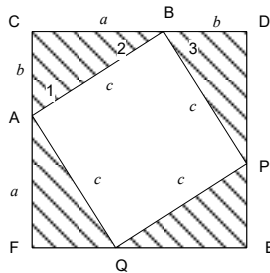


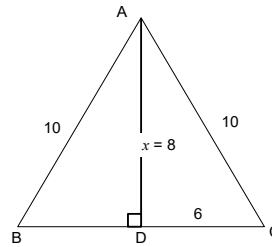
Answer Key

1. 30
2. $4 \times 30 = 120$
3. $12 + 5 = 17$
 $17^2 = 289$
 $289 - 120 = 169$
4. $5^2 + 12^2 = 169$
5. $X + Y = Z$
6. $169 = 13^2$
 $c = 13$
7. 84
8. $4 \times 84 = 326$
9. $7 + 24 = 31$
 $31^2 = 961$
 $961 - 326 = 625$
10. $7^2 + 24^2 = 625$
11. $X + Y = Z$
12. $625 = 25^2$
 $c = 25$

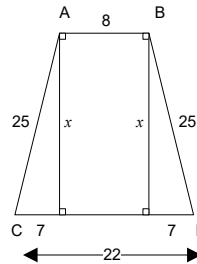


13. Construct a square CDEF with four congruent corner triangles as $\triangle ABC$.
The length of each side of CDEF is $a + b$. Note that $\angle 2 + \angle 3 = \angle 2 + \angle 1 = 90^\circ$
Therefore, $\angle ABP = 90^\circ$, same as $\angle BPQ = \angle PQA = \angle QAB$.
We conclude that ABPQ is also a square with each side c .
From one hand, the area of ABPQ is c^2 .
From the other, the area of ABPQ
= area(CDEF) - 4·area($\triangle ABC$)
= $(a + b)^2 - 4(\frac{1}{2}ab)$
= $a^2 + b^2$
Both quantities represent the area of square ABPQ, we have established
 $a^2 + b^2 = c^2$
14. $16 \div 2 = 8, x = \sqrt{10^2 - 8^2}$
15. $x = 20$
16. $x = 12$
17. $x = 9 \times 2 + 10 = 28$

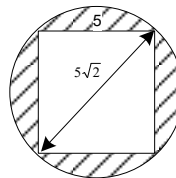
18. $x = 8$



19. First, you have to figure out one leg of the right triangle has a length of 7.
20. $25^2 = 7^2 + x^2$, so $x = 24$



21. The area of the trapezoid = $\frac{1}{2} \times 24 \times (8 + 22) = 360$
22. $2x^2 = 100$, so $x = 5\sqrt{2}$
23. The radius of the circle is $\frac{5\sqrt{2}}{2}$. The area of the circle is $\pi(\frac{5\sqrt{2}}{2})^2 = \frac{1}{2}25\pi$. Thus, the shaded area = $12.5\pi - 25$ (≈ 14.5 unit²).

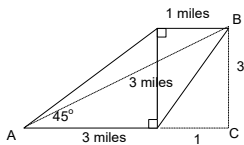


24. $11 - 5 = 6, x = \sqrt{6^2 + 8^2} = 10$
25. $x = 12$
26. $x = 17$
27. 10
28. $4\sqrt{2}$
29. $AB = \sqrt{2}, AC = \sqrt{3}, AD = 2, AE = \sqrt{5}$
30. The route of ADB is $3\sqrt{2} + 1$. The route of ACB is $3 + \sqrt{10}$. So, route ADB is the shortest route.

Geo⁺Alg (T1) Issue 1

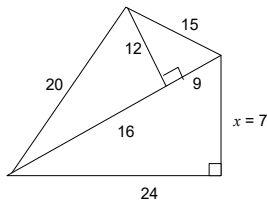
31. 5

$$AB^2 = AC^2 + BC^2 = 25 \Rightarrow AB = 5$$



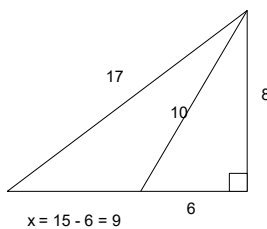
32. 7

See the following diagram.



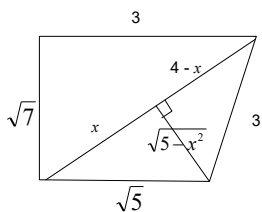
33. 9

See the diagram below.



34. 1.5

See the following diagram and solution.



We have $(\sqrt{5-x^2})^2 + (4-x)^2 = 3^2$

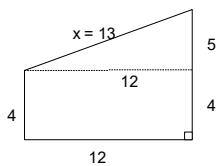
$$5 - x^2 + x^2 - 8x + 16 = 9$$

$$12 = 8x$$

$x = 1.5$

35. 13

See the following diagram.



36. C

Note that

$$x = \frac{\pi}{8}AC^2$$

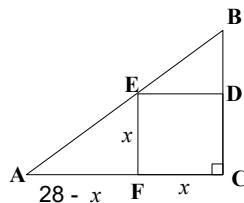
$$y = \frac{\pi}{2} \text{BC}^2$$

$$z = \frac{\pi}{8}AB^2$$

Thus, we have

$$x + y = \frac{\pi}{8} (AC^2 + BC^2) = \frac{\pi}{8} AB^2 = z.$$

37. As the following diagram,



we have $\Delta AFE \sim \Delta ACB$, thus,

$$\frac{x}{28-x} = \frac{3}{4}$$

$$4x = 3(28 - x)$$

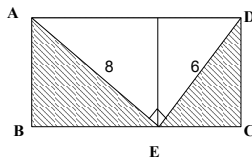
$$4x = 84 - 3x$$

$$x = 12$$

The area of the square is 144.

38. 48

Since the shaded parts can form a triangle identical to $\triangle ADE$, and both make a rectangle with 6 and 8 as the length and the width, thus the area of the rectangle is $8 \times 6 = 48$

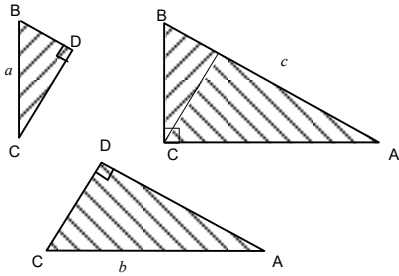


39. 2 (in)

The diameter is 6 in, the longest part of the straw which will be submerged in the container is 10 in, thus the shortest length staying outside the container is $12 - 10 = 2$ in.

40. Since $(a^2 + b^2)^2 = (a^2 - b^2)^2 + (2ab)^2$, the triangle must be a right triangle.

Geo+Alg (T1) Issue 1



41.

i) Obvious

ii) $\text{area}(\triangle CBD) : \text{area}(\triangle ACD) : \text{area}(\triangle ABC)$
 $= a^2 : b^2 : c^2$ (area ratio is side ratio squared)
 $\text{area}(\triangle CBD) + \text{area}(\triangle ACD) = \text{area}(\triangle ABC)$
 Thus, $a^2 + b^2 = c^2$

42. The choices (B) and (D) are correct.

43. $\frac{3}{4}$

44. $-\frac{3}{4}$

45. $Y = (0, 3)$
 $MP = PY = 6$

46. $X = (0, 12)$
 $AM = MX = 3$

47. $MY = 12$

48. $AX = 6$

49. $\frac{3}{2}$
 slope of $MN = 2 \times \frac{3}{4} = \frac{3}{2}$

50. 8

$$\frac{3}{2} = \frac{MY}{NY} = \frac{12}{x}$$

$x = 8$, thus $NY = 8$.

51. 16

$NO = 2NY = 16$

52. $N = (-8, 3)$

53. $(-4, 12)$

The length of $BX = 4$. (Why?) So, $B = (-4, 12)$

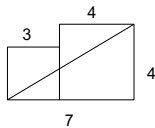
54. $y = \frac{3}{4}x + 9$

Since its slope $= \frac{3}{4}$ and it passes through $(0, 9)$, we may use the slope-intercept form

$$y = mx + b$$

$$b = 9$$

55. $y = -\frac{3}{4}x + 9$



71.

56. $y = \frac{3}{2}x + 15$

Its slope $= \frac{3}{2}$ and its y -intercept is 15.

57. 15

58. 5

Since the coordinates of N is $(-8, 3)$, the distance $= 5$.

59. $\sqrt{97}$

Since the coordinates of B is $(-4, 12)$, the distance is $\sqrt{4^2 + 9^2} = \sqrt{97}$.

60. $y = -\frac{9}{4}x + 21$

$C = (4, 12)$, $O = (8, 3)$, the slope $= -\frac{9}{4}$, so the linear equation is $y = -\frac{9}{4}x + 21$.

61. $y = 12$

62. $y = -\frac{3}{4}x + 9$

$B = (-4, 12)$, $O = (8, 3)$, slope $= -\frac{3}{4}$, so the equation is $y = -\frac{3}{4}x + 9$.

63. 15

$C = (4, 12)$, $N = (-8, 3)$, so the distance $= 15$.

64. 18

The shaded area $= 6$, so the unshaded area $= 18$.

65. 48

Since $PY = 6$, $PZ = 9$, $QZ = 12$, so $YT = 8$ (similar triangle). Thus, the area of $\triangle PTY = 24$. The shaded area, two times of $\triangle PTY$, is 48.

66. 4:5

67. 174

The overlapping parts have an area of $6 + 48 = 54$.

The areas of the three triangles are 24, 96, and 108.

So, the entire polygon has an area of $228 - 54 = 174$.

68. 25

$BC = 10$, the area of the square is $10^2 = 100$, thus the area of the shaded triangle is $\frac{1}{4}(100) = 25$

69. D

Since x can be the hypotenuse or just one leg.

70. $\sqrt{65}$

$$7^2 + 4^2 = 65$$