

Angeles City Science High School

Mathematics 9

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Section: 9 - Adenine

What's More

1. Let;

$x = \text{Altitude}$
 $x+3 = \text{Base}$

$A = \frac{1}{2}bh$

$35 = \frac{(x+3)(x)}{2}$

$(35 = \frac{x^2+3x}{2}) \cdot 2$

$70 = x^2+3x$

$x^2+3x-70=0$

$(x+10)(x-7)=0$

$x+10=0 \quad | \quad x-7=0$
 $x=-10 \quad | \quad \boxed{x=7}$

$7+3=10$

Checking:

$A = \frac{1}{2}bh$

$35 = \frac{10(7)}{2}$

$35 = \frac{70}{2}$

$35 = 35$
✓

The altitude is 7m.

2. Let:

x = shortest side

$x+7$ = other side

$$A^2 + B^2 = C^2$$

$$(x)^2 + (x+7)^2 = (13)^2$$

$$x^2 + x^2 + 14x + 49 = 169$$

$$2x^2 + 14x + 49 - 169 = 0$$

$$\frac{2x^2 + 14x - 120}{2} = 0$$

$$x^2 + 7x - 60 = 0$$

$$(x+12)(x-5) = 0$$

$$x+12=0 \quad | \quad x-5=0$$

$$x=-12 \quad | \quad \boxed{x=5} \rightarrow \text{shortest side}$$

$$5+7 = \boxed{12} \rightarrow \text{other side}$$

Checking:

$$A^2 + B^2 = C^2$$

$$(5)^2 + (12)^2 = (13)^2$$

$$25 + 144 = 169$$

$$169 = 169$$

✓

The length of the shortest side is 5m.

3. Let:

$x = \text{number}$

$$5\sqrt{x-1} = x+3$$

$$(5\sqrt{x-1})^2 = (x+3)^2$$

$$25(x-1) = x^2 + 6x + 9$$

$$25x - 25 = x^2 + 6x + 9$$

↘

$$x^2 + 6x + 9 + 25 - 25x = 0$$

$$x^2 - 19x + 34 = 0$$

$$(x-17)(x-2) = 0$$

$$x-17=0 \quad | \quad x-2=0$$

$$\boxed{x=17} \quad | \quad \boxed{x=2}$$

Checking:

$$x=17$$

$$5\sqrt{17-1} = x+3$$

$$5\sqrt{16} = 17+3$$

$$5(4) = 20$$

$$20 = 20$$

✓

$$x=2$$

$$5\sqrt{2-1} = 2+3$$

$$5\sqrt{1} = 5$$

$$5(1) = 5$$

$$5 = 5$$

✓

The number is either 17 or 2.

4. Let:

$$x = \text{width}$$

$$2x - 1 = \text{length}$$

$$A = LW$$

$$28 = (2x - 1)(x)$$

$$28 = 2x^2 - x$$



$$2x^2 - x - 28 = 0$$

$$(2x - 8)(x + 7) = 0$$

$$2x - 8 = 0 \quad | \quad x + 7 = 0$$

$$\frac{2x = 8}{2}$$

$$\frac{2x = -7}{2}$$

$$\boxed{x = 4}$$

$$x = \frac{-7}{2}$$

$$\text{width} = 4$$

$$\text{length} = 2(4) - 1$$

$$= 8 - 1$$

$$= 7$$

Checking:

$$A = LW$$

$$28 = (2(4) - 1)(4)$$

$$28 = (7)(4)$$

$$\cancel{28 = 28} \quad 28 = 28$$

✓

The dimensions of the photograph are 4m by 7m.

5.

Let:

$$x = \text{width}$$

$$x + 4 = \text{length}$$

$$A = LW$$

$$45 = (x + 4)(x)$$

$$45 = x^2 + 4x$$

$$x^2 + 4x - 45$$

$$(x + 9)(x - 5)$$

$$x + 9 = 0 \quad | \quad x - 5 = 0$$

$$x = -9 \quad | \quad \boxed{x = 5}$$

$$\text{width} = 5$$

$$\begin{aligned} \text{length} &= 5 + 4 \\ &= 9 \end{aligned}$$

checking:

$$A = LW$$

$$45 = (5 + 4)(5)$$

$$45 = 9(5)$$

$$45 = 45$$

✓

the length is 9m
and the width is 5m.

Assessment

1. Let:

x = number

$$(2\sqrt{x})^2 = (14)^2$$

$$4x = 196$$

$$\boxed{x = 49}$$

The number is 49.

2. Let:

x = 1st consecutive

$x+2$ = 2nd consecutive

$$\sqrt{x+x+2} = 6\sqrt{2}$$

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

$$2x+2 = 36(2)$$

$$2x+2 = 72$$

$$2x = 72 - 2$$

$$\frac{2x = 70}{2}$$

$$\boxed{x = 35} \rightarrow \text{1st consecutive}$$

$$x+2 = \text{2nd consecutive}$$

$$\boxed{35+2 = 37} \rightarrow \text{2nd consecutive}$$

The larger integer is 37.

3. Let:

$$x = \text{length}$$

$$A = LW$$

$$20 = x(2\sqrt{2})$$

$$(20)^2 = (x(2\sqrt{2}))^2$$

$$400 = (2x\sqrt{2})^2$$

$$400 = 4x^2(2)$$

$$400 = 8x^2$$

$$x^2 = 50$$

$$x = 5\sqrt{2}$$

The tarpaulin
is $5\sqrt{2}$ meters long.

$$4. A^2 + B^2 = C^2$$

$$(13)^2 + (8)^2 = C^2$$

$$169 + 64 = C^2$$

$$233 = C^2$$

$$C = \sqrt{233}$$

Peter will travel
 $\sqrt{233}$ m

$$5. A^2 + B^2 = C^2$$

$$(5)^2 + (9)^2 = C^2$$

$$25 + 81 = C^2$$

$$106 = C^2$$

$$C = \sqrt{106}$$

She is $\sqrt{106}$ km
far from her house