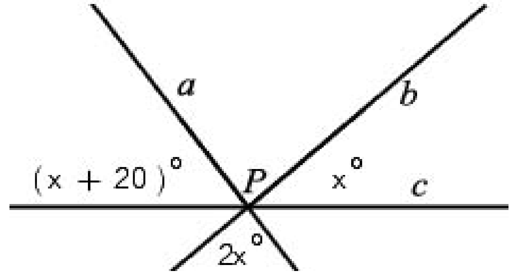
Math 5 – Chapter G Test SOLNS – Fall ’10

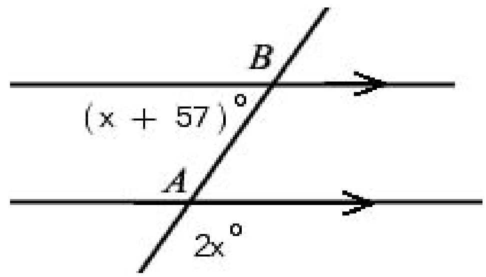
1. Given lines *a*, *b* and *c* intersecting at point *P* in the diagram to the right, what is the value of x?

   SOLN: Since vertical angles are equal and a straight angle is 180°, we have
   x + 20 + 2x + x = 180 so that
   4x = 160 and so x = 40.

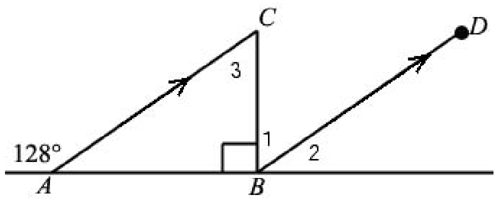


2. Given that AB is a transversal cutting parallels in the diagram at right, find the value of x. Explain your reasoning.

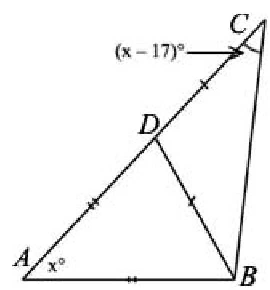
   SOLN: Either supplementary angle at *A* will have measure 180 – 2x and will either correspond to x + 57 or be an alt. int. angle to x + 57, so 180 – 2x = x + 57 so that 3x = 123 whence x = 41.



3. Given the transversal *AB* cutting parallel lines $AC \parallel BD$ in the diagram at right, explain how you deduce
   a. ∠2 SOLN: ∠CAB is supplementary to 128 and corresponds to ∠2 so ∠2 = 180 – 128 = 52°
   b. ∠1 SOLN: ∠1 is complementary to ∠2 so ∠1 = 90 – 52 = 38°
   c. ∠3 SOLN: is an alt. int angle to ∠1 when BC cuts $AC \parallel BD$ so ∠3 = 38°

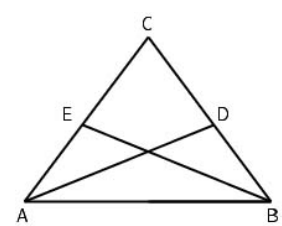


4. Find the value of x that will work in the figure at right. SOLN: Label the vertices (shown.) ΔABD is isosceles so ∠ADB = ∠ABD and since the sum of int ∠’s is 180°, x + 2∠ADB = 180 ↔ ∠ADB = 90 – x/2. ∠ADC is straight, so ∠BDC = 180 – ∠ADB = 90 + x/2 and since ΔABD is also isosceles, x – 17 = ½(180 – ∠BDC) = ½(90 – x/2) ↔ x – 17 = 45 – x/4 ↔ 5x/4 = 61 ↔ x = 244/5 = 48.8°



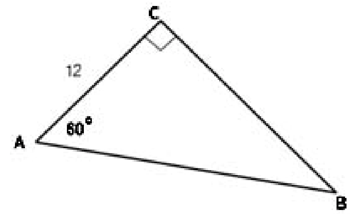
5. Given the figure at right with $AC = CB$ and $\angle DAB = \angle EBA$, prove that $AD = EB$. Use a two-column proof format.

Statement	Reason
1. $AC = CB$ & $\angle DAB = \angle EBA$,	Given
2. $\angle CAB = \angle CBA$,	since base ∠s of isos Δ =
3. $\angle CAD = \angle CAB - \angle DAB$ $\angle CBE = \angle CBA - \angle EBA$	subtraction postulate
4. $\angle CAD = \angle CBE$	by transitivity of =
5. ∠C = ∠C	by reflexive property of =
6. ΔCAD = ΔCBE	by ASA
7. BE = AD	by CPCTC

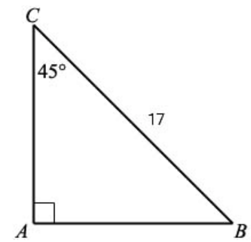


6. A 16-ft ladder is leaning against a wall which is perpendicular to the floor. If the ladder reaches 12 ft up the wall, how far away from the base of the wall is the foot of the ladder?
   SOLN: This is the short leg of a right triangle: $x = \sqrt{16^2 - 12^2} = \sqrt{112} = \sqrt{16 \cdot 7} = 4\sqrt{7}$ ft.

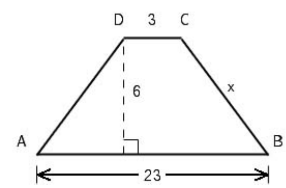
7. Find the lengths of AB and BC in the triangle at right.
   SOLN: The hypotenuse AB is twice the short leg, so AB = 24. Then by Pythagoras BC = sqrt($24^2 - 12^2$) = sqrt(12^2)(sqrt(2^2 – 1) = 12sqrt(3)



8. Consider this triangle at right:
   a. Find the perimeter of the triangle. SOLN: The legs are $\frac{17\sqrt{2}}{2}$ so the total perimeter is $17 + 17\sqrt{2} = 17\left(1+\sqrt{2}\right)$
   b. Find the area of the triangle. SOLN: ½ bh $= \frac{1}{2}\left(\frac{17\sqrt{2}}{2}\right)^2 = \frac{289}{4}$

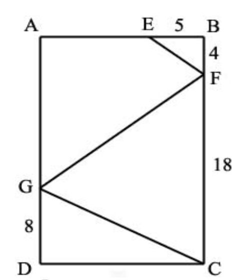


9. If *ABCD* (at right) is an isosceles trapezoid.
   a. Find the perimeter.
      SOLN: First find x by noting it's the hypotenuse of a right triangle with legs of 6 and 10: $x = \sqrt{6^2 + 10^2} = \sqrt{136} = 2\sqrt{34}$
      so the perimeter is 3+23+2x = 26 $+4\sqrt{34}$ units
   b. Find the area: ½ $(b_1 + b_2)h$ = ½ (26)(6) = 78 square units.



10. A sector in a circle of radius 10 has a central angle of 72°.
    a. Find the perimeter of the sector.
       SOLN: Perimeter = (72/360)($2\pi r$) + $2r$ = 4π + 20 units.
    b. Find the area of the sector.
       SOLN: Area = (72/360)(πr^2) = 20π square units

11. Given rectangle ABCD in the diagram at right, with ΔCFG containing area 135 square units, find the area of the quadrilateral AEFG.
    SOLN: The area of ΔCFG = ½(CD)18 = 135 means that CD = 15.
    Thus the area of AEFG = 15(22) – 10 – 60 – 135 = 125 sq. units



12. Find the area of the shaded region below. ABC is a right triangle. $\widehat{DE}$ is a semicircle of radius 8 in.
    SOLN: AC = $\sqrt{30^2 - 24^2} = \sqrt{324} = 18$ so the area of the shaded region is ½(18)(24) – ½π8^2 = 216 – 32π square inches.