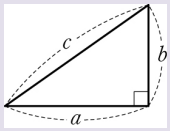
계산시 참고사항

1. 피타고라스의 정리

직각삼각형에서 직각을 끼고 있는 두 변의 길이를 각각 a, b라 하고, 빗변의 길이를 c라 하면 $a^2+b^2=c^2$



2. 직각삼각형의 변의 길이

직각삼각형에서 직각을 끼고 있는 두 변의 길이를 각각 a, b라 하고, 빗변의 길이를 c라 하면

(1) a, b의 길이가 주어졌을 때, $c=\sqrt{a^2+b^2}$

(2) a, c의 길이가 주어졌을 때, $b=\sqrt{c^2-a^2}$

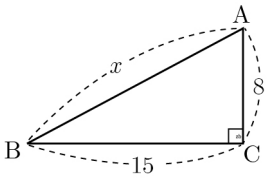
(3) b, c의 길이가 주어졌을 때, $a=\sqrt{c^2-b^2}$

참고
◉ 직각삼각형에서는 두 변의 길이를 알면 한 변의 길이를 구할 수 있다

직각삼각형의 변의 길이

◪ 다음 그림의 직각삼각형 ABC에서 x의 값을 구하여라.

1.



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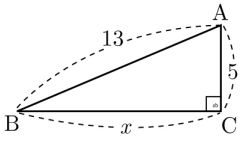

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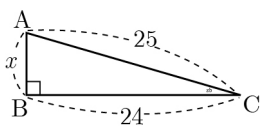

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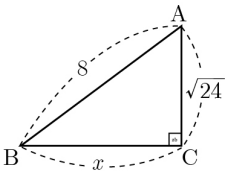

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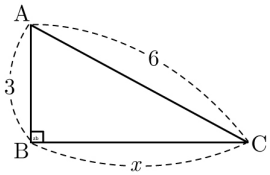

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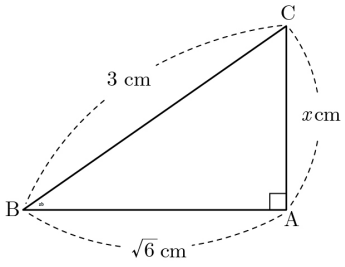

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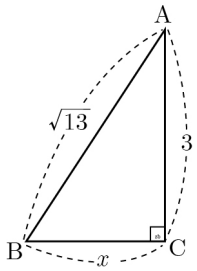

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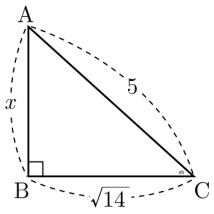

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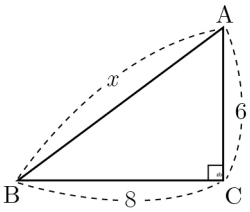

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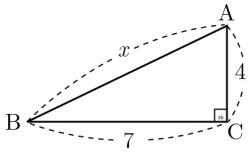

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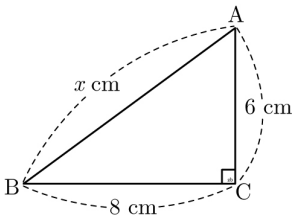

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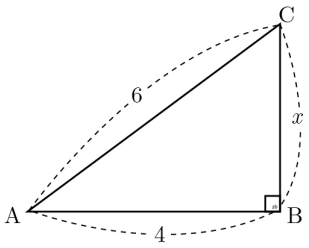

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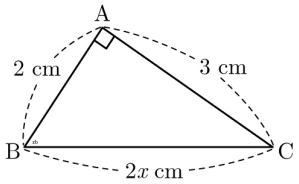

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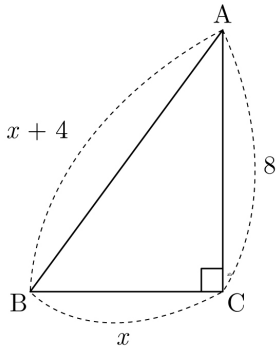

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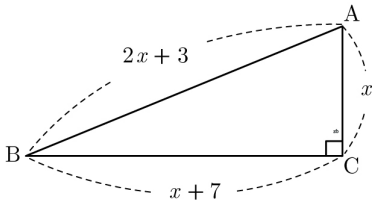

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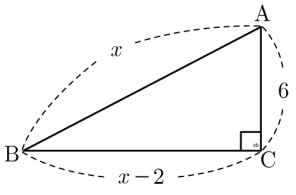

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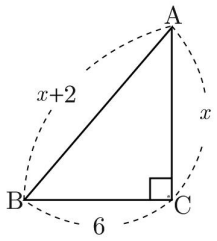

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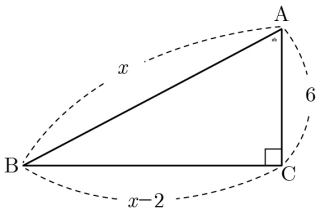

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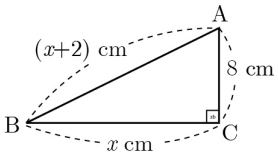

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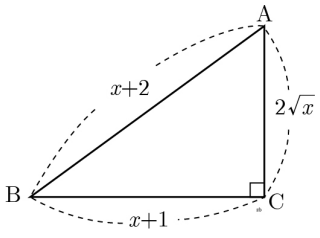

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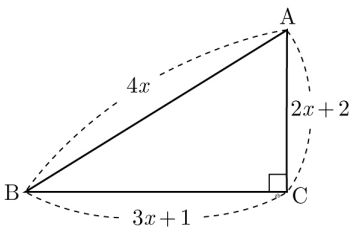
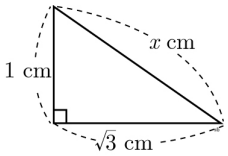


◪ 다음 직각삼각형에서 x의 값을 구하여라.

22.



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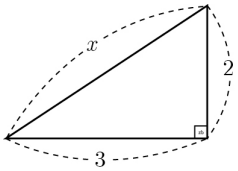

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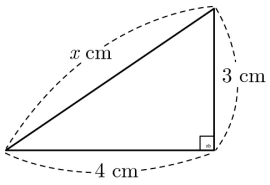

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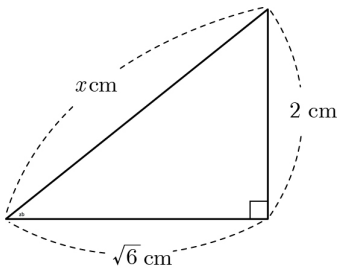

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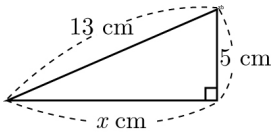

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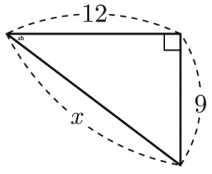

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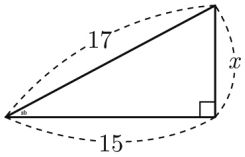

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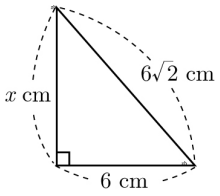

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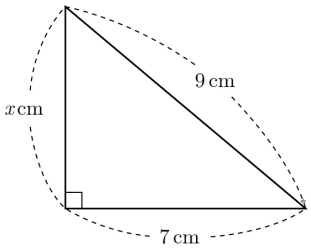

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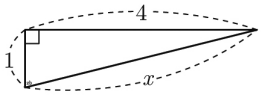

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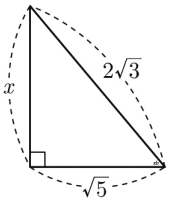

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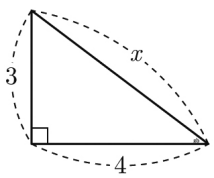

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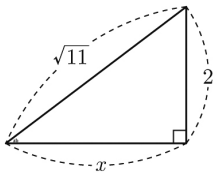

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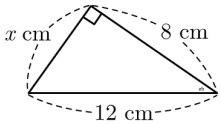

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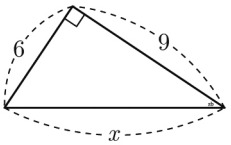

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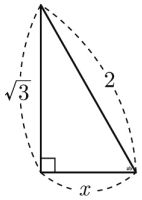

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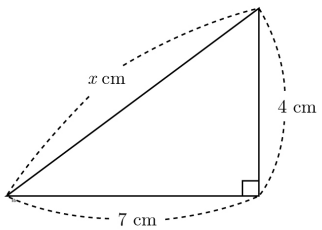

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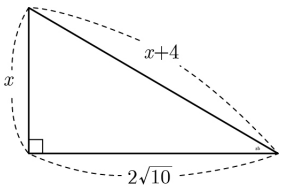
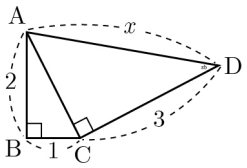


2개 이상의 직각삼각형의 변의 길이

◪ 다음 그림에서 x의 값을 구하여라.

40.



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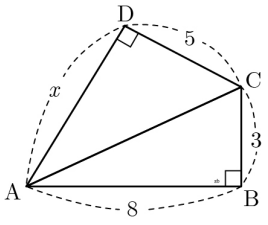

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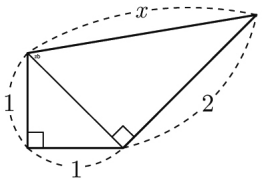

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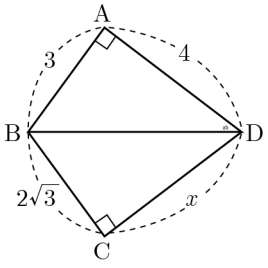

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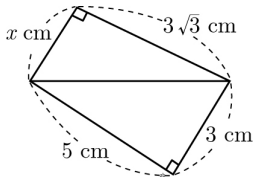

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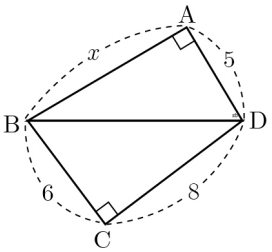

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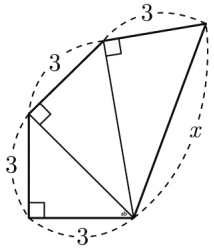

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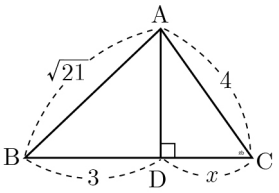

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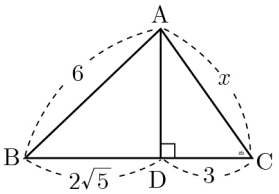

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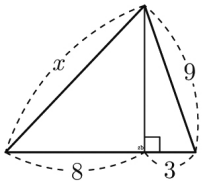

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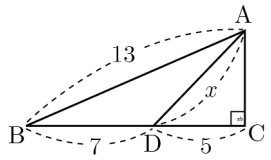

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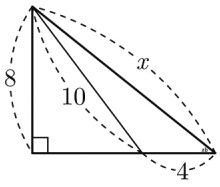

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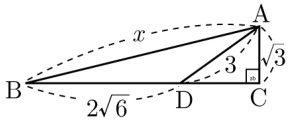
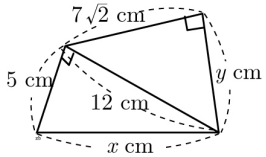


◪ 다음 그림에서 x, y의 값을 각각 구하여라.

53.



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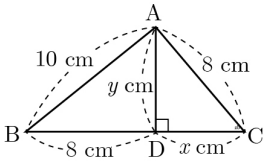

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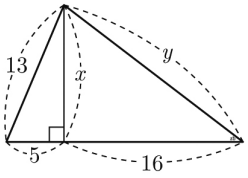

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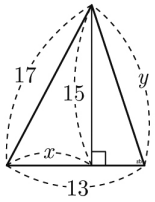

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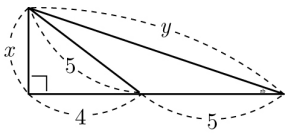

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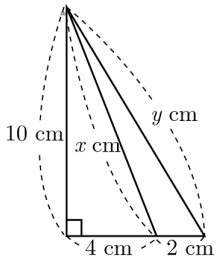

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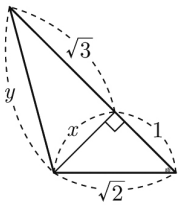

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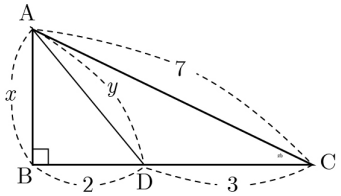

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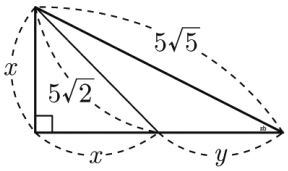

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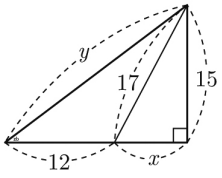

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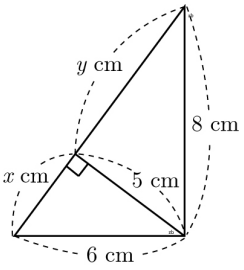

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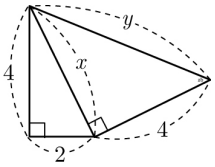

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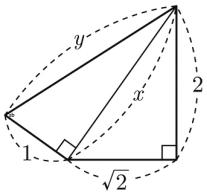

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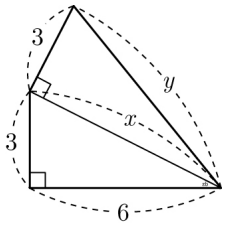

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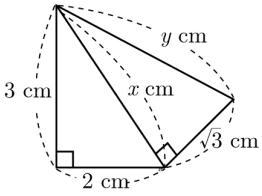

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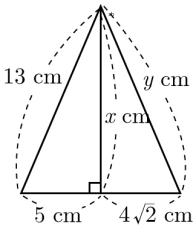


정답 및 해설

1) 17

⇨ $x=\sqrt{8^2+15^2}=\sqrt{289}=17$

2) 12

⇨ $x=\sqrt{13^2-5^2}=\sqrt{144}=12$

3) 7

⇨ $x=\sqrt{25^2-24^2}=\sqrt{49}=7$

4) $2\sqrt{10}$

⇨ 직각삼각형 ABC에서 $x=\sqrt{8^2-(\sqrt{24})^2}=2\sqrt{10}$

5) $3\sqrt{3}$

⇨ $x=\sqrt{6^2-3^2}=3\sqrt{3}$

6) $\sqrt{3}$

⇨ 직각삼각형 ABC에서 $x=\sqrt{3^2-(\sqrt{6})^2}=\sqrt{3}$

7) 2

⇨ $x=\sqrt{(\sqrt{13})^2-3^2}=\sqrt{4}=2$

8) $\sqrt{11}$

⇨ $x=\sqrt{5^2-(\sqrt{14})^2}=\sqrt{11}$

9) 10

⇨ $x=\sqrt{8^2+6^2}=\sqrt{100}=10$

10) $\sqrt{65}$

⇨ 직각삼각형 ABC에서 $x=\sqrt{7^2+4^2}=\sqrt{65}$

11) 10

⇨ $x=\sqrt{6^2+8^2}=10$

12) $2\sqrt{5}$

⇨ $x=\sqrt{6^2-4^2}=2\sqrt{5}$

13) $\frac{\sqrt{13}}{2}$

⇨ $(2x)^2=2^2+3^2$

$4x^2=13 \quad \therefore x=\frac{\sqrt{13}}{2}$

14) 6

⇨ $(x+4)^2=x^2+8^2$

$8x=48 \quad \therefore x=6$

15) 5

⇨ $(2x+3)^2=x^2+(x+7)^2,\ 4x^2+12x+9=x^2+x^2+14x+49$

$2x^2-2x-40=0,\ x^2-x-20=0,\ (x-5)(x+4)=0$

$x>0$이므로 $x=5$가 된다.

16) 10

⇨ $x^2=(x-2)^2+6^2$

$4x=40 \quad \therefore x=10$

17) 8

⇨ $(x+2)^2=x^2+6^2$, $4x=32$

$\therefore x=8$

18) 10

19) 15

⇨ 직각삼각형 ABC에서

$x^2+8^2=(x+2)^2,\ 4x=60 \quad \therefore x=15$

20) $\frac{3}{2}$

⇨ 직각삼각형 ABC에서

$(x+2)^2=(x+1)^2+(2\sqrt{x})^2$

$x^2+4x+4=x^2+2x+1+4x$

$2x=3 \quad \therefore x=\frac{3}{2}$

21) 5

22) 2

⇨ $x^2=1^2+(\sqrt{3})^2=4 \quad \therefore x=2$

23) $\sqrt{13}$

⇨ 피타고라스 정리에 의해 $x=\sqrt{3^2+2^2}=\sqrt{13}$

24) 5

⇨ 피타고라스 정리에 의해 $x=\sqrt{4^2+3^2}=5$

25) $\sqrt{10}$

⇨ 직각삼각형에서 $x^2=(\sqrt{6})^2+2^2$

$x^2=10 \quad \therefore x=\sqrt{10}$

26) 12

⇨ $13^2=x^2+5^2,\ x^2=144 \quad \therefore x=12$

27) 15

⇨ $12^2+9^2=x^2 \quad \therefore x=15(x>0)$

28) 8

⇨ $15^2+x^2=17^2 \quad \therefore x=8(x>0)$

29) 6

⇨ $(6\sqrt{2})^2=x^2+6^2,\ x^2=36 \quad \therefore x=6$

30) $4\sqrt{2}$

⇨ 직각삼각형에서 피타고라스 정리에 의해
$x=\sqrt{9^2-7^2}=4\sqrt{2}$

31) $\sqrt{17}$
⇨ $1^2+4^2=x^2 \therefore x=\sqrt{17}\,(x>0)$

32) $\sqrt{7}$
⇨ $x^2+(\sqrt{5})^2=(2\sqrt{3})^2 \therefore x=\sqrt{7}\,(x>0)$

33) 5
⇨ 피타고라스의 정리에 의하여
$3^2+4^2=x^2 \quad \therefore\ x=5\ (x>0)$

34) $\sqrt{7}$
⇨ $x^2+2^2=(\sqrt{11})^2 \quad \therefore\ x=\sqrt{7}\,(x>0)$

35) $4\sqrt{5}$
⇨ $x=\sqrt{12^2-8^2}=4\sqrt{5}$

36) $3\sqrt{13}$
⇨ $6^2+9^2=x^2 \quad \therefore\ x=3\sqrt{13}\,(x>0)$

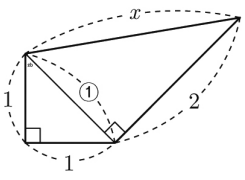
37) 1
⇨ $(\sqrt{3})^2+x^2=2^2 \quad \therefore\ x=1\,(x>0)$

38) $\sqrt{65}$
⇨ $x=\sqrt{7^2+4^2}=\sqrt{49+16}=\sqrt{65}$

39) 3
⇨ $x^2+(2\sqrt{10})^2=(x+4)^2$
$8x+16=40,\ 8x=24 \quad \therefore\ x=3$

40) $\sqrt{14}$
⇨ △ABC에서 $\overline{AC}=\sqrt{1^2+2^2}=\sqrt{5}$
△ACD에서 $x=\sqrt{3^2+(\sqrt{5})^2}=\sqrt{14}$

41) $4\sqrt{3}$
⇨ $\overline{AC}=\sqrt{x^2+5^2}=\sqrt{8^2+3^2}$
$x^2+25=73,\ x^2=48 \quad \therefore\ x=4\sqrt{3}$

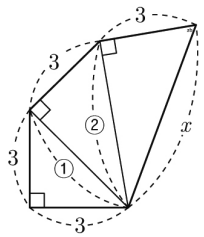
42) $\sqrt{6}$
⇨ 

①$=\sqrt{1^2+1^2}=\sqrt{2} \quad \therefore\ x=\sqrt{(\sqrt{2})^2+2^2}=\sqrt{6}$

43) $\sqrt{13}$
⇨ △ABD에서 $\overline{BD}=\sqrt{3^2+4^2}=\sqrt{25}=5$
△BCD에서 $x=\sqrt{5^2-(2\sqrt{3})^2}=\sqrt{13}$

44) $x=\sqrt{7}$
⇨ $x^2+(3\sqrt{3})^2=5^2+3^2,\ x^2=7 \quad \therefore x=\sqrt{7}$

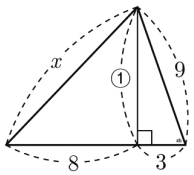
45) $5\sqrt{3}$
⇨ △BCD에서 $\overline{BD}=\sqrt{6^2+8^2}=\sqrt{100}=10$
△ABD에서 $x=\sqrt{10^2-5^2}=\sqrt{75}=5\sqrt{3}$

46) 6
⇨ 

①$=\sqrt{3^2+3^2}=3\sqrt{2} \quad$ ②$=\sqrt{(3\sqrt{2})^2+3^2}=3\sqrt{3}$
$\therefore x=\sqrt{(3\sqrt{3})^2+3^2}=6$

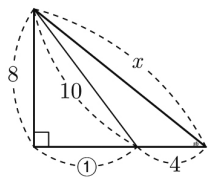
47) 2
⇨ △ABD에서 $\overline{AD}=\sqrt{(\sqrt{21})^2-3^2}=\sqrt{12}=2\sqrt{3}$
△ACD에서 $x=\sqrt{4^2-(2\sqrt{3})^2}=\sqrt{4}=2$

48) 5
⇨ △ABD에서 $\overline{AD}=\sqrt{6^2-(2\sqrt{5})^2}=\sqrt{16}=4$
△ACD에서 $x=\sqrt{3^2+4^2}=\sqrt{25}=5$

49) $2\sqrt{34}$
⇨ 

①$=\sqrt{9^2-3^2}=6\sqrt{2}$
$\therefore\ x=\sqrt{(6\sqrt{2})^2+8^2}=2\sqrt{34}$

50) $5\sqrt{2}$
⇨ $\overline{BC}=7+5=12$이므로
△ABC에서 $\overline{AC}=\sqrt{13^2-12^2}=\sqrt{25}=5$
△ACD에서 $x=\sqrt{5^2+5^2}=\sqrt{50}=5\sqrt{2}$

51) $2\sqrt{41}$
⇨ 

$①=\sqrt{10^2-8^2}=6 \quad \therefore \ x=\sqrt{(6+4)^2+8^2}=2\sqrt{41}$

52) $\sqrt{57}$

⇨ △ACD에서 $\overline{CD}=\sqrt{3^2-(\sqrt{3})^2}=\sqrt{6}$

$\overline{BC}=2\sqrt{6}+\sqrt{6}=3\sqrt{6}$이므로

△ABC에서 $x=\sqrt{(3\sqrt{6})^2+(\sqrt{3})^2}=\sqrt{57}$

53) $x=13,\ y=\sqrt{46}$

⇨ $x=\sqrt{5^2+12^2}=13,\ y=\sqrt{12^2-(7\sqrt{2})^2}=\sqrt{46}$

54) $x=2\sqrt{7},\ y=6$

⇨ △ADB에서 $y=\sqrt{10^2-8^2}=6$

△ADC에서 $x=\sqrt{8^2-6^2}=2\sqrt{7}$

55) $x=12,\ y=20$

⇨ $x=\sqrt{13^2-5^2}=\sqrt{144}=12$

$y=\sqrt{12^2+16^2}=\sqrt{400}=20$

56) $x=8,\ y=5\sqrt{10}$

⇨ $x=\sqrt{17^2-15^2}=\sqrt{64}=8$

$y=\sqrt{(13-8)^2+15^2}=\sqrt{250}=5\sqrt{10}$

57) $x=3,\ y=3\sqrt{10}$

⇨ $x=\sqrt{5^2-4^2}=\sqrt{9}=3$

$y=\sqrt{(4+5)^2+3^2}=3\sqrt{10}$

58) $x=2\sqrt{29},\ y=2\sqrt{34}$

⇨ $x=\sqrt{10^2+4^2}=2\sqrt{29},\ y=\sqrt{10^2+(4+2)^2}=2\sqrt{34}$

59) $x=1,\ y=2$

⇨ $x=\sqrt{(\sqrt{2})^2-1^2}=1$

$y=\sqrt{(\sqrt{3})^2+1^2}=\sqrt{4}=2$

60) $x=2\sqrt{6},\ y=2\sqrt{7}$

⇨ 직각삼각형 ABC에서 $x=\sqrt{7^2-5^2}=2\sqrt{6}$

직각삼각형 ABD에서 $y=\sqrt{2^2+(2\sqrt{6})^2}=2\sqrt{7}$

61) $x=5,\ y=5$

⇨ $x^2+x^2=(5\sqrt{2})^2,\ x^2=25 \quad \therefore \ x=5(x>0)$

$(5+y)^2+5^2=(5\sqrt{5})^2,(5+y)^2=100,$

$5+y=10 \quad \therefore \ y=5 \ (y>0)$

62) $x=8,\ y=25$

⇨ $x=\sqrt{17^2-15^2}=\sqrt{64}=8$

$y=\sqrt{(12+8)^2+15^2}=\sqrt{625}=25$

63) $x=\sqrt{11},\ y=\sqrt{39}$

⇨ $x=\sqrt{6^2-5^2}=\sqrt{11},\ y=\sqrt{8^2-5^2}=\sqrt{39}$

64) $x=2\sqrt{5},\ y=6$

⇨ $x=\sqrt{2^2+4^2}=\sqrt{20}=2\sqrt{5}$

$y=\sqrt{4^2+(2\sqrt{5})^2}=\sqrt{36}=6$

65) $x=\sqrt{6},\ y=\sqrt{7}$

⇨ $x=\sqrt{(\sqrt{2})^2+2^2}=\sqrt{6}$

$y=\sqrt{1^2+(\sqrt{6})^2}=\sqrt{7}$

66) $x=3\sqrt{5},\ y=3\sqrt{6}$

⇨ $x=\sqrt{6^2+3^2}=\sqrt{45}=3\sqrt{5}$

$y=\sqrt{(3\sqrt{5})^2+3^2}=\sqrt{54}=3\sqrt{6}$

67) $x=\sqrt{13},\ y=4$

⇨ $x=\sqrt{3^2+2^2}=\sqrt{13},\ y=\sqrt{(\sqrt{13})^2+(\sqrt{3})^2}=4$

68) $x=12,\ y=4\sqrt{11}$

⇨ $x=\sqrt{13^2-5^2}=12,\ y=\sqrt{12^2+(4\sqrt{2})^2}=4\sqrt{11}$