PROBLEM SET A

1. $y + 65 = 180$
$y = 180 - 65 = \mathbf{115}$

2. $x + 40 = 90$
$x = 90 - 40 = \mathbf{50}$

3. $x + 89 = 180$
$x = 180 - 89 = \mathbf{91}$
Since vertical angles are equal:
$y = \mathbf{89}$
$p = \mathbf{91}$

4. $z + 100 = 180$
$z = 180 - 100 = \mathbf{80}$
Since vertical angles are equal:
$2x = 80$
$x = \mathbf{40}$

$4y = 100$
$y = \mathbf{25}$

5. Angle + Supplement = 180°
Angle + 40° = 180°
Angle = 180° − 40°
Angle = **140°**

6. Angle + Complement = 90°
Angle + 40° = 90°
Angle = 90° − 40°
Angle = **50°**

7. $-2 - (-2) = -2 + 2 = \mathbf{0}$

8. $-3 - [-(-2)] = -3 - 2 = \mathbf{-5}$

9. $-2 - 3(-2 - 2) - 5(-5 + 7)$
$= -2 - 3(-4) - 5(2)$
$= -2 - (-12) - (10)$
$= -2 + 12 - 10 = \mathbf{0}$

10. $-[-2(-5 + 2) - (-2 - 3)]$
$= -[-2(-3) - (-5)]$
$= -[6 + 5] = \mathbf{-11}$

11. $-2 + (-2)^3 = -2 + (-8)$
$= -2 - 8 = \mathbf{-10}$

12. $-3^2 - 3 - (-3)^2$
$= -9 - 3 - 9 = \mathbf{-21}$

13. $-3(-2 - 3 + 6) - [-5(-2) + 3(-2 - 4)]$
$= -3(1) - [-5(-2) + 3(-6)]$
$= -3 - [10 - 18] = -3 - 10 + 18 = \mathbf{5}$

14. $-2 - 2^2 - 2^3 - 2^4$
$= -2 - 4 - 8 - 16 = \mathbf{-30}$

15. $|-2| - |-4 - 2| + |8| = |-2| - |-6| + |8|$
$= 2 - 6 + 8 = \mathbf{4}$

16. $-|-3(2) - 3| - 2^2 = -|-6 - 3| - 4$
$= -|-9| - 4 = -9 - 4 = \mathbf{-13}$

17. $-2^2 - 2^3 - |-2| - 2 = -4 - 8 - 2 - 2$
$= \mathbf{-16}$

18. $-3[-1 - 2(-1 - 1)][-3(-2) - 1]$
$= -3[-1 - 2(-2)][6 - 1] = -3[-1 + 4][6 - 1]$
$= -3[3][5] = \mathbf{-45}$

19. $-3[-3(-4 - 1) - (-3 - 4)]$
$= -3[-3(-5) - (-7)]$
$= -3[15 + 7] = -3[22] = \mathbf{-66}$

20. $-2[(-3 + 1) - (-2 - 2)(-1 + 3)]$
$= -2[(-2) - (-4)(2)] = -2[-2 + 8]$
$= -2[6] = \mathbf{-12}$

21. $-2\big[-2(-4) - 2^3\big](-|2|) = -2[8 - 8](-2)$
$= -2[0](-2) = \mathbf{0}$

22. $-8 - 3^2 - (-2)^2 - 3(-2) + 2$
$= -8 - 9 - 4 + 6 + 2 = \mathbf{-13}$

23. $-\{-[-5(-3 + 2)7]\} = -\{-[-5(-1)7]\}$
$= -\{-[35]\} = \mathbf{35}$

24. $-5 - |-3 - 4| - (3)^2 - 3$
$= -5 - |-7| - 9 - 3$
$= -5 - 7 - 9 - 3 = \mathbf{-24}$

25. $3(-2 + 5) - 2^2(2 - 3) - |-2|$
$= 3(3) - 4(-1) - 2$
$= 9 + 4 - 2 = \mathbf{11}$

26. $\dfrac{-5 - (-2) + 8 - 4(5)}{6 - 4(-3)}$
$= \dfrac{-5 + 2 + 8 - 20}{6 + 12} = \dfrac{-15}{18} = \mathbf{-\dfrac{5}{6}}$

27. $(-2)\big[|-3 - 4 - 5| - 2^3 - (-1)\big]$
$= (-2)\big[|-12| - 8 + 1\big] = (-2)[12 - 8 + 1]$
$= -2[5] = \mathbf{-10}$

28. $\dfrac{-3 - (-2) + 9 - (-5)}{7(|-3 + 4|)}$
$= \dfrac{-3 + 2 + 9 + 5}{7(1)} = \mathbf{\dfrac{13}{7}}$

29. $4(-2)[-(7 - 3)(5 - 2)2] = -8[-(4)(3)(2)]$
$= -8[-24] = \mathbf{192}$

30. $4 - (-4) - 5(3 - 1) + 3(4)(-2)^3$
$= 4 + 4 - 5(2) + 3(4)(-8)$
$= 4 + 4 - 10 - 96 = \mathbf{-98}$

PROBLEM SET B

1. $A_{Shaded} = A_{Square} - A_{Circle}$
$= [(8)(8) - \pi(4)^2]\ m^2$
$= (64 - 16\pi)\ m^2 \approx \mathbf{13.76\ m^2}$

2. $A_{Shaded} = A_{Total} - A_{Not\ Shaded}$
$= \left[\frac{1}{2}(12)(10)\right] m^2 -$
$\left[(3)(4) + \frac{1}{2}(3)(6) + \frac{1}{2}(9)(4)\right] m^2$
$= 60\ m^2 - 39\ m^2 = \mathbf{21\ m^2}$

3. $A_{Shaded} = A_{Circle} - A_{Triangle}$
$= \left[\pi(8)^2 - \frac{1}{2}(16)(8)\right] cm^2$
$= (64\pi - 64)\ cm^2 \approx \mathbf{136.96\ cm^2}$

4. Perimeter $= \left[\frac{1}{2}(2)(\pi)(2) + 14\right] m$
$= (2\pi + 14)\ m \approx \mathbf{20.28\ m}$

5. Area of 40° sector $= \frac{40}{360}(A_{Circle})$
$= \frac{40}{360}[\pi(5)^2]\ m^2$
$= \frac{40}{360}(25\pi)\ m^2 \approx \mathbf{8.72\ m^2}$

6. $V_{Pyramid} = \frac{1}{3}V_{Prism} = \frac{1}{3}[A_{Base} \times height]$
$= \frac{1}{3}\left[\frac{1}{2}(6)(4)\ cm^2 \times 10\ cm\right]$
$= \frac{1}{3}(120)\ cm^3 = \mathbf{40\ cm^3}$

7. $A_{Base} = \left[(3)(4) + \frac{1}{2}\pi(2)^2\right] m^2$
$= (12 + 2\pi)\ m^2 \approx \mathbf{18.28\ m^2}$

$V_{Cylinder} = A_{Base} \times height$
$= (12 + 2\pi)\ m^2 \times 8\ m$
$= (96 + 16\pi)\ m^3 \approx \mathbf{146.24\ m^3}$

8. $V_{Sphere} = \frac{2}{3}V_{Cylinder} = \frac{2}{3}[A_{Base} \times height]$
$= \frac{2}{3}[\pi(6)^2\ cm^2 \times 12\ cm]$
$= \frac{2}{3}(36\pi)(12)\ cm^3 \approx \mathbf{904.32\ cm^3}$

$S.A. = 4\pi r^2 = 4\pi(6)^2\ cm^2 \approx \mathbf{452.16\ cm^2}$

9. Area of 72° sector $= \frac{72}{360}(A_{Circle})$
$= \frac{72}{360}[\pi(10)^2]\ cm^2$
$= \frac{72}{360}(100\pi)\ cm^2 \approx \mathbf{62.8\ cm^2}$

10. Perimeter $= \left[\frac{1}{2}(2)(\pi)(2) + 16 + 4\right] yd$
$+ \left[\frac{1}{2}(2)(\pi)(2)\right] yd$
$= (4\pi + 20)\ yd \approx \mathbf{32.56\ yd}$

11. $z + 70 = 180$
$z = 180 - 70 = \mathbf{110}$
Since vertical angles are equal:
$2x = 70$
$x = \mathbf{35}$

$y = \mathbf{110}$

12. $5A + 40 = 90$
$5A = 90 - 40$
$5A = 50$
$A = \frac{50}{5} = \mathbf{10}$

13. $2B + 140 = 180$
$2B = 180 - 140$
$2B = 40$
$B = \frac{40}{2} = \mathbf{20}$

14. Angle + complement $= 90°$
Angle $+ 10° = 90°$
Angle $= 90° - 10° = \mathbf{80°}$

15. Angle + supplement $= 180°$
Angle $+ 60° = 180°$
Angle $= 180° - 60° = \mathbf{120°}$

16. $-2^2 - 2^3 - (-2)^2 - 2 = -4 - 8 - 4 - 2$
$= \mathbf{-18}$

17. $-2^2 - |-4| + |4| = -4 - 4 + 4 = \mathbf{-4}$

18. $-|-3| - 3 - 3^2 = -3 - 3 - 9 = \mathbf{-15}$

19. $-4 - (-3)^3 - 2^2 + |-4|$
$= -4 + 27 - 4 + 4 = \mathbf{23}$

20. $-3^2 - 2(-4 + 6) = -9 - 2(2) = \mathbf{-13}$

21. $-4(-2^2 - 3) - 5 + |-3| = -4(-4 - 3) - 5 + 3$
$= -4(-7) - 5 + 3 = 28 - 5 + 3 = \mathbf{26}$

22. $-2[-1 - (-5)] - [-6(-2) + 3]$
$= -2[-1 + 5] - [12 + 3]$
$= -2[4] - [15] = -8 - 15 = \mathbf{-23}$

23. $-2^2 - 2^3 - 2 - |-2| = -4 - 8 - 2 - 2 = \mathbf{-16}$

24. $-2 - |-3 - 4 + 8| - 2^2 = -2 - |1| - 4$
$= -2 - 1 - 4 = \mathbf{-7}$

25. $-|-2 - 3 - 4| - |-2| = -|-9| - |-2|$
$= -9 - 2 = \mathbf{-11}$

26. $\dfrac{-5 - (-2) + 8 - 4(5) - 3}{6 - 4(-3)}$
$= \dfrac{-5 + 2 + 8 - 20 - 3}{6 + 12} = \dfrac{-18}{18} = \mathbf{-1}$

27. $(-2)[|-3 + 4 - 5| - 2^3 - (-1)]$
$= (-2)[|-4| - 8 + 1] = (-2)[4 - 8 + 1]$
$= (-2)(-3) = \mathbf{6}$

28. $\dfrac{-|-5| - (-2) + 6 - 4(3 - |6 - 9|)}{5 - |(4)(-3)|}$
$= \dfrac{-5 + 2 + 6 - 4(3 - 3)}{5 - |-12|}$
$= \dfrac{-5 + 2 + 6 - 0}{5 - 12} = \dfrac{3}{-7} = -\dfrac{\mathbf{3}}{7}$

29. $\dfrac{-2 - (-3 - 2) - (-2 + 5)}{-4(2^2 - 3)(-2)}$
$= \dfrac{-2 - (-5) - (3)}{-4(1)(-2)} = \dfrac{-2 + 5 - 3}{8}$
$= \dfrac{0}{8} = \mathbf{0}$

30. $-2(-3 + 4 - 6) - 2^2(-2) - 3(-2) - |-5|$
$= -2(-5) - 4(-2) + 6 - 5$
$= 10 + 8 + 6 - 5 = \mathbf{19}$

Problem Set 1

1. Since angles opposite equal sides are equal angles:
$x = \mathbf{45}$
$y + 45 + 45 = 180$
$y = 180 - 90 = \mathbf{90}$

2. Since angles opposite equal sides are equal angles:
$x = \mathbf{55}$
$y + 55 + 55 = 180$
$y = 180 - 110 = \mathbf{70}$

3. $2C + 70 = 180$
$2C = 110$
$C = \mathbf{55}$
Since lines are parallel: $B = \mathbf{110}$; $A = \mathbf{70}$

4. $2 \times \overrightarrow{SF} = 3$
$\overrightarrow{SF} = \dfrac{3}{2}$
$3 \times \overrightarrow{SF} = x$
$3\left(\dfrac{3}{2}\right) = x$
$x = \mathbf{\dfrac{9}{2}}$

5. $A_{Shaded} = A_{Top\ Shaded} + A_{Bottom\ Shaded}$
$A_{Top\ Shaded} = \left[\dfrac{1}{2}\pi(4)^2 - \dfrac{1}{2}(8)(4)\right] cm^2$
$= (8\pi - 16)\ cm^2$
$A_{Bottom\ Shaded} = \dfrac{60}{360}[\pi(4)^2]\ cm^2$
$= \dfrac{60}{360}(16\pi)\ cm^2$
$A_{Shaded} = (8\pi - 16)\ cm^2 + \dfrac{60}{360}(16\pi)\ cm^2$
$= \left(8\pi + \dfrac{8}{3}\pi - 16\right) cm^2 \approx \mathbf{17.49\ cm^2}$

6. $A_{Shaded} = A_{Total} - A_{White\ Triangles}$
$A_{Total} = \left[\dfrac{1}{2}(8)(6) + \dfrac{1}{2}\pi(5)^2 + \dfrac{1}{2}\pi(4)^2 + \dfrac{1}{2}\pi(3)^2\right] cm^2$
$= (24 + 25\pi)\ cm^2$
$A_{White\ Triangles} = \left[\dfrac{1}{2}(5)(5) + \dfrac{1}{2}(4)(4) + \dfrac{1}{2}(3)(3)\right] cm^2$
$= 25\ cm^2$
$A_{Shaded} = (24 + 25\pi)\ cm^2 - 25\ cm^2$
$= (25\pi - 1)\ cm^2 \approx \mathbf{77.5\ cm^2}$

7. $\text{Perimeter} = \left[\dfrac{1}{2}(2)(\pi)(4) + 48\right] ft$
$= (4\pi + 48)\ ft \approx \mathbf{60.56\ ft}$

8. $V_{Cylinder} = A_{Base} \times \text{height}$
$= [\pi(4)^2\ ft^2 \times 8\ ft]$
$= 128\pi\ ft^3 \approx \mathbf{401.92\ ft^3}$
$V_{Sphere} = \dfrac{2}{3}V_{Cylinder}$
$= \dfrac{2}{3}(128\pi)\ ft^3 \approx \mathbf{267.95\ ft^3}$