44^\circ$
 (h) $a = 70^\circ, b = 40^\circ, c = 140^\circ, d = 20^\circ, e = 20^\circ$
3. (a) $a = 90^\circ, b = 65^\circ$ (b) $a = 74^\circ$ (c) $a = 90^\circ, b = 90^\circ, c = 50^\circ, d = 75^\circ$
 (d) $a = 10^\circ, b = 170^\circ$
4. (a) $a = 20^\circ, b = 140^\circ$ (b) $a = 25^\circ, b = 25^\circ$ (c) $a = 30^\circ, b = 120^\circ$
 (d) $a = 100^\circ, b = 40^\circ, c = 40^\circ$
 (e) $a = 48^\circ, b = 84^\circ, c = 42^\circ, d = 42^\circ, e = 96^\circ$
 (f) $a = 75^\circ, b = 75^\circ, c = 15^\circ, d = 15^\circ, e = 150^\circ$
 (g) $a = 69^\circ, b = 69^\circ, c = 42^\circ, d = 69^\circ, e = 69^\circ$
 (h) $a = 28^\circ, b = 124^\circ, c = 70^\circ, d = 40^\circ, e = 16^\circ$
5. (a) $a = 30^\circ, b = 70^\circ, c = 70^\circ, d = 80^\circ$ (b) $a = 110^\circ, b = 140^\circ$
 (c) $a = 110^\circ, b = 140^\circ, c = 40^\circ, d = e = f = g = 70^\circ$
 (d) $a = b = 65^\circ, c = 60^\circ, d = 115^\circ$
6. (a) 5 (b) 7.8 (c) 12 (d) 10

2 Angles and Circles 2

1. (a) 30° (b) 120° (c) $c = d = 35^\circ$ (d) 146°
 (e) $f = 90^\circ, g = 55^\circ$ (f) $x = y = 43^\circ$
 (g) $a = 65^\circ, b = 25^\circ, c = 25^\circ, d = 65^\circ$ (h) $a = 27^\circ, b = 126^\circ, c = 63^\circ$
2. (a) $\angle OAB = \angle OBA, \angle BAC = \angle BFC, \angle OGA = \angle OAG, \angle OFC = \angle OCF,$
 $\angle OCB = \angle OBC, \angle FCB = \angle ACD = \angle GAC$
 (b) angles $\angle GAC, \angle ACD, \angle BCF$
3. (a) $a = 120^\circ, b = 75^\circ$ (b) $c = 149^\circ, d = 123^\circ$
 (c) $a = 55^\circ, b = 125^\circ$ (d) $c = 140^\circ$ (e) $a = 48^\circ, b = 75^\circ$
 (f) $a = 75^\circ, b = 100^\circ$ (g) $a = 85^\circ, b = 30^\circ$ (h) $x = 160^\circ$

*Angles, Circles and Tangents***Answers****2**

4. ABCD and PQR
5. (a) $a = 37^\circ$, $b = 108^\circ$, $c = 37^\circ$ (b) $a = 30^\circ$, $b = c = 75^\circ$, $d = 60^\circ$, $e = 30^\circ$
 (c) $a = 32.5^\circ$, $b = 147.5^\circ$ (d) 34°
6. (a) 50° (b) 22.5° (c) 40°
7. Let $\widehat{DCB} = \widehat{CBD} = x$
 and $\widehat{BDC} = y$
 So $x + x + y = 180^\circ$ (x)
 But $\widehat{CAB} = y$
 $\widehat{CAD} = x$
 and $\widehat{PAD} = 180 - (x + y)$
 $= x$, using (x) above
 Thus $\widehat{CAD} = \widehat{PAD}$ and AD bisects \widehat{CAP} .
8. As PQR is isosceles, then OQ is the perpendicular bisector of PR.
 $\widehat{POQ} = 2 \times \widehat{PRQ} = 2x$ if $\widehat{PRQ} = x$
 $\widehat{PQO} = 2x$ (isosceles Δ)
 $\widehat{RQO} = 2x$ (symmetry)
 $= \widehat{POQ}$
 and PO is parallel to QR.
9. $x = 94^\circ$, $y = 28^\circ$, $z = 19^\circ$
10. (a) x (b) $90 - x$ (c) x (d) $2x$
11. (a) $x = 45^\circ$, $y = 45^\circ$ (b) Angles in ABCD are all right angles and sides equal.
12. (a) 32° (b) 38° (c) 38° (d) 52°

3 Circles and Tangents

1. (a) 40° (b) $b = 55^\circ$, $c = 35^\circ$ (c) $a = b = c = 70^\circ$
 (d) $a = 11^\circ$, $b = 79^\circ$, $c = 79^\circ$, $d = 22^\circ$ (e) $a = 52^\circ$, $b = 104^\circ$
 (f) $a = b = c = 24^\circ$, $d = 62^\circ$
2. (a) 4.8 (b) $\frac{8}{3}$ (c) $x = 3.9$, $y = 4$ (d) $x = 7$, $y = 3.5$
 (e) $x = 4$, $y = 6$ (f) $x = 3$, $y = 2$
3. (c) 6
4. (b) 30°
5. $a = 74^\circ$, $b = 36^\circ$, $c = 32^\circ$
6. (a) $x = 65^\circ$ (b) $y = 130^\circ$ (c) $z = 50^\circ$
7. (a) 90° (b) 90° (c) 50° (d) 50°