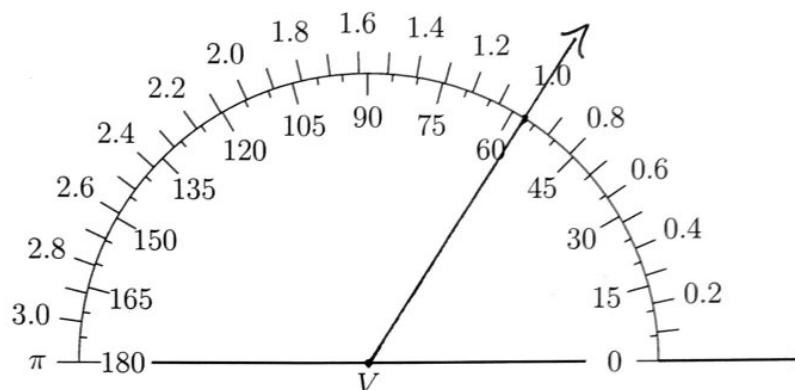## 2.7 Test: Extension topics

Diagrams are not necessarily drawn to scale unless otherwise stated.

1. The protractor shown below is marked with degree measures on the inside and radian measures on the outside. Make a 1 radian angle by drawing a ray from the center V through the protractor semicircle.

2. Use the protractor above to convert radians and degrees. (nearest whole degree, nearest hundredth radian).

   (a) $80° = $ **1.40**

   (b) $28° = $ **0.50**

   (c) 1.0 radian $= $ **57°**

   (d) 2.7 radian $= $ **155°**

3. Given $x = -3$ simplify each expression. (try to do them without a calculator)

   (a) $|x - 1| = $ **4**

   (b) $2 \times |x + 2| = $ **2**

4. Find all values of x satisfying the equation. (show the two cases and checks)

$$|x + 2| + 7 = 17$$

$$|x + 2| = 10$$

$x + 2 = 10$
$x = 8$

$x + 2 = -10$
$x = -12$

$|8 + 2| + 7 = 17$
$10 + 7 = 17 ✓$

$|(-12) + 2| + 7 = 17$
$10 + 7 = 17 ✓$

5. Convert each value to scientific notation.

   (a) $70{,}000 =$ 7×10^4

   (b) $860{,}000 =$ 8.6×10^5

6. Expand each value to regular numeric form. (i.e. an integer)

   (a) $3 \times 10^6 =$ $3{,}000{,}000$

   (b) $1.25 \times 10^3 =$ 125

7. Round each value to the *nearest hundredth.*

   (a) 1 radian $= 57.29577951...°$
   $\approx 57.30°$

   (b) $\sqrt{5} \approx 2.2360679...$
   ≈ 2.24

8. Round each value to the nearest thousand.

   (a) $53{,}997 \approx$ $54{,}000$

   (b) $42{,}224 \approx$ $42{,}000$

   (the area of Florida in square miles)   (the area of New York)

9. The distance in miles from New York City to Santo Domingo, Dominican Republic is 1,554 miles. Convert that distance to kilometers. (1 mile $\approx$ 1.61 kilometers)

   $1{,}554 \; mi \times \dfrac{1.61 \; km}{1 \; m} = 2501.94 \; km$

   $\approx 2502 \; km$

   Use the formula for percent error in the following problem

   $$\epsilon = \left| \frac{v_A - v_E}{v_E} \right| \times 100\%$$

10. The actual length of earth's year is about 365.25 days. Find the percent error of using an approximation of 360 days.

    $$\mathcal{E} = \left| \frac{360 - 365.25}{365.25} \right| \times 100\%$$

    $= 1.43737... \%$

    $\approx 1.44 \%$

11. In the diagram below $\angle BOC = 7x - 50$ and $\angle DOE = 4x - 3$. Find m$\angle AOB$.
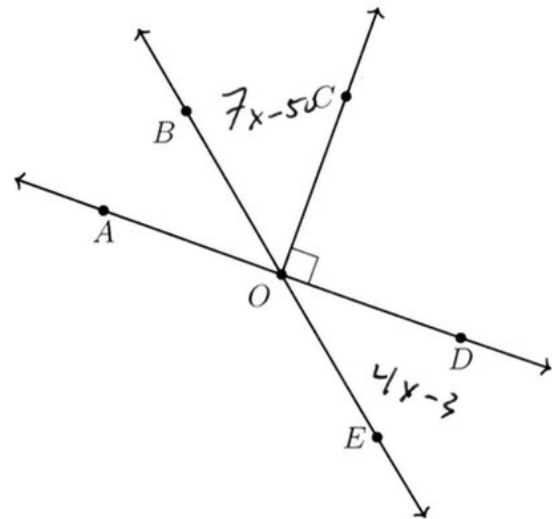
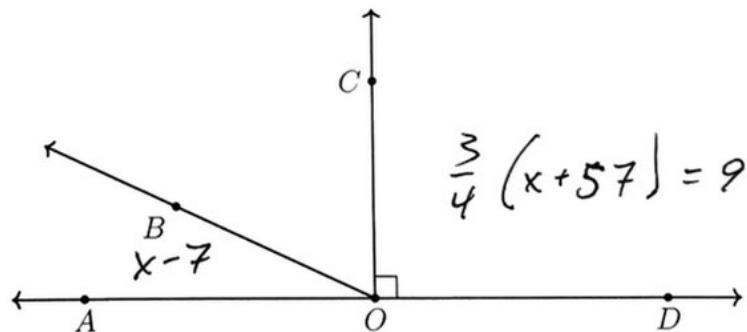$(7x - 50) + 90 + (4x - 3) = 180$

$11x = 143$

$x = 13$

$m\angle AOB = m\angle DOE = 4(13) - 3$
$= 49°$

$m\angle BOC = 7(13) - 50$
$= 41°$

$49 + 41 = 90 ✓$

12. In the diagram below $\angle AOB = x - 7$ and $\angle COD = \frac{3}{4}(x + 57)$. Find $\angle BOC$

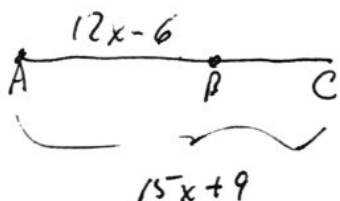$\frac{3}{4}(x + 57) = 90$

$x + 57 = \left(\frac{4}{3}\right) 90$

$x + 57 = 120$

$x = 63$

$m\angle AOB = 63 - 7 = 56$

$m\angle COB = 90 - 56$
$= 34°$

13. In the line segment $\overline{ABC}$, $\overline{AB}$ is twice as long as $\overline{BC}$. $AB = 12x - 6$ and $AC = 15x + 9$. Find BC.

$12x - 6$

A ———•——— C
    B

$15x + 9$

$AB = 2BC = 2(AC - AB)$

$12x - 6 = 2\left((15x + 9) - (12x - 6)\right)$

$12x - 6 = 2(3x + 15)$

$6x = 36$

$x = 6$

$AB = 12(6) - 6 = 66$
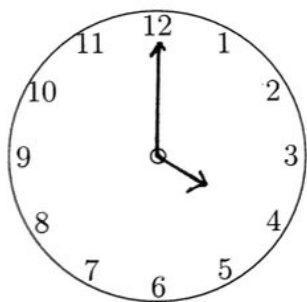
$BC = \frac{1}{2} \cdot 66 = 33$
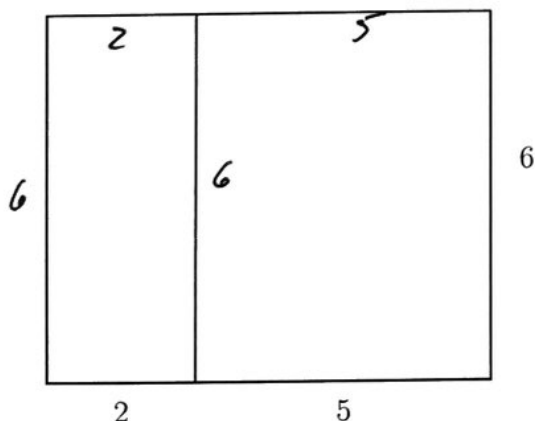
$AC = 15(6) + 9 = 99$ ✓

$66 + 33 = 99$ $BC = 33$

14. Mark the positions of the minute and hour hands at 4:00. Write down the measure in degrees of the angle made by the two clock hands.

$m\angle = \frac{1}{3}(360) = 120°$

15. A compound shape composed of two rectangles is shown with dimensions marked, both having heights of 6 cm and with base lengths of 2 cm and 5 cm respectively.

(a) Find the perimeter of the smaller rectangle on the left.

$P_s = 2(6) + 2(2)$

$= 16\ cm$

(b) Find the total area of the combined rectangles

$A_T = 6(2 + 5)$

$= 42\ cm^2$