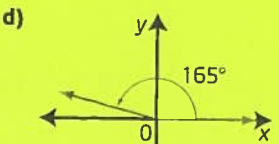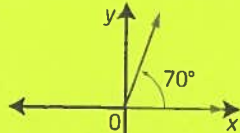# Chapter 2 Trigonometry

2.1 Angles in Standard Position, pages 83 to 87

1. a) No; the vertex is not at the origin.
   b) Yes; the vertex is at the origin and the initial arm is on the x-axis.
   c) No; the initial arm is not on the x-axis.
   d) Yes; the vertex is at the origin and the initial arm is on the x-axis.

2. a) F   b) C   c) A
   d) D   e) B   f) E

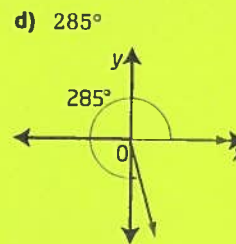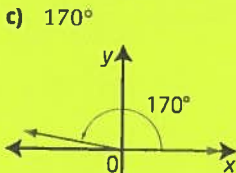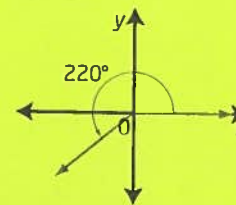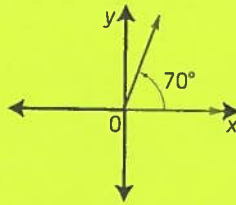3. a) I   b) IV   c) III
   d) I   e) III   f) II

4. a)

   b)

   c)

   d)

5. a) 10°   b) 15°   c) 72°   d) 35°
6. a) 135°, 225°, 315°   b) 120°, 240°, 300°
   c) 150°, 210°, 330°   d) 105°, 255°, 285°
7. a) 288°   b) 124°   c) 198°   d) 325°
8.

θ	sin θ	cos θ	tan θ
30°	$\dfrac{1}{2}$	$\dfrac{\sqrt{3}}{2}$	$\dfrac{1}{\sqrt{3}}$ or $\dfrac{\sqrt{3}}{3}$
45°	$\dfrac{1}{\sqrt{2}}$ or $\dfrac{\sqrt{2}}{2}$	$\dfrac{1}{\sqrt{2}}$ or $\dfrac{\sqrt{2}}{2}$	1
60°	$\dfrac{\sqrt{3}}{2}$	$\dfrac{1}{2}$	$\sqrt{3}$

9. 159.6°
10. a) dogwood $(-3.5, 2)$, white pine $(3.5, -2)$, river birch $(-3.5, -2)$
    b) red maple 30°, flowering dogwood 150°, river birch 210°, white pine 330°
    c) 40 m
11. $50\sqrt{3}$ cm
12. a) A′$(x, -y)$, A″$(-x, y)$, A‴$(-x, -y)$
    b) $\angle$A′OC $= 360° - \theta$, $\angle$A″OC $= 180° - \theta$, $\angle$A‴OB $= 180° + \theta$
13. $(5\sqrt{3} - 5)$ m or $5(\sqrt{3} - 1)$ m
14. 252°
15. Cu (copper), Ag (silver), Au (gold), Uuu (unununium)
16. a) 216°   b) 8 days   c) 18 day
17. a) 70°   b) 220°

    c) 170°   d) 285°

18. a)

Angle	Height (cm)
0°	12.0
15°	23.6
30°	34.5
45°	43.8
60°	51.0
75°	55.5
90°	57.0

    b) A constant increase in the angle does not produce a constant increase in the height. There is no common difference between heights for each pair of angles; for example, 23.6 cm − 12 cm = 11.6 cm, 34.5 cm − 23.6 cm = 10.9 cm.
    c) When θ extends beyond 90°, the heights decrease, with the height for 105° equal to the height for 75° and so on.
19. 45° and 135°
20. a) 19.56 m
    b) i) 192°   ii) 9.13 m
21. a) B   b) D